

26/1/73

AUSTRALIAN FOSSIL DECAPOD CRUSTACEA:  
FAUNAL AND ENVIRONMENTAL CHANGES

by

R. J. F. Jenkins

Department of Geology and Mineralogy

University of Adelaide

Volume 1

April, 1972

Frontispiece

Upper: A male specimen of the extant Ommatocarcinus macquillivrayi White, 1852, from near Sydney, New South Wales.

Lower: The probable ancestor of Ommatocarcinus macquillivrayi, the fossil species Ommatocarcinus corioensis (Creswell, 1886) from the approximately Middle Miocene Port Campbell Limestone at Gravel Point, southeast of Port Campbell, Victoria. Specimen collected by Dr. G. Baker, 1965.

26/1/73

Volume II

Atlas of Tables, Figures and Plates

Tables

2-9

1

pocket at back of Vol.II

Figures

1-13, 15-18, 20-63

after Table 9

14, 19

pocket at back of Vol.II

Plates

1-23

after Figure 63

Table 2

Classification of fossil decapod species known from the Cretaceous of Australia; their distribution and the world distribution of the genera to which they belong. Distribution of genera after Glaessner (1969).

*Reptantia* (Natantian) decapods

Infraorder ASTACIDEA Latreille

Family Erymidae Van Straelen

Subfamily Eryminae Van Straelen

Enoploclytia McCoy, 1849

L. Cretaceous (upper Albian) - U. Cretaceous, ? Paleocene: Europe, West Africa, Madagascar, North America; L. Cretaceous (Aptian): eastern Australia.

Enoploclytia tenuidigitata Woods, 1957

L. Cretaceous (Aptian). North Queensland.

Enoploclytia sp. Woods, 1957

L. Cretaceous (Aptian). North Queensland.

Palaeastacus Bell, 1850

? U. Jurassic - U. Cretaceous (Cenomanian): Europe; L. Cretaceous (Albian) - U. Cretaceous: North America; L. Cretaceous (Albian): eastern Australia.

Table 2 (cont'd)

Palaeastacus terrareginae (Etheridge, 1914)

L. Cretaceous (Albian). North Queensland.

Family Nephropidae Dana

Subfamily Nephropinae Dana

Hoploparia McCoy, 1849

L. Cretaceous - L. Tertiary: cosmopolitan. (Glaessner, 1969).

Hoploparia mesembria Etheridge Jr., 1917

L. Cretaceous (Albian). Central Queensland.

? Subfamily Neophoberinae Glaessner

Tillocheles Woods, 1957

L. Cretaceous (Albian): eastern Australia.

Tillocheles shannonae Woods, 1957

L. Cretaceous (Albian). Central Queensland.

Infraorder PALINURA Latreille

Superfamily Glypheoidea Winckler

Family Glypheidae Winckler

Glyphea von Meyer, 1835

? U. Triassic, Jurassic-Cretaceous: Europe, Greenland, North America, East Africa, Australia. (Glaessner, 1969).



Table 2 (cont'd)

Glyphea arborinsularis Etheridge Jr., 1917

L. Cretaceous (Aptian). Maryborough Formation, Southeastern Queensland. North Central Queensland.

Glyphea oculata Woods, 1957

L. Cretaceous (Albian). Central Queensland.

Superfamily Palinuroidea Latreille

Family Palinuridae Latreille

Astacodes Bell, 1863

U. Jurassic, L. Cretaceous: Europe; L. Cretaceous: ?? eastern Australia; U. Cretaceous (Turonian-Santonian): Texas.

(??) Astacodes sp. Woods, 1957

L. Cretaceous (Albian). Central Queensland.

Infraorder BRACHYURA Latreille

Section Dromiacea de Haan

Superfamily Homoloidea White

Family Homolidae White

Homolopsis Bell, 1863

Cretaceous-Tertiary (Albian-Senonian-Danian): Europe; L. Cretaceous (Albian): northeastern Australia; U. Cretaceous: western Canada, South Dakota, New Jersey.

Table 2 (cont'd)

Homolopsis etheridgei (Woodward, 1892)

L. Cretaceous (Albian). Central Queensland.

Section Oxystomata H. Milne-Edwards  
Superfamily Dorippoidea de Haan  
? Family Cynomidae Ihle

Doratiopus Woods, 1953

Cretaceous (Albian-Cenomanian): northeastern and northern Australia.

Doratiopus salebrosus Woods, 1953

L. Cretaceous (Albian). Central Queensland.

Torynomma Woods, 1953

Cretaceous (Albian-lower Turonian): northeastern and northern  
Australia.

Torynomma quadrata Woods, 1953

L. Cretaceous (Albian). Central Queensland.

Table 3

Percentage composition of Oligocene faunule  
from the Mount Gambier area

Species	Percentage of faunule which each species constitutes
<u>Paqurus gambierensis</u> sp. nov.	.7
<u>Trizopagurus</u> sp. indet.	.7
<u>Munida monowalana</u> sp. nov.	4.5
<u>Munida spriggi</u> sp. nov.	1
<u>Dynomene ovata</u> sp. nov.	2
<u>Paromola pritchardi</u> sp. nov.	6
<u>Ebalia (Ebalia) spanioz</u> sp. nov.	.3
<u>Lyreidus tridentatus</u> de Haan	.3
<u>Leptomithrax martensis</u> sp. nov.	4
<u>Tutankhamen hieracodes</u> sp. nov.	4
<u>Ovalipes primitivus</u> sp. nov.	3
<u>Nectocarcinus caffercoensis</u> sp. nov.	10.5
<u>Pseudocarcinus parvus</u> sp. nov.	24
<u>Carcinoplax praevictoriensis</u> sp. nov.	4
<u>Carcinoplax woodsi</u> sp. nov.	35

Table 4

Classification of fossil decapod species comprising the Oligocene faunule from Mount Gambier; the world distribution of the genera to which the species belong and the modern forms which they resemble.

Fossil species: classification and distribution of genera

Modern forms which the fossil species most closely resemble

Family PAGURIDAE Latreille

Paqurus Fabricius, 1775

L. Cretaceous; Texas; Paleocene: Alabama; M. <sup>Corene. Spain</sup> Oligocene-L. Miocene: southern Australia; Pliocene: England; Pleistocene: California, Europe; Recent: cosmopolitan.

Paqurus gambierensis sp. nov.

P. provenzanoi Forest and Saint Laurent, 1967

Trizopaqurus Forest, 1952

M. Oligocene: southern Australia; Recent: Atlantic, Indo-West-Pacific.

Trizopaqurus sp. indet.

T. strigimanus (White, 1847)

Family GALATHEIDAE Samouelle

Munida Leach, 1820

Paleocene (Danian): Northern Europe; M. Oligocene: southern Australia; Recent: cosmopolitan (warm and temperate seas).

Table 4 (cont'd)

Munida monowalana sp. nov.

M. japonica Stimpson, 1858

Munida spriggi sp. nov.

M. andamanica Alcock, 1901

Family DYNOMENIDAE Ortmann

Dynomene Latreille, 1825

M. Oligocene: southern Australia;  
Recent: Atlantic, Indo-Pacific, North  
America (west coast).

Dynomene ovata sp. nov.

D. pilumnoides Alcock, 1899

Family HOMOLIDAE White

Paromola Wood-Mason and Alcock, 1891

Paleocene or Eocene: Japan;  
M. Oligocene: southern Australia;  
Recent: Eastern Atlantic and Mediterranean,  
Indo-Pacific, western Americas.

Paromola pritchardi sp. nov.

{ P. petterdi (Grant, 1905)  
{ P. alcocki (Stebbing, 1920)

Family LEUCOSIIDAE Samouelle

Ebalia Leach, 1817

M. Oligocene-Recent.

Ebalia (Ebalia)

M. Oligocene: southern Australia;  
Miocene: Burma; Miocene-Pleistocene:  
Europe; Recent: Atlantic, Mediterranean,  
Indo-Pacific, western North  
America.

Ebalia (Ebalia) spanios sp. nov.

E. yokoyai Sakai, 1965

Table 4 (cont'd)

Family RANINIDAE de Haan

Lyreidus de Haan, 1841

U. Eocene: New Zealand; Oligocene: West Indies, Europe, southern Australia; Miocene: Europe, southern Australia, New Zealand; Pliocene: Italy; Recent: North America (east coast), Central America (east coast), Indo-Pacific

Lyreidus tridentatus de Haan

L. tridentatus de Haan, 1841

Family MAJIDAE Samouelle

Leptomithrax Miers, 1876

M. Oligocene-L. Miocene: southern Australia; U. Miocene-L. Pliocene: New Zealand; Recent: western Pacific

Leptomithrax martensis sp. nov.

L. longimanus Miers, 1876

Family PARTHENOPIDAE Macleay

Tutankhamen Rathbun, 1925

M. Oligocene: southern Australia; Recent: West Indies and off Florida, Japan, Hawaii.

Tutankhamen hieracodes sp. nov.

T. pteromerus (Ortmann, 1893)

Family PORTUNIDAE Rafinesque

Ovalipes Rathbun, 1898

M. Oligocene-U. Miocene: southern

Table 4 (cont'd)

Australia; Pliocene: southern Australia,  
New Zealand; Pleistocene: New Zealand;  
Recent: North America (east coast), Indo-  
Pacific, Australia, New Zealand.

Ovalipes primitivus sp. nov.

O. georgei Stephenson and Rees, 1968

O. elongatus Stephenson and Rees,  
1968

Nectocarcinus A. Milne-Edwards, 1860

M. Oligocene-Miocene-Pliocene:  
southern Australia; Recent: south-  
western, southern, southeastern Australia,  
New Zealand, Chile.

Nectocarcinus capercoensis sp. nov. N. spinifrons Stephenson, 1961

Family XANTHIDAE Dana

Pseudocarcinus H. Milne-Edwards

M. Oligocene-Miocene-Pleistocene-  
Recent: southern Australia.

Pseudocarcinus parvus sp. nov.

P. gigas (Lamarck, 1818)

Family GONEPLACIDAE Macleay

Carcinoplax H. Milne-Edwards, 1852

M. Eocene: Spain; M. Oligocene:  
southern Australia; Miocene: Japan;  
Recent: Indo-Pacific, West Africa.

Carcinoplax praevictoriensis sp. nov. C. victoriensis Rathbun, 1923

Carcinoplax woodsi sp. nov. C. haswelli (Miers, 1884)

Table 5

Classification of fossil decapod species comprising the middle Lower Miocene faunule from the Mount Gambier area (assemblage M1); the world distribution of the genera to which they belong and the modern forms which they resemble. Distribution of genera after Glaessner (1969).

Fossil species: classification and distribution of genera

Modern forms which the fossil species most closely resemble

Family AXIIDAE Huxley

Axius Leach, 1815

Oligocene: Panama; L. Miocene to possibly early M. Miocene: southern Australia; Pliocene: France; Recent: cosmopolitan.

Axius wadeae sp. nov.

A. plectrorhynchus Strahl, 1862

Family PAGURIDAE Latreille

Paguristes Dana, 1851

Oligocene: Panama; L.-?M. Miocene: southern Australia; Pliocene: France; Recent: cosmopolitan.

Paguristes sp. indet.

Family HOMOLIDAE White

Paromola Wood-Mason and Alcock, 1891

Distribution, see Table 4.





Table 6

Classification of fossil decapod species comprising the middle Lower Miocene assemblage M2; the world distribution of the genera to which they belong and the modern forms which they resemble.

Fossil species: classification and distribution of genera

Modern forms which the fossil species most closely resemble

Family CALLIANASSIDAE Dana

Callianassa Leach, 1814

U. Cretaceous-Recent: cosmopolitan.

Callianassa bulwara sp. nov.

Unidentified species from New Guinea

Callianassa cf. aequimana Baker

C. aequimana Baker, 1907

Ctenocheles Kishinouye, 1926

L. Cretaceous: Texas; U. Cretaceous: Europe, Madagascar; Paleocene: Denmark, southern Australia, Alabama, New Jersey; Eocene: Europe, Japan, U.S.A.; M.-U. Oligocene: Hungary, southern Australia; L.-?M. Miocene: southern Australia; Pleistocene: New Zealand; Recent: western Pacific, Caribbean.

Ctenocheles sclephros sp. nov.

C. maorianus Powell, 1949

Family PAGURIDAE Latreille

Paguristes Dana, 1851

Distribution, see Table 5.

Table 6 (cont'd)

Paquristes chondrochelus sp. nov.

P. triangulopsis Forest and St.  
Laurent, 1967

Paquristes brevirostris antiqua  
subsp. nov.

P. brevirostris Baker, 1905

Family LEUCOSIIDAE Samouelle

Ebalia Leach, 1817

M. Oligocene-Recent

Ebalia (Phlyxia) Bell, 1855

L. Miocene: southern Australia;

Recent: Australia.

Ebalia (Phlyxia) sturti sp. nov.

Ebalia (Phlyxia) quadridentata  
spinifera Miers, 1886

Ebalia (Phlyxia) tatei sp. nov.

-

Ebalia (Phlyxia) nildottiensis  
sp. nov.

-

Family MAJIDAE Samouelle

Maja Lamarck, 1801

L. Miocene: southern Australia;

Miocene-Pleistocene: Europe, North  
Africa; Miocene: Fiji; Recent: eastern  
Atlantic, Mediterranean, Indo-West-  
Pacific.

Maja robinsoni sp. nov.

{ M. japonica Rathbun, 1932  
{ M. gibba Alcock, 1895

Notomithrax Griffin, 1963

L. Miocene: southern Australia;

Recent: southwest Pacific to Chile.

Notomithrax angustifrons sp. nov.

N. minor (Filhol, 1885)

Table 6 (cont'd)

Leptomithrax Miers, 1876

Distribution, see Table 4.

Leptomithrax elegans sp. nov.

L. longipes (Thomson, 1902)

Schizophroida Sakai, 1933

L. Miocene: southern Australia;  
Recent: western and central Pacific.

Schizophroida tertiaria sp. nov.

S. hilensis (Rathbun, 1906)

Naxia Latreille, 1825

L. Miocene: southern Australia;  
Recent: southwestern, southern and  
southeastern Australia, Kermadec  
Islands.

Naxia sp.

N. aries (Guérin, 1825)

Family PORTUNIDAE Rafinesque

Ovalipes Rathbun, 1898

Distribution, see Table 4.

Ovalipes costatus sp. nov.

O. iridescens (Miers, 1886)

Ovalipes denticulatus sp. nov.

O. georgei Stephenson and Rees, 196

Nectocarcinus A. Milne-Edwards, 1860

Distribution, see Table 4.

Nectocarcinus granosus sp. nov.

N. integrifrons (Latreille, 1825)

Family XANTHIDAE Dana

Pilumnus Leach, 1815

Oligocene: West Indies; L. Miocene:  
southern Australia; Miocene, Pleistocene:  
Europe; Recent: cosmopolitan.

Pilumnus sp.

P. acer Rathbun, 1923

Table 7

Classification of fossil decapod species comprising the middle to late Lower Miocene assemblage M3 (Calappilia australis assemblage); the world distribution of the genera to which they belong and the modern forms which they resemble.

Fossil species: classification  
and distribution of genera

Modern forms which the fossil  
species most closely resemble

Family CALLIANASSIDAE Dana

Ctenocheles Kishinouye, 1926

Distribution, see Table 6.

Ctenocheles sclephros sp. nov.

C. maorianus Powell, 1949

Family PAGURIDAE Latreille

Paqurus Fabricius, 1775

Distribution, see Table 4.

Paqurus greenwayensis sp. nov.

P. nana (Henderson, 1888)

Paqurus murrayensis sp. nov.

-

Paquristes Dana, 1851

Distribution, see Table 5.

Paquristes chondrochelus sp. nov.

Paquristes brevirostris antiqua  
subsp. nov.

P. brevirostris Baker, 1905

Family CALAPPIDAE de Haan

Calappilia A. Milne-Edwards, 1873

Table 7 (cont'd)

U. Paleocene: New Jersey; Eocene: Texas, Florida, middle and southern Europe, Java, Borneo; Oligocene: Europe; U. Oligocene-L. Miocene: northern Brazil; L. Miocene-possibly early M. Miocene: southern Australia; L. Miocene: Natal; U. Miocene: Austria; Recent: West Indies, western Pacific.

Calappilia australis sp. nov.

C. milneedwardsii (Miers, 1886)

Family LEUCOSIIDAE Samouelle

Ebalia (Phlyxia) Bell, 1855

Distribution, see Table 6.

Ebalia (Phlyxia) nildottiensis  
sp. nov.

Nucia Dana, 1852

L. Miocene: Java, southern Australia; Recent: Indo-Pacific.

Nucia rhomboides sp. nov.

N. bouvieri Ihle, 1918

Family MAJIDAE Samouelle

Maja Lamarck, 1801

Distribution, see Table 6.

Maja robinsoni sp. nov.

{ M. japonica Rathbun, 1932  
{ M. gibba Alcock, 1895

Notomithrax Griffin, 1963

Distribution, see Table 6.

Notomithrax angustifrons sp. nov.

N. minor (Filhol, 1885)

Table 7 (cont'd)

Family PORTUNIDAE Rafinesque

Ovalipes Rathbun, 1898

Distribution, see Table 4.

Ovalipes eamesi sp. nov.

O. iridescens (Miers, 1886)

Nectocarcinus A. Milne-Edwards, 1860

Distribution, see Table 4.

Nectocarcinus granosus sp. nov.

N. integrifrons (Latreille, 1825)

Family XANTHIDAE Dana

Pilumnus Leach, 1815

Distribution, see Table 6.

Pilumnus sp.

P. acer Rathbun, 1923

Table 8

Classification of fossil decapod species comprising the late Lower to possibly early Middle Miocene assemblage M4; the world distribution of the genera to which they belong and the modern forms which they resemble.

Fossil species: classification and distribution of genera

Modern forms which the fossil species most closely resemble

Family AXIIDAE Huxley

Axius Leach, 1815

Distribution, see Table 5.

Axius morganensis sp. nov.

A. plectrorhynchus Strahl, 1862

Family CALLIANASSIDAE Dana

Ctenocheles Kishinouye, 1926

Distribution, see Table 6.

Ctenocheles sclephros sp. nov.

C. maorianus Powell, 1949

Ctenocheles compressus sp. nov.

-

Family CALAPPIDAE de Haan

Calappilia A. Milne-Edwards, 1873

Distribution, see Table 7.

Calappilia australis sp. nov.

C. milneedwardsii (Miers, 1886)

Calappilia grandispinis (Etheridge and McCulloch, 1916)

C. milneedwardsii (Miers, 1886)



Table 8 (cont'd)

Family LEUCOSIIDAE Samouelle

Pariphiculus Alcock, 1896

L. Miocene: East Indies, southern  
Australia; Recent: Indo-West-Pacific.

Pariphiculus coronatus spinosus  
subsp. nov.

P. coronatus Alcock and Anderson  
1894

Family RANINIDAE de Haan

Lyreidus de Haan, 1841

Distribution, see Table 4.

Lyreidus tridentatus de Haan

L. tridentatus de Haan, 1841

Family PORTUNIDAE Rafinesque

Nectocarcinus

Distribution, see Table

Nectocarcinus granosus sp. nov.

N. integrifrons (Latreille, 1825)

Family GONEPLACIDAE Macleay

Ommatocarcinus White, 1852

M. Eocene: Spain; Miocene:  
southeastern Australia, New Zealand;  
Recent: Indo-West-Pacific, New  
Zealand.

Ommatocarcinus corioensis  
(Cresswell, 1886)

O. macgillivrayi White, 1852

Table 9

Divisions and species-groups recognized  
within the genus Leptomithrax Miers

Bennett, 1964	Griffin, 1966a	This Thesis
Subgenera	Informal species-groups containing species indicated	Informal species groups
<u>Leptomithrax sensu stricto</u>	<u>L. longimanus</u> Miers, 1876 <u>L. australis</u> (Jacquinot, 1853) <u>L. garricki</u> Griffin, 1966	<u>longimanus</u> group
<u>Australomithrax</u>	<u>L. tuberculatus</u> Whitelegge, 1964 + Subsp. <u>L. tuberculatus mortenseni</u> Bennett, 1964 <u>L. sternocostulatus</u> (H. Milne-Edwards, 1851) ( <u>L. parvispinosus</u> (Ward, 1933)) <u>L. gaimardii</u> (H. Milne-Edwards, 1834) <u>L. waitei</u> (Whitelegge, 1900) <u>L. globifer</u> Rathbun, 1918	<u>tuberculatus</u> group
<u>Zemithrax</u>	<u>L. longipes</u> (Thomson, 1902)	<u>longipes</u> group
	<u>L. richardsoni</u> Dell, 1960	<u>richardsoni</u> group

Figure 1

Map showing occurrences of Tertiary fossil decapod Crustacea  
in southeastern Australia.

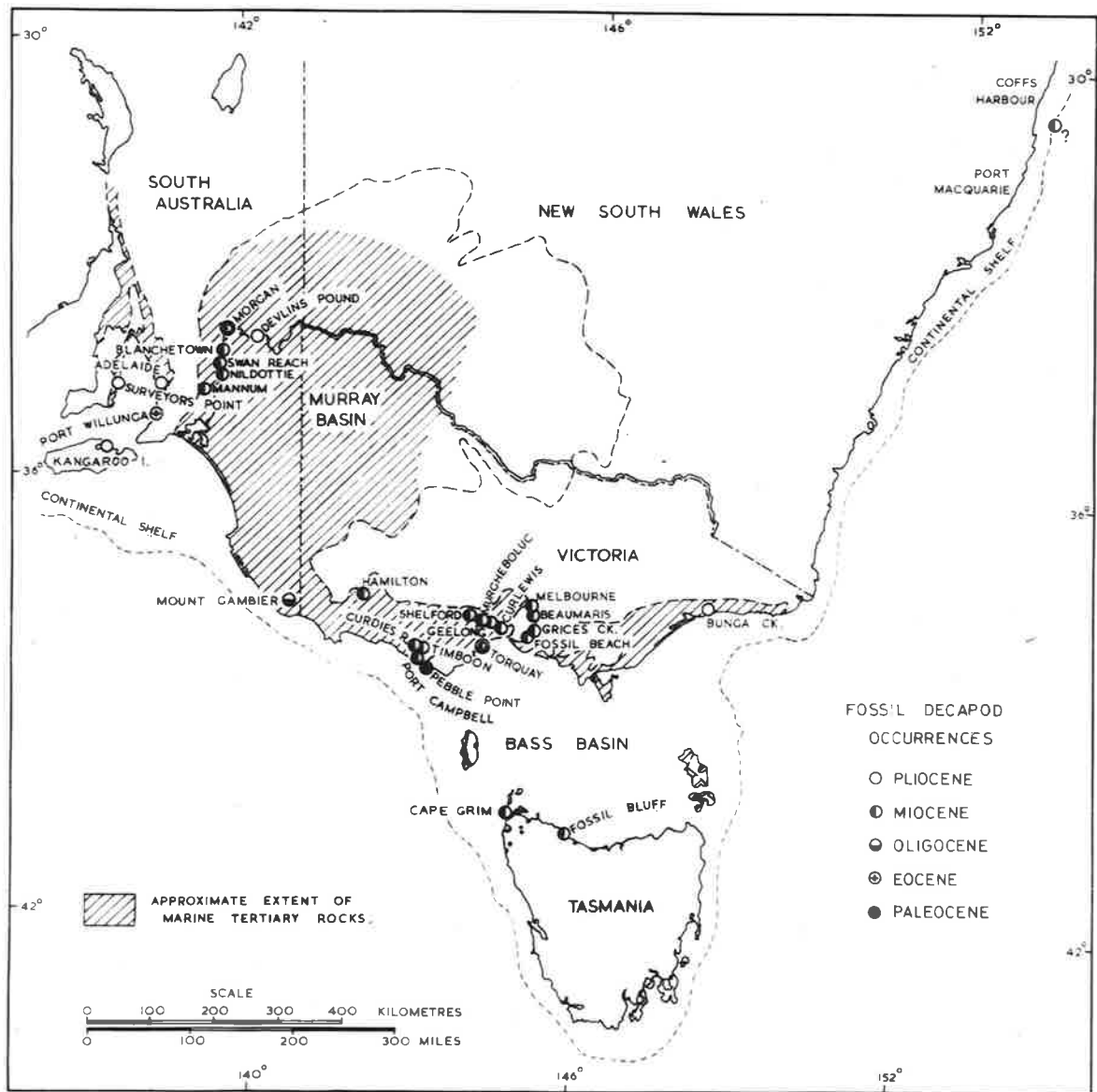


Figure 1

Figure 2

Hypothetical time ranges of some key Lower and early Middle  
Miocene foraminifera in southern Australia. Two local  
zonal schemes are indicated.

Figure 2

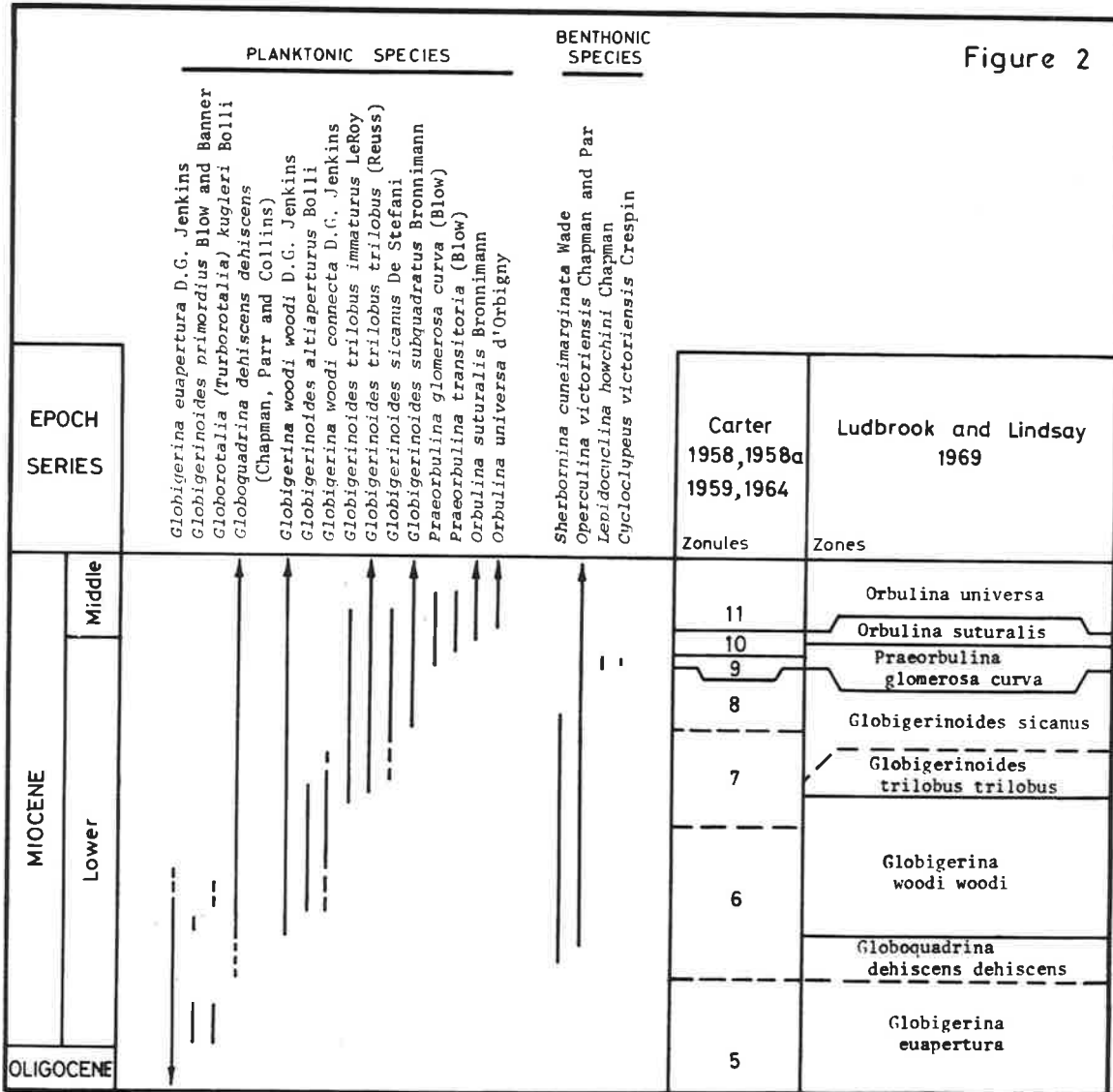


Figure 3

Chronostratigraphic framework for times during which the fossil decapods described in this thesis existed. The correlation between the foraminiferal zonation of Banner and Blow (1965) and Blow (1969), and the locally erected zonal schemes is tentative and is based principally on the work of McGowran et al. (1970).

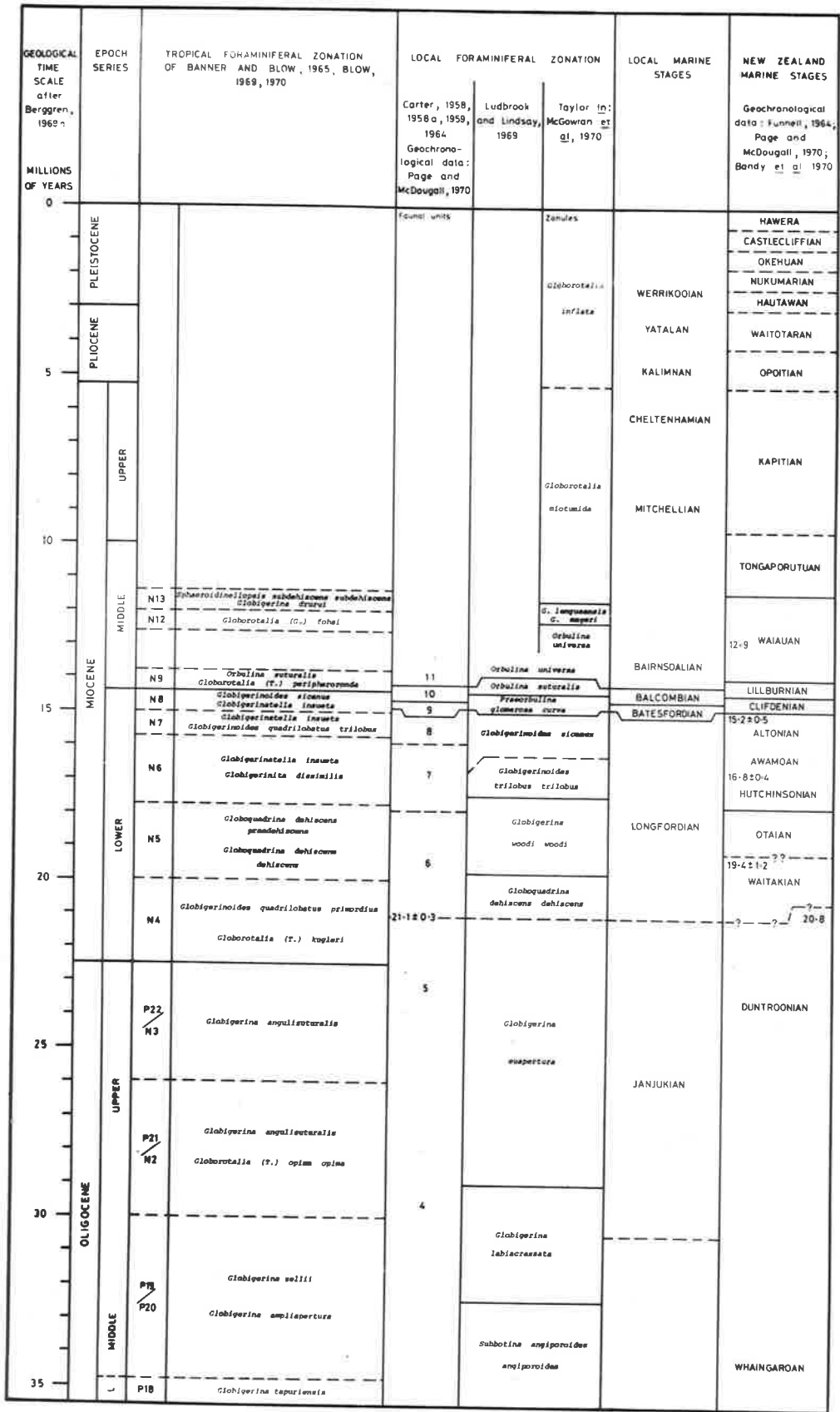


Figure 3



Figure 4

Correlation chart for Middle Oligocene and later Tertiary rocks in which fossil decapods are known to occur in southeastern Australia. \*, Occurrence of decapod remains in situ.  
•, Occurrence of decapod remains as remanié fossils within phosphatic nodules.

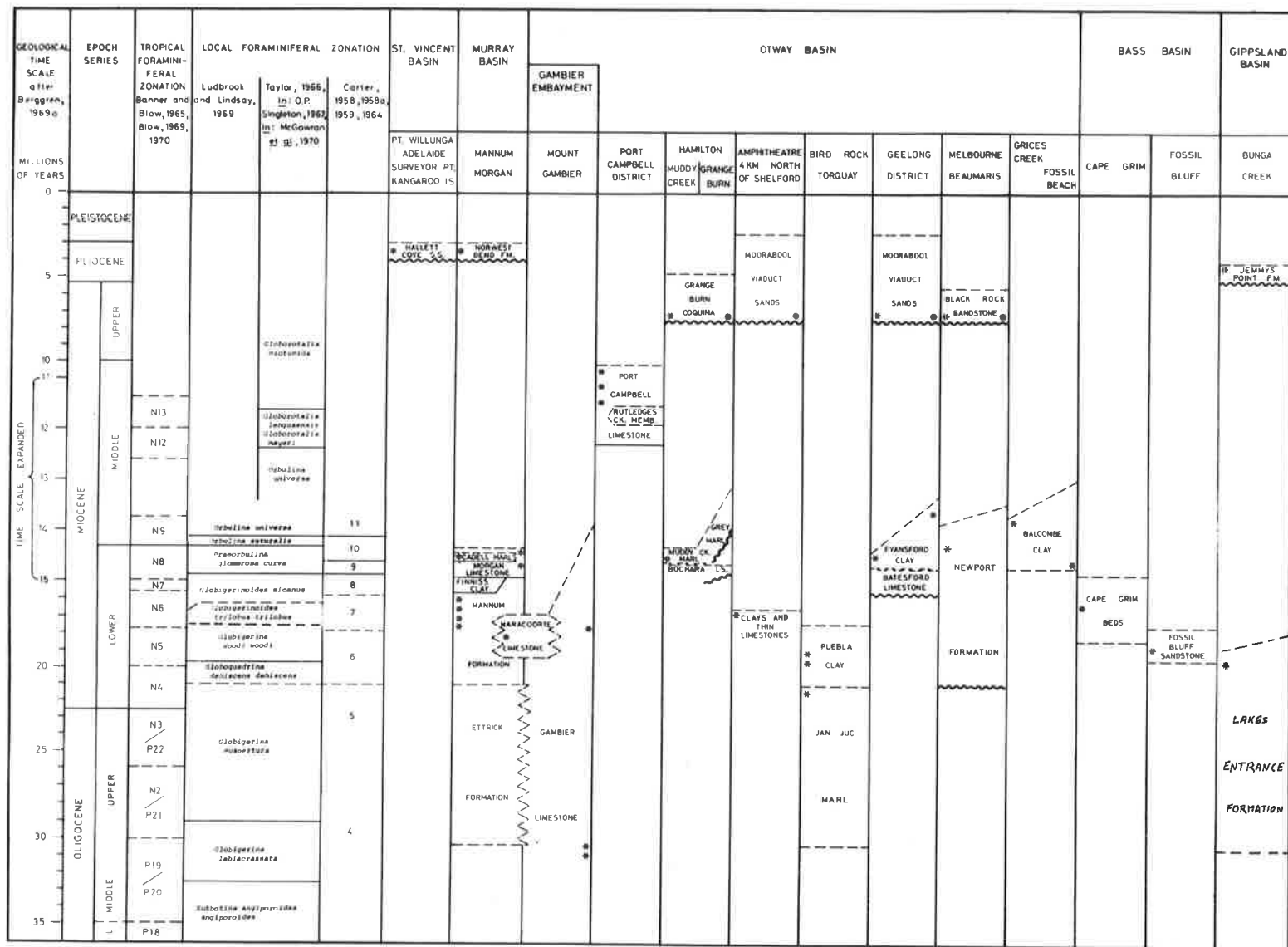


Figure 4

Figure 5

Classification of marine bottom environments of the continental shelf and continental slope.

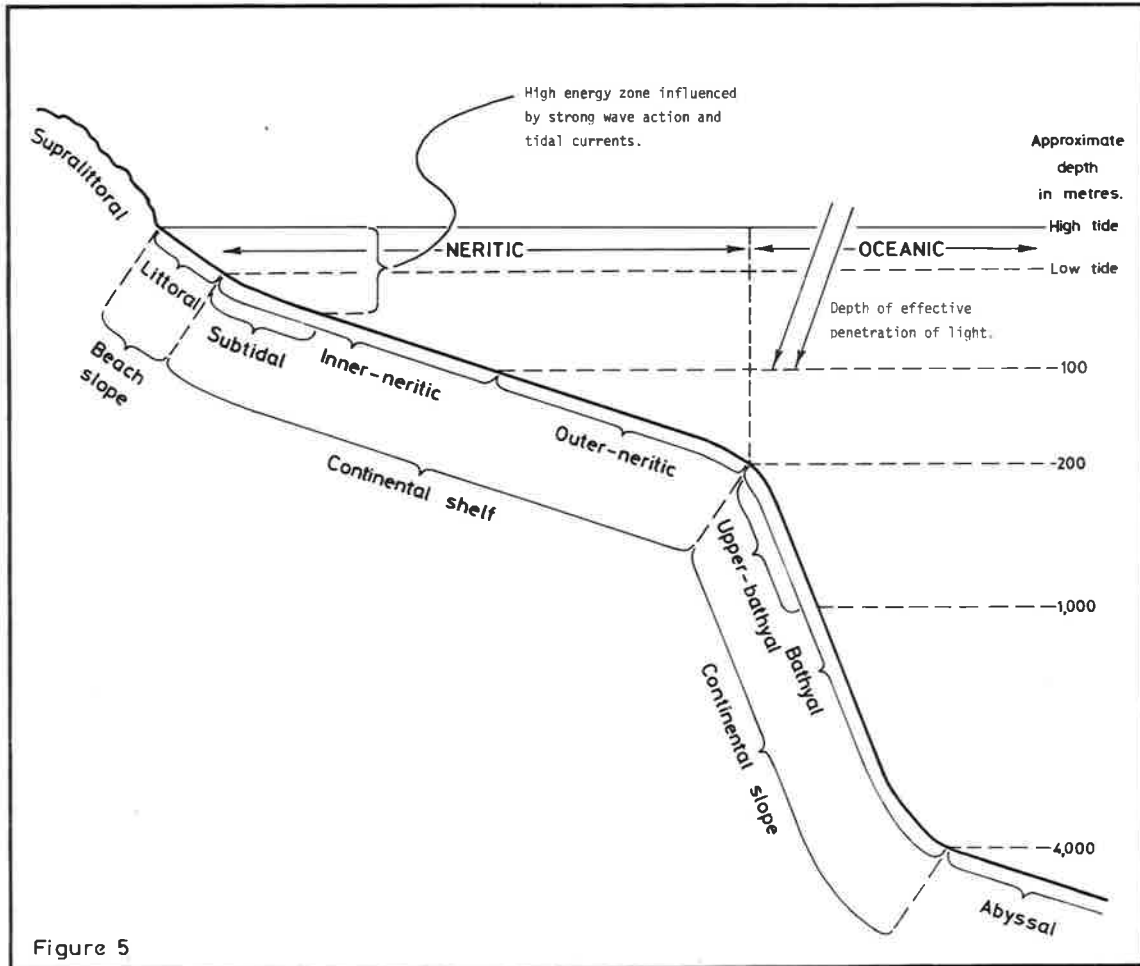


Figure 5

Figure 6

Locality maps. Quarries where fossil decapods are known to occur in the Mount Gambier area are indicated.

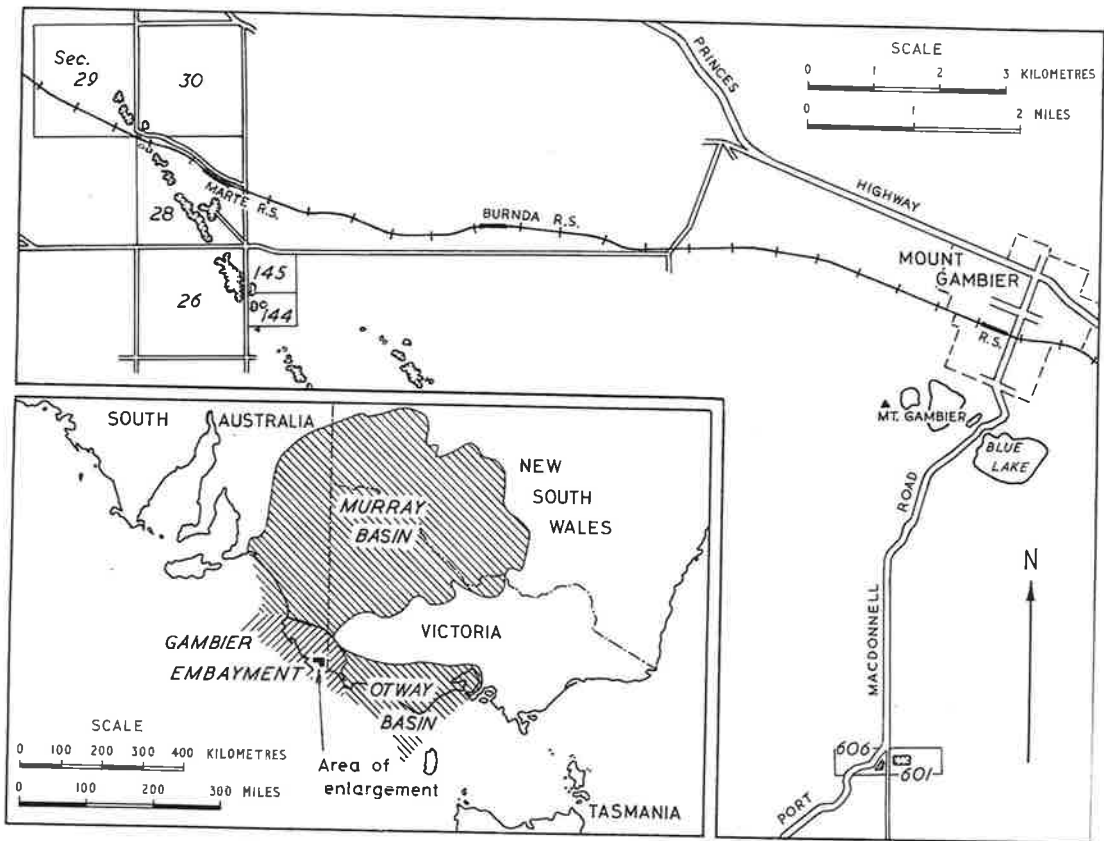


Figure 6

Figure 7

Section of Gambier Limestone exposed in building stone quarries  
12 km west of Mount Gambier. The distribution of fossil  
decapod species found at this occurrence is indicated.

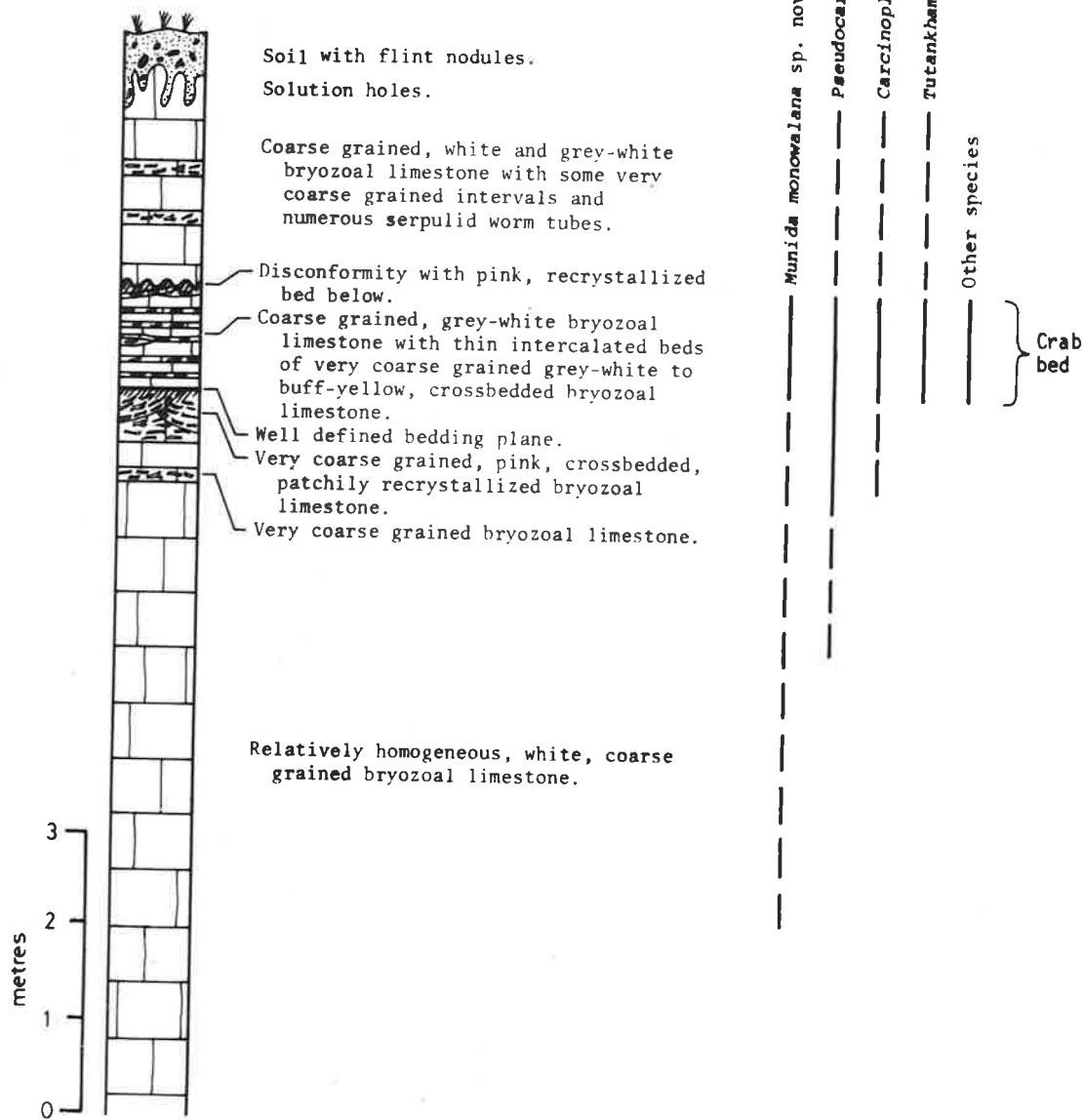


Figure 7



Figure 8

Size frequency histogram for measurements of the width of the carapace of 75 specimens of Carcinoplax woodsi sp. nov. from the crab-bed in the Gambier Limestone, 12 km west of Mount Gambier. Seven possible maxima in the data are indicated and the enveloping curve for the histogram (approximate) is shown.

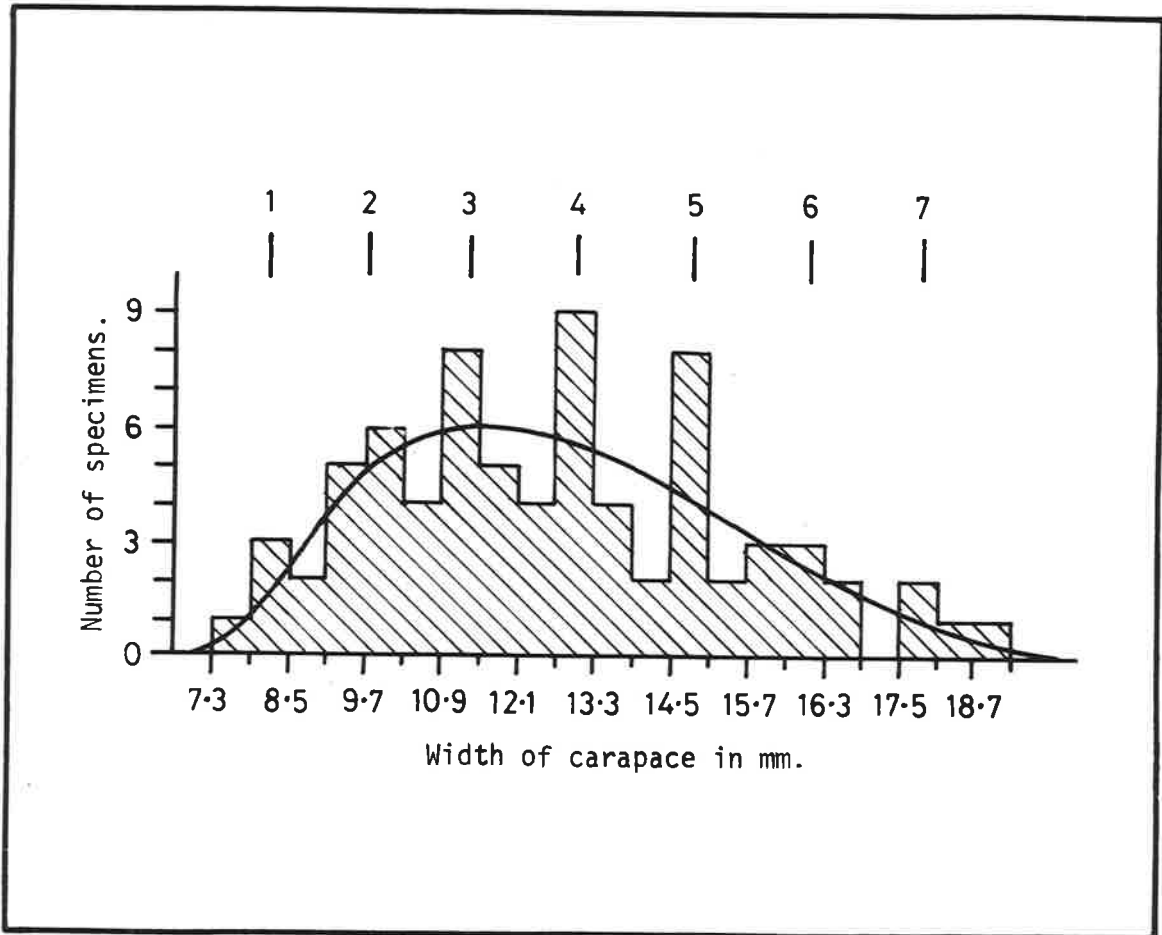


Figure 8

Figure 9

Depth ranges of the modern species which the fossil decapods comprising the Middle Oligocene assemblage from Mount Gambier most closely resemble.

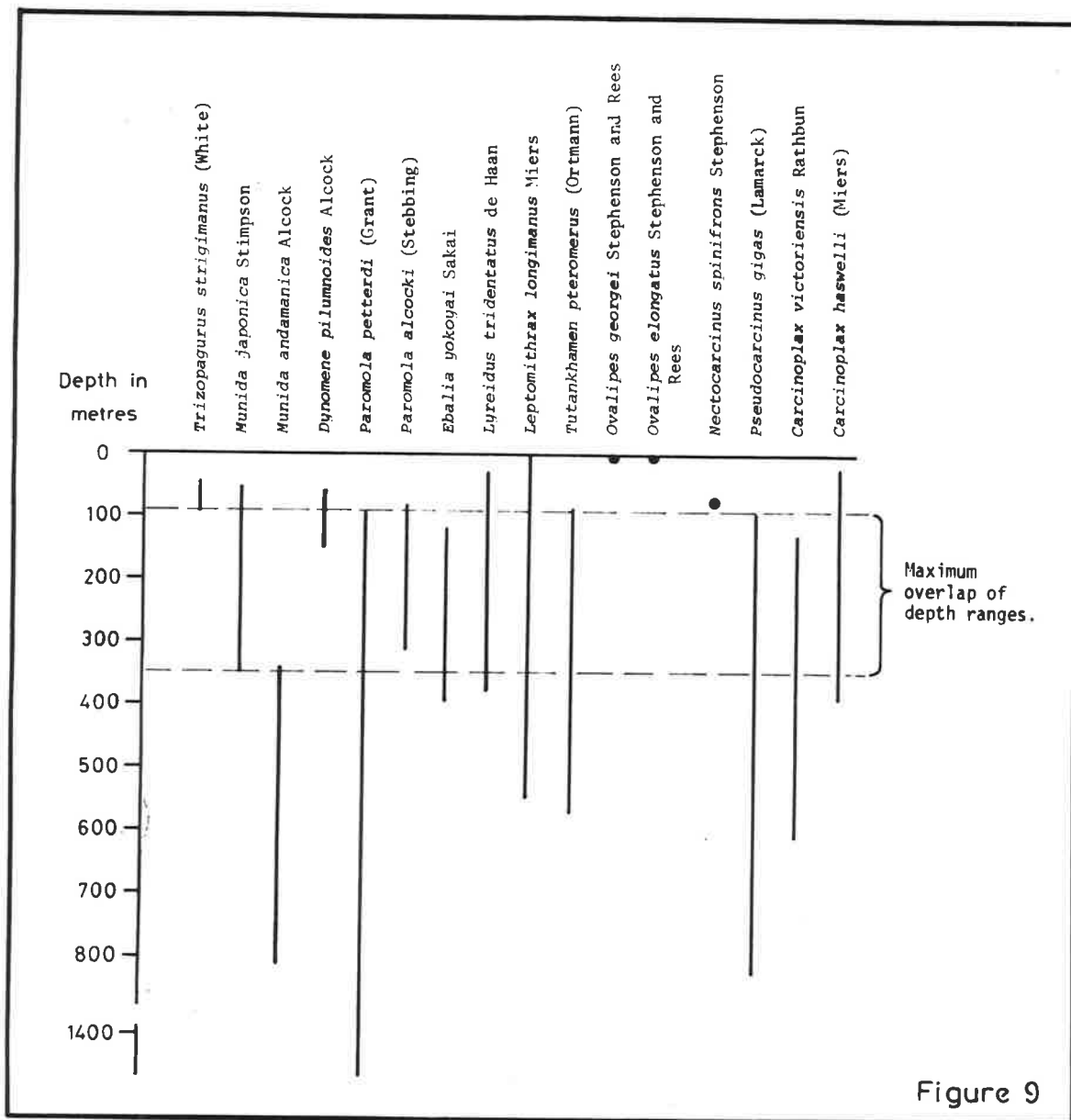


Figure 9

Figure 10

Foraminifera present in four samples from the section of the Gambier Limestone exposed in the building stone quarries 12 km west of Mount Gambier.

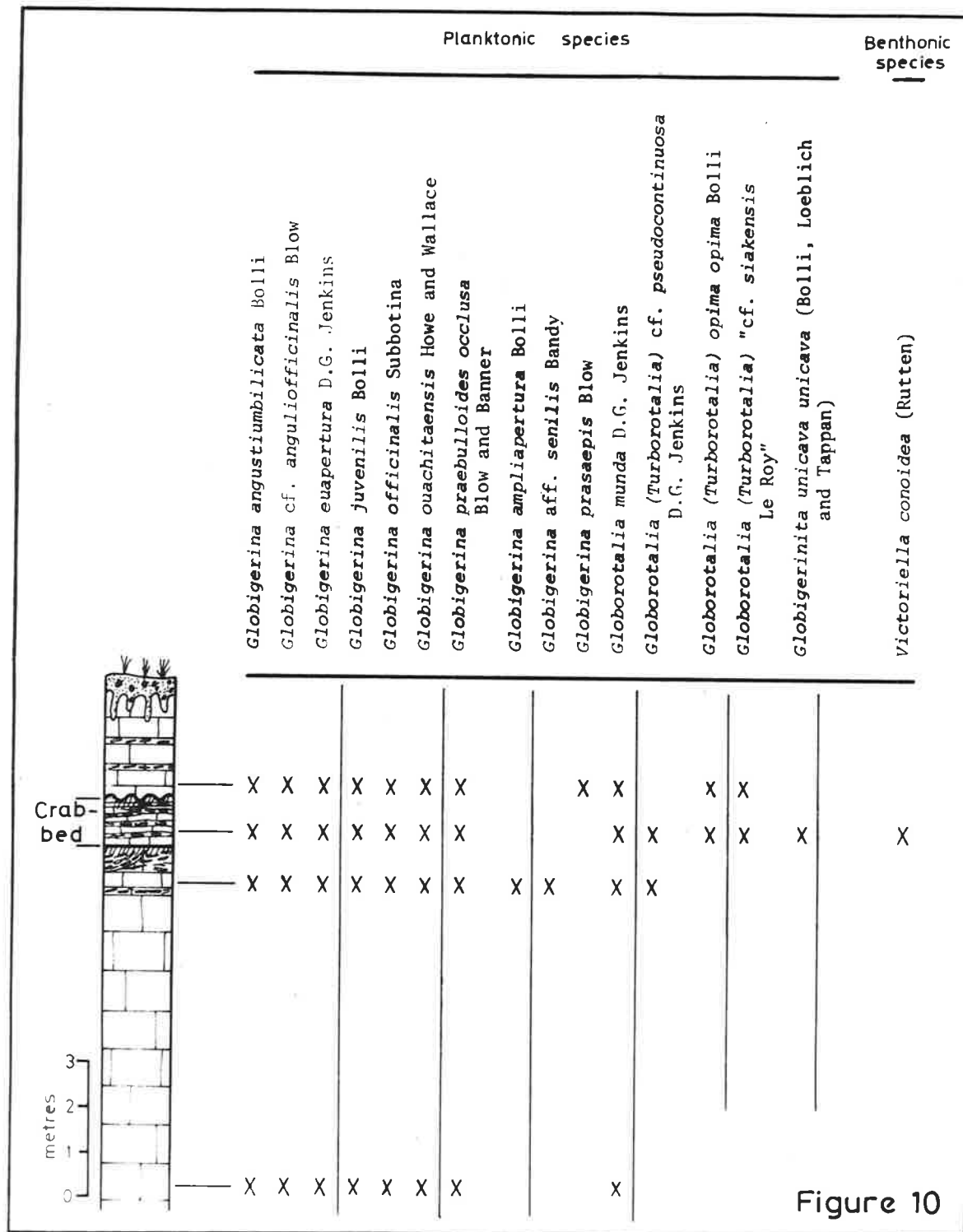


Figure 10

Figure 11

Stratigraphic nomenclature applied to the Mid-Tertiary section exposed in cliffs near Bird Rock, Torquay, Victoria, and the foraminiferal age data available for the sequence. The correlation with the zonation of Ludbrook and Lindsay (1969) is based on the work of McGowran et al. (1970).

Raggatt and Crespin, 1952, 1955 Carter, 1964		Singleton, 1968	Raggatt and Crespin, 1955 Carter, 1959, 1964	Carter, 1964	Taylor in Singleton, 1968	Apparent correlation with zones of Ludbrook and Lindsay, 1969	EPOCH SERIES
PUEBLA FORMATION	Beds at Point Danger and Yellow Bluff	YELLOW BLUFF BEDS	LONGFORDIAN STAGE	Faunal units	Zonules	<i>Globigerinoides</i>	LOWER MIOCENE
	"Scutellina Limestone"	ZEALLY LIMESTONE		8	<i>bisphericus</i>	<i>sicanus</i>	
	"Cellepora Limestone"	CELLEPORA BEDS		7	<i>Globigerinoides trilobus</i> <i>trilobus</i>	<i>Globigerinoides trilobus</i> <i>trilobus</i>	
	"Ancilla Clays"	PUEBLA CLAY		6	<i>Globigerina woodi</i> <i>Globigerinoides trilobus</i>	<i>Globigerina woodi woodi</i>	
	"Septarian Limestones"						
JAN JUC FORMATION	JAN JUC MARL	JANJUKIAN STAGE	5	<i>Globorotalia opima opima</i>  <i>Bolivina anastomosa</i>	<i>Globigerina euapertura</i>	UPPER OLIGOCENE	
			4	<i>Victoriella conoidea</i>	<i>Globigerina labiacrassata</i>		

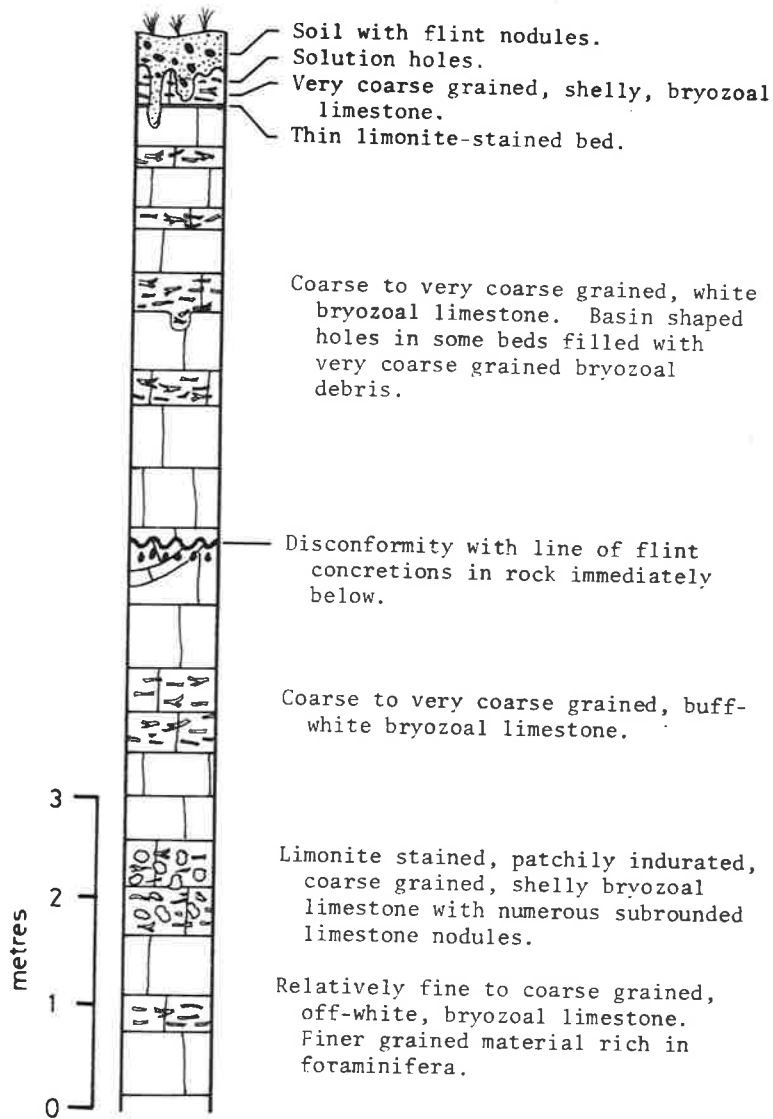
Figure 11



Figure 12

Section of Gambier Limestone exposed in quarries on sections 601 and 606 Hundred of Blanche, 6.4 km south of Mount Gambier. The distribution of the fossil decapods found at this occurrence is indicated.

Figure 12



*Axius wadeae* sp. nov.

*Lyreidus tridentatus* de Haan

*Nectocarcinus* sp.

*Ovalipes denticulatus* sp. nov.

Parthenopid sp.

— *Paromola* cf. *pritchardi* sp. nov.

Figure 13

Locality maps. Known occurrences of fossil decapods  
(arrowed) in the cliffs of the River Murray are indicated.

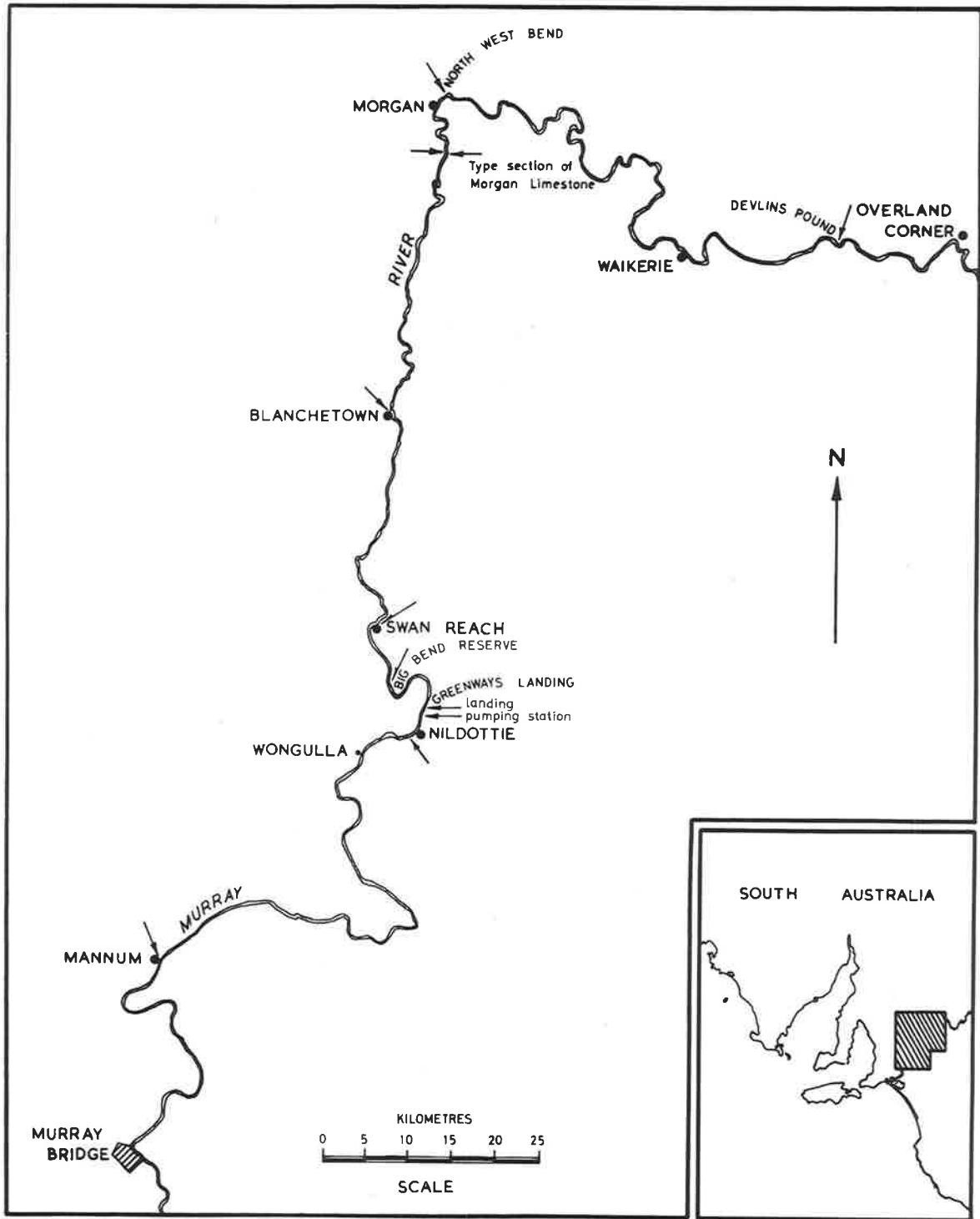


Figure 13

Figure 15

Depth ranges of the modern species which the fossil decapods occurring in the "raggy limestone" facies of the Mannum Formation in the Nildottie-Swan Reach area most closely resemble.

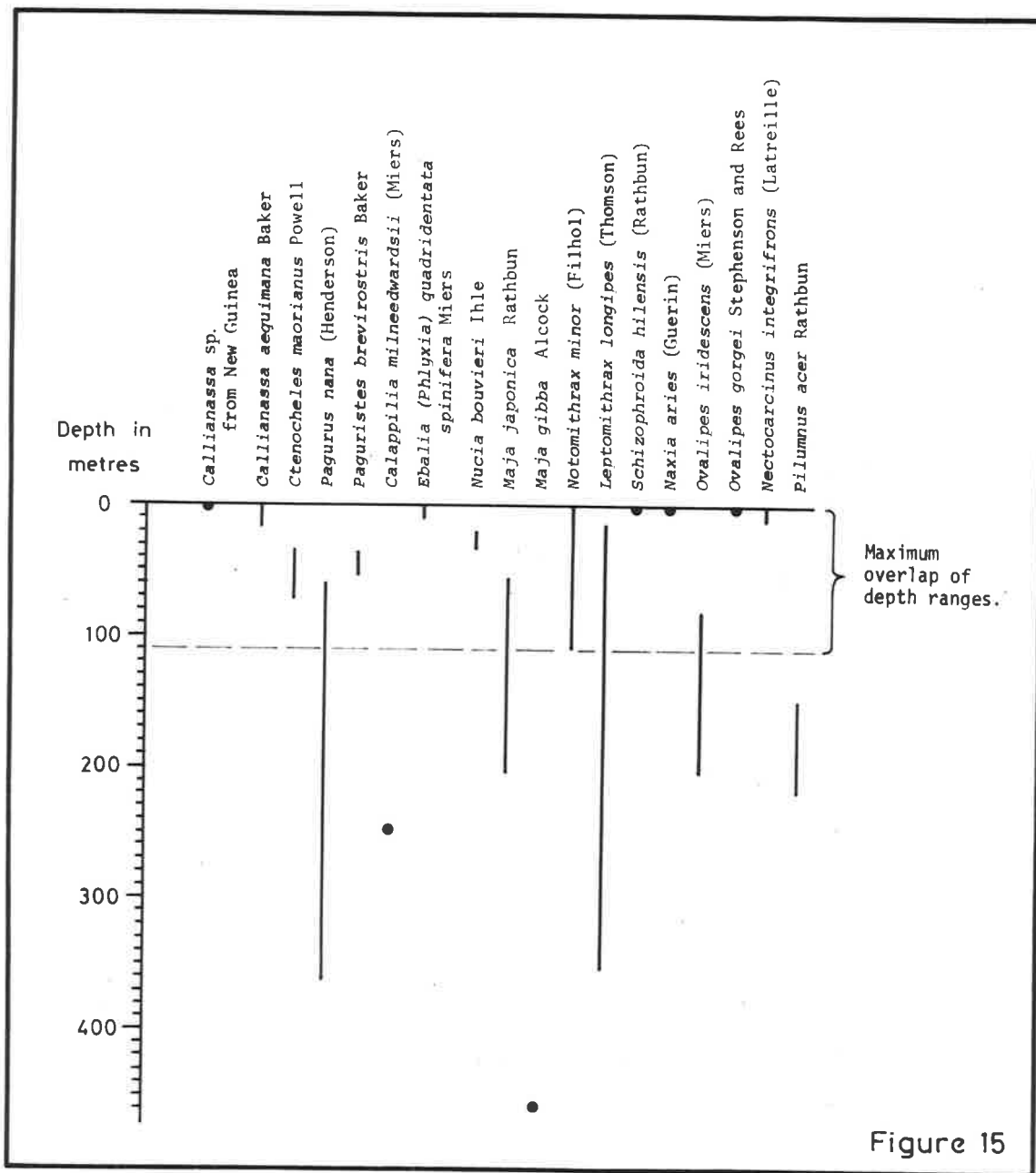


Figure 15

Figure 16

Formation of the "raggy limestone" facies of the Mannum Formation in the Mildottie-Swan Reach area, South Australia.

- A. Deposition of a graded bed of bioclastic calcarenite during waning phase of strong current activity.
- B. During a subsequent period of little current activity organisms excavate dwelling burrows within the still unconsolidated sediment. Abandoned burrows become filled with marly silt.
- C. Submarine lithification of the bed occurs, particularly near the exposed upper surface; infaunal activity is thus precluded. Decomposition of organic material trapped within the sediment releases  $H_2S$  and  $CO_3^{--}$  ions which form acidic solutions and dissolve cavities along pre-existing burrows. An epifaunal community of bryozoans, brachiopods, molluscs and decapods develops on the hard ground at the top of the bed.
- D. During waxing phase of strong current activity epifaunal debris is swept into open cavities in the bed and the top of the stratum begins to erode.
- E. During waning phase of strong current activity a new bed of calcarenite is deposited. The cycle repeats.

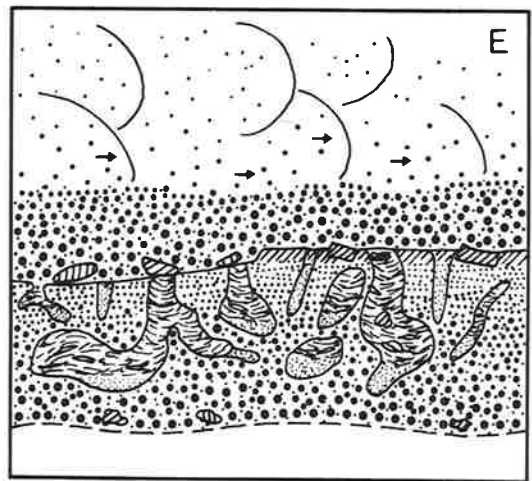
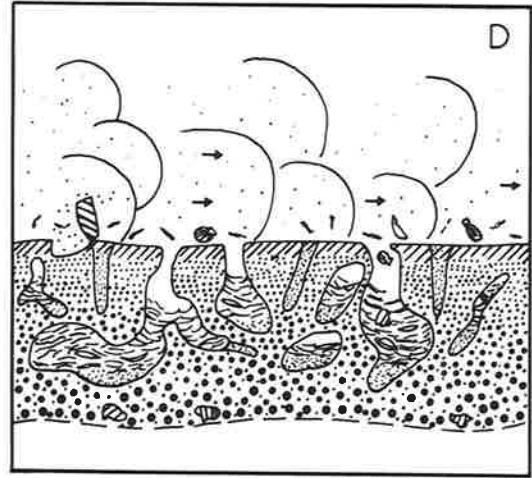
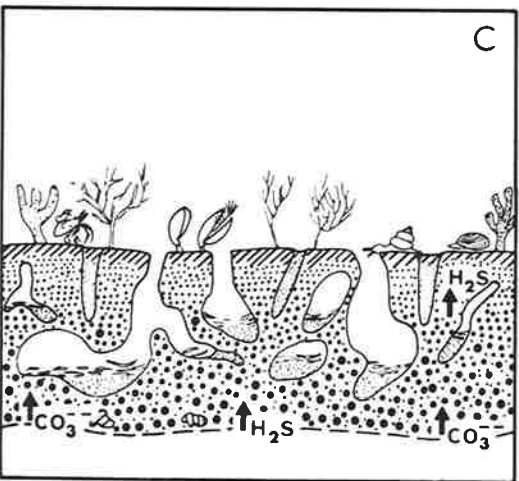
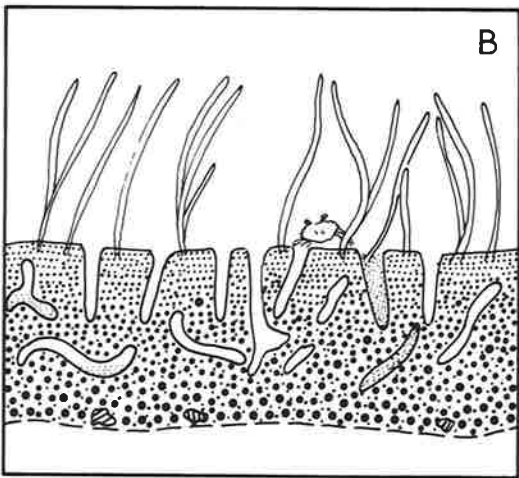
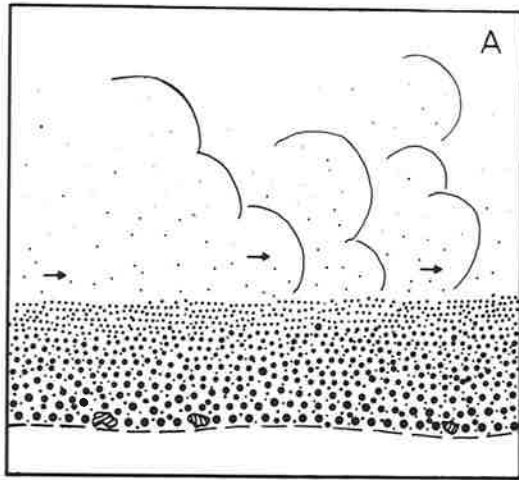


Figure 16



Figure 17

Type section of Morgan Limestone in cliff on east side of River Murray, 6.4 km south of Morgan. The distribution of the fossil decapods found at or near this occurrence is indicated.

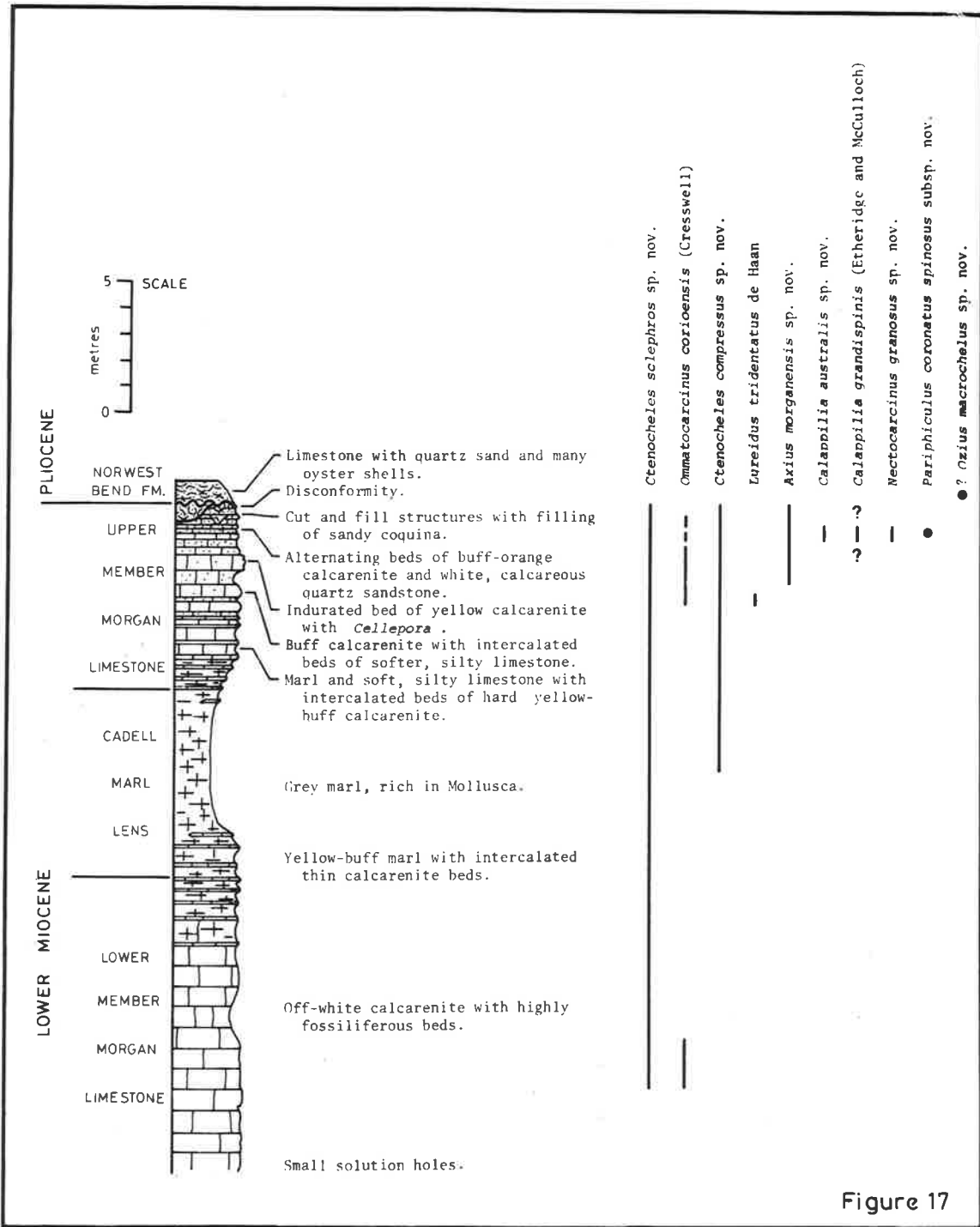


Figure 17

Figure 18

Foraminiferal zonation of coastal section in the vicinity of Port Campbell, Victoria. The local zonation is correlated with a New Zealand zonal scheme and marine stages recognized in New Zealand. The correlation with the zonation of Blow (1969) is tentative, and is based principally on the work of McGowran et al. (1970).

BAKER, 1950, 1953	LOCAL FORAMINIFERAL ZONATION.		NEW ZEALAND MARINE STAGES	NEW ZEALAND FORAMINIFERAL ZONATION OF D.G. JENKINS, 1971	TROPICAL FORAMINIFERAL ZONATION OF BLOW, 1969		EPOCH SERIES
	WADE, 1964, 1966	TAYLOR, 1966, IN: O.P. SINGLETON, 1967, IN: MCGOWRAN ET AL 1970					
PORT  CAMPBELL  LIMESTONE  ← RUTLEGES CK. MEMB.	<i>Globorotalia</i>  <i>mayeri</i>	<i>Globorotalia</i>  <i>miotumida</i>	TONGAPORUTUAN	<i>Globorotalia</i>  <i>miotumida</i>  <i>miotumida</i>	N13  N12	<i>Sphaeroidinellopsis</i> <i>subdehiscens</i> s.s.  <i>Globigerina druryi</i>  <i>Globorotalia</i> (G) <i>fohsi</i>	MIOCENE  MIDDLE
GLENAMPLE  CLAY		<i>Orbulina</i>  <i>universa</i>	<i>Globorotalia</i> <i>lenguaensis</i>  <i>Globorotalia</i> <i>mayeri</i>	WAIAUAN		<i>Globorotalia</i>  <i>mayeri</i>  <i>mayeri</i>	
GELLIBRAND CLAY			LILLBURNIAN		N9	<i>Orbulina suturalis</i> <i>Globorotalia</i> (T.) <i>peripheronda</i>	

Figure 18

Figure 20

Map showing occurrences of Cretaceous and Tertiary fossil  
decapod Crustacea in Australia.

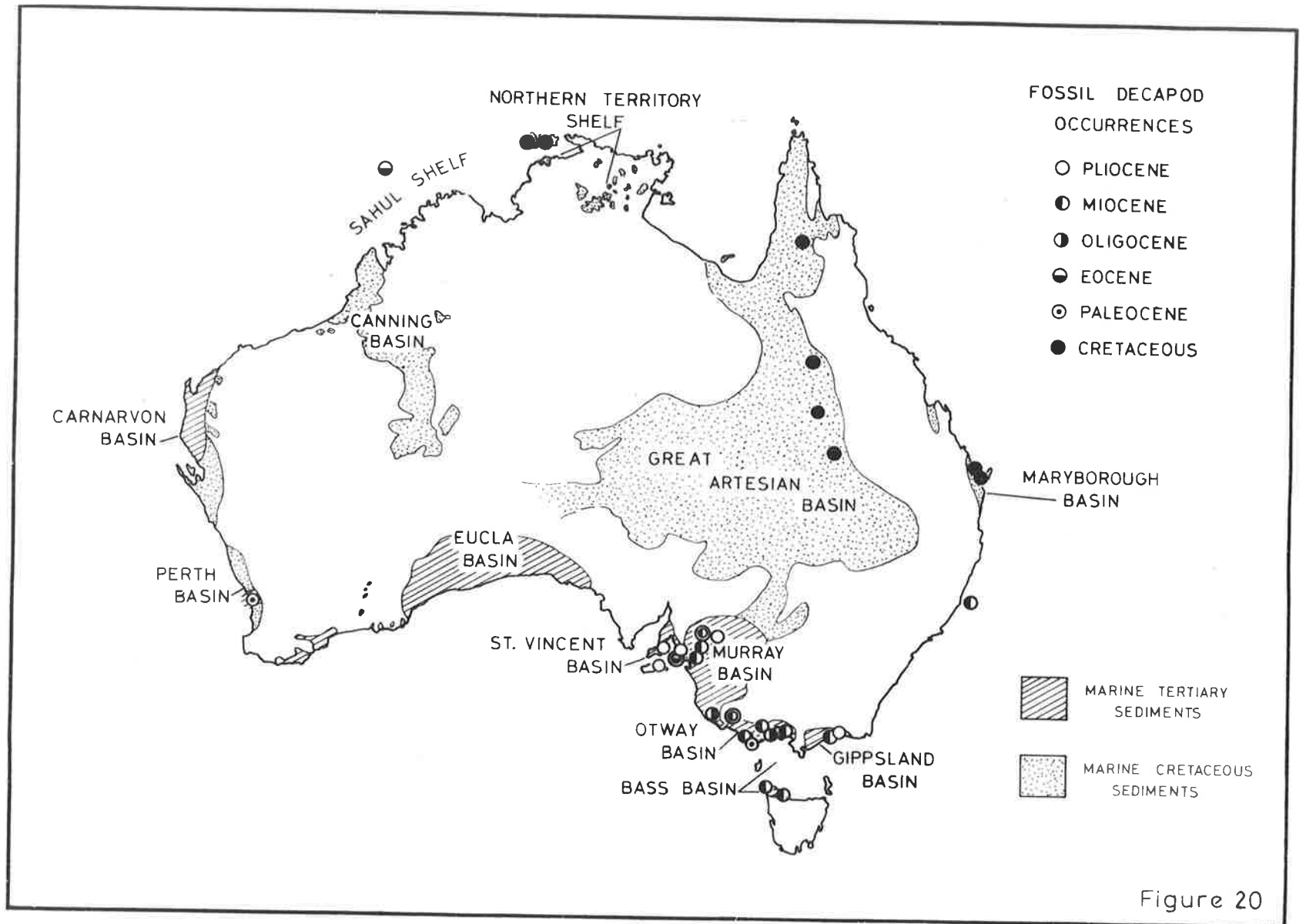


Figure 20

Figure 21

Distribution of the modern species which most closely resemble the fossil decapods comprising the Middle Oligocene assemblage from near Mount Gambier.

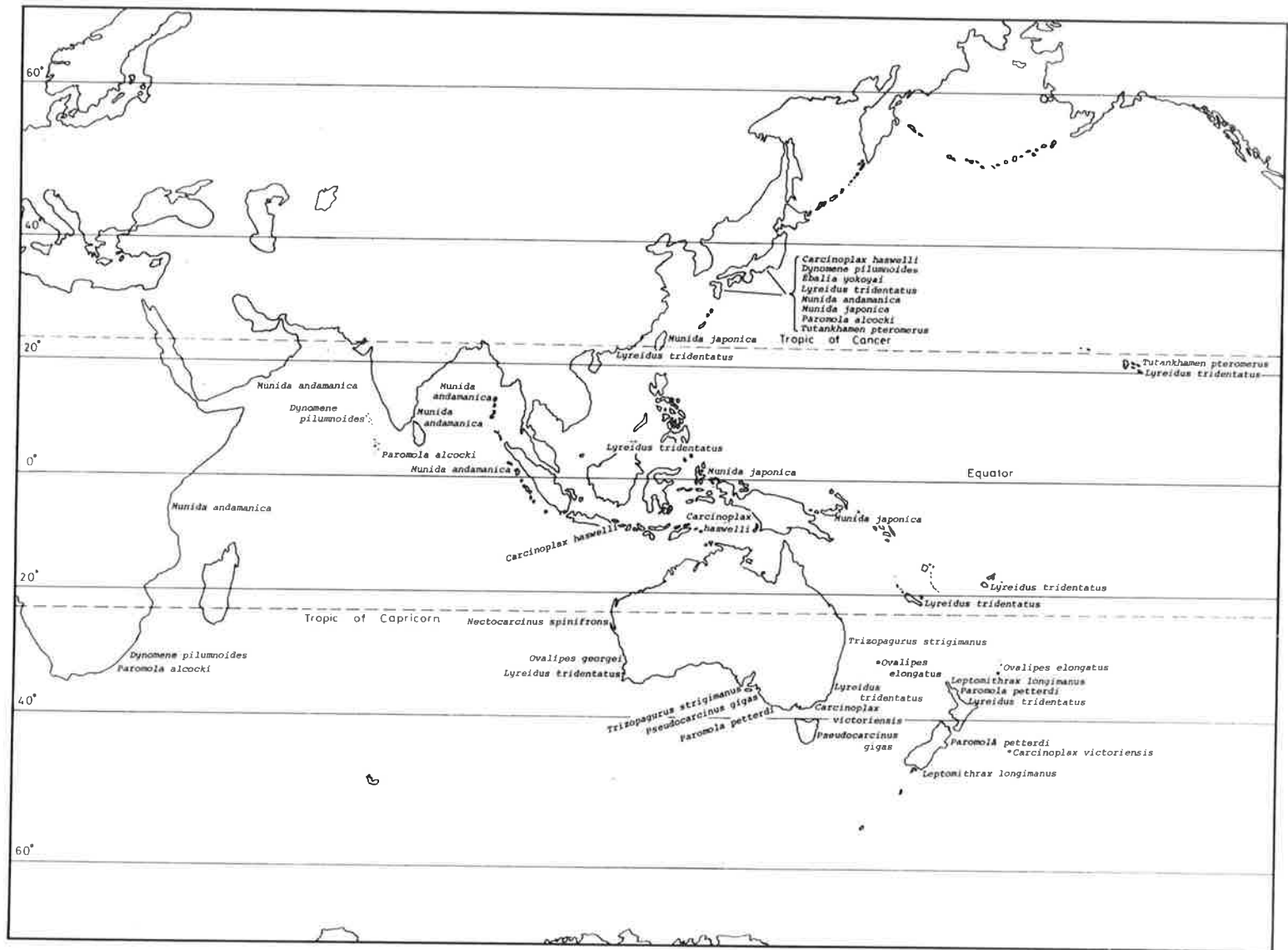


Figure 21



Figure 22

Distribution of the modern species which most closely resemble the fossil decapods comprising the middle Lower Miocene assemblage M2.



Figure 23

Distribution of the modern species which most closely resemble the fossil decapods comprising the middle to late Lower Miocene assemblage M3 (Calappilia australis assemblage).

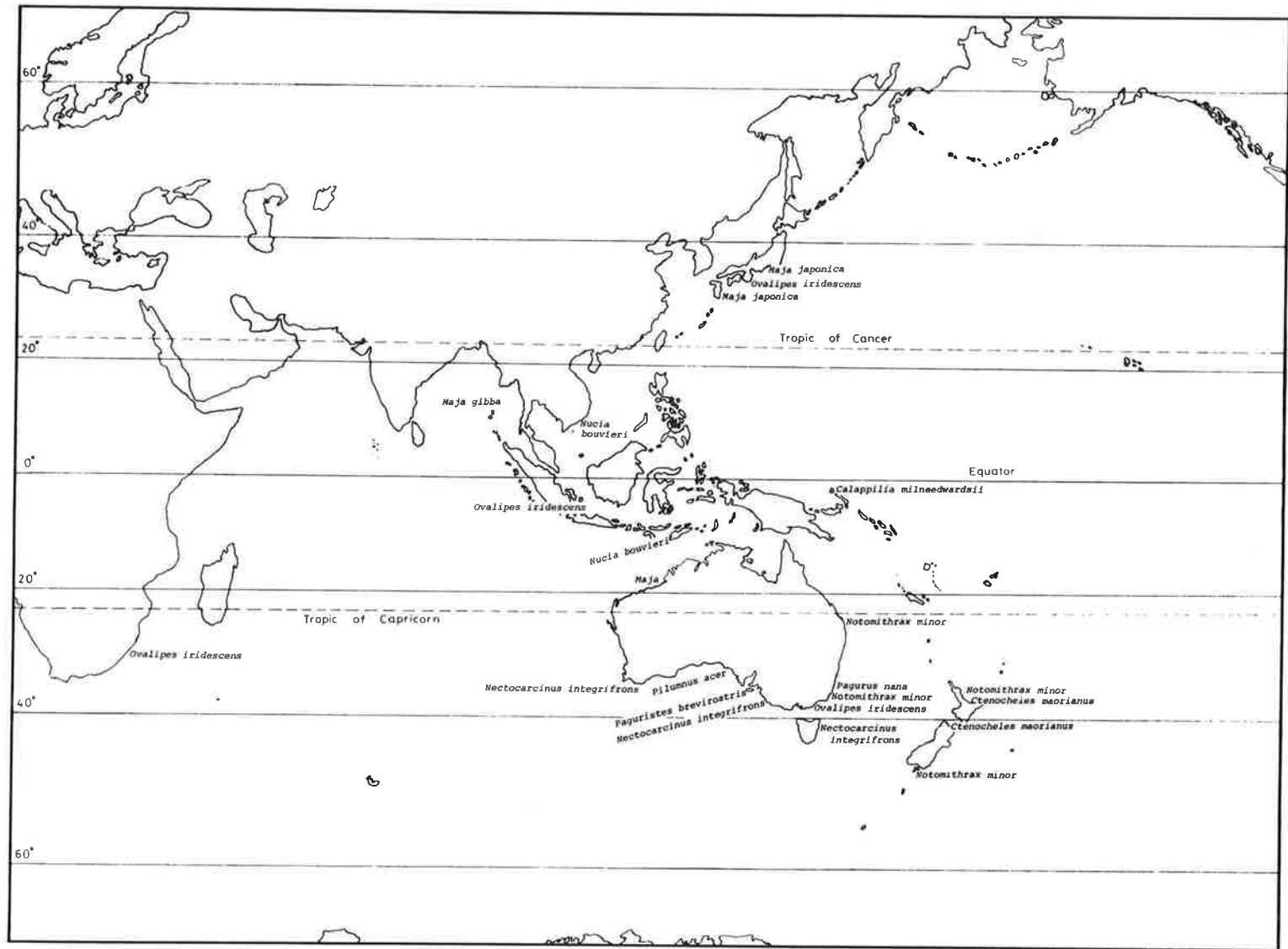


Figure 23

Figure 24

Distribution of the modern species which most closely resemble the fossil decapods comprising the late Lower to possibly early Middle Miocene assemblage M4.

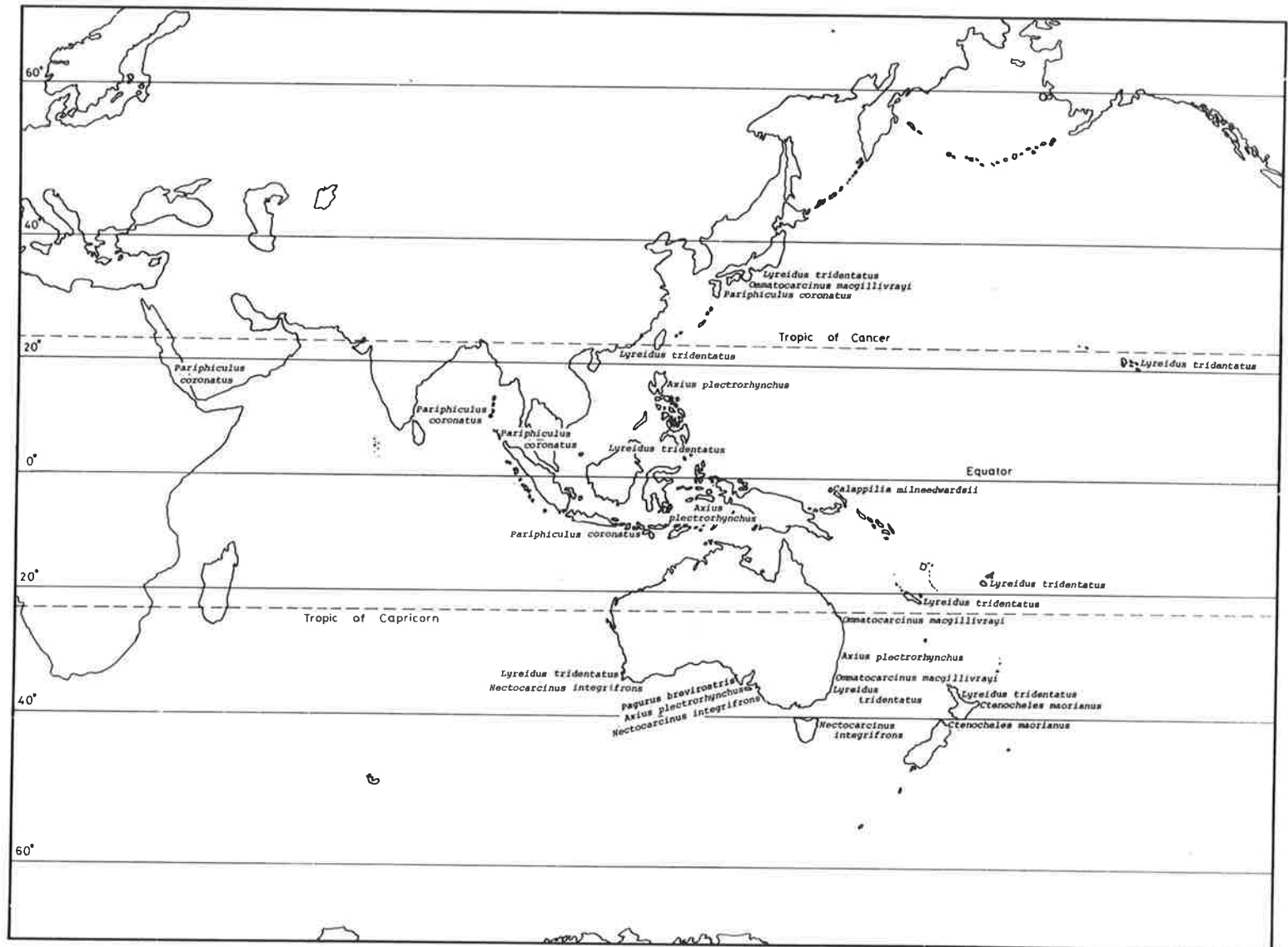


Figure 24

Figure 25

Palaeoclimatic data for the Australian Tertiary, record of transgression and regression in Australia, and the separation of Australia and Antarctica. New Zealand palaeoclimatic data is included for comparison.

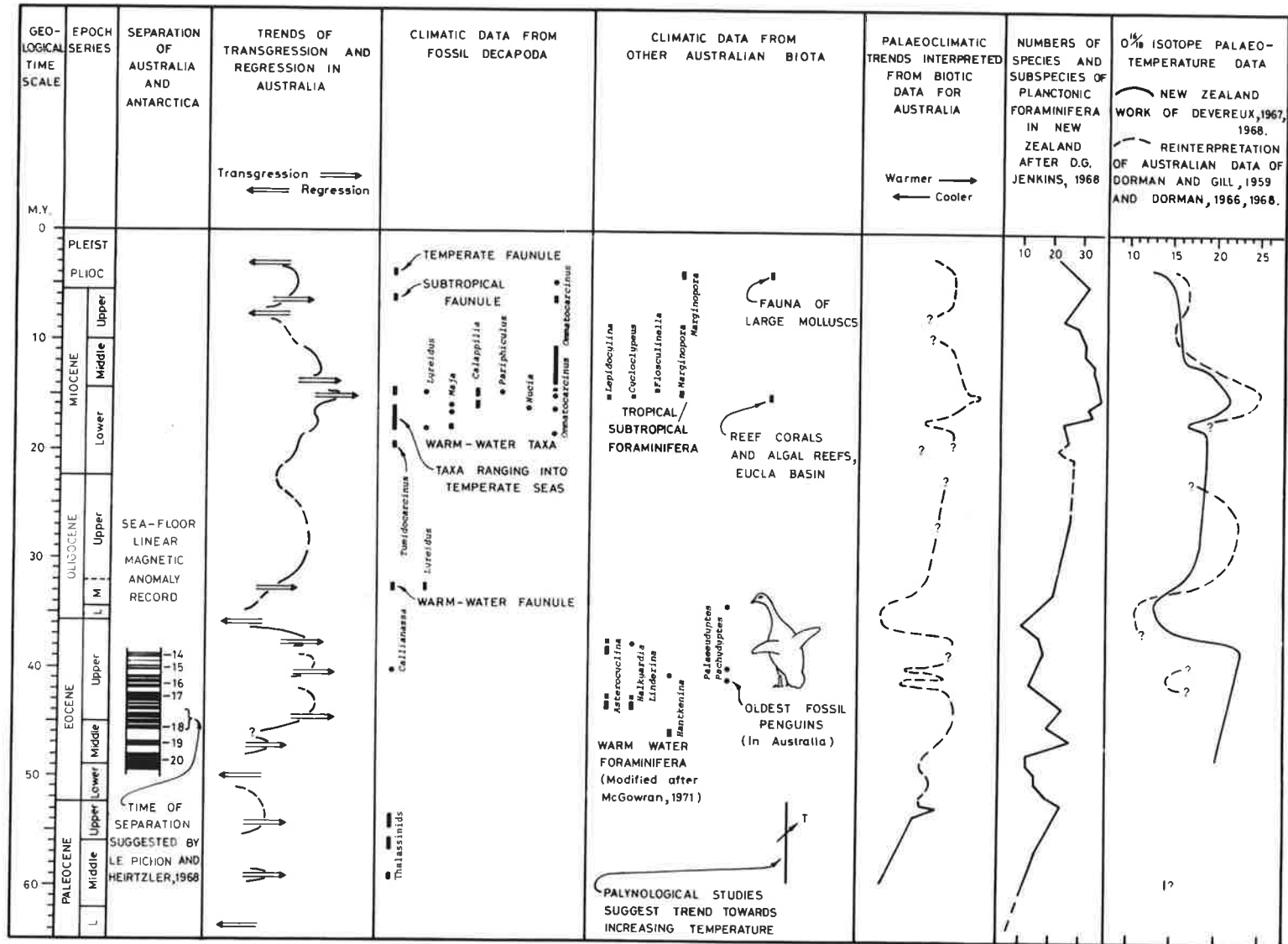


Figure 25



Figure 26

Callianassa bulwara sp. nov. Propodus of right (large) cheliped showing arrangement of hair pores, holotype, S.A.M. P15627, x 8.

a. Outer side. b. Inner side.

Figure 27

Callianassa sp. (unidentified). Right (large) claw of extant form collected by Professor Glaessner from the intertidal mud flats of Port Moresby, New Guinea, x 5.

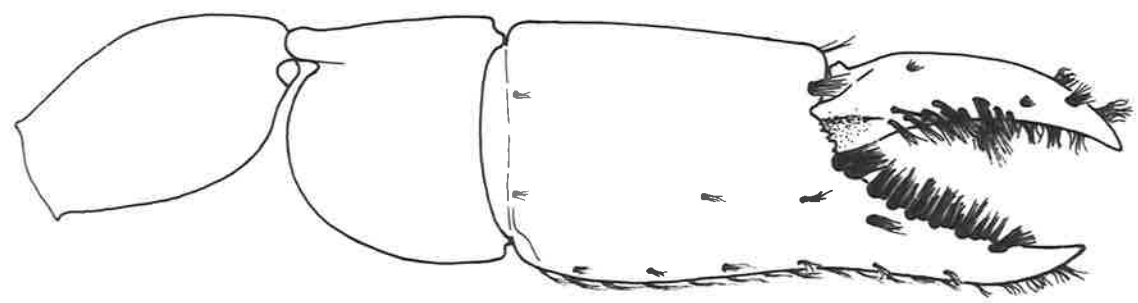
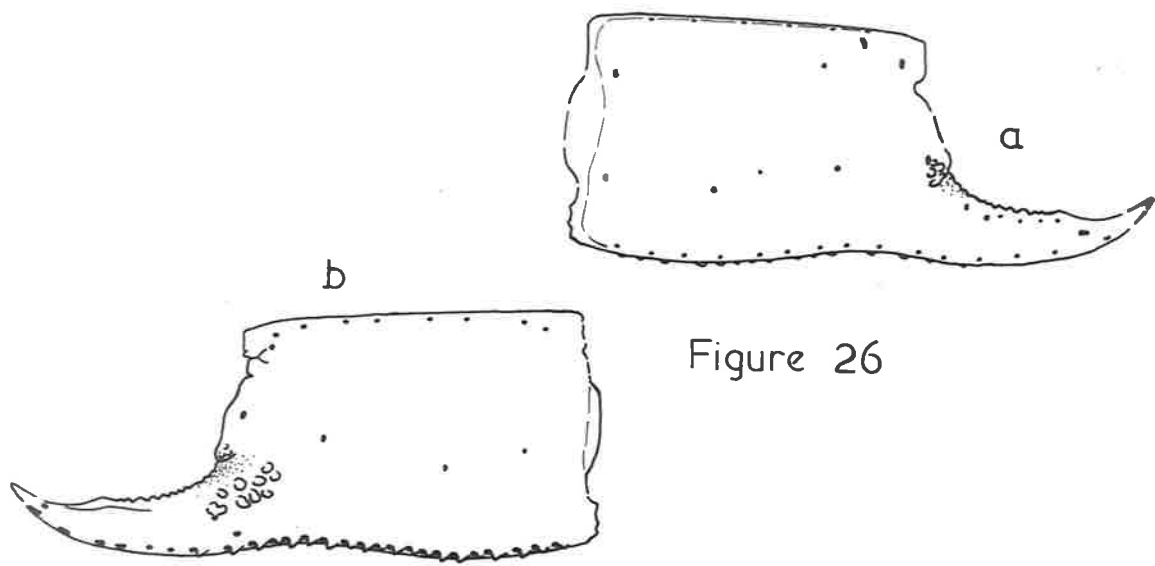


Figure 28

Ctenocheles fragilis sp. nov. Proximal  $\frac{1}{8}$  to  $\frac{1}{2}$  length of fingers of right, large chela showing arrangement of hair pores and teeth, x 5. a. Inner side of dactylus. b. Transverse section at  $\frac{1}{2}$  length of dactylus. c. Outer side of dactylus. d. Inner side of fixed finger. e. Transverse section at  $\frac{1}{2}$  length of finger. f. Outer side of fixed finger.

Figure 29

Ctenocheles compressus sp. nov. Proximal  $\frac{1}{8}$  to  $\frac{1}{2}$  length of fingers of right, large chela, x 7. a. Inner side of dactylus. b. Transverse section at  $\frac{1}{2}$  length of dactylus. c. Outer side of dactylus. d. Inner side of fixed finger. e. Transverse section at  $\frac{1}{2}$  length of finger. f. Outer side of fixed finger.

Figure 30

Ctenocheles sclephros sp. nov. Proximal  $\frac{1}{8}$  to  $\frac{1}{2}$  length of fingers of right, large chela, x 7. a. Inner side of dactylus. b. Transverse section at  $\frac{1}{2}$  length of dactylus. c. Outer side of dactylus. d. Inner side of fixed finger. e. Transverse section at  $\frac{1}{2}$  length of finger. f. Outer side of fixed finger.

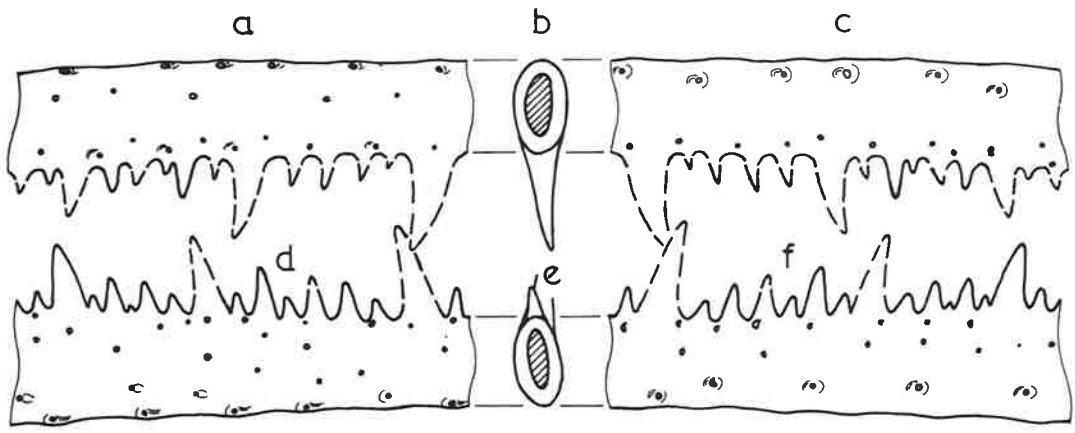


Figure 30

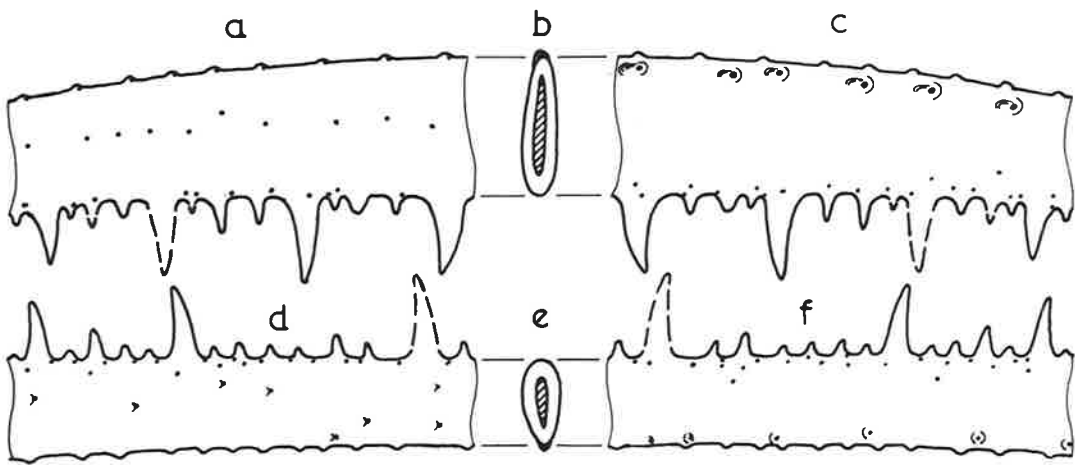


Figure 29

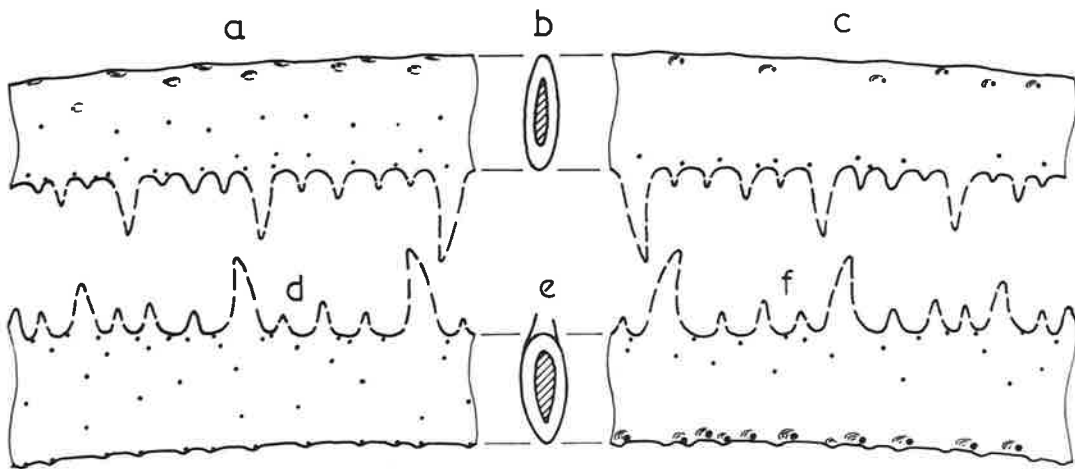


Figure 28

Figure 31

Munida monowalana sp. nov. Reconstruction of carapace, x 3.

F, frontal region; H, hepatic region; G, gastric region;

B, branchial region; C, cardiac region.

Figure 32

Munida spriggi sp. nov. Reconstruction of carapace, x 2.5.

Notation of regions as for Figure 31.

Figure 33

Dynomene ovata sp. nov. Carapace, x 4.

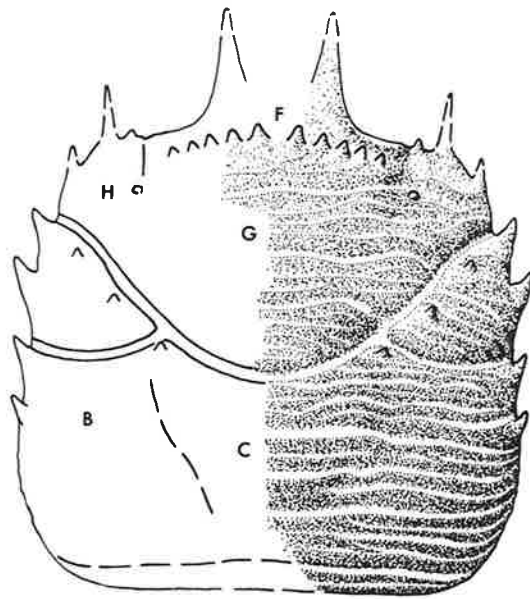


Figure 31

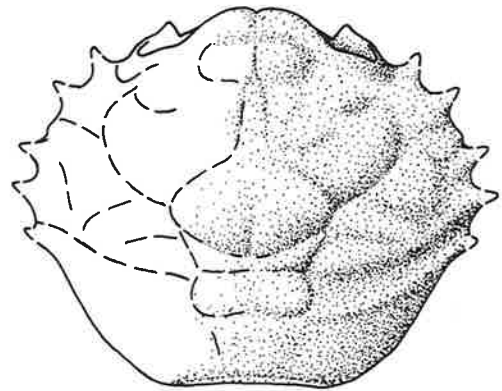


Figure 33

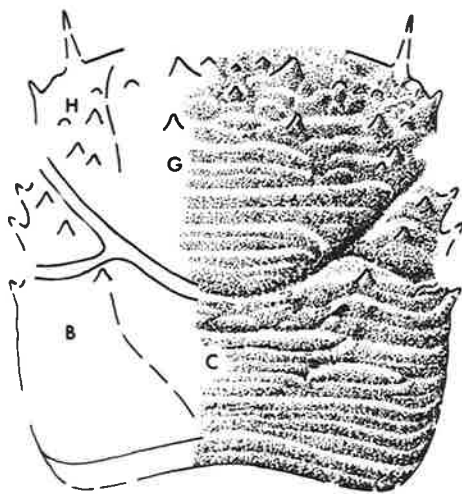


Figure 32

Figure 34

Paromola pritchardi sp. nov. Reconstruction of carapace, x 3.  
Regions indicated as follows: O, supraorbital; Eg, epigastric;  
Pg, protogastric, 1, anteromedial lobe, 2, anterolateral  
lobe, 3, posterolateral lobe; H, hepatic; Mg, mesogastric;  
M, metogastric; Eb, epibranchial; Ib, inner-branchial lobe;  
U, urogastric; C, cardiac; Mb, mesobranchial; Mt, meta-  
branchial; I, intestinal.

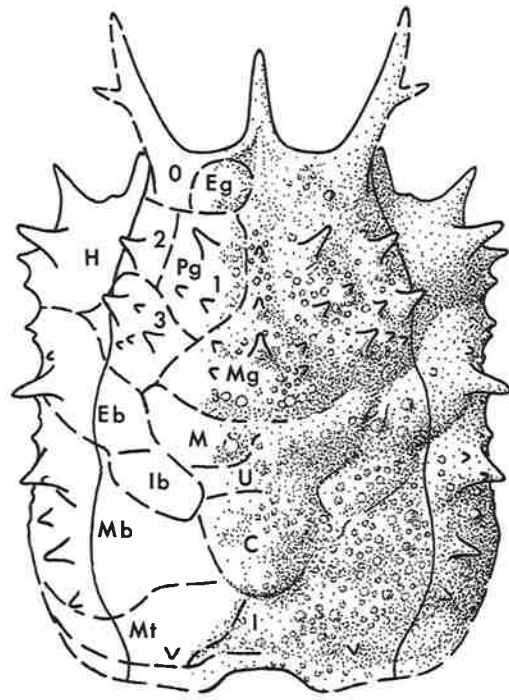


Figure 34



Figure 35

Ebalia (Ebalia) spanios sp. nov. a. Reconstruction of carapace,  
x 6. b. Enlarged sectional view of ornamentation on carapace.

Figure 36

Ebalia (Phlyxia) sturti sp. nov. a. Reconstruction of carapace,  
x 7. b. Enlarged oblique view of spine and spinules on carapace.

Figure 37

Ebalia (Phlyxia) tatei sp. nov. a. Reconstruction of carapace,  
x 8. b,c. Enlarged sectional view of granules and bosses on  
carapace.

Figure 38

Ebalia (Phlyxia) nildottiensis sp. nov. a. Reconstruction of  
carapace, x 8. b. Enlarged oblique view of spine and spinules  
on carapace.

Figure 39

Pariphiculus coronatus spinosus subsp. nov. a. Carapace, holo-  
type, S.A.M. P15790, x 3.5. b. Enlarged oblique view of spine  
and granules on carapace.

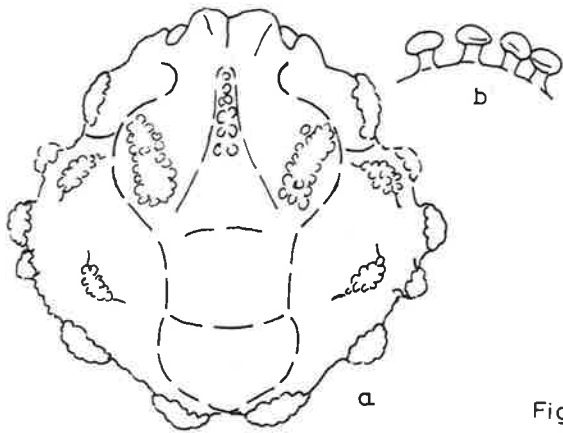


Figure 35

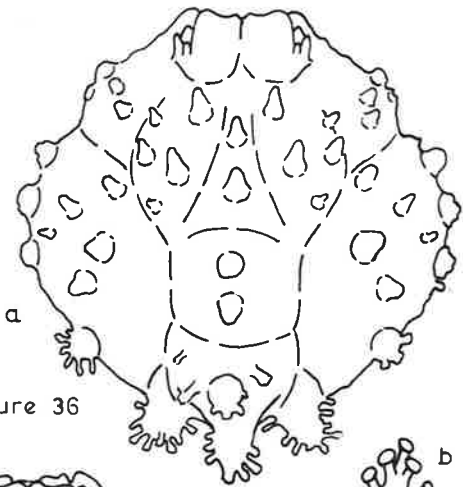


Figure 36

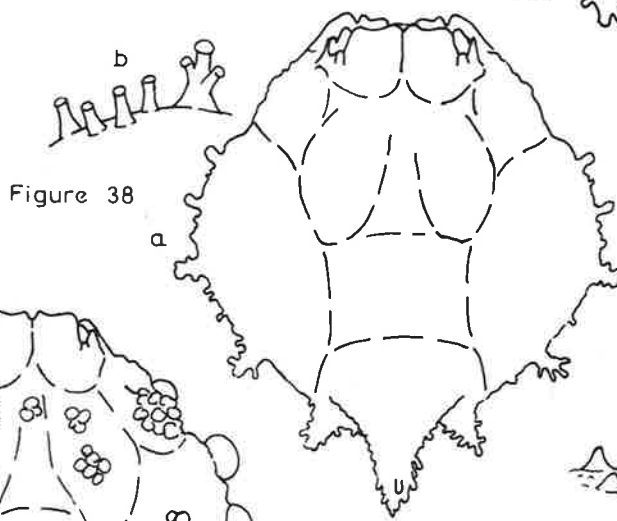


Figure 38

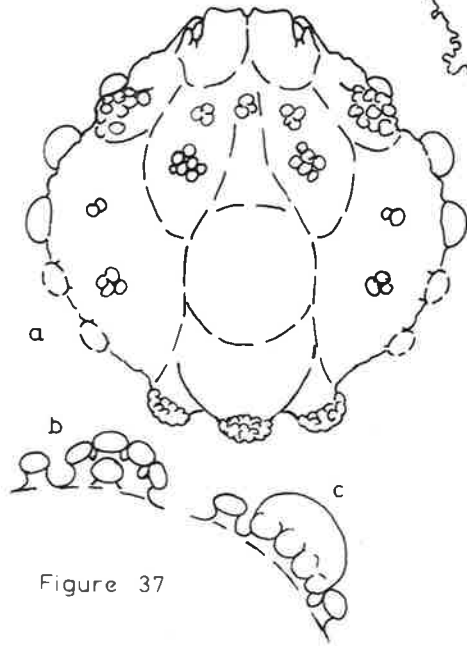


Figure 37

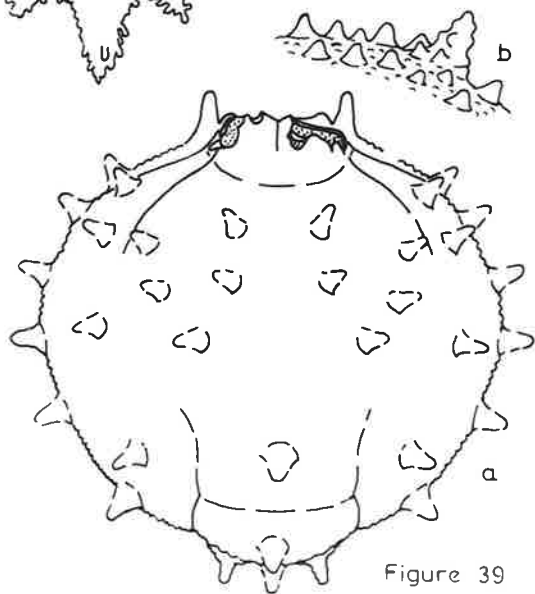


Figure 39

Figure 40

Inferred phylogenetic relationships of the species of  
Lyreidus.

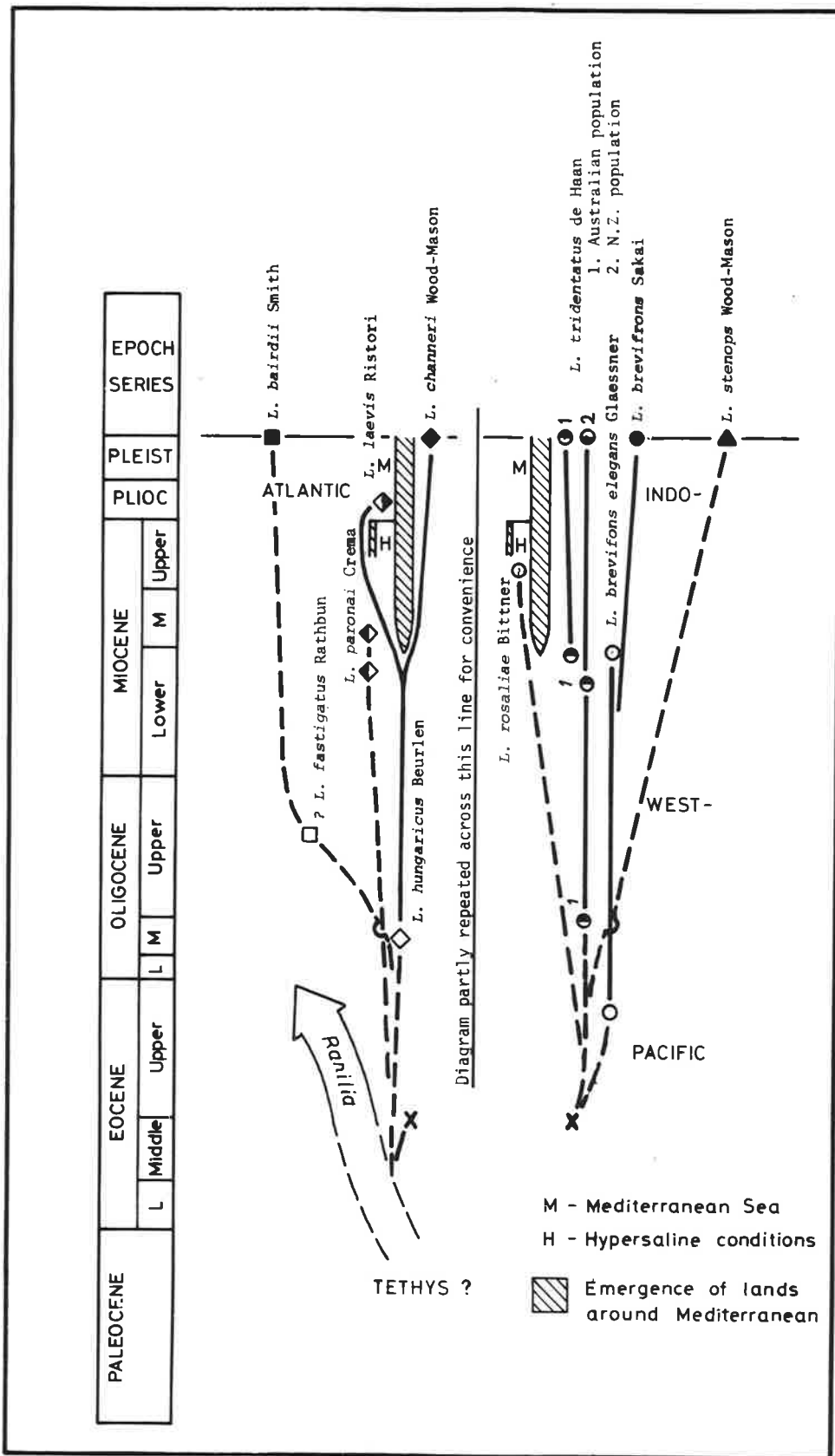


Figure 40

Figure 41

Notomithrax angustifrons sp. nov. a. Dorsal view of carapace,  
x 3; regions notated as follows: F, frontal; O, orbital;  
H, hepatic; Pg, protogastric; Mg, mesogastric; M, metagastric;  
U, urogastric; C, cardiac; I, intestinal; Eb, epibranchial;  
Mb, mesobranchial; Mt, metabranchial. b. Dorsal view of  
orbital region of carapace, x 6. c. Ventral view of anterior  
parts of carapace, x 6.

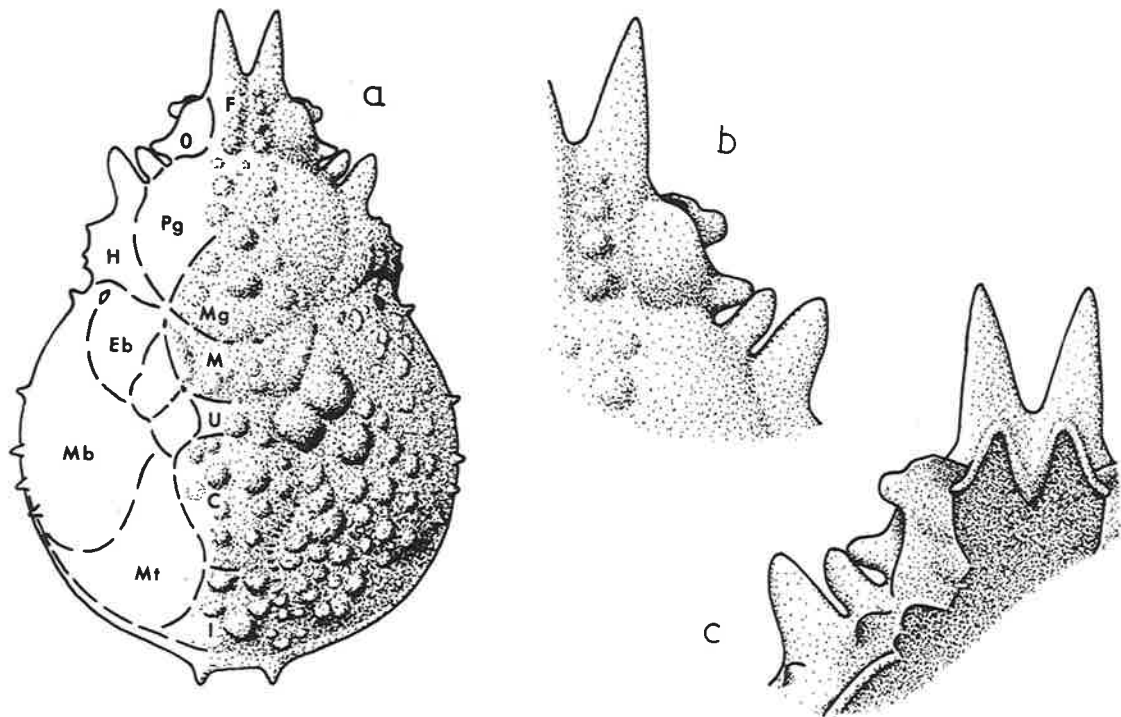


Figure 41

Figure 42

Leptomithrax martensis sp. nov. a. Reconstruction of carapace, dorsal view, x 3; notation of regions as for Figure 41. b. View of interior surface of carapace showing position of muscle attachment scars, x 3. c. Enlarged dorsal view of orbital region, x 6.

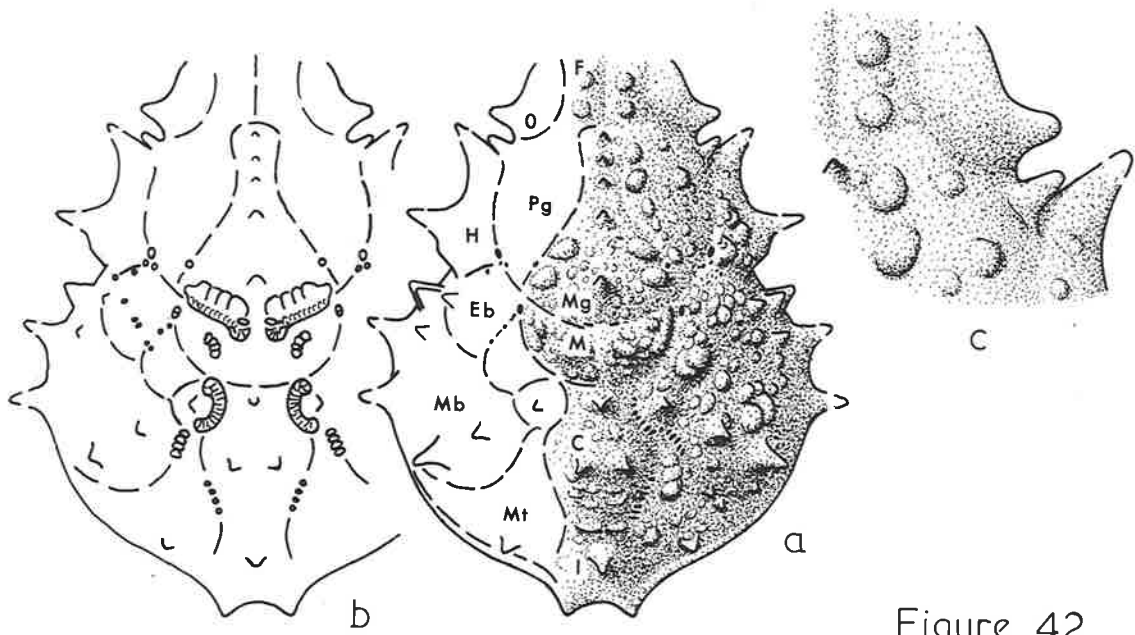


Figure 42



Figure 43

Inferred phylogenetic relationships of some of the species of Leptomithrax. The Eocene part of the scheme is hypothetical.

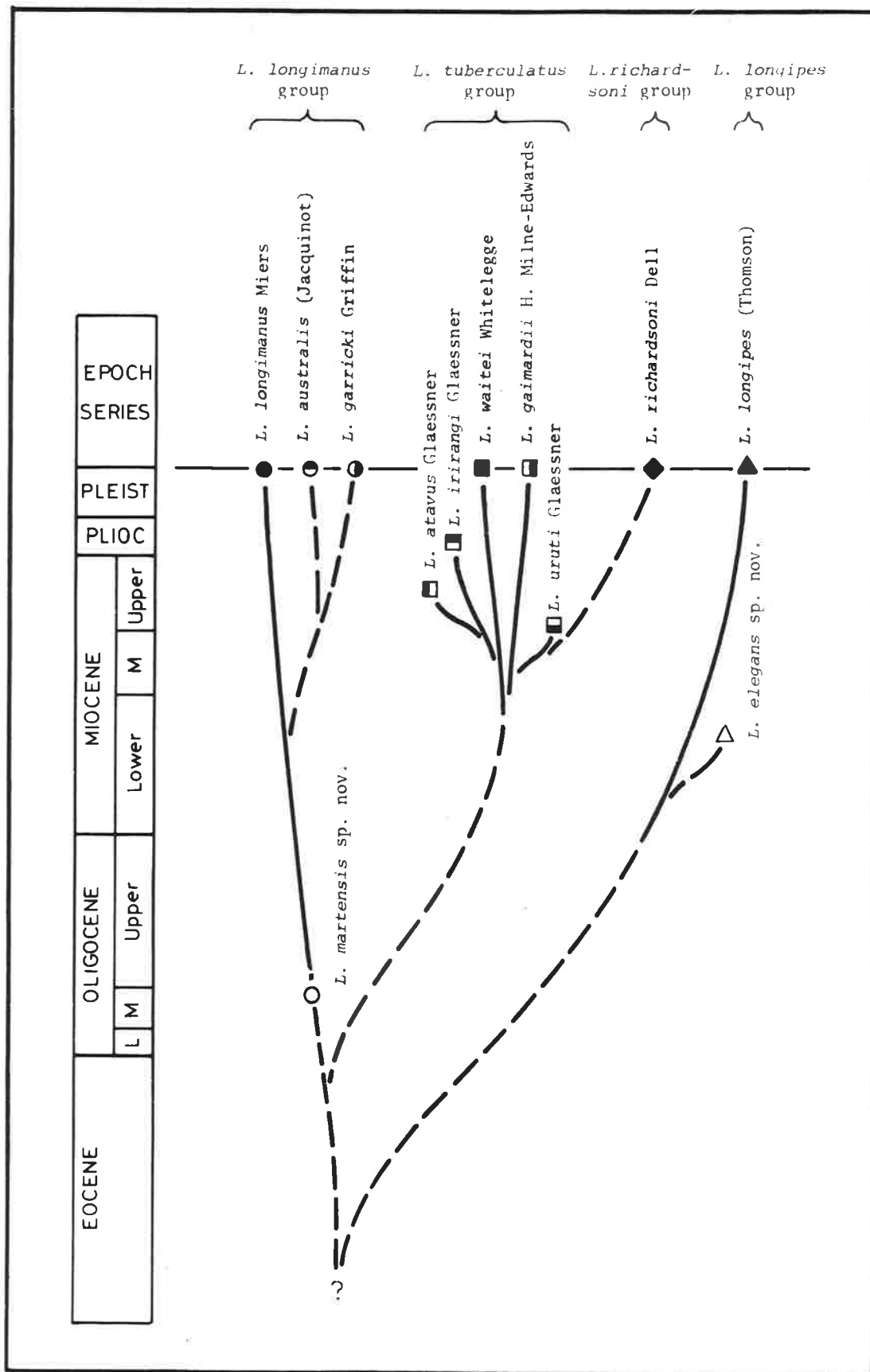


Figure 43

Figure 44

Schizophroida tertiaria sp. nov. a. Dorsal view of juvenile carapace, holotype, S.A.M. P15583, the regions notated as in Figure 41, x 7. b. Lateral view of carapace of holotype, x 7. c. Dorsal view of orbital region of apparently mature carapace, x 7. Ventral view of anterior parts of apparently mature carapace, x 7.

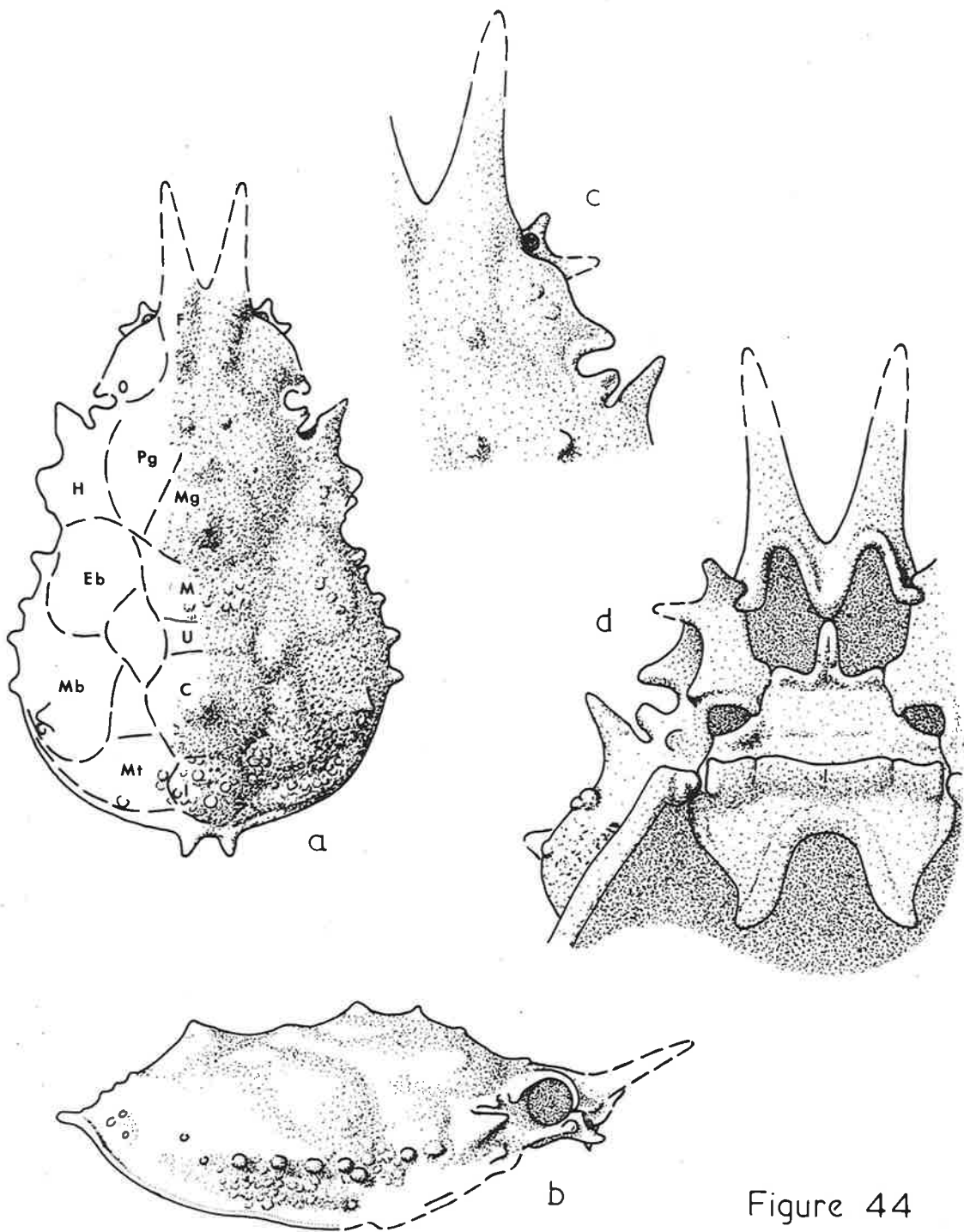


Figure 44

Figure 45

Tutankhamen hieracodes sp. nov. Reconstruction of carapace,  
x 5. Notation of regions as for Figure 41.

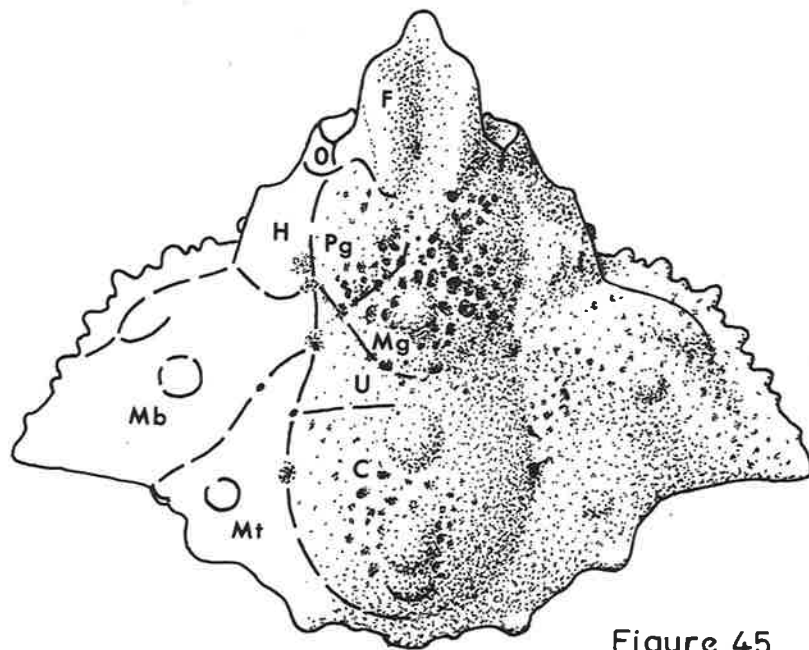


Figure 45

Figure 46

Ovalipes primitivus sp. nov. Reconstruction of carapace, x 4.

Figure 47

Ovalipes denticulatus sp. nov. Reconstruction of carapace,  
x 4.5.

Figure 48

Ovalipes victoriensis sp. nov. Reconstruction of carapace,  
x 2.

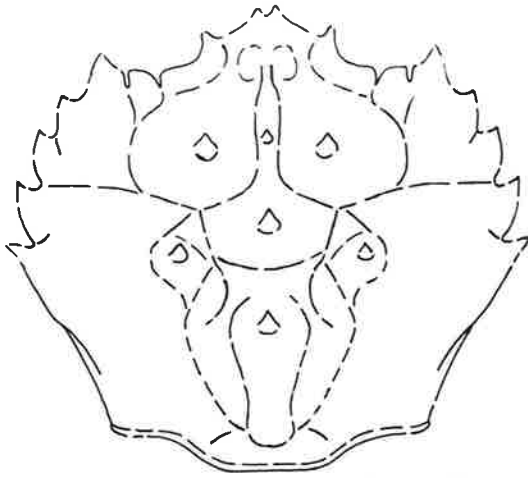


Figure 46

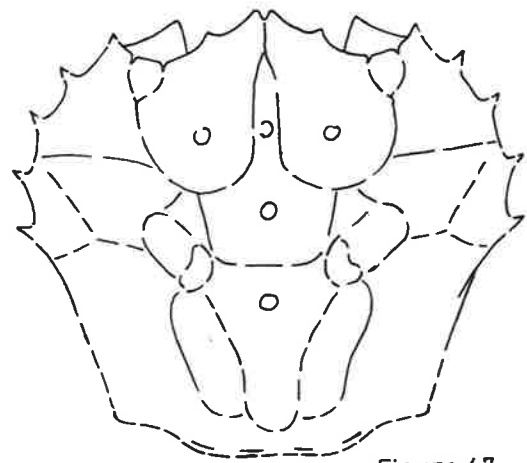


Figure 47

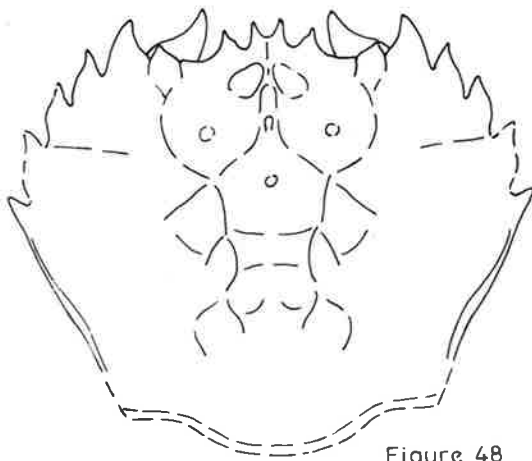


Figure 48



Figure 49

Inferred phylogenetic relationships of species of Ovalipes.  
The pre-Oligocene part of the scheme is hypothetical.

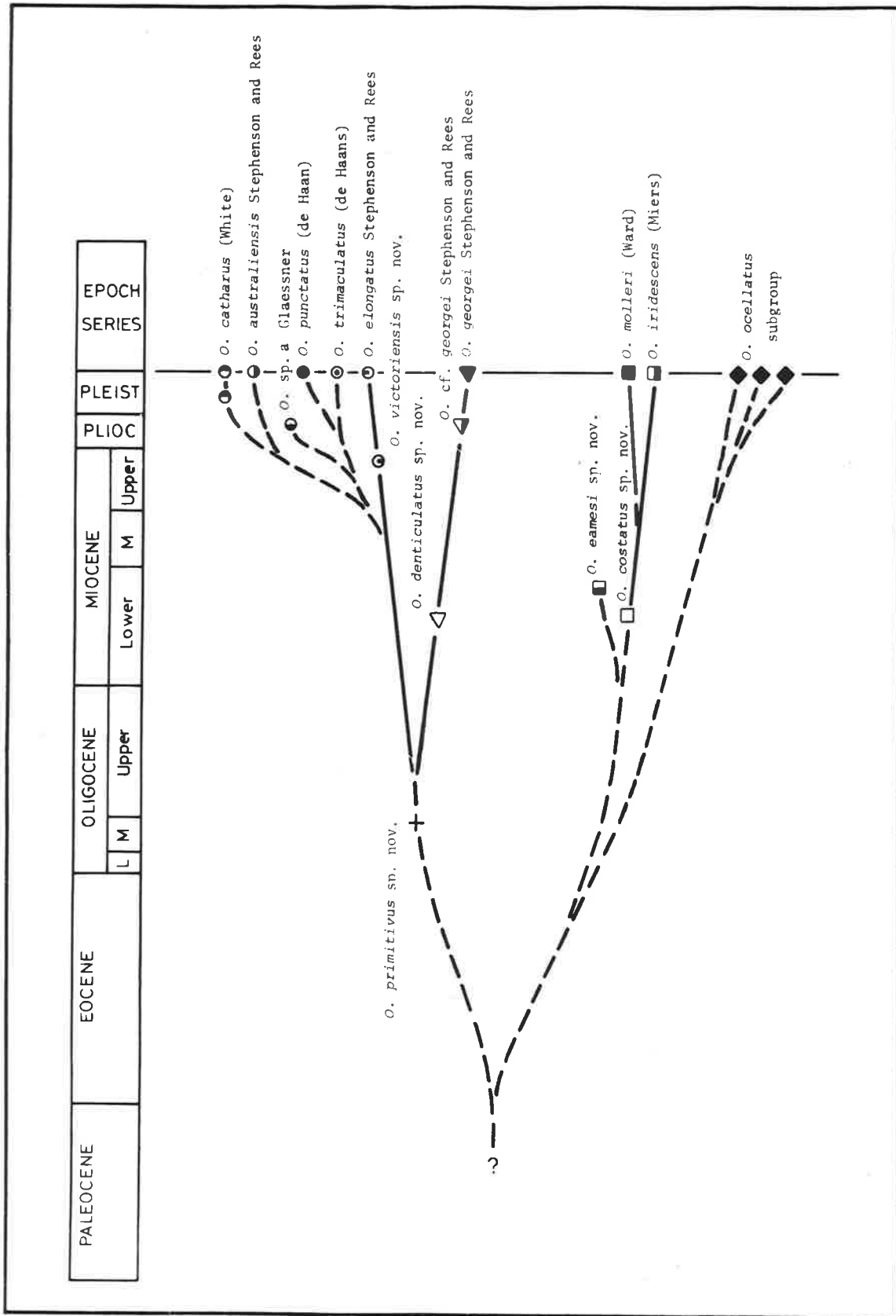


Figure 49

Figure 50

Nectocarcinus cafercoensis sp. nov. Reconstruction of  
carapace, x 7.

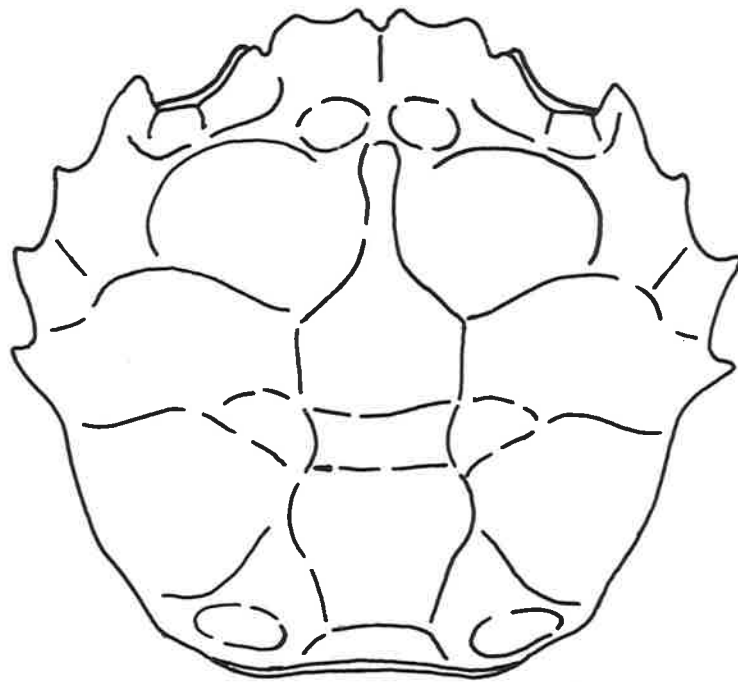


Figure 50

Figure 51

Inferred phylogenetic relationships of species of Nectocarcinus.  
The different lineages occur progressively further eastwards;  
the N. caffercoensis, N. spinifrons lineage is documented in  
southern and western Australia, the N. granosus, N. integrifrons  
group is found in the southern half of Australia, the N.  
antacticus group occurs in New Zealand waters, and N. bullatus  
occurs off Chile.

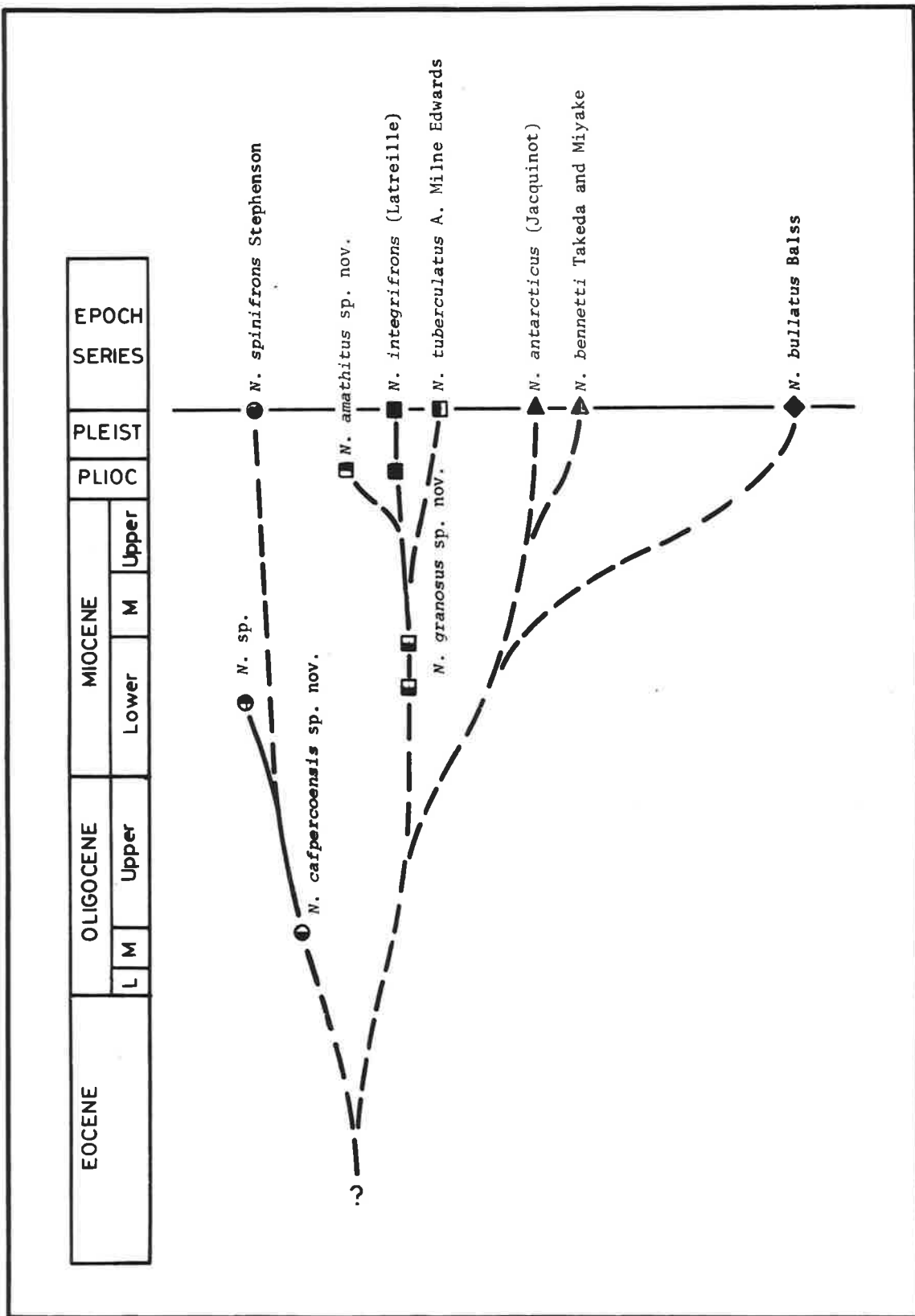


Figure 51

Figure 52

Pseudocarcinus parvus sp. nov. a. Reconstruction of carapace, dorsal view, x 2; notation of regions as follows: F, frontal; O, orbital; Eg, epigastric; H, hepatic; Pg, protogastric; Mg, mesogastric; M, metagastric; U, urogastric; C, cardiac; Eb, epibranchial; Mb, mesobranchial; Mt, metabranchial.

b. View of interior surface of carapace showing muscle attachment scars, x 2. c. Merus, carpus and propodus of right (larger) cheliped, lateral view, x 2.

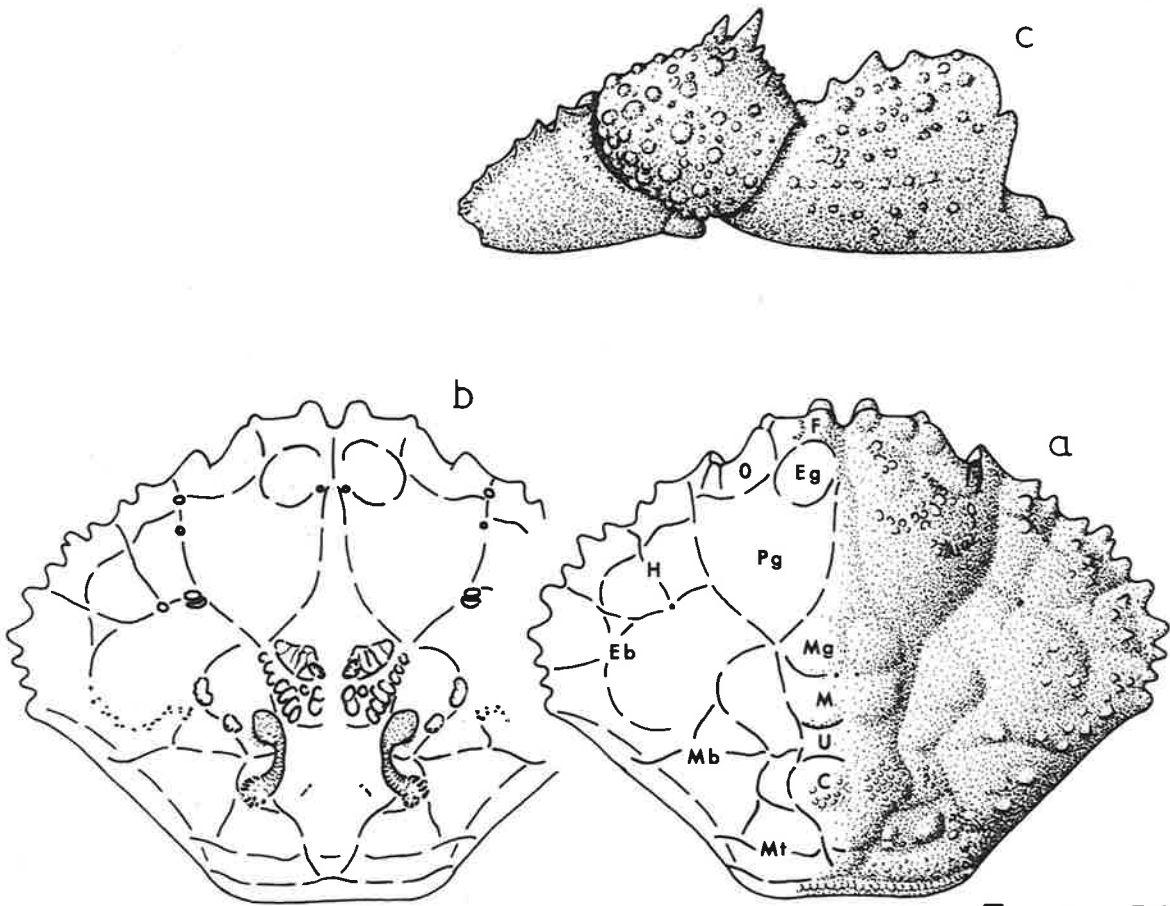


Figure 52



Figure 53

Pseudocarcinus cf. gigas (Lamarck, 1818). a. Hypothetical outline of carapace: the part of specimen N.M.V. P29348aa preserved is indicated by a heavy line, x .6. b. Hypothetical outline of the right (larger) claw: a heavy line indicates the part of specimen N.M.V. P29348b preserved, x .6.

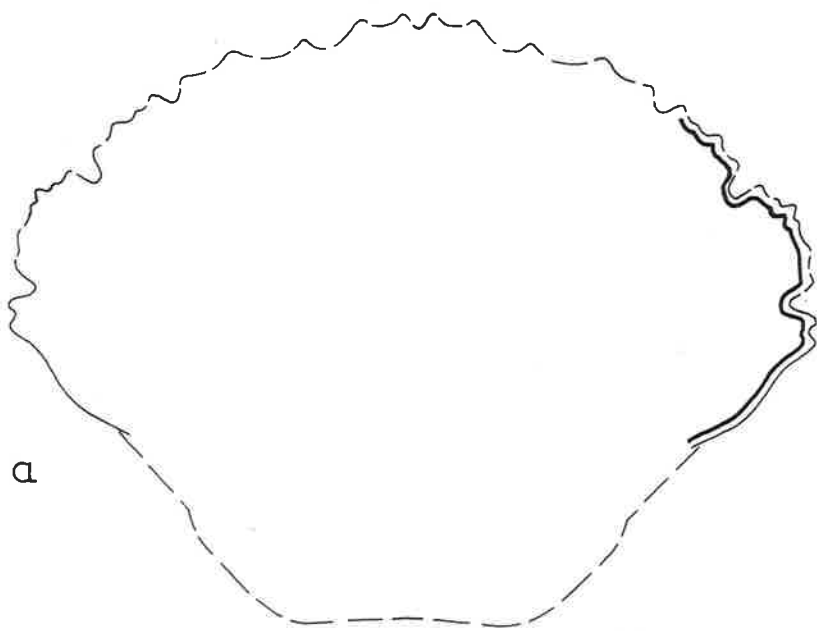
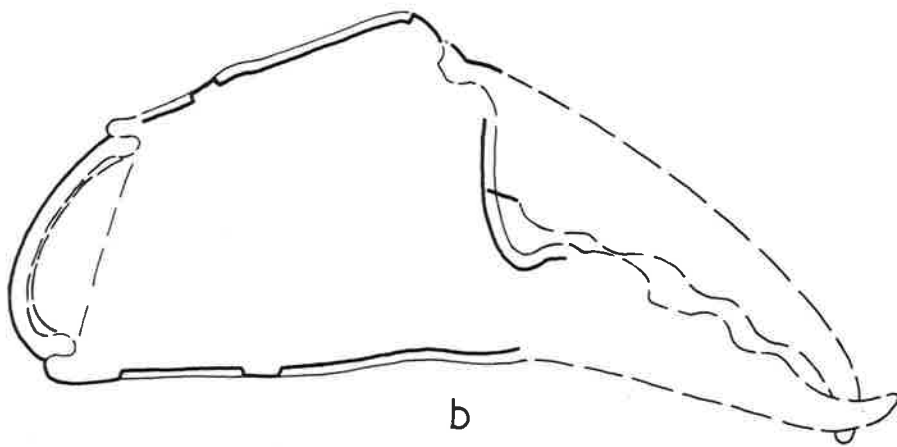


Figure 53

Figure 54

Width of the carapace and length of the palm of the larger claw of species of Pseudocarcinus plotted against geological time. Time scale after Berggren, 1969a.

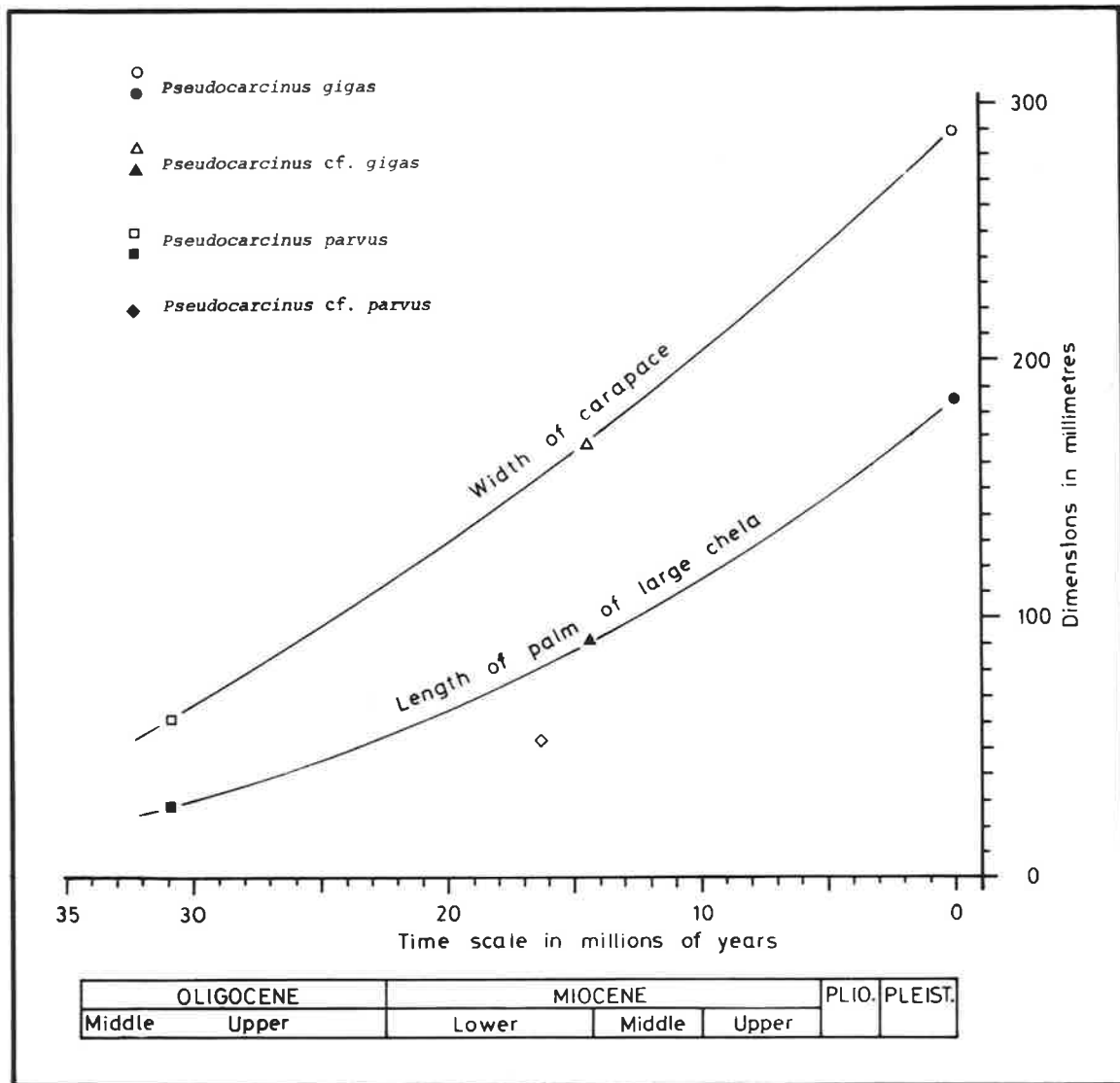


Figure 54

Figure 55

Regressions of double-logarithmic plots of selected dimensions  
of the carapace of Pseudocarcinus parvus and Pseudocarcinus  
gigas.

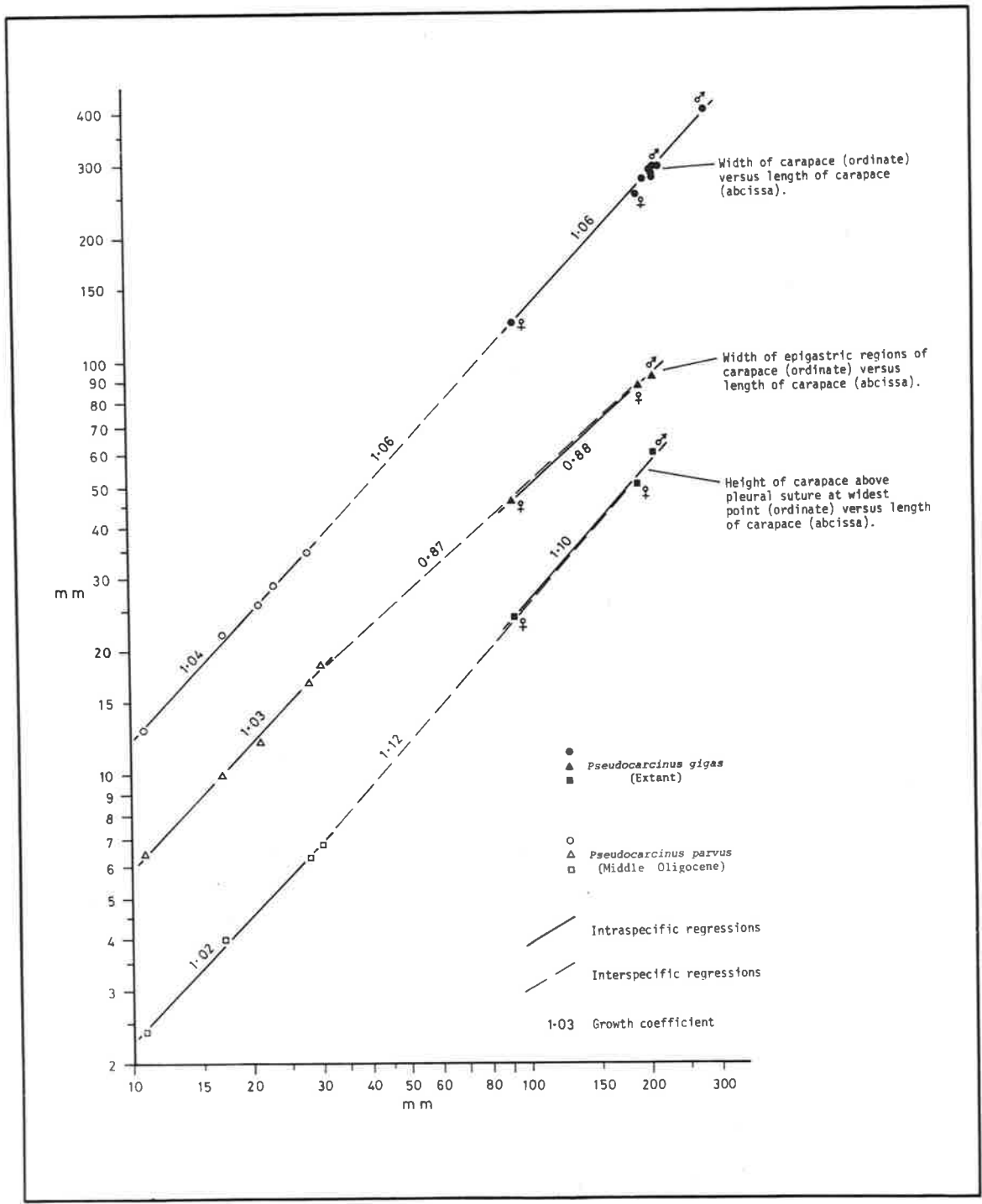


Figure 55

Figure 56

Regressions of double-logarithmic plots of selected dimensions of the chelae and dimensions of the chelae versus the length of the carapace for fossil forms of Pseudocarcinus and the living Pseudocarcinus gigas.

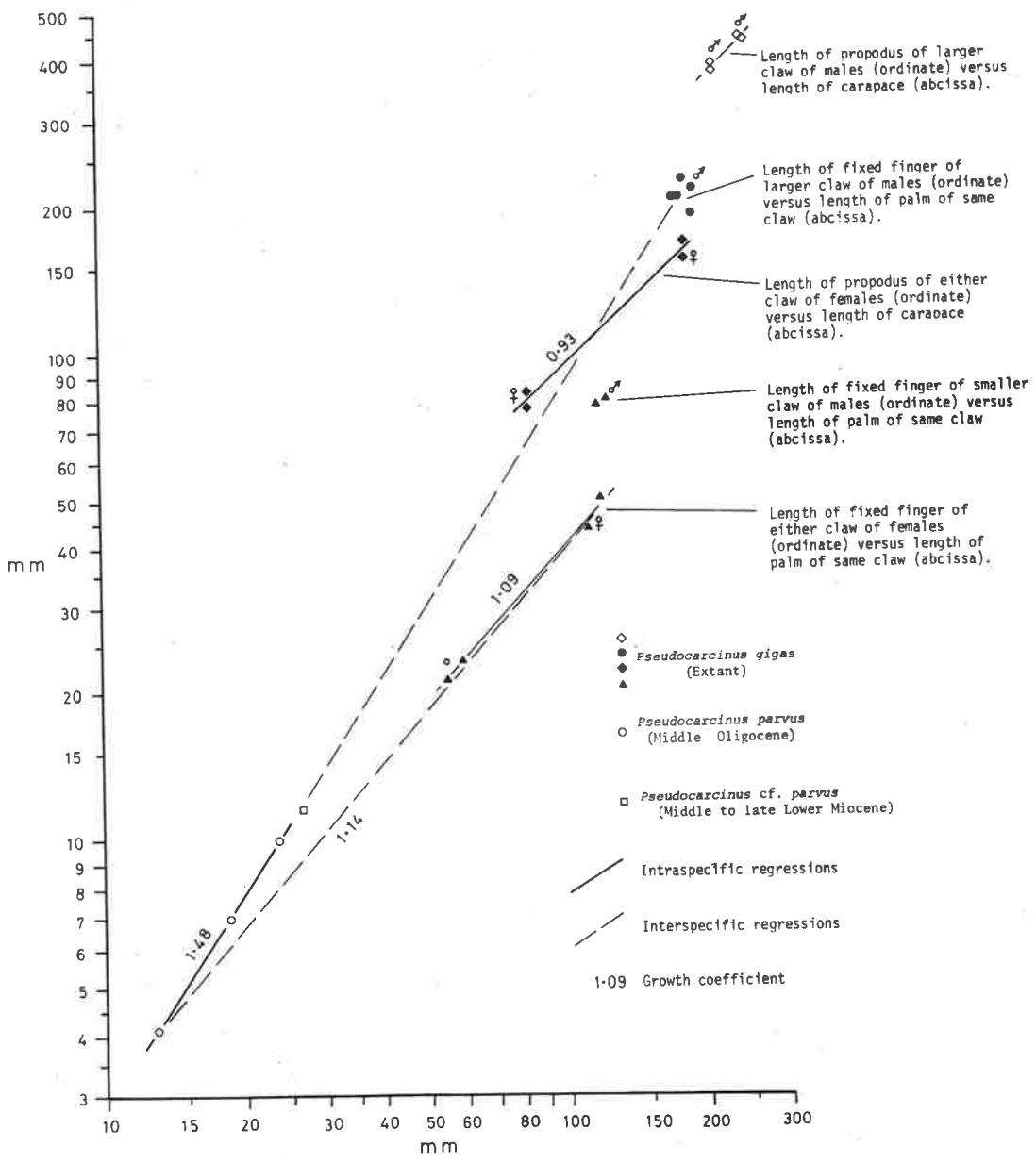


Figure 56



Figure 57

Carcinoplax praevictoriensis sp. nov. Reconstruction of carapace: view of interior surface showing muscle attachment scars, x  $4\frac{1}{2}$ . Regions notated as follows: F, frontal; O, orbital; Eg, epigastric; H, hepatic; Pg, protogastric; Mg, mesogastric; U, urogastric; C, cardiac; I, intestinal; Eb, epibranchial; Mb, mesobranchial; Pl, posterolateral.

Figure 58

Carcinoplax woodsi sp. nov. Reconstruction of carapace, x 5.

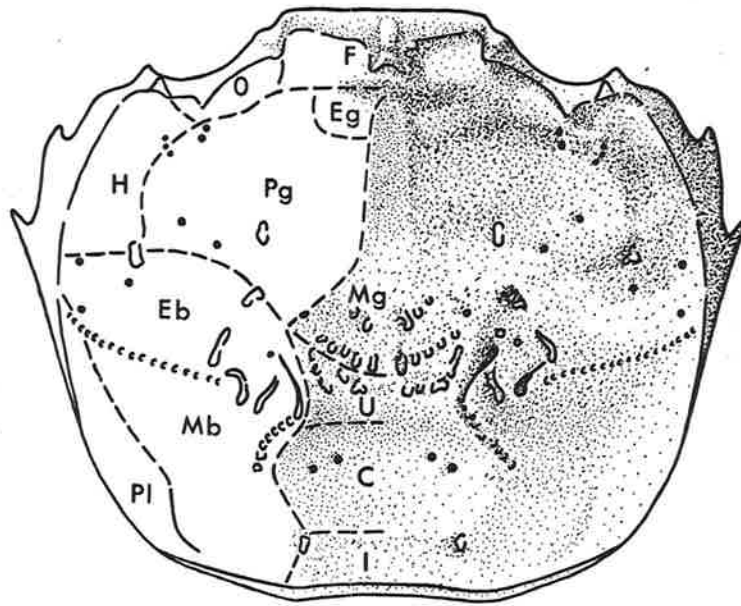


Figure 57

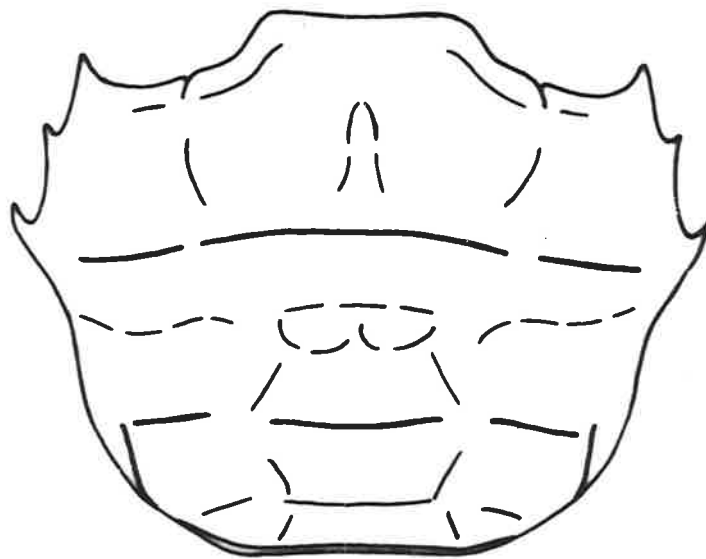


Figure 58

Figure 59

Inferred phylogenetic relationships of some of the species  
of Carcinoplax.

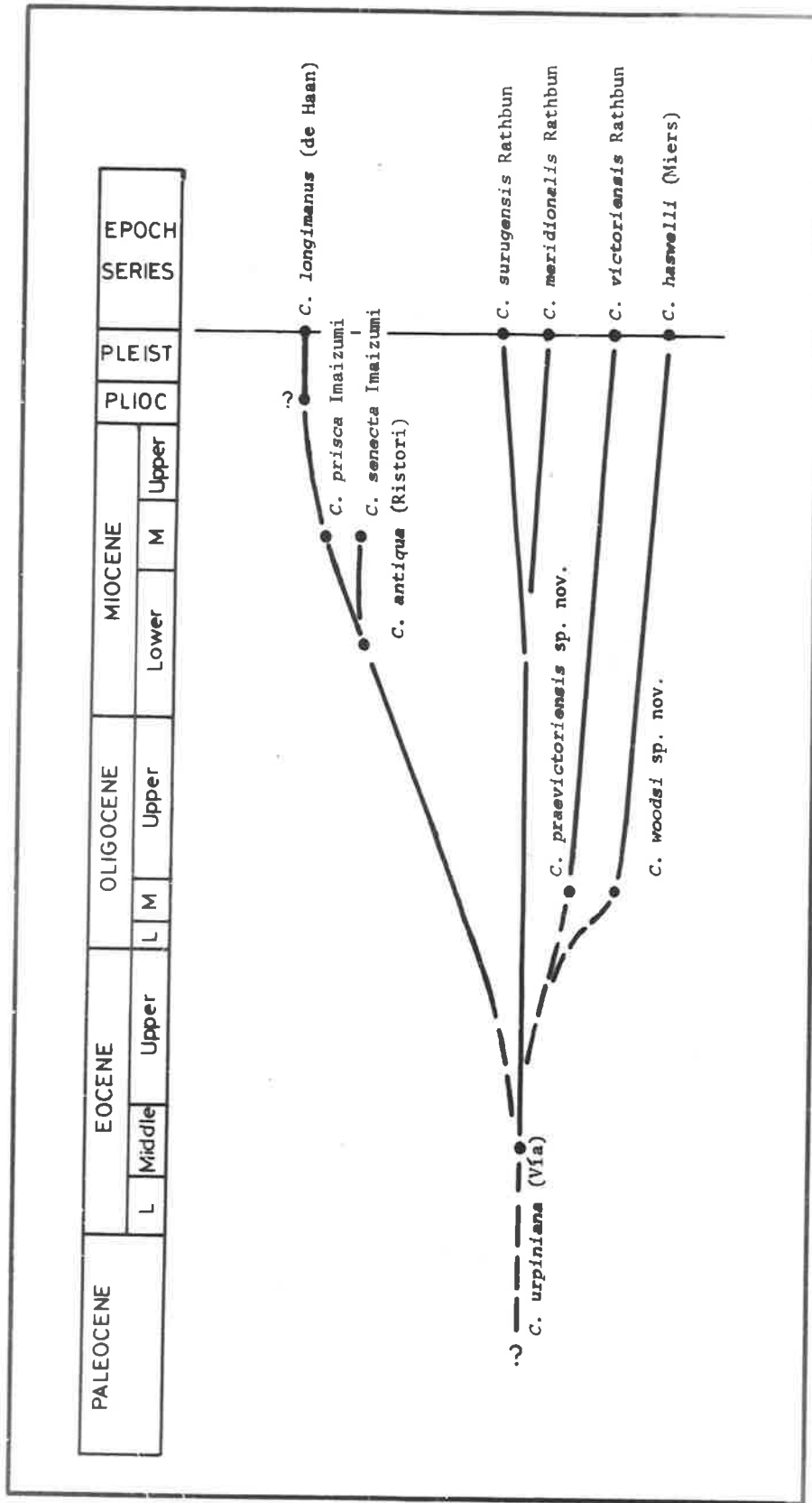


Figure 59

Figure 60

Reconstruction of Metanephrops motunauensis gen. nov., sp. nov.

Areas with large stipple are coarsely pitted. All drawings to same scale, approximately  $\frac{2}{3}$  times natural size.

- A. ♀, lateral view: upper distal portion of eyestalk (es), basal joint of left antennal peduncle (ba), basis of left first pereopod (bp).
- B. ♀, dorsal view: right antennal scale (as).
- C. ♂, allotype/zfc 202 (C.M.), dorsal view of second, third and fourth abdominal segments.
- D. ♂, allotype, dorsal view of merus and carpus of right first pereopods.
- E. ♂, allotype, dorsal view of chela of right first pereopod.

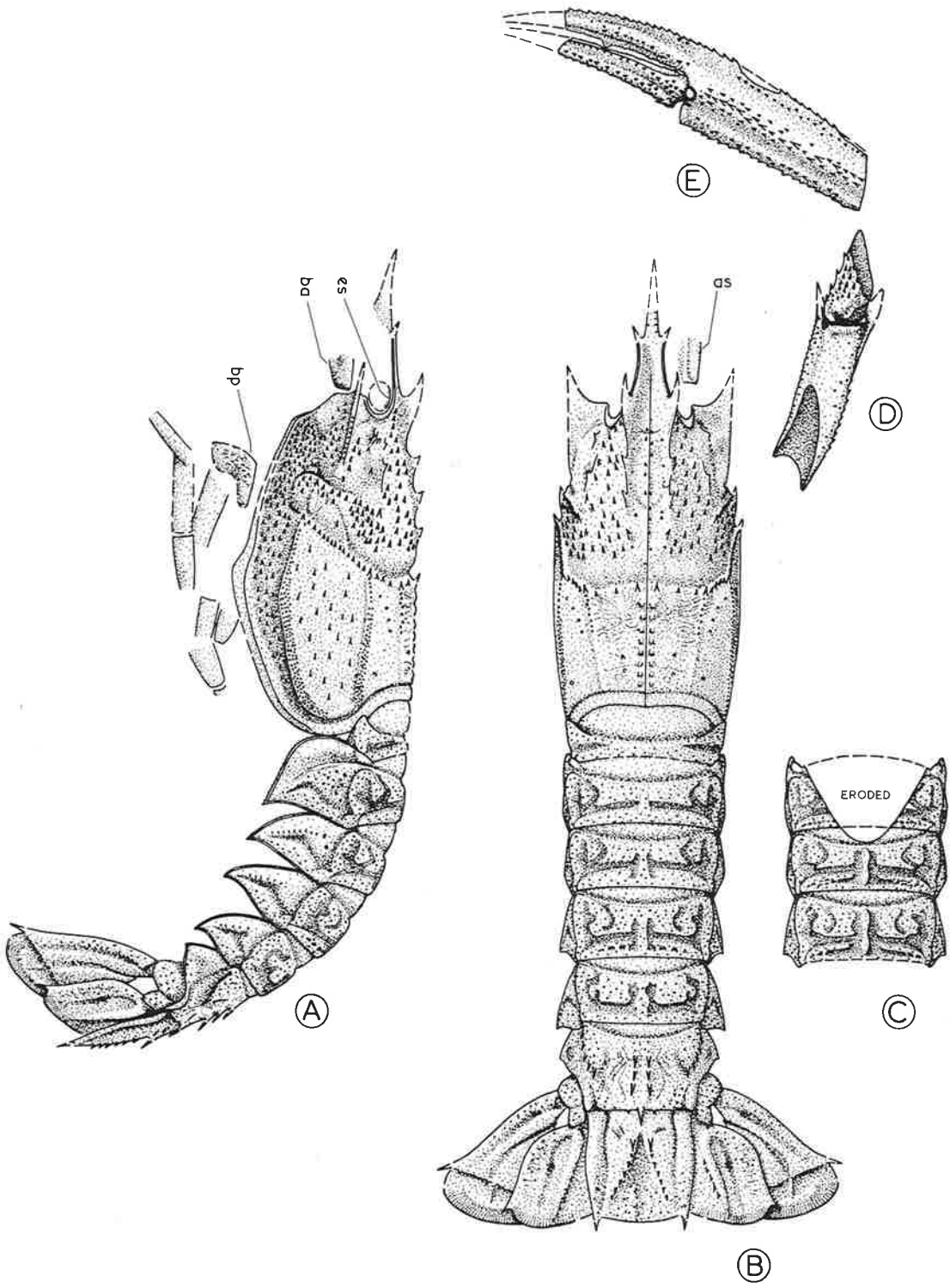


Figure 60

Figure 61

Geographic distribution of species of Metanephrops gen. nov.

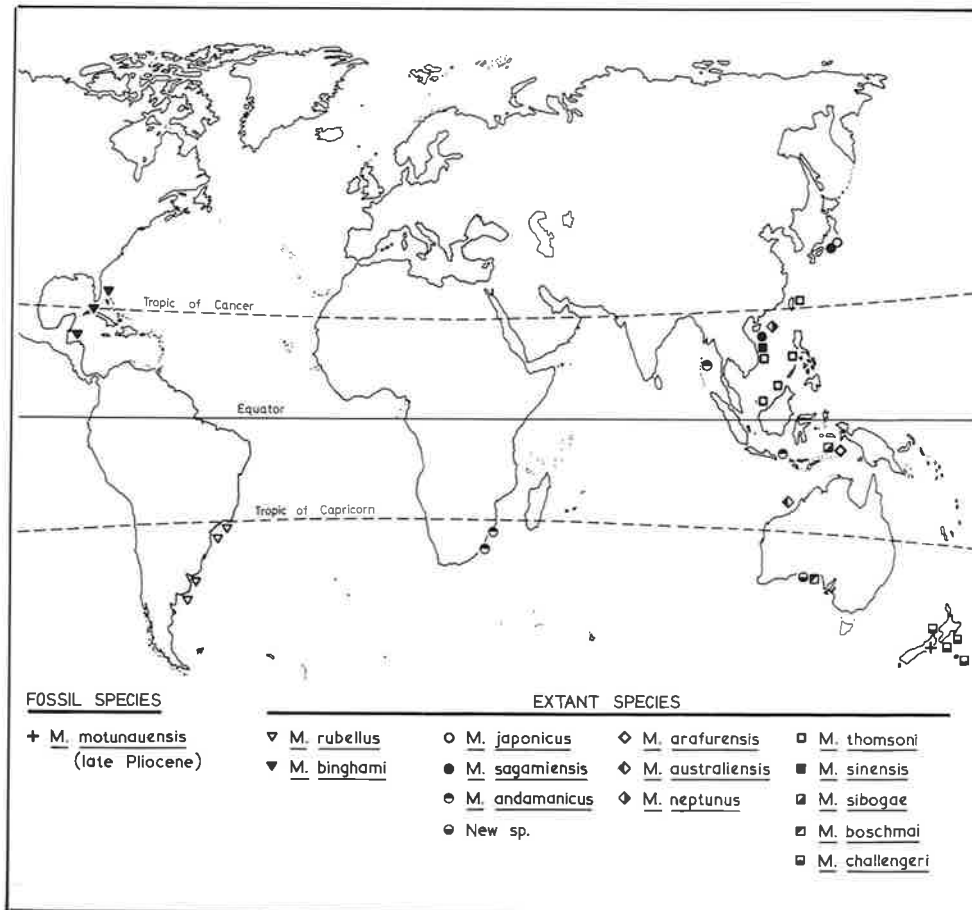


Figure 61



Figure 62

Known depth range of extant species of Metanephrops gen. nov.

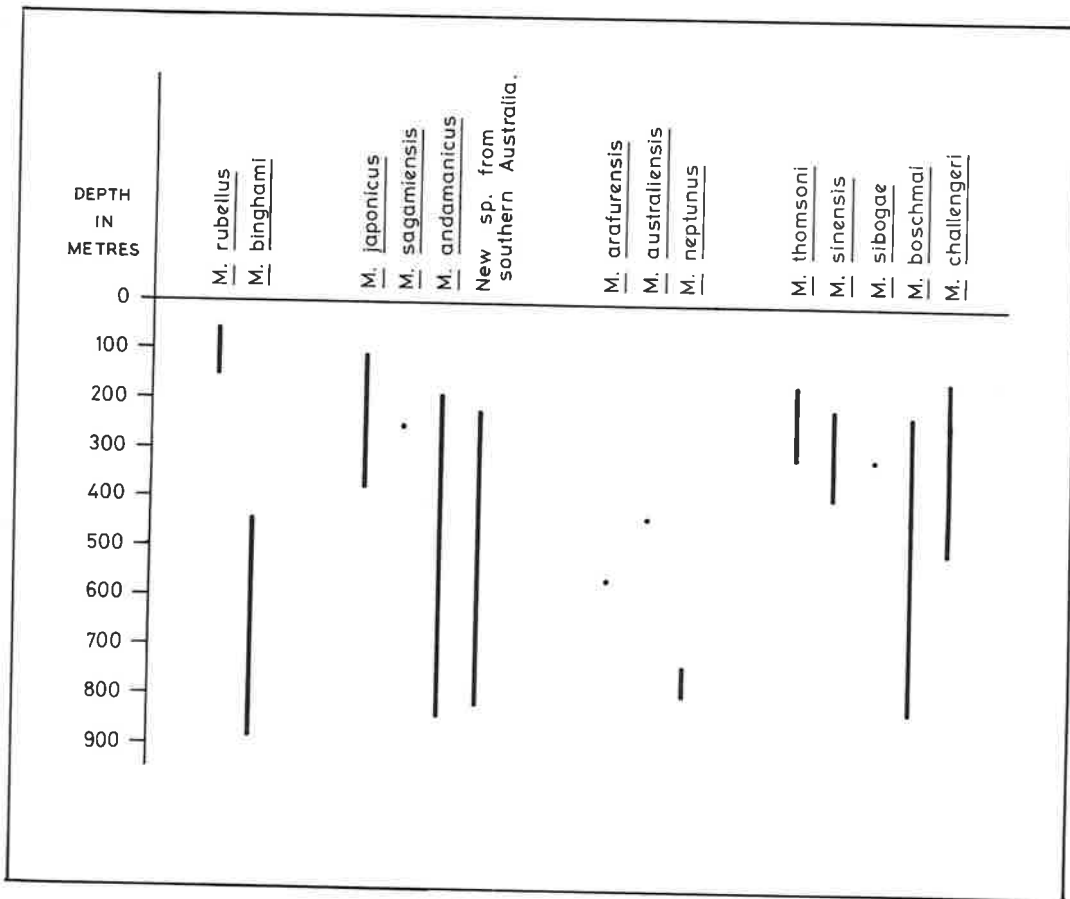


Figure 62

Figure 63

Inferred phylogenetic relationships of species of Metanephrops gen. nov. Except for the fossil M. motunauensis sp. nov.; the geological time scale is arbitrary with respect to the phylogenetic scheme.

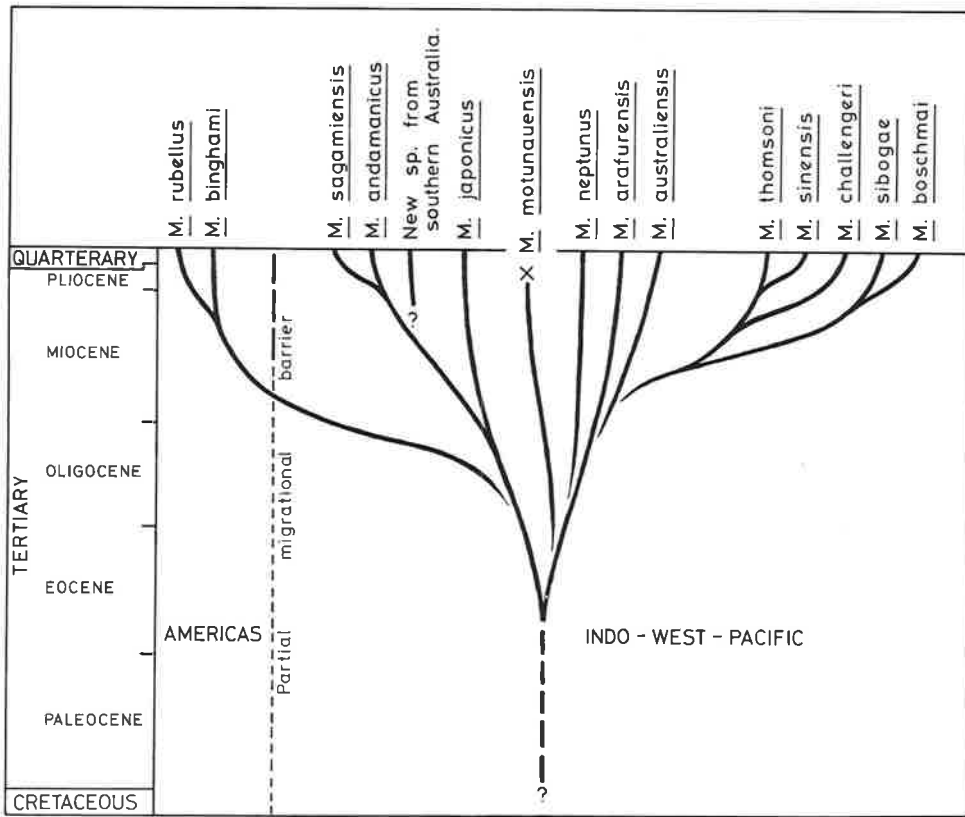


Figure 63

Plate 1 (cont'd)

Callianassa cf. aequimana Baker, 1907

Fig. 13a,b Incomplete propodus of right chela, specimen S.A.M. P15551.  
13a, lateral view of outer surface, x 5. 13b, lateral  
view of inner surface, x 5. Mannum Formation, 7 m above  
N.R.L., Nildottie loc.3. Middle Lower Miocene.

Plate 1 (cont'd)

- Fig.7a-c Fingers of smaller chela, all x  $1\frac{1}{2}$ . 7a, lateral view of inner side of dactylus, paratype S.A.M. P15815. 7b, lateral view of outer side of dactylus, paratype S.A.M. P15816. 7c, lateral view of outer side of fixed finger, paratype S.A.M. P15817. Locality and age of all as for P15810, fig.5a,b.

Callianassa bulwara sp. nov.

- Fig.8a,b Incomplete propodus of left (larger) cheliped, holotype S.A.M. P15627. 8a, lateral view of outer surface, x 3. 8b, lateral view of inner surface, x 3. Mannum Formation, 7-8.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.9 Lateral view of outer side of incomplete propodus of right (larger) chela, paratype S.A.M. P15628, x  $2\frac{3}{4}$ . Locality and age as for P15627, fig.8a,b.
- Fig.10 Lateral view of outer side of fixed finger of right (larger) chela, paratype S.A.M. P15629, x 3. Locality and age as for P15627, fig.8a,b.
- Fig.11 Lateral view of outer side of fixed finger of left (larger) chela, paratype S.A.M. P15630, x 3. Mannum Formation, from 14 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Callianassa aequimana Baker, 1907

- Fig.12a,b Propodus of left chela, hypotype S.A.M. P15890. 12a, lateral view of outer surface, x  $2\frac{1}{2}$ . 12b, lateral view of inner surface, x  $2\frac{1}{2}$ . Middle part of Hallett Cove Sandstone, cliffs south of Port Willunga. Pliocene.

Plate 1

Axius wadeae sp. nov.

- Fig.1 Lateral view of outer side of right (larger) chela, holotype S.A.M. P15797, x 2. Gambier Limestone, between 8 and 9 m below ground surface in quarry on section 601, Hundred of Blanche, Mount Gambier loc.2. Middle Lower Miocene.
- Fig.2 Lateral view of inner side of incomplete propodus of right (larger) chela, paratype S.A.M. P15801, x  $3\frac{1}{2}$ . Locality and age as for P15797, fig.1.
- Fig.3 Lateral view of inner side of incomplete left (larger) chela, paratype S.A.M. P15800, x  $2\frac{1}{2}$ . Locality and age as for P15797, fig.1.
- Fig.4a,b Incomplete propodus of right (? smaller) chela; paratype S.A.M. P15803. 4a, lateral view of outer side, x 4. 4b, lateral view of inner side, x 4. Locality and age as for P15797, fig.1.

Axius morganensis sp. nov.

- Fig.5a,b Nearly complete right (larger) chela, holotype S.A.M. P15810. 5a, lateral view of outer surface, x  $1\frac{1}{2}$ . 5b, lateral view of inner surface, x  $1\frac{1}{2}$ . Morgan Limestone, top 3 m of upper member, Morgan loc.1. Late Lower or early Middle Miocene.
- Fig.6 Lateral view of outer side of left (larger) chela, paratype S.A.M. P15811, x  $1\frac{1}{4}$ . Locality and age as for P15810, fig.5a,b.

PLATE 1

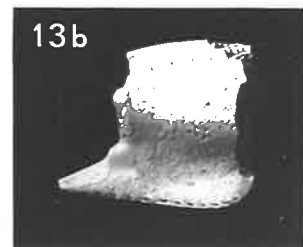
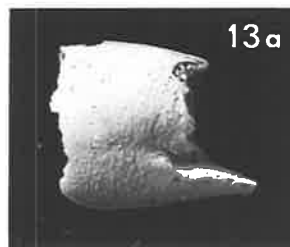
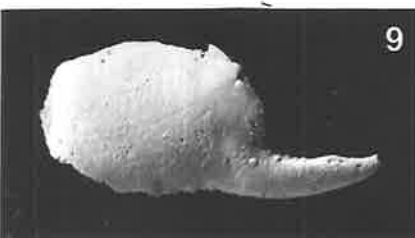
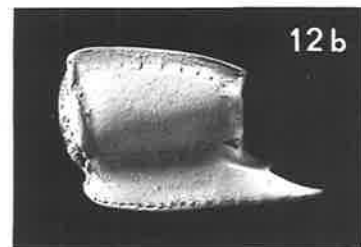
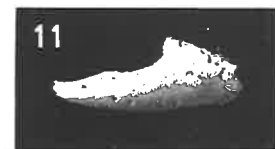
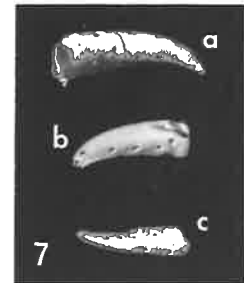
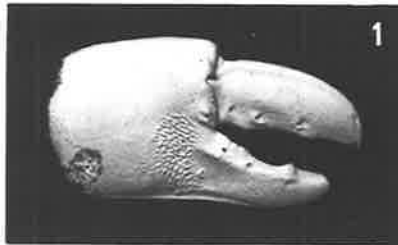




Plate 2 (cont'd)

- Fig. 13a,b Fixed finger of left (larger) chela, paratype S.A.M. P15875. 13a, lateral view of outer surface, x 2. 13b, lateral view of inner surface, x 2. Top part of Cadell Marl Lens, Morgan loc.1. Late Lower Miocene.
- Fig. 14 Lateral view of inner side of fixed finger of right (smaller) chela, paratype S.A.M. P15881, x  $2\frac{1}{2}$ . Locality and age as for N.M.V. P29351, fig. 10.

Plate 2 (cont'd)

- Fig.6 Lateral view of external mould and incomplete remains of dactylus of right (larger) chela, paratype N.M.V. P29358, x 1½. Remains further damaged since photograph taken. Specimen within a phosphatic nodule; locality and age as for N.M.V. P29362, fig.5.
- Fig.7 Lateral view of external mould and partial remains (inner side) of dactylus of right (larger) chela, paratype N.M.V. P29359, x 1½. In a phosphatic nodule; locality and age as for N.M.V. P29362, fig.5.
- Fig.8a-d Specimens of palm of right (larger) cheliped. 8a,b, lateral view of outer surface, 8a, paratype N.M.V. P29360, 8b, paratype N.M.V. P29361, both x 1. 8c,d, dorsal view, 8c, N.M.V. P29360, 8d, N.M.V. P29361, both x 1. From within phosphatic nodules; locality and age as for N.M.V. P29362, fig.5.

Ctenocheles compressus sp. nov.

- Fig.9a,b Dactylus of right (larger) chela, holotype S.A.M. P15872. 9a, lateral view of outer surface, x 2. 9b, lateral view of inner surface, x 2. (Morgan Limestone), River Murray Cliffs, South Australia. Probably Lower Miocene.
- Fig.10 Lateral view of outer side of incomplete dactylus of right (larger) chela, paratype N.M.V. P29351, x 2. Cadell Marl Lens, Morgan loc.1. Late Lower Miocene.
- Fig.11 Lateral view of inner side of incomplete dactylus of left (larger) chela, paratype S.A.M. P15873, x 3. Locality and age as for P15872, fig.9a,b.
- Fig.12 Lateral view of inner surface of incomplete dactylus of left (larger) chela, paratype S.A.M. P15876, x 3. Morgan Limestone, 3 m below top of upper member, Morgan loc.1. Late Lower or possibly early Middle Miocene.

Plate 2

Callianassa aequimana Baker, 1907

- Fig.1      Carpus and chela of right cheliped (lateral view of outer surface) in association with the claw of the left cheliped, hypotype S.A.M. P15889, x  $2\frac{1}{2}$ . Middle part of Hallett Cove Sandstone, sea cliffs south of Port Willunga. Pliocene.

Ctenocheles fragilis sp. nov.

- Fig.2      Lateral view of outer side of incomplete fixed finger of left (larger) cheliped, holotype N.M.V. P29352, x 2. (Top of Jan Juc Marl), the Ledge, cliffs opposite Bird Rock, Torquay. Late Upper Oligocene or early Lower Miocene.
- Fig.3a-e    Incomplete fingers of the larger claw, all x 2. 3a, lateral view of outer surface of dactylus of a left claw, paratype N.M.V. P29357. 3b, lateral view of inner surface of dactylus of a left claw, paratype N.M.V. P29353. 3c, ventral view of base of dactylus of a right claw, paratype N.M.V. P29354. 3d, lateral view of inner side of fixed finger of a left claw, paratype N.M.V. P29355. 3e, lateral view of outer side of fixed finger of a left claw, paratype N.M.V. P29356. Locality and age as for N.M.V. P29352, fig.2.
- Fig.4      Lateral view of inner side of incomplete fixed finger of right (smaller) chela, paratype S.A.M. P15884, x 2. Puebla Clay, from a fallen block, cliffs near Bird Rock, Torquay. Early to middle Lower Miocene.
- Fig.5      Lateral view of outer side of incomplete fixed finger of left (larger) chela, paratype N.M.V. P29362, x  $1\frac{1}{2}$ . Since the photograph was taken the specimen has been further damaged. Specimen within a phosphatic nodule from nodule bed at base of Moorabool Viaduct Sand at Curlewis, near Geelong. Remanié, within the Late Miocene.

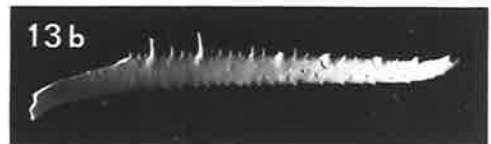
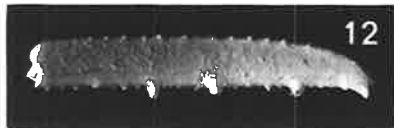
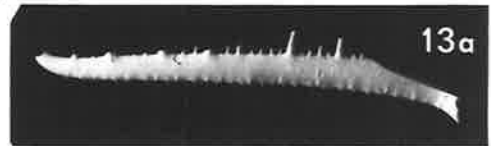
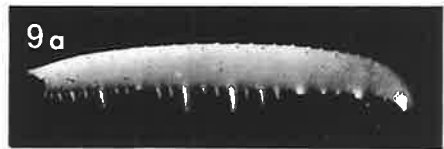
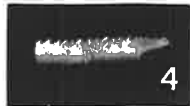
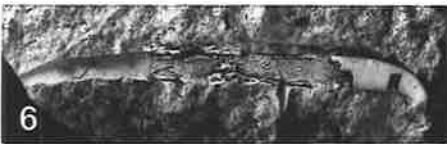
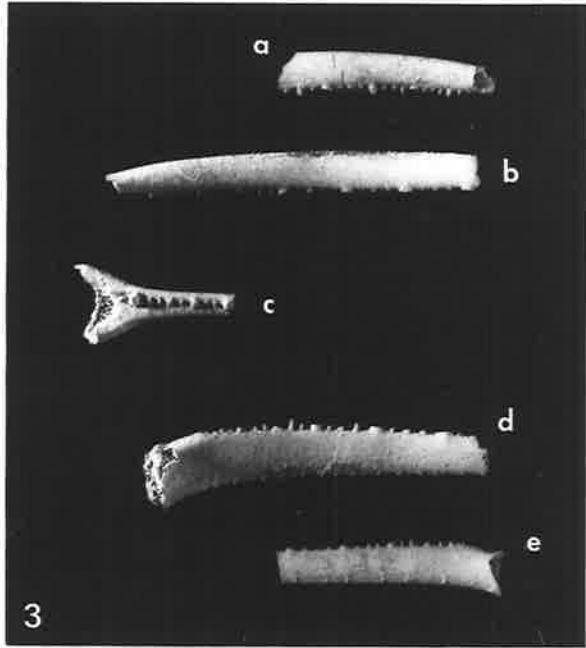
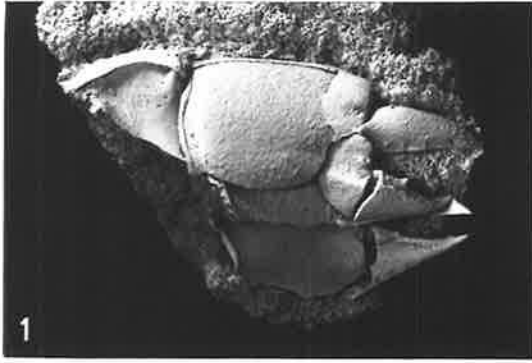


Plate 3 (cont'd)

Fig.15 Lateral view of outer side of propodus of right (smaller) anterior cheliped, paratype S.A.M. P15571, x 4. Locality and age as for P15570, fig.13.

Fig.16a,b Propodus of right (smaller) anterior cheliped, paratype S.A.M. P15573. 16a, lateral view of outer side, x 7. 16b, lateral view of inner side, x 7. From 10 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Plate 3 (cont'd)

- Fig.8a,b Proximal part of dactylus of left (larger) chela, paratype S.A.M. P15859. 8a, lateral view of inner surface, x 2. 8b, ventral view, x 2. Stratigraphic position unknown, River Murray Cliffs, South Australia. Probably Lower to early Middle Miocene.
- Fig.9 Lateral view of outer side of proximal part of dactylus of right (larger) chela, paratype S.A.M. P15858, x 2. Mannum Formation, 12-13.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.10 Lateral view of outer side of proximal part of fixed finger of right (smaller) anterior cheliped, paratype S.A.M. P15869, x 2½. Morgan Limestone, middle part of lower member at Morgan loc.1. Late Lower Miocene.
- Fig.11a,b Incomplete dactylus of left (smaller) anterior cheliped, paratype S.A.M. P15870. 11a, lateral view of outer side, x 2½. 11b, ventral view, x 2½. Locality and age as for P15869, fig.10.
- Fig.12 Lateral view of inner side of fixed finger of left (smaller) chela, paratype S.A.M. P15879, x 3. Cadell Marl Lens, Morgan loc.1. Late Lower Miocene.

Paquristes chondrochelus sp. nov.

- Fig.13 Lateral view of outer side of propodus of left (larger) chela, holotype S.A.M. P15570, x 3½. Between 7.5 and 15 m above N.R.L., Nildottie loc.4. Middle Lower Miocene.
- Fig.14 Lateral view of inner side of propodus of left (larger) chela, paratype S.A.M. P15574, x 3½. From about 16.5 m above N.R.L., Nildottie loc.3. Late Lower Miocene.

Plate 3

Ctenocheles sclephros sp. nov.

- Fig.1a,b Fixed finger of left (larger) chela, the distal end incomplete, holotype S.A.M. P15854. 1a, lateral view of outer surface, x 2. 1b, lateral view of inner surface, x 2. Cadell Marl Lens, middle part, Morgan loc.1. Late Lower Miocene.
- Fig.2 Lateral view of inner side of incomplete palm of right (smaller) anterior cheliped, paratype S.A.M. P15856, x 2½. Same locality and age as P15854 (fig.1a,b), in direct association with it.
- Fig.3 Lateral view of inner side of distal part of fixed finger of left (larger) chela, paratype S.A.M. P15855, x 2. Same locality and age as P15854 (fig.1a,b), in direct association with it.
- Fig.4 Lateral view of inner side of incomplete fixed finger of right (larger) chela, paratype S.A.M. P15857, x 2½. Morgan Limestone, North West Bend, near Morgan. Late Lower to early Middle Miocene.
- Fig.5a,b Propodus of right (larger) chela, paratype S.A.M. P15862. 5a, lateral view of outer side, x 1½. 5b, lateral view of inner side, x 1½. Mannum Formation, 19-20 m above N.R.L., Nildottie loc.2. Late Lower Miocene.
- Fig.6 Lateral view of outer surface of palm of right (larger) chela, paratype S.A.M. P15865, x 2. Morgan Limestone, 2 m below top of upper member, Morgan loc.1. Late Lower to early Middle Miocene.
- Fig.7 Lateral view of fixed finger of left (larger) chela, paratype N.M.V. P29350. The specimen is split down the centre for most of its length, lateral view, x 2. In a phosphatic nodule from base of Moorabool Viaduct Sands, at Curlewis near Geelong. Remanié in Late Miocene.

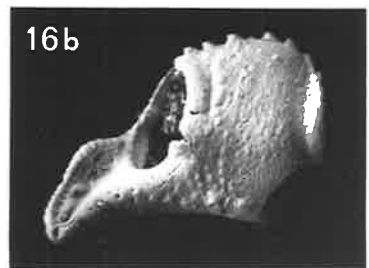
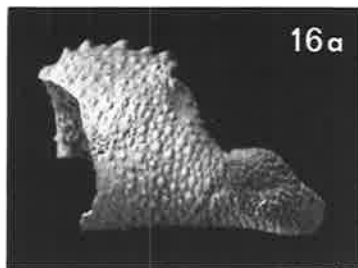
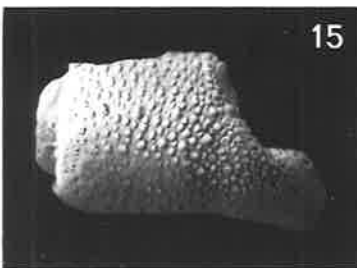
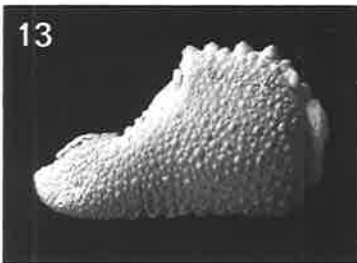
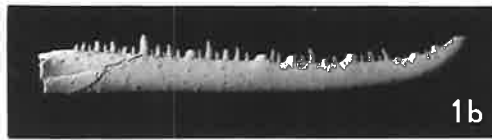
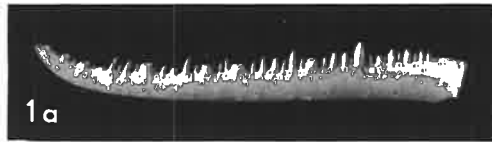
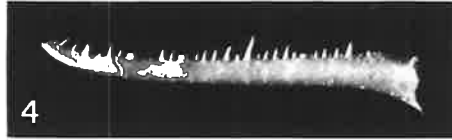




Plate 4 (cont'd)

Fig.8 Palm of right (larger) cheliped, paratype S.A.M. P15904, x 5. Mannum Formation, 14.5-17 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Trizopagurus sp.

Fig.9a-c Incomplete merus of right cheliped, S.A.M. P15785. 9a, lateral view of outer surface, x  $2\frac{1}{2}$ . 9b, lateral view of inner surface, x  $2\frac{1}{2}$ . 9c, ventral view, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Plate 4

Paguristes brevirostris antiqua subsp. nov.

- Fig.1a,b Propodus of left (larger) cheliped, holotype S.A.M. P15577. 1a, lateral view of outer surface, x 4. 1b, lateral view of inner surface, x 4. Mannum Formation, 7 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.2 Lateral view of outer surface of propodus of left (larger) cheliped, paratype S.A.M. P15575, x  $4\frac{1}{2}$ . Mannum Formation, 13 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.3 Lateral view of outer surface of propodus of right (smaller) cheliped, paratype S.A.M. P15579, x  $4\frac{1}{2}$ . Mannum Formation, 7.5-8.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.4a,b Propodus of right (smaller) cheliped, paratype N.M.V. P29363. 4a, lateral view of outer surface, x 5. 4b, lateral view of inner surface, x 5. Muddy Creek Marl, Muddy Creek near Hamilton. Late Lower Miocene.

Pagurus greenwayensis sp. nov.

- Fig.5a,b Propodus of right (larger) cheliped, the surface somewhat etched due to weathering, holotype S.A.M. P15903. 5a, lateral view of outer surface, x 4. 5b, lateral view of inner surface, x 4. Mannum Formation, 16 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.6 Propodus of right (larger) cheliped, the surface of the palm etched due to weathering, paratype S.A.M. P15906, x 4. Locality and age as for P15904, fig.6.
- Fig.7 Palm of right (larger) cheliped, the surface ornamentation well preserved, paratype S.A.M. P15905, x 4. Locality and age as for P15904, fig.6.

PLATE 4

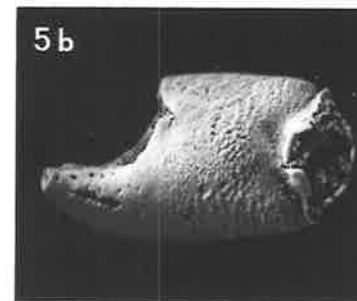
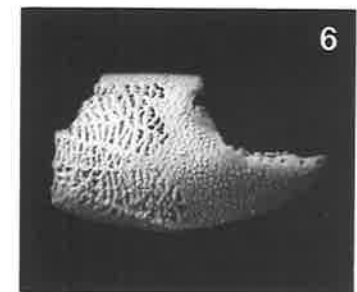
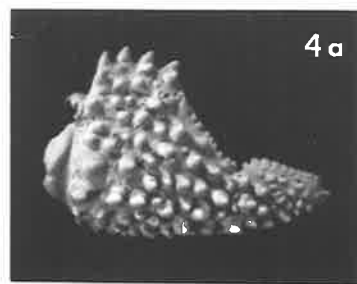
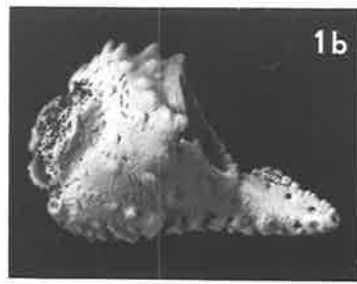
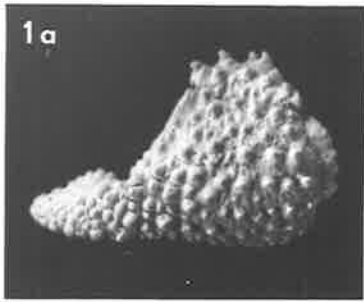


Plate 5 (cont'd)

Munida spriggi sp. nov.

Fig.6 Dorsal view of right half of carapace, the frontal region missing and part of the lateral portion broken away, holotype S.A.M. P15657, x 7. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Fig.7 View of interior surface of carapace, all edges of the specimen damaged, paratype S.A.M. P15658, x 7. Crab bed in Gambier Limestone, quarry on southwestern part of section 30, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Dynomene ovata sp. nov.

Fig.8 Dorsal view of incomplete carapace, holotype S.A.M. P15671, x 3. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Fig.9 Dorsal view, paratype S.A.M. P15672, x 4. Crab bed in Gambier Limestone, quarry southeast of centre of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Plate 5

Paqurus murrayensis sp. nov.

- Fig.1a,b Propodus of right (? larger) cheliped, holotype S.A.M. P15891. 1a, lateral view of outer side, x 3. 1b, lateral view of inner side, the spooned upper surface of the finger visible, x 3. Mannum Formation, 15-18 m above N.R.L., Nildottie loc.4. Late Lower Miocene.

Paqurus gambierensis sp. nov.

- Fig.2a,b Propodus of right (? larger) cheliped, holotype S.A.M. P15770. 2a, lateral view of outer side, the spinules or tubercles eroded, x  $2\frac{1}{2}$ . 2b, lateral view of inner side, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Munida monowalana sp. nov.

- Fig.3 Dorsal view of left half of carapace, the frontal region broken away, holotype S.A.M. P15666, x  $3\frac{1}{3}$ . Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.4 Dorsal view of fragment representing right anterolateral portion of carapace, paratype S.A.M. P15668, x 5. Locality and age as for P15666, fig.3.
- Fig.5 Dorsal view of right half of carapace, one lateral rostral spine present, paratype S.A.M. P15667, x 5. Locality and age as for P15666, fig.3.

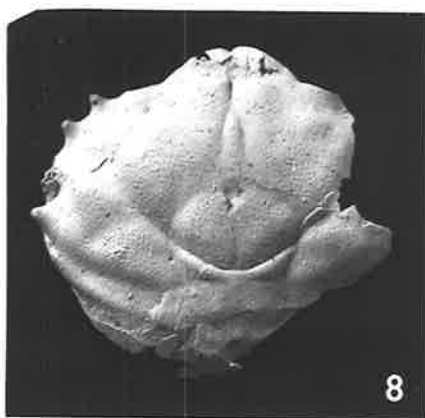
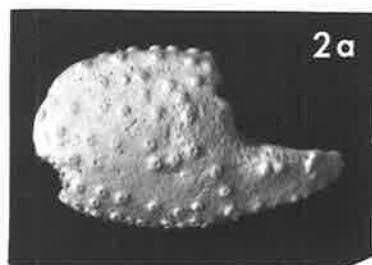
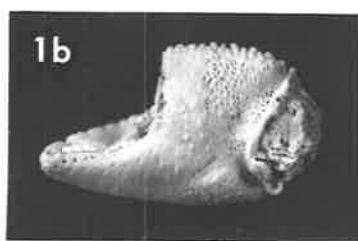


Plate 6 (cont'd)

Paromola petterdi (Grant, 1905)

Fig.7 Specimen ♂ S.A.M. C,83, dorsal view, x 1.4. From 32 km S.W. of Cape Everard, Victoria, at 164 m depth.

Plate 6

Paromola pritchardi sp. nov.

- Fig.1 Holotype S.A.M. P15631, median part of carapace, dorsal view, x 3. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Paratype S.A.M. P15632, median part of carapace, dorsal view, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry near centre of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.3a,b Paratype S.A.M. P15637, lateral part of carapace from left side, with spinule (s) on lower corner of lateral margin of orbit. 3a, dorsal view, x 3. 3b, lateral view, x 3. Locality and age as for P15632, fig.2.
- Fig.4a,b Paratype S.A.M. P15636, fragment broken from lateral part of left side of carapace. 4a, dorsal view, x 3. 4b, lateral view, x 3. Crab bed in Gambier Limestone, quarry on southwestern part of section 30, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.5. Paratype S.A.M. P15639, fragmentary remains of median part of carapace with rostrum and one supraorbital spine present, view of interior surface, x 2. Locality and age as for P15632, fig.2.

Paromola cf. pritchardi

- Fig.6 Specimen S.A.M. P15806, fragment of median part of carapace, view of interior surface, x  $2\frac{1}{2}$ . Gambier Limestone, from a loose piece of rock, 3.5 m below ground surface in quarry on section 606, Hundred of Blanche, Mount Gambier loc.2. Middle Lower Miocene.



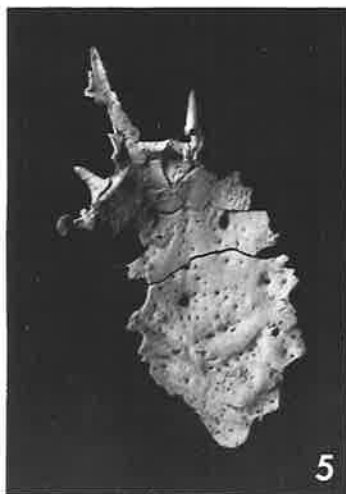
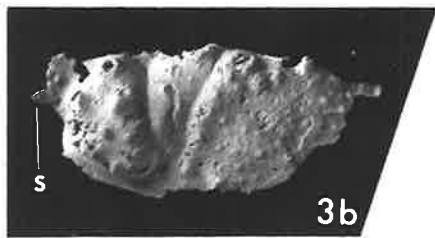
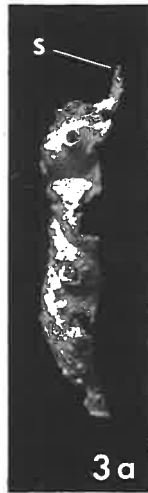


Plate 7 (cont'd)

Paromola petterdi (Grant, 1905)

Fig.7a,b Specimen S.A.M. C,83. 7a, dorsal view, x  $\frac{3}{5}$ . 7b, anterior-ventral aspect, x  $2\frac{1}{2}$ . From S.W. of Cape Everard, Victoria.

Plate 7

Paromola pritchardi sp. nov.

- Fig.1 Paratype S.A.M. P15643, hepatic region, right side of carapace; a spinule (s) on the part of the margin corresponding to the anterolateral corner of the buccal frame; lateral view, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Paratype S.A.M. P15635, incomplete lateral part of right side of carapace, lateral view, x 3. Locality and age as for P15643, fig.1.
- Fig.3 Paratype, ♂ S.A.M. P15640, tergite of third segment of abdomen, view of interior surface (top anterior), x 6. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.4 Paratype, ♂ S.A.M. P15641, tergite of fifth segment of abdomen, view of interior surface (top anterior), x 3. Locality and age as for P15643, fig.1.
- Fig.5 Paratype, ♀ S.A.M. P15634, tergite of fourth segment of abdomen, external surface (top anterior), x  $2\frac{1}{2}$ . Locality and age as for P15643, fig.1.

Paromola cf. pritchardi

- Fig.6 Specimen S.A.M. P15805, fragment of lateral part of left side of carapace, lateral view, x  $3\frac{1}{2}$ . Gambier Limestone, quarry on section 606, Hundred of Blanche, Mount Gambier loc.2. Middle Lower Miocene.

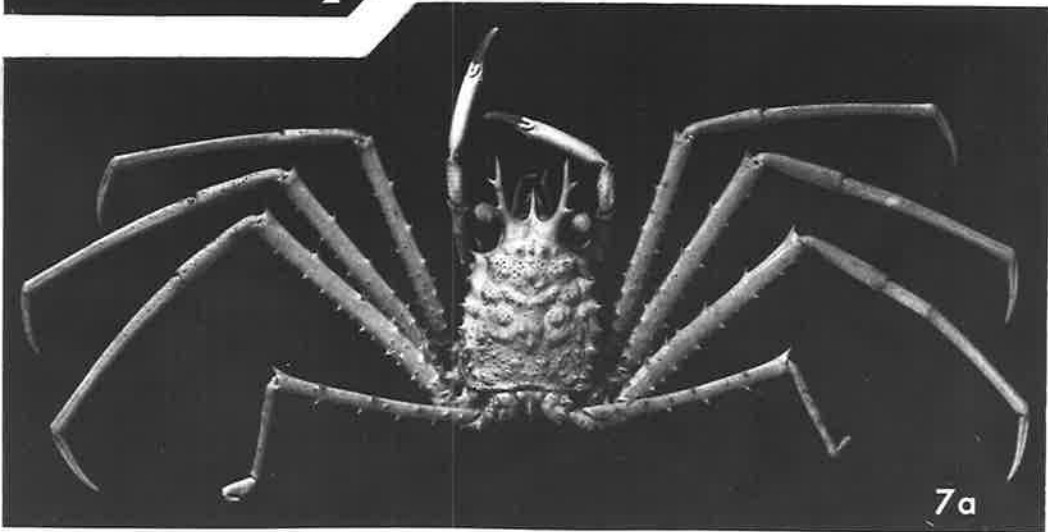
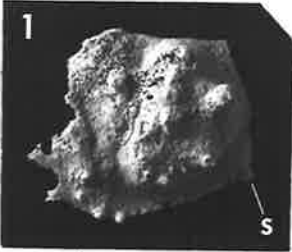
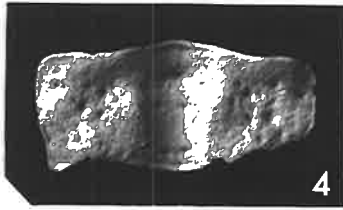


Plate 8 (cont'd)

Fig. 7a-f  
(cont'd)

7b, anterior view, x  $1\frac{1}{3}$ . 7c, anterior view of orbital region and epistome, x 3. 7d, dorsal view of frontal region and orbits, x  $2\frac{1}{4}$ . 7e, oblique ventral-antero-lateral view showing marginal pterygostomial stridulating plectrum (p), x 3. 7f, view of ventral aspect, x  $1\frac{1}{3}$ .  
Balcombe Clay, Balcombe Bay. Late Lower Miocene.

Plate 8

Calappilia australis sp. nov.

- Fig.1 Dorsal view of incomplete carapace, holotype S.A.M. P15610, x  $2\frac{1}{2}$ . Mannum Formation, 19-20 m above N.R.L., Nildottie loc.2. Late Lower Miocene.
- Fig.2 Dorsal view of carapace, paratype S.A.M. P15611, x 3. Locality and age as for P15610, fig.1.
- Fig.3 Anterolateral view of carapace showing marginal pterygostomial stridulating plectrum (p), paratype S.A.M. P15626, x 4. Morgan Limestone, 2 m below top of upper member, Morgan loc.1. Late Lower or early Middle Miocene.
- Fig.4a,b Carapace with part of lateral aspect preserved as an internal mould, paratype M.U.G.D. 3772. 4a, dorsal view, x 2. 4b, anterior view showing front and orbits, x 2. Batesford Limestone, New Quarry, Batesford near Geelong. Late Lower Miocene.
- Fig.5 Lateral view of outer surface of right (larger) chela; shell opening device present at base of fingers, paratype S.A.M. P15624, x  $2\frac{1}{2}$ . Locality and age as for P15610, fig.1.
- Fig.6a,b Carpus and propodus of left (smaller) cheliped, paratype S.A.M. P15614. 6a, lateral view of outer surface, x 2. 6b, view of inner surface showing vertical stridulating ridge (s) on distal part of palm of chela, x 2. Locality and age as for P15610, fig.1.

Calappilia grandispinis (Etheridge and McCulloch, 1916)

- Fig.7a-f Carapace with right posterolateral aspect broken away, hypotype N.M.V. P29346. 7a, dorsal view, x  $1\frac{1}{3}$ .

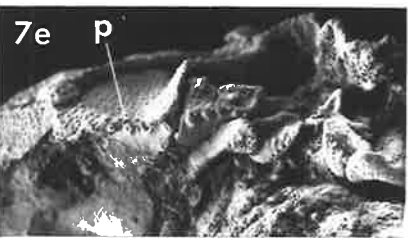
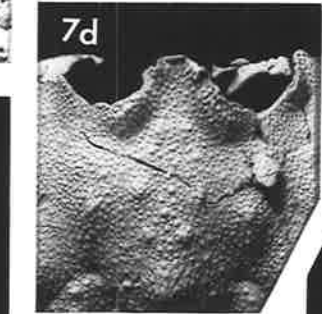
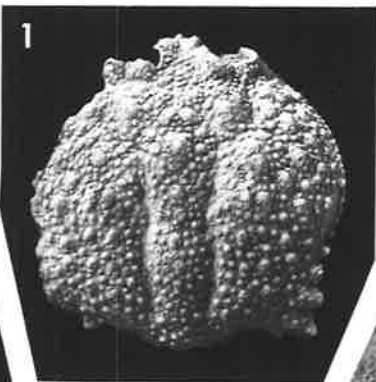
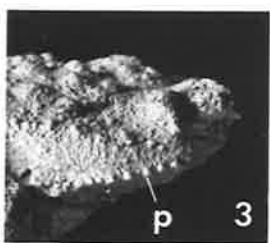
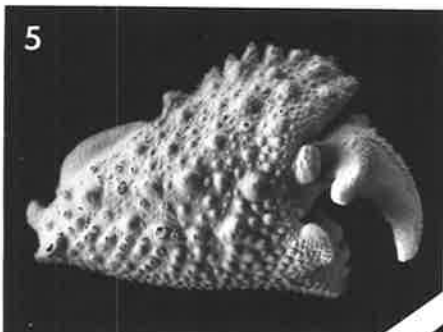
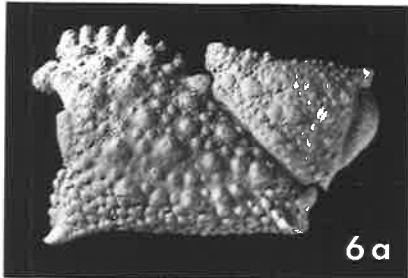


Plate 9 (cont'd)

- Fig.6 Dorsal view of incomplete carapace, paratype S.A.M. P15561, x 5. Mannum Formation, 7 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Ebalia (Phlyxia) sturti sp. nov.

- Fig.7 Dorsal view of incomplete carapace, holotype S.A.M. P15562, x 6. Mannum Formation, 7.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

- Fig.8 Carapace from which much of surface ornamentation has been removed by abrasion, dorsal view, paratype S.A.M. P15563, x 5. Mannum Formation, 8.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Ebalia (Phlyxia) nildottiensis sp. nov.

- Fig.9 Dorsal view, holotype S.A.M. P15564, x 6. Mannum Formation, 16 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Nucia rhomboides sp. nov.

- Fig.10a,b Carapace, holotype S.A.M. P15567. 10a, dorsal view, x 4. 10b, anterior view, x 4. Mannum Formation, approximately 18-20 m above N.R.L., Nildottie loc.4. Late Lower Miocene.

Pariphiculus coronatus spinosus subsp. nov.

- Fig.11a,b Carapace, holotype S.A.M. P15790. 11a, dorsal view, x 2. 11b, lateral view, x 2. Morgan Limestone, .5 m below top of upper member, Morgan loc.1. Late Lower or early Middle Miocene.



Plate 9

Calappilia australis sp. nov.

- Fig.1 Rubber latex internal mould of carapace, dorsal view, paratype S.A.M. P15625, x 2. The latex has only partly penetrated into the posterolateral spines. Mannum Formation, 4.6 m above N.R.L. in cliff 100 m north of old punt landing, west side of River Murray, Blanchetown. Late Lower Miocene.

Calappilia grandispinis (Etheridge and McCulloch, 1916)

- Fig.2 Rubber latex internal mould of carapace, dorsal view, hypotype N.M.V. P16192, x 2. (Muddy Creek Marl), Muddy Creek near Hamilton. Late Lower Miocene.
- Fig.3 Incomplete lateral aspect of carapace preserved partly as an internal mould, hypotype S.A.M. P15902, x  $1\frac{1}{2}$ . Morgan Limestone (? upper member), old kiln just S. of Brenda Park, 5 km south of Morgan. Late Lower or early Middle Miocene.

Ebalia spanios sp. nov.

- Fig.4 Dorsal view of carapace, holotype S.A.M. P15656, x 4. Crab bed in Gambier Limestone, quarry southeast of centre of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Ebalia (Phlyxia) tatei sp. nov.

- Fig.5 Dorsal view of a carapace which has the front damaged, holotype S.A.M. P15560, x  $5\frac{1}{2}$ . Mannum Formation, 13 m above N.R.L. Nildottie loc.3. Middle Lower Miocene.

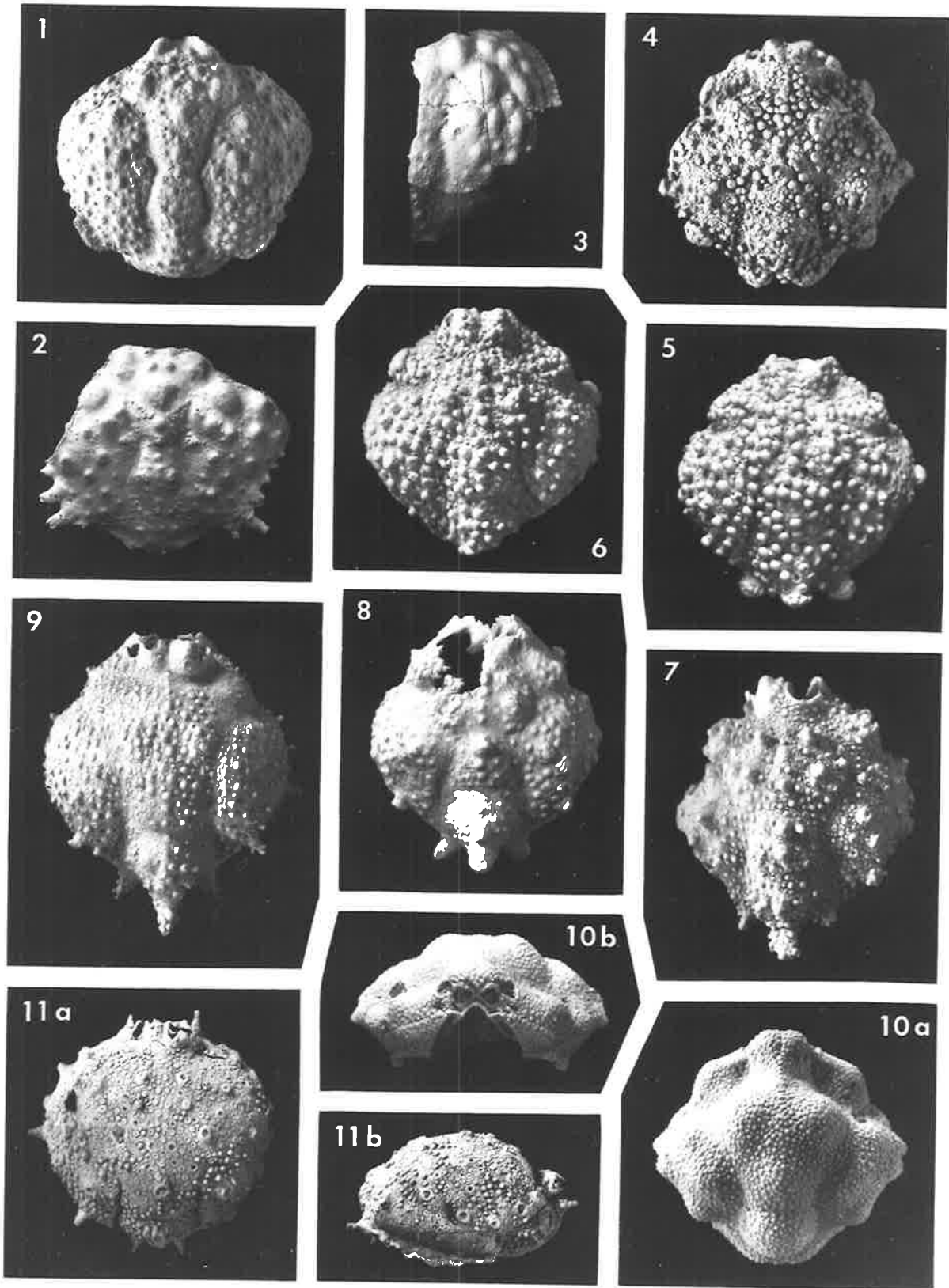


Plate 10 (cont'd)

Fig. 6a,b Carapace with frontoorbital region broken away, hypotype S.A.M. P15820. 6a, dorsal view, x 2. 6b, ventral view of anterior aspect, x 3. Morgan Limestone, 3.5 m below top of upper member, Morgan loc.1. Late Lower or possibly early Middle Miocene.

Plate 10

Lyreidus brevifrons elegans Glaessner, 1960

- Fig.1a-d Slightly distorted carapace with the tips of the extra-orbital spines broken away, hypotype N.Z.G.S. DC 359. 1a, dorsal view, x 2. 1b, ventral view, x 2. 1c, dorsal view of anterior part showing form of rostrum and orbits; basal articles of antennule (an) and antenna (a) and part of eyestalk (e) visible, x 5. 1d, ventral view of anterior aspect, lettering as for 1c, x 5. Upper part of Arnold Series, .8 km S. of Perpendicular Point, near Porarari, west coast of South Island of New Zealand. Runangan (late Upper Eocene).

Lyreidus tridentatus de Haan, 1839

- Fig.2 Carapace with median portion preserved as an internal mould, dorsal view, hypotype S.A.M. P15772, x 2. Crab bed in Gambier Limestone, quarry near centre of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.3 Incomplete carapace, hypotype S.A.M. P15773, x 2. Gambier Limestone, vicinity of Mount Gambier. Oligocene to Middle Miocene.
- Fig.4a,b Carapace, hypotype S.A.M. P15793. 4a, dorsal view, x 3. 4b, ventral view of anterior aspect, x 8. Gambier Limestone, 8.5-10.5 m below ground surface in quarry on section 601, Hundred of Blanche, Mount Gambier loc.2. Middle Lower Miocene.
- Fig.5a,b Carpus and incomplete propodus of right cheliped, hypotype S.A.M. P15795. 5a, lateral view of outer surface, x 2½. 5b, dorsal view, x 2½. Locality and age as for P15793, fig.4a,b.

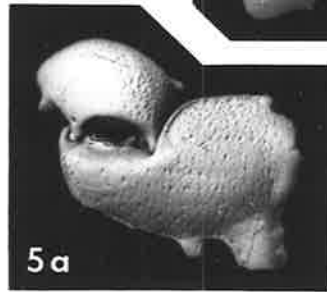
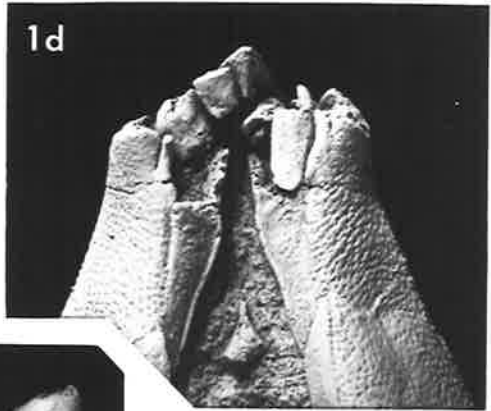


Plate 11

Maja robinsoni sp. nov.

Fig. 1a-e · Carapace of holotype S.A.M. P15679. 1a, dorsal view, x 2. 1b, lateral view, x 2. 1c, ventral view, x 2. 1d, view of ventral anterior aspect, x 3. 1e, view showing additional details of buccal and antennula-antennal regions, x 3. Mannum Formation, 12-15 m above N.R.L., Nildottie loc.1. Middle Lower Miocene.

Fig. 2 Dorsal view of paratype S.A.M. P15680, x 2. Mannum Formation, 7 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

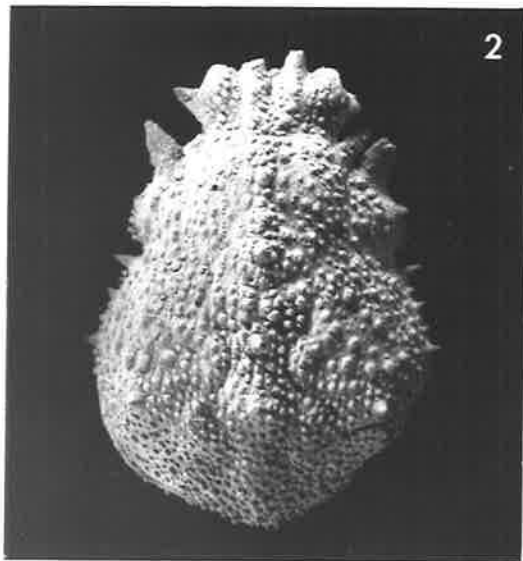
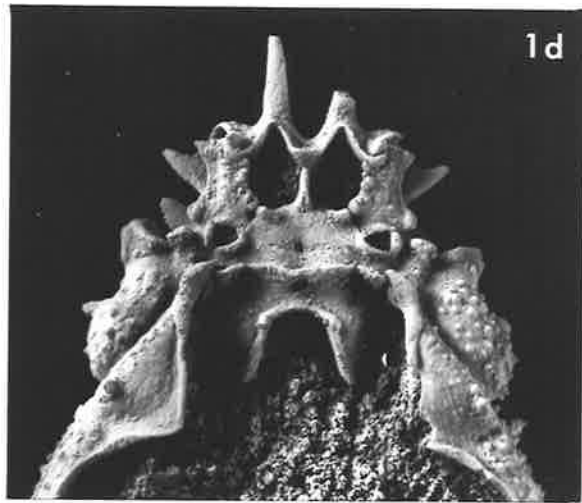
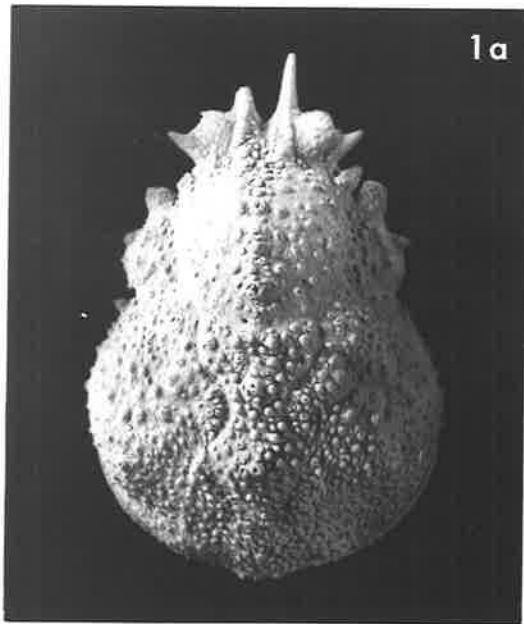
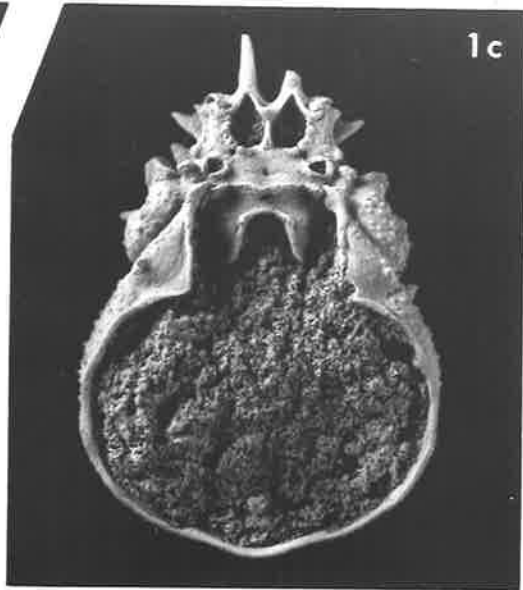


Plate 12

Notomithrax angustifrons sp. nov.

- Fig.1a-a Carapace of holotype S.A.M. P15587. 1a, dorsal view, x 2. 1b, lateral view, x 2. 1c, view of anterior ventral aspect, x  $5\frac{1}{2}$ . Mannum Formation, 14 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.2 Dorsal view of incomplete carapace, paratype S.A.M. P15588, x 3. Mannum Formation, 11 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.3a,b Fragment broken from anterior part of carapace, the orbital region complete except for the intercalated spine and the anterolateral spine of the basal antennal article; paratype S.A.M. P15592. 3a, dorsal view, x 5. 3b, view of ventral aspect, x 5. Mannum Formation, 15 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.4 Dorsal view of fragmentary anterior part of carapace, paratype S.A.M. P15593, x 5. Mannum Formation, 13 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.5 Dorsal view of a carapace preserved largely as an internal mould, paratype N.M.V. P29349, x 2. Balcombe Clay, Balcombe Bay. Late Lower Miocene.
- Fig.6 Carpus and propodus of left cheliped, lateral view of outer surface, paratype S.A.M. P15591, x  $2\frac{1}{2}$ . Mannum Formation, 7 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.7a,b Left chela, paratype S.A.M. P15590. 7a, lateral view of outer surface; the dactylus its one tooth (at about  $\frac{2}{5}$  length from proximal end) broken away, x 2. 7b, dorsal view, x 2. Mannum Formation, 7-8.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.



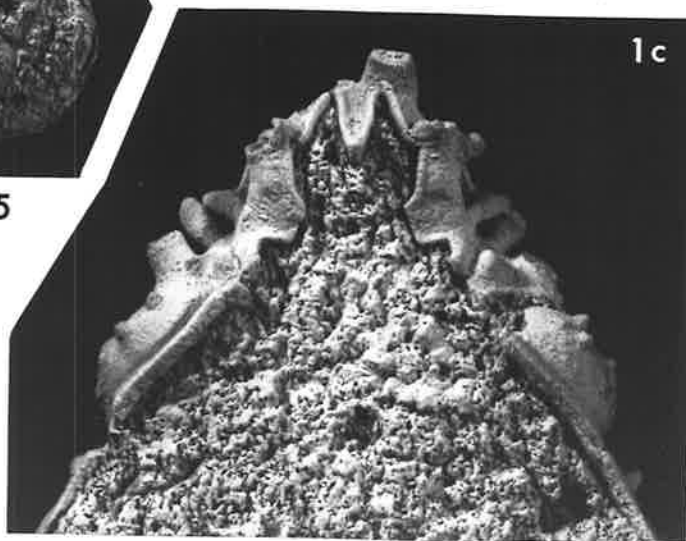
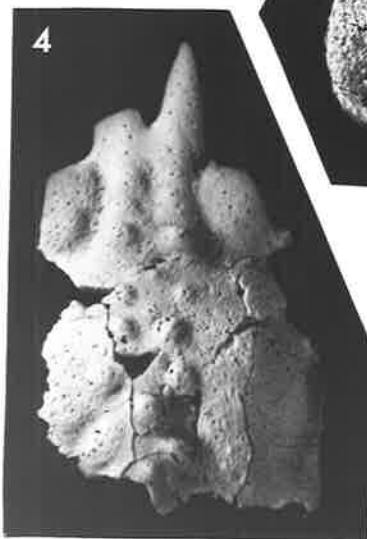
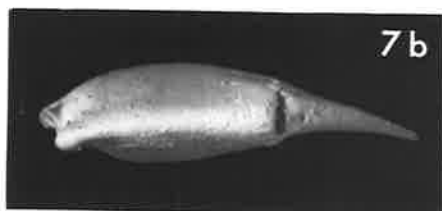
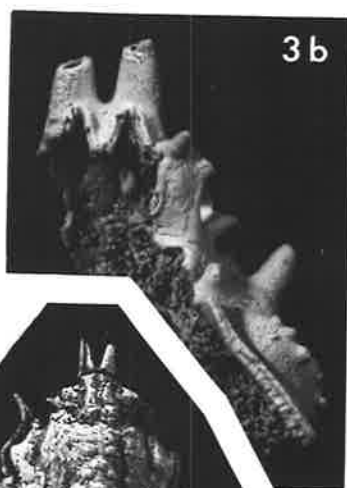
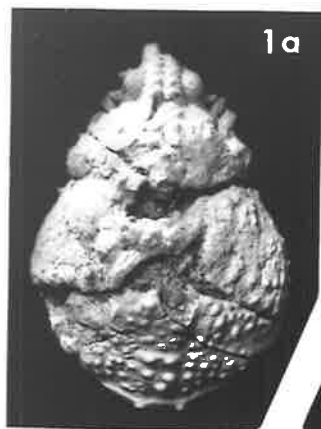


Plate 13

Leptomithrax martensis sp. nov.

- Fig.1 Dorsal view of incomplete left half of carapace, holotype S.A.M. P15650, x  $2\frac{1}{2}$ . The supraorbital margin is complete except for the anterior part of the eave and the tip of the postorbital spine. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Dorsal view of fragment which shows ornamentation of part of protogastric region and meso- and metagastric regions, paratype S.A.M. P15652, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.3 Dorsal view of incomplete right half of carapace, paratype S.A.M. P15651, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry southeast of middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.4 Dorsal view of fragment broken from posterior portion of carapace, paratype S.A.M. P15653, x 2. Locality and age as for P15650, fig.1.

Leptomithrax elegans sp. nov.

- Fig.5a-d. Carapace of holotype S.A.M. P15553. 5a, dorsal view, x  $2\frac{1}{2}$ . 5b, lateral view, x  $2\frac{1}{2}$ . 5c, ventral view, x  $2\frac{1}{2}$ . 5d, view of anterior ventral aspect, x  $4\frac{1}{2}$ . Mannum Formation, 12.5 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.6 Dorsal view of fragment broken from right side of carapace, paratype S.A.M. P15554, x  $2\frac{1}{2}$ . Mannum Formation, 8 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

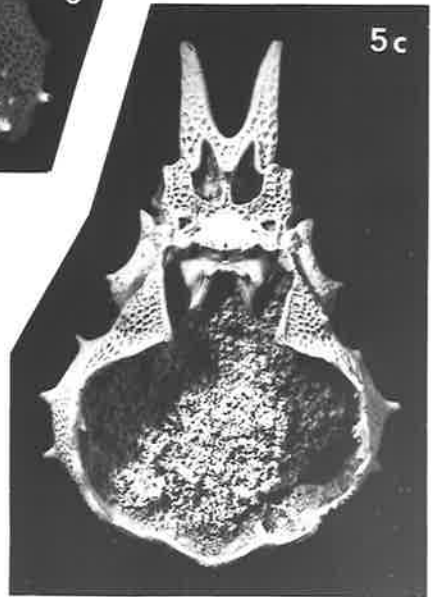
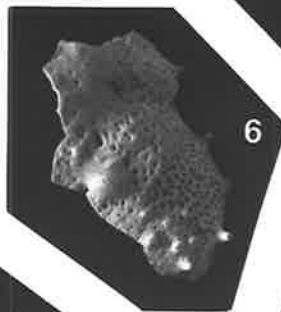
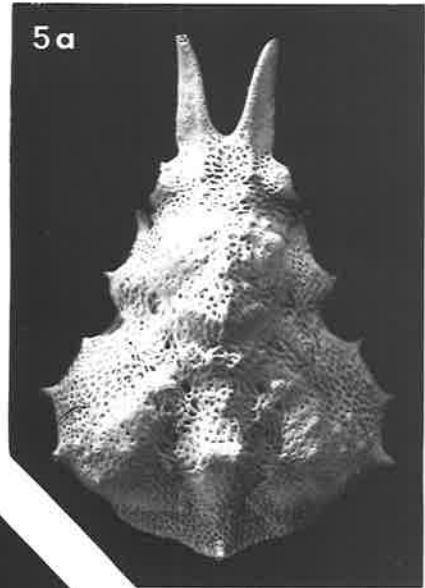
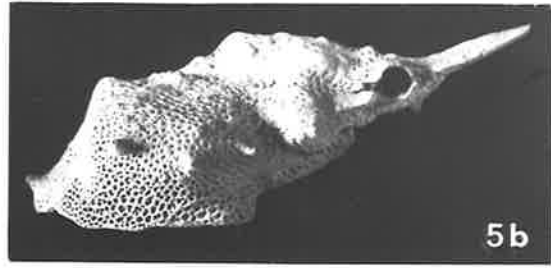


Plate 14 (cont'd)

Tutankhamen hieracodes sp. nov.

- Fig.7 Dorsal view of specimen with front damaged, holotype S.A.M. P15660, x 3. Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.8 View of interior surface of carapace, paratype S.A.M. P15662, x 3. Locality and age as for P15660, fig.7.
- Fig.9 Dorsal view of incomplete palm of left cheliped, paratype S.A.M. P15663, x 3. Locality and age as for P15660, fig.7.

Plate 14

Schizophroida tertiaria sp. nov.

- Fig.1a,b Carapace of holotype S.A.M. P15583. 1a, dorsal view, x 4. 1b, lateral view, x 4. Mannum Formation, 14 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.2a,b Fragment broken from anterior part of carapace, paratype S.A.M. P15585. 2a, view of ventral aspect, x 4. 2b, dorsal view, x 4. Mannum Formation, 12-13 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.3 View of ventral aspect of fragment broken from anterior part of carapace, paratype S.A.M. P15586, x 5. Mannum Formation, between 12-15 m above N.R.L., Nildottie loc.4. Middle Lower Miocene.

Naxia sp.

- Fig.4 Dorsal view of fragment broken from posterior part of carapace, specimen S.A.M. P15557, x 4. Mannum Formation, 12-14 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.5 Dorsal view of fragment broken from median part of carapace and including cardiac and parts of branchial regions, specimen S.A.M. P15558, x 3. Mannum Formation, 8 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.6 Dorsal view of fragment broken from median part of carapace and including posterior gastric pits, specimen S.A.M. P15559, x 3. Mannum Formation, 13 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

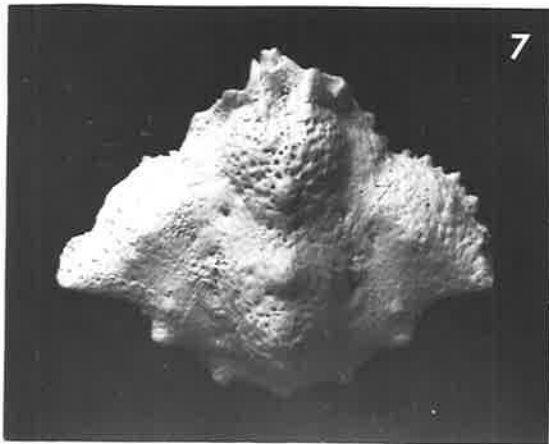
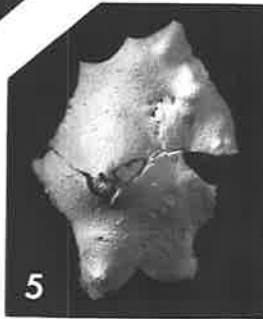
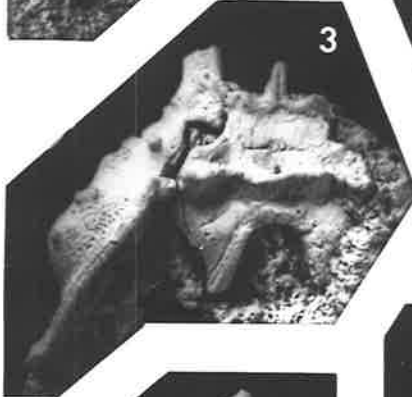
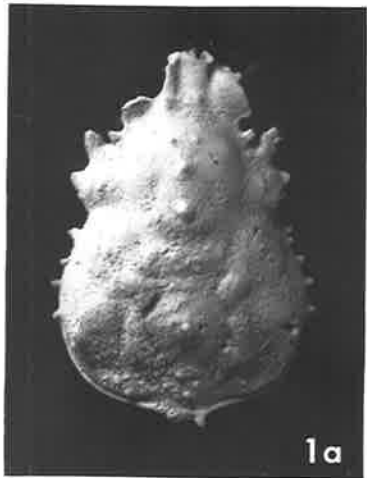


Plate 15 (cont'd)

Ovalipes eamesi sp. nov.

Fig. 7a-c Propodus of right (larger) chela, holotype S.A.M. P15597. 7a, lateral view of outer surface, x 2. 7b, dorsal view, x 2. 7c, lateral view of inner surface, x 2. Mannum Formation, 15-20 m above N.R.L., Nildottie loc.1. Middle to late Lower Miocene.

Ovalipes victoriensis sp. nov.

Fig. 8 Dorsal view of incomplete carapace, holotype N.M.V. P25941, x  $1\frac{1}{2}$ . (The elongate fragment on the extreme right of the specimen has been lost since the photograph was taken). Black Rock Sandstone, Beaumaris. Late Miocene.

Plate 15

Ovalipes primitivus sp. nov.

- Fig.1 Dorsal view of holotype S.A.M. P15719, x 3. Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Dorsal view of fragment broken from anterior part of carapace. The outermost layer of the exoskeletal material has exfoliated. Paratype S.A.M. P15720, x 4. Locality and age as for P15719, fig.1.
- Fig.3 View of internal surface of an incomplete carapace; several of the shallow grooves or depressions lateral to the mesogastric and urogastric regions represent places of muscle attachment. Paratype S.A.M. P15722, x 3. Crab bed in Gambier Limestone, quarry on north-eastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.4 Lateral view of outer surface of fixed finger and distal part of palm of left (? smaller) chela, paratype S.A.M. P15721, x 3. Crab bed in Gambier Limestone, quarry on southwestern part of section 30, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Ovalipes denticulatus sp. nov.

- Fig.5 Dorsal view of carapace from which outermost layer of shell material has exfoliated, holotype S.A.M. P15568, x 3. Mannum Formation, in a fallen block but probably from 12-15 m above N.R.L., Nildottie loc.4. Middle Lower Miocene.
- Fig.6 Dorsal view of incomplete carapace, paratype S.A.M. P15569, x 3. Gambier Limestone, 8 m below ground surface in quarry on section 601, Hundred of Blanche, Mount Gambier loc.2. Middle Lower Miocene.



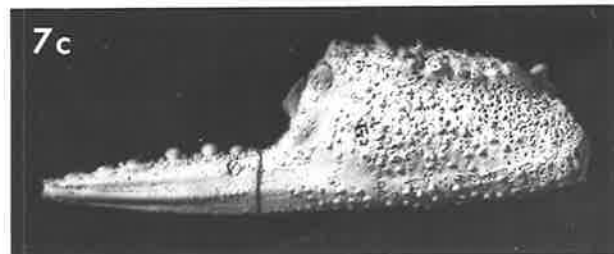
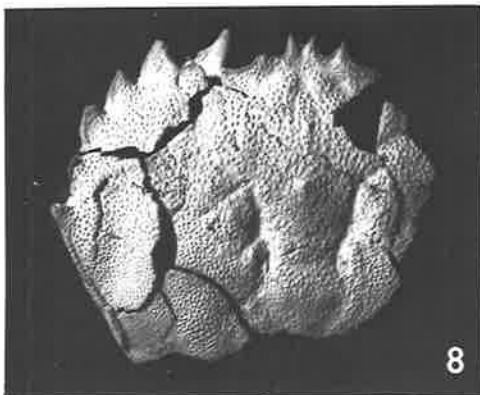
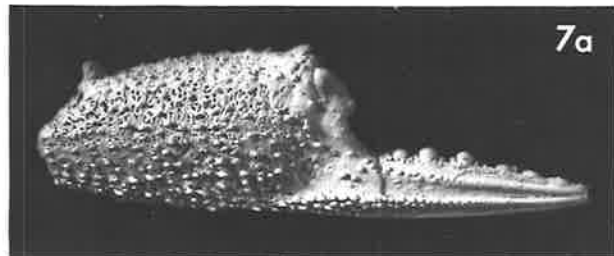
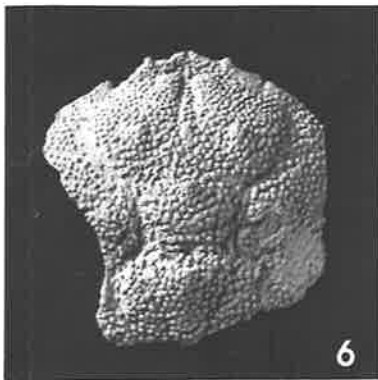
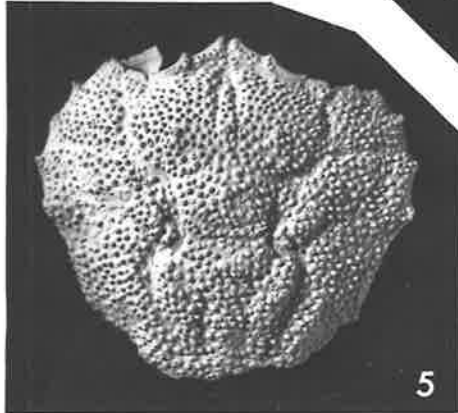
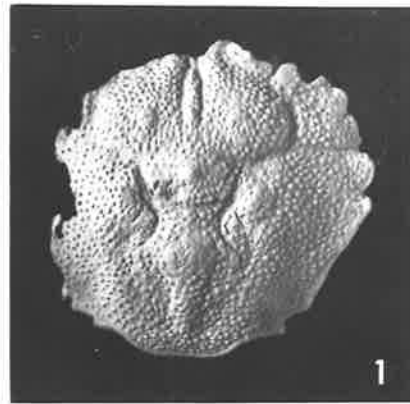
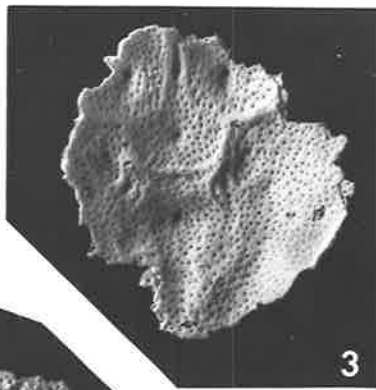
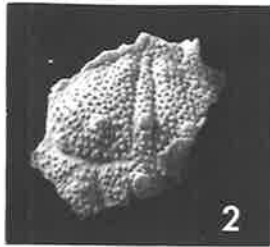


Plate 16 (cont'd)

Fig.13 Lateral view of outer side of propodus of right (larger) claw, paratype S.A.M. P15901, x  $1\frac{3}{4}$ . The shell material is etched and parts of its outer layer have exfoliated. Mannum Formation, 12-14 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

Fig.14 Lateral view of outer side of carpus and palm of right cheliped, paratype S.A.M. P15898, x  $2\frac{1}{4}$ . Mannum Formation, 7-20 m above N.R.L., Nildottie loc.4. Middle to upper Lower Miocene.

Plate 16 (cont'd)

- Fig.7a,b Fixed finger of right (larger) chela, paratype S.A.M. P15914. 7a, lateral view of outer surface, x  $2\frac{1}{2}$ . 7b, lateral view of inner surface, x  $2\frac{1}{2}$ . Mannum Formation, 15 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.8 Incomplete fixed finger of right (larger) chela, paratype S.A.M. P15601, x 3. Mannum Formation, 19-20 m above N.R.L., Nildottie loc.2. Upper Lower Miocene.

Nectocarcinus caffercoensis sp. nov.

- Fig.9 Dorsal view of a carapace which has the front missing, holotype S.A.M. P15728, x 3. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.10 Dorsal view of carapace, paratype S.A.M. P15729, x 3. The left side of the front is undamaged; the shell material of the middle part of the carapace is badly corroded. Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.11 View of interior surface of incomplete carapace, paratype S.A.M. P15738, x 4. Muscle attachments are visible as small depressions and reticulate areas; those of the median part of the carapace have been etched by ground waters. Crab bed in Gambier Limestone, quarry to southeast of centre of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.

Nectocarcinus granosus sp. nov.

- Fig.12 View of outer side of movable finger of right (larger) claw, paratype S.A.M. P15899, x 2.2. Mannum Formation, 7-14 m above N.R.L., Greenways Landing, Nildottie loc.3. Middle Lower Miocene.

Plate 16

Ovalipes costatus sp. nov.

- Fig.1a,b Fixed finger of left (smaller) chela, holotype S.A.M. P15602. 1a, lateral view of outer surface, x 2. 1b, lateral view of inner surface, x 2. Mannum Formation, 9-12 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.2a,b Fixed finger of right (larger) chela, paratype S.A.M. P15608. 2a, lateral view of outer surface, x 2 $\frac{1}{2}$ . 2b, lateral view of inner surface, x 2 $\frac{1}{2}$ . Mannum Formation, 7-14 m above N.R.L., Nildottie loc.4. Middle Lower Miocene.
- Fig.3 Lateral view of outer surface of fixed finger of left (smaller) chela, paratype S.A.M. P15603, x 1 $\frac{3}{4}$ . Locality and age as for P15602, fig.1a,b.
- Fig.4a,b Movable finger of left (smaller) chela, paratype S.A.M. P15607. 4a, lateral view of outer surface, x 2. 4b, lateral view of inner surface, x 2. Mannum Formation, about 12 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.
- Fig.5a,b Movable finger of right (larger) chela, paratype S.A.M. P15609. 5a, lateral view of outer surface, x 2. 5b, lateral view of inner surface, x 2. Locality and age as for P15608, fig.2a,b.

Ovalipes eamesi sp. nov.

- Fig.6a,b Movable finger of right (larger) chela, paratype S.A.M. P15598. 6a, lateral view of outer surface, x 2. 6b, lateral view of inner surface, x 2. Mannum Formation, 15 m above N.R.L., Nildottie loc.3. Middle Lower Miocene.

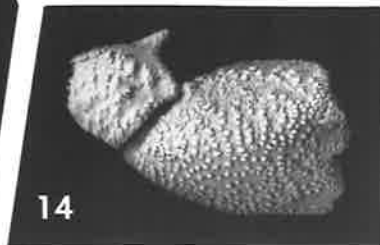
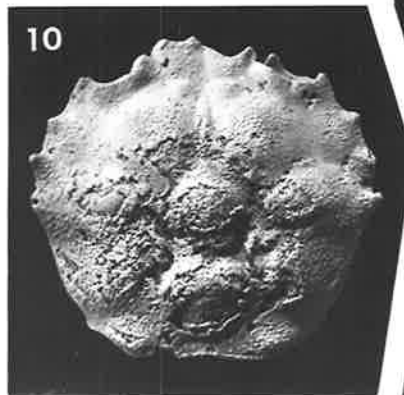
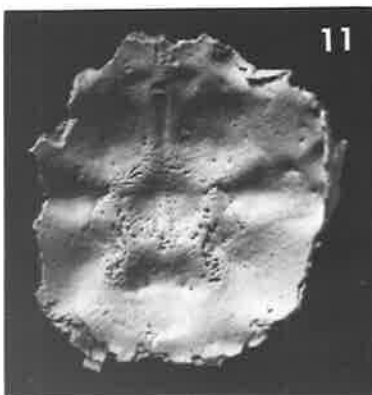
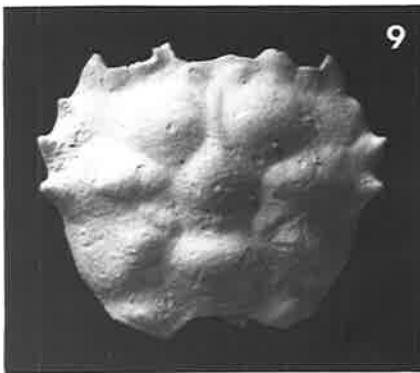
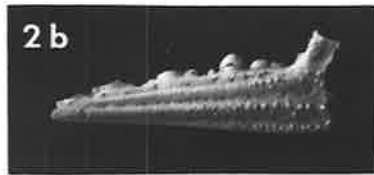
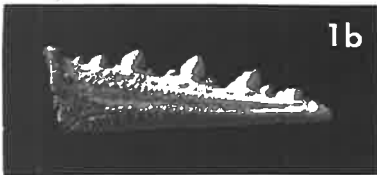
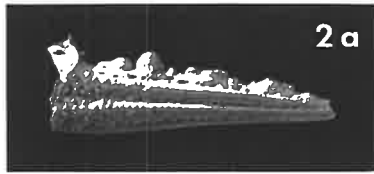
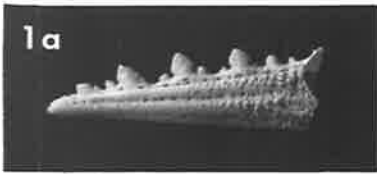
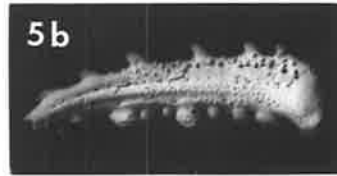
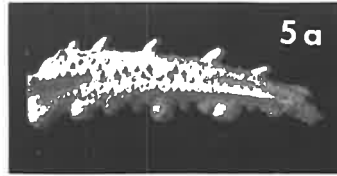


Plate 17

Nectocarcinus granosus sp. nov.

Fig. 1a,b Palm of right (larger) cheliped, holotype S.A.M. P15896. 1a, lateral view of outer surface, x  $2\frac{1}{2}$ . 1b, lateral view of inner surface, x  $2\frac{1}{2}$ . Mannum Formation, in cliff 11-14 m above N.R.L., Nildottie loc.3. Mid Lower Miocene.

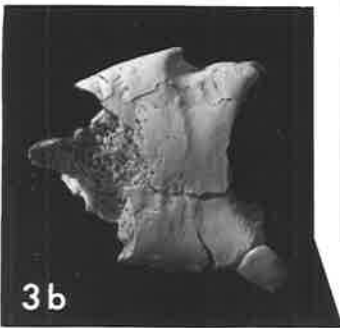
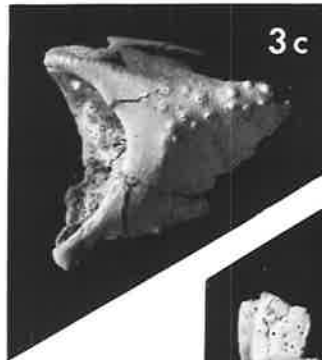
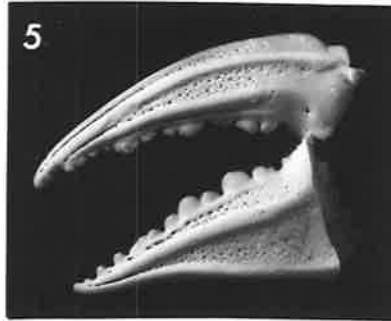
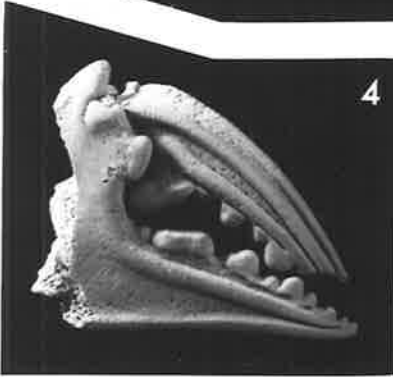
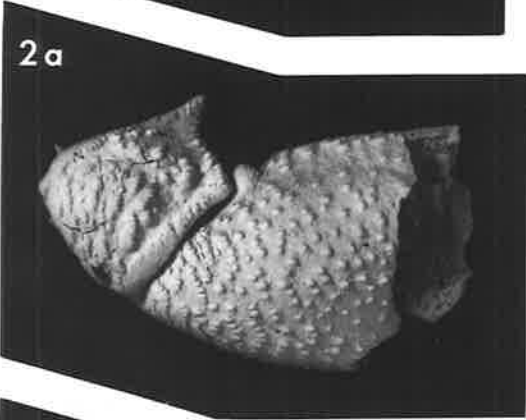
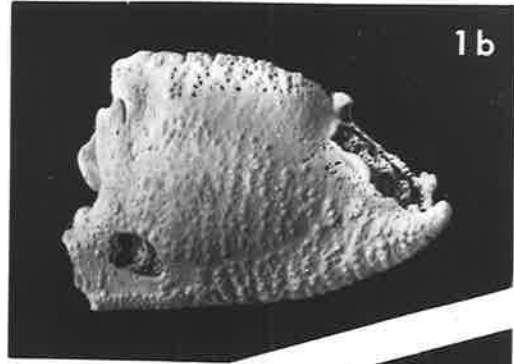
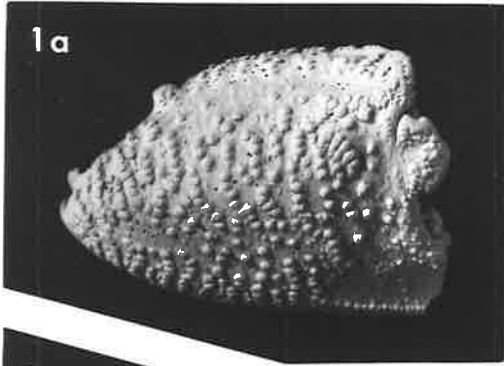
Fig. 2a,b Carpus and palm of right cheliped, paratype S.A.M. P15897. 2a, lateral view of outer surface, x  $1\frac{1}{2}$ . 2b, lateral view of inner surface, x  $1\frac{1}{2}$ . Upper 2.4 m of upper member of Morgan Limestone, Morgan loc.1. Late Lower or early Middle Miocene.

Nectocarcinus amathitus sp. nov.

Fig. 3a-d Remains of part of carapace and merus and chela of right (larger) claw of one individual, holotype S.A.M. P15845. 3a, dorsal view of fragment of anterolateral portion of carapace; several oyster spats are attached on the upper surface, x  $1\frac{1}{4}$ . 3b, merus, lateral view of outer surface, x  $1\frac{1}{4}$ . 3c, merus, lateral view of inner part, x  $1\frac{1}{4}$ . 3d, chela, outer, lateral view. Hallett Cove Sandstone, sea cliffs south of Port Willunga. Pliocene.

Fig. 4 Lateral view of outer face of distal parts of right (larger) chela, paratype S.A.M. P65, x  $1\frac{1}{2}$ . Hallett Cove Sandstone, Port Willunga. Pliocene.

Fig. 5 Lateral view of outer surface of fingers of left (smaller) cheliped, paratype S.A.M. P15842, x  $1\frac{1}{4}$ . Locality and age as for P65, fig.4.



Nectocarcinus integrifrons (Latreille, 1825)

- Fig.1 Lateral view of outer surface of incomplete movable finger of right (larger) chela, hypotype S.A.M. P15840, x  $1\frac{1}{2}$ . Hallett Cove Sandstone, vicinity of Port Willunga. Pliocene.
- ?Ozius macrochelus sp. nov.
- Fig.2 Lateral view of outer surface of fingers of right (larger) chela, holotype S.A.M. P15821, x  $1\frac{1}{4}$ . Hallett Cove Sandstone, Blanche Point near Port Willunga. Pliocene.
- Fig.3 Lateral view of outer surface of broken movable finger of right (larger) chela, paratype S.A.M. P15822, x 1. Hallett Cove Sandstone, Port Willunga. Pliocene.
- Fig.4 Lateral view of outer surface of distal part of movable finger of right (larger) chela, paratype S.A.M. P15823, x 1. Locality and age as for P15822, fig.3.
- Fig.5 Lateral view of outer face of incomplete fixed finger of right (larger) chela, paratype S.A.M. P15827, x 1. Locality and age as for P15822, fig.3.
- Fig.6a,b Fixed finger of right (larger) chela, paratype S.A.M. P12331. 6a, lateral view of outer face, x  $1\frac{1}{4}$ . 6b, dorsal view showing rounded teeth, x  $1\frac{1}{4}$ . Upper part of cliff, Devlins Pound. Pliocene.
- Fig.7 Lateral view of outer face of movable finger of right (larger) chela, paratype S.A.M. P15834, x  $1\frac{1}{2}$ . Hallett Cove Sandstone, Snapper Point near Port Willunga. Pliocene.
- Fig.8 Lateral view of outer surface of incomplete movable finger of right (larger) chela, paratype S.A.M. P15929, x 2. Locality and age as for P15822, fig.3.



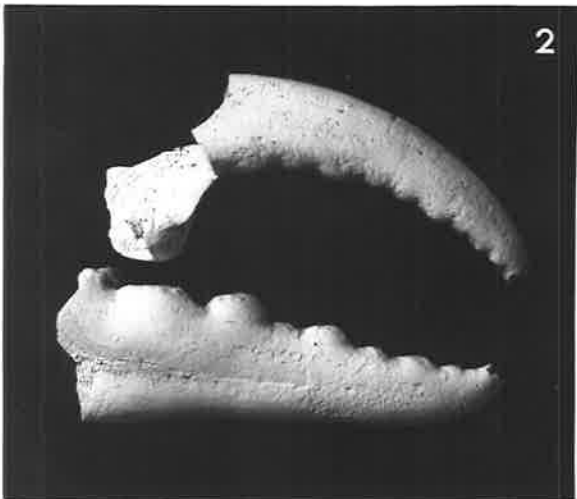


Plate 19 (cont'd)

Pseudocarcinus gigas (Lamarck, 1818)

Fig.9

Dorsal view of carapace of a male of the present-day form, x .3. The specimen had been cooked when photographed; the colour was deep red with cream spots and patches. Several calcareous serpulid worm tubes can be seen adhering to the carapace in the photograph. Off Beachport, South Australia, apparently from inshore waters.

Pseudocarcinus parvus sp. nov.

- Fig.1 Dorsal view of holotype S.A.M. P15686, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Dorsal view of paratype S.A.M. P15688, x  $1\frac{1}{2}$ . The right lateral portion of the carapace is also damaged. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.3 Dorsal view of paratype S.A.M. P15692, x  $1\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry on southwestern part of section 30, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.4 Dorsal view of frontal region of carapace, paratype S.A.M. P15691, x 2. Locality and age as for P15692, fig.3.
- Fig.5 Inner surface of merus of left cheliped, paratype S.A.M. P15690, x 2. Locality and age as for P15688, fig.2.
- Fig.6 Inner surface of manus of left chela, paratype S.A.M. P15696, x 2. Locality and age as for P15686, fig.1.
- Fig.7 Outer lateral view of carpus and internal view of fragmentary remains of manus of right cheliped, paratype S.A.M. P15697, x 2. Locality and age as for P15686, fig.1.

Pseudocarcinus cf. gigas (Lamarck, 1818)

- Fig.8 Dorsal view of limonitic internal mould and partial cast of lateral part of carapace (right side), holotype N.M.V. P29348a, x  $3\frac{1}{4}$ . Newport Formation, Melbourne. Balcombian.

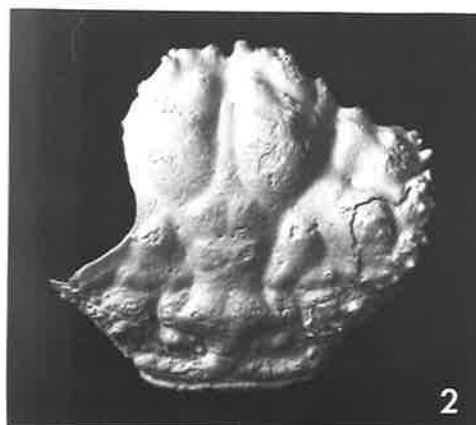


Plate 20 (cont'd)

Pseudocarcinus gigas (Lamarck, 1818)

Fig.7

Outer, oblique dorso-lateral view of fixed finger of right (larger) chela, hypotype N.M.V. P15912, x  $15/16$ . Shelly lime sand inland from Woakwine Dune, Hatherleigh Drain, approximately 1 mile N.N.W. of Rendelsham Railway Siding, Millicent area. Quaternary.

Plate 20

Pseudocarcinus parvus sp. nov.

- Fig.1 Outer side of manus of left chela, paratype S.A.M. P15694, x 2. Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.2 Outer side of propodus of right (larger) chela, paratype S.A.M. P15690, x  $2\frac{1}{2}$ . Locality and age as for P15694, fig.1.
- Fig.3 Outer side of propodus of right (larger) chela, paratype S.A.M. P15695, x  $1\frac{3}{4}$ . Locality and age as for P15694, fig.1.

Pseudocarcinus cf. parvus

- Fig.4 Outer side of right (larger) chela, specimen U.T.D.G. 53683A, x 1. Cape Grim. Middle to late Lower Miocene.
- Fig.5 Outer, lateral view of fragment from distal dorsal part of manus of right chela, specimen U.T.D.G. 53683B, x 1. Locality and age as for 53683A, fig.4.

Pseudocarcinus cf. gigas (Lamarck, 1818)

- Fig.6 Outer, lateral view of limonitic internal mould and partial cast of right (larger) chela, holotype N.M.V. P29348b, x  $\frac{3}{4}$ . The fingers are largely incomplete. The domed surface at the left hand end of the specimen represents the limonite encrusted carpus. Newport Formation, West Essendon, Melbourne. Late Lower or early Middle Miocene.

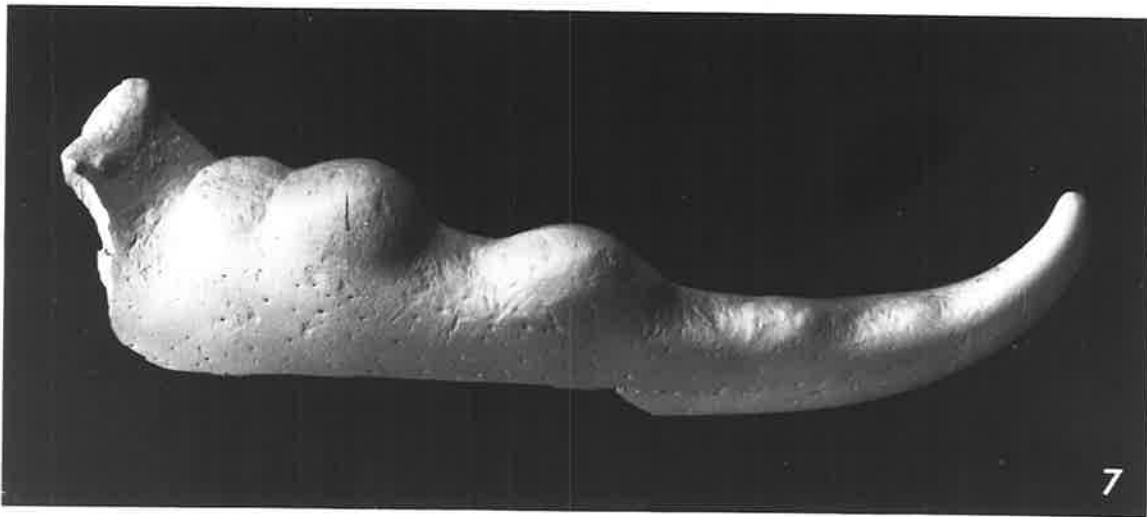
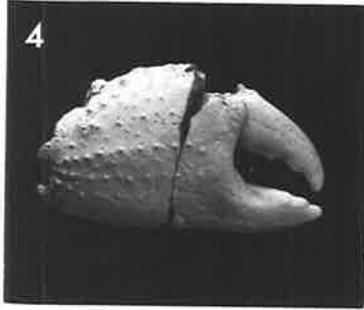


Plate 21 (cont'd)

Homoioplox woodsii sp. nov.

- Fig.7 Dorsal view, holotype S.A.M. P15747, x  $2\frac{1}{2}$ . Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.8a,b Carapace of paratype S.A.M. P15750. 8a, dorsal view, x 3. 8b, anterior view showing front and orbit, x 3. Locality and age as for P15747, fig.7.
- Fig.9 Dorsal view, paratype S.A.M. P15748, x  $3\frac{1}{2}$ . Locality and age as for P15747, fig.7.
- Fig.10 Dorsal view, paratype S.A.M. P15748, x 3. Locality and age as for P15747, fig.7.



Plate 21

Ommatocarcinus corioensis (Cresswell, 1886)

- Fig.1 Dorsal view of mature male, hypotype N.M.V. P24719, x 1. From the Port Campbell Limestone, notch east of the Amphitheatre, Port Campbell. Middle Miocene.
- Fig.2 Dorsal view of front, hypotype of Hall (1904), ♀, N.M.V. P7668, x 4. (Port Campbell Limestone), Two Mile Beach, Near Port Campbell. Middle Miocene.
- Fig.3 Stridulating ridge on anterior of pterygostomial region, hypotype A.U. F17216, x 2½. In a phosphatic nodule from the base of the Moorabool Viaduct Sands, railway cutting at Cowies Creek, near Geelong. Remanié, in Late Miocene.

Carcinoplax praevictoriensis sp. nov.

- Fig.4 Dorsal view, holotype S.A.M. P15674, x 2¼. Crab bed in Gambier Limestone, quarry on northeastern part of section 26, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.5 View of interior surface of anterior portion of carapace, paratype S.A.M. P15675, x 2½. Muscle attachment scars are visible as slight depressions. Crab bed in Gambier Limestone, quarry near middle of section 28, Hundred of Blanche, Mount Gambier loc.1. Middle Oligocene.
- Fig.6 View of interior surface of a carapace which is preserved as the original shell material and partly as an external mould, paratype S.A.M. P15676, x 2½. Muscle attachment scars visible as small pits and depressions. Locality and age as for P15675, fig.5.

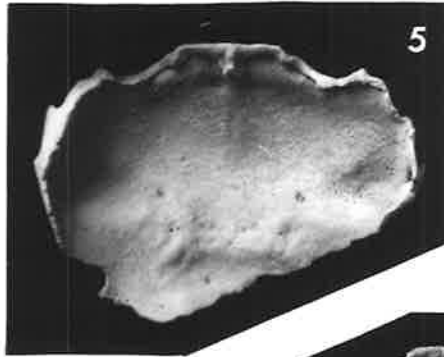
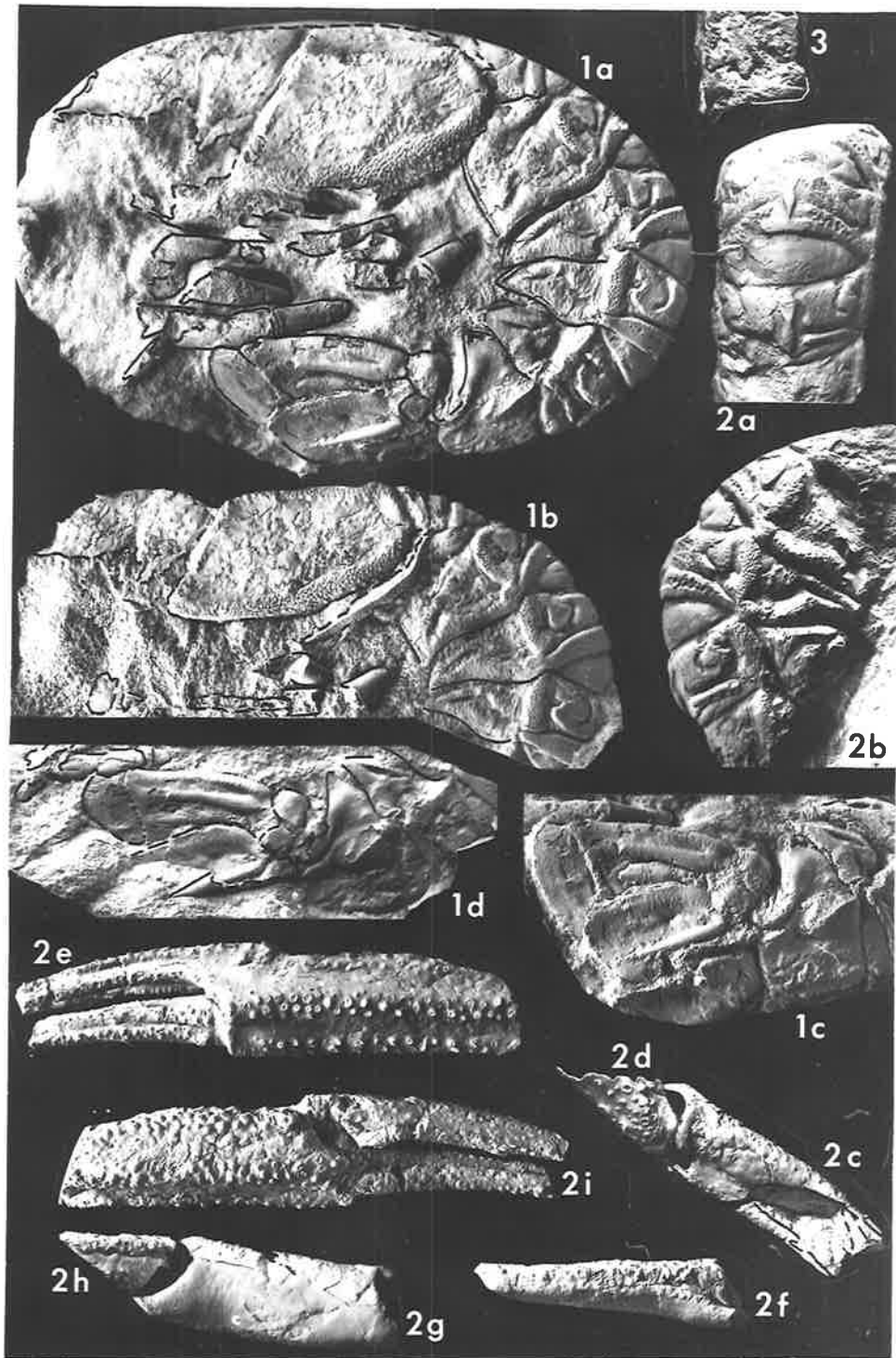


Plate 22

Metanephrops motunauensis gen. nov., sp. nov. Ink lines outlining structures are drawn contiguous with the outer perimeter of the structure. Dashed lines mark accidental fractures. Figures all natural size.

- Fig. 1a-d. Holotype ♀, zfc 201 (C.M.). 1a, lateral view. 1b, latex cast of counterpart, hind portion of lower marginal border of carapace showing. 1c, uropod and hind portion of abdomen. 1d, latex cast of counterpart of uropod and hind portion of abdomen, spinulation of hind margin of large segment of exopodite visible.
- Fig. 2a-i. Allotype ♂, zfc 202 (C.M.). 2a, 2nd to 5th segments of abdomen, dorsal view. 2b, 2nd to 5th segments of abdomen, lateral view. 2c, merus of 1st pereopod, dorsal view. 2d, carpus of 1st pereopod, dorsal view. 2e, propodus and dactylus of 1st pereopod, dorsal view. 2f, merus of 1st pereopod, outer lateral view. 2g, merus of 1st pereopod, ventral view. 2h, carpus of 1st pereopod, ventral view. 2i, propodus and dactylus of 1st pereopod, ventral view.
- Fig. 3. Paratype ♀, zfc 193 (C.M.): hind portion of left half of carapace showing posterior marginal border, dorsal view.

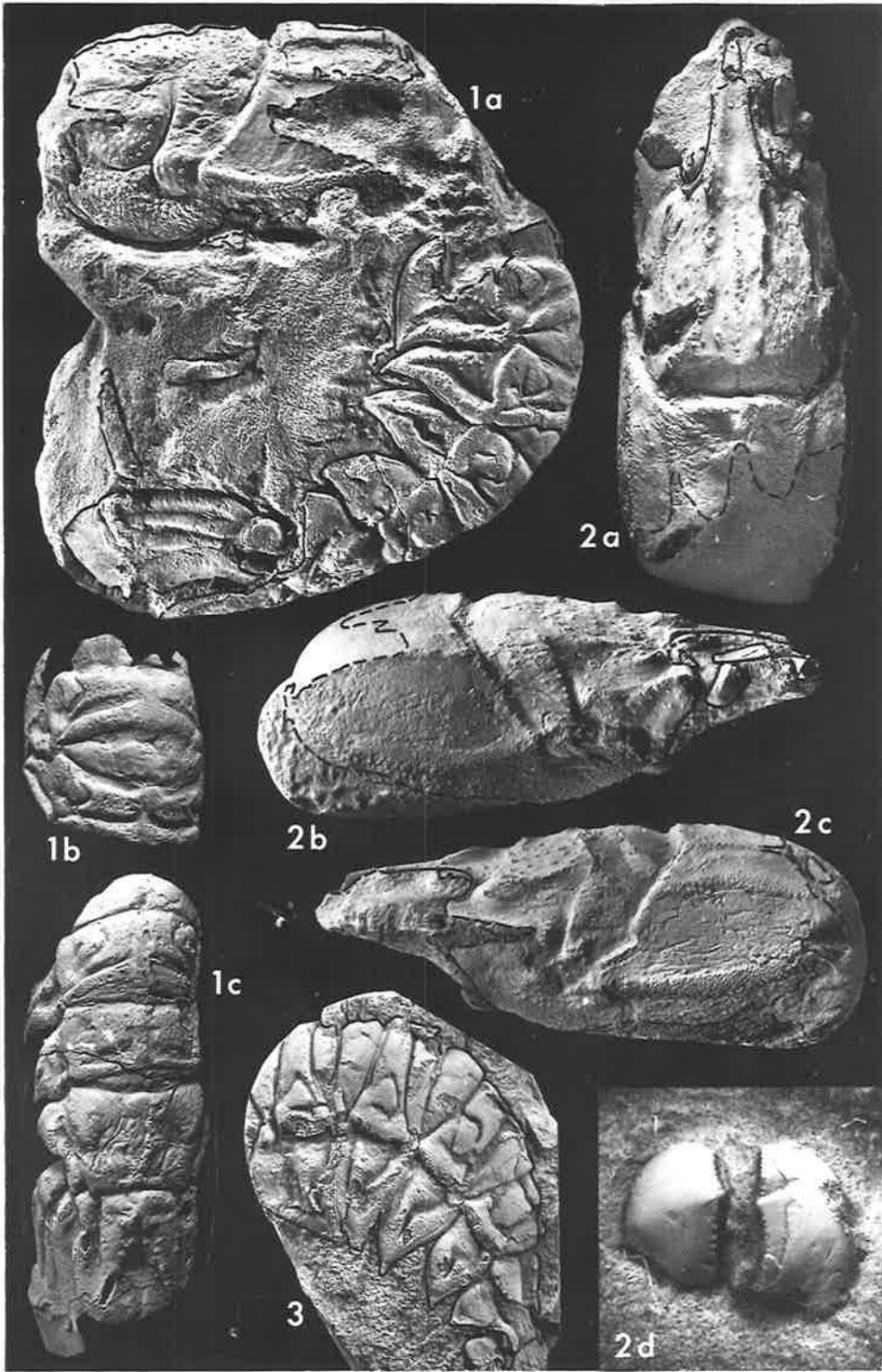


Metanephrops motunauensis gen. nov., sp. nov. Masking and outlining of structures contiguous with the outer perimeter of the structure. Dashed lines indicate accidental fractures.

Fig. 1a-c Paratype ♀, zfc 170 (C.M.). 1a, lateral view, x 1. 1b, 2nd and 3rd segments of abdomen, dorsal view, x 1. 1c, posterior portion of abdomen, dorsal view, x 1.

Fig. 2a-d Paratype, zfc 40 (C.M.). 1a, carapace, portions of eyestalks, right antennal scale, basis of antenna, and antennal peduncle visible, dorsal view, x  $\frac{7}{8}$ . 1b, same, mandibular gnathobases also shown, right lateral view, x  $\frac{7}{8}$ . 1c, carapace, left lateral view, x  $\frac{7}{8}$ . 1d, mandibular gnathobases, ventral view, x  $2\frac{1}{2}$ .

Fig. 3 Paratype ♀, zfc 134 (C.M.): 2nd to 6th segments of abdomen, lateral view, x 1.



1675

*METANEPHROPS*, A NEW GENUS OF LATE PLIOCENE TO RECENT  
LOBSTERS (DECAPODA, NEPHROPIDAE)

BY

RICHARD J. F. JENKINS

Department of Geology and Mineralogy, University of Adelaide, Adelaide, South Australia 5001,  
Australia

*Reprinted from*: CRUSTACEANA, Vol. 22, Part 2, 1972



LEIDEN  
E. J. BRILL

Jenkins, R. J. F. (1972). *Metanephrops*, a new genus of late Pliocene to recent lobsters (Decapoda, Nephropidae). *Crustaceana*, 22(2), 161-177.

NOTE:

This publication is included in the print copy  
of the thesis held in the University of Adelaide Library.

It is also available online to authorised users at:

<http://dx.doi.org/10.1163/156854072X00426>



Figure 14

Geological section exposed in the Nildottie-Swan Reach area, South Australia, the observed ranges of the fossil decapod Crustacea and index foraminifera which it contains, and its chronostratigraphic relationships. The geological time scale is based on the work of Funnell (1964), Berggren (1969a) and Bandy et al. (1970). Australian and New Zealand oxygen isotope palaeotemperature data (with the item numbers given by the original authors) is indicated. The foraminifera illustrated were drawn with the aid of a camera lucida and are all approximately x 50.

