

MIDDLE EOCENE OSTRACODA (CRUSTACEA) FROM THE COASTAL SECTION, BORTONIAN STAGE, AT HAMPDEN, SOUTH ISLAND, NEW ZEALAND

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(Received 25 March, 1993; accepted, 26 May 1993)

ABSTRACT

Ayress, M.A. (1993). Middle Eocene Ostracoda (Crustacea) from the coastal section, Bortonian Stage, at Hampden, South Island, New Zealand. *New Zealand Natural Sciences* 20: 15-21.

From an analysis of a single large sample of Middle Eocene, Bortonian Stage, micaceous siltstone collected from the Hampden coastal section (Bortonian Stage lectostratotype), North Otago, 22 well-preserved species of marine, middle to outer shelf Ostracoda were identified and their relative abundance recorded. Of these, *Actinocythereis? reticulospinosa* sp. nov. and *Dutoitella hampdenensis* sp. nov. are formally described here. The excellent preservation and stratigraphical importance of the sampled locality is emphasised.

KEYWORDS: Ostracoda - New Zealand - new taxa - fossil - Eocene.

INTRODUCTION

Most previous studies of fossil ostracods from New Zealand have been selective in their approach. Hornibrook (1952, 1953) described Cainozoic to Recent species concentrating on stratigraphically useful taxa. Descriptions of selected Tertiary to Recent forms have also been provided recently (Ayress 1990, 1993, in press; Ayress & Swanson 1991; Ayress & Warne 1993; Whatley & Millson 1992, and Whatley *et al.* 1992). Only the studies by Swanson (1969) and Milhau (1993) on Early Miocene sequences in the Middle Waipara district and the Waitemata Basin respectively, have described the total assemblage found in a fossil sample.

This contribution also documents the total ostracod fauna, in this case found in a single very large sample (approximately 2 kg) collected from the Bortonian Stage, Middle Eocene, cliff section, at Hampden Beach, Otago, South Island. The locality provides an important record of Bortonian Stage, Middle Eocene age (Cameron & Waghorn 1985, Hornibrook *et al.* 1989). Here, although Ostracoda are rather uncommon, fossil preservation is extremely good and microfossils of Bortonian age are

generally not well represented elsewhere in New Zealand.

SAMPLE DETAILS

An approximately 2 kg sample of bluish-grey, loosely consolidated, micaceous siltstone (Hampden Formation), was collected about 100 m north of Kakaho Creek, North Otago, South Island (Fig. 1), from the coastal cliff exposure 2 m below the unconformable top of the unit. Full sample details have been recorded in the fossil record file, number J42/f214, administered by the Geological Society of New Zealand. The locality grid reference using the 1984 New Zealand NZMS 260 map sheet is J42/402433. The Hampden coastal section has been designated as lectostratotype of the Bortonian Stage (Finlay & Marwick 1940, Hornibrook *et al.* 1989) and the Hampden Formation is entirely Bortonian in age.

Fossil specimens were easily extracted from the loose sediment simply by washing gently through a 75 μ m aperture sieve. Drawings were made using a camera lucida microscope attachment. All photomicrographs were taken using a Cambridge 360 electron microscope.

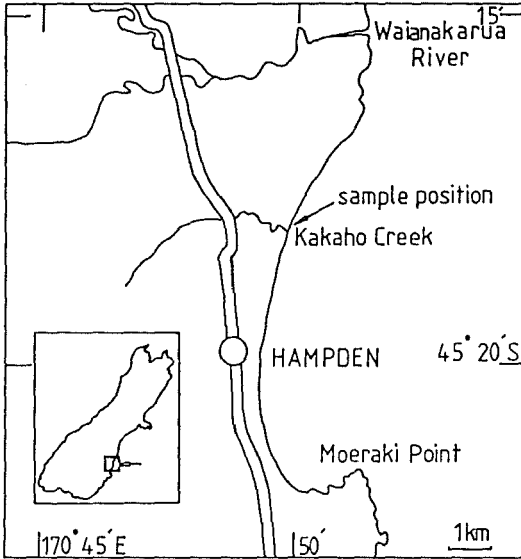


Figure 1. Map of Northeast Otago showing position of locality sampled.

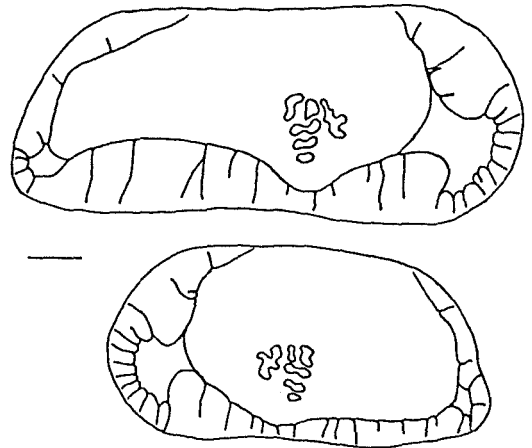


Figure 2. Camera lucida drawings of *Krithe nitida*, male RV, OU 40697 (upper), female LV, OU 40698 (lower). Scale bar = 0.1 mm.

SYSTEMATICS

New taxa are listed below. A full species list found in the sample is given in Table 1 and illustrations of these can be found in Figures 2 to 4. The size range of two apparently morphologically variable species; *Krithe nitida* Whatley & Downing and *Actinocythereis* aff. *thomsoni* (Hornibrook) are shown graphically in Figure 5. Given the large size variation it is possible that more than one species is represented in each case. However, further subdivision must await a better understanding of the geographic and stratigraphic variation of these species and recognition of their consistent diagnostic features. Type and figured specimens are deposited in the collections of the Geology Museum, University of Otago, the catalogue numbers with prefix OU apply to these. The following abbreviations are employed in the descriptions: C = carapace, V = valve, RV = right valve, LV = left valve.

Class: Ostracoda Latreille 1806
 Order: Podocopida Müller 1894
 Suborder: Podocopina Sars 1866
 Superfamily: Cytheracea Baird 1850

Family: Trachyleberididae Sylvester-Bradley 1948

Genus: *Actinocythereis* Puri 1953

Type species: *Cythere exanthemata* Ulrich & Bassler 1904

Actinocythereis? *reticulospinosa* sp. nov. Fig. 4A-F

Etymology: with reference to the reticulate and spinose ornament of this species.

Type locality and horizon: Middle Eocene, Bortoni-an Stage of Hampden Coastal outcrop, North Otago, see above for further details.

Dimensions:

	Catalogue number	Length (mm)	Height (mm)
Holotype, Female LV	OU 40687	0.81	0.53
Paratype, Female RV	OU 40688	0.81	0.49
Paratype, Male C	OU 40689	0.83	0.50

Table 1. Species composition, specimen abundance and age distribution of ostracods collected from the sample analysed. N = number of valves.

Species	N	Known New Zealand stage range
<i>Krithe nitida</i> Whatley & Downing 1983	49	Kaiatan (Lt. Eoc.) - ?Recent
<i>Actinocythereis</i> aff. <i>thomsoni</i> (Hornibrook 1952)	34	Bortonian (M. Eoc.) - Waitakian (E. Mio.)
<i>Philoneptunus swansoni</i> Whatley <i>et al.</i> 1992	19	Bortonian (M. Eoc.) - lower Whaingaroan (E. Olig.)
<i>Marwickcythereis marwicki</i> (Hornibrook 1952)	16	Mangaorapan (E. Eoc.) - Runangan (Lt. Eoc.)
<i>Dutoitella hampdenensis</i> sp. nov.	15	Bortonian (M. Eoc.)
<i>Protobuntonia hayi</i> (Hornibrook 1953)	12	Bortonian (M. Eoc.) - Runangan (Lt. Eoc.)
<i>Bradleya dictyonites</i> Benson 1972	11	Mangaorapan (E. Eoc.) - ?Recent
<i>Cytherella</i> sp.	11	?Waipawan (E. Eoc.) - Recent
<i>Actinocythereis reticulospinosa</i> sp. nov.	9	Bortonian (M. Eoc.)
<i>Bradleya</i> sp.	8	Bortonian (M. Eoc.) - lower Whaingaroan (E. Olig.)
<i>Cytherella paranitida</i> Whatley & Downing 1983	5	Bortonian (M. Eoc.) - Recent
<i>Philoneptunus reticulatus</i> Whatley <i>et al.</i> 1992	5	Bortonian (M. Eoc.) - Runangan (Lt. Eoc.)
<i>Rugocythereis reticulata</i> Ayress 1993	5	Bortonian (M. Eoc.) - Recent
<i>Actinocythereis</i> sp.	3	Bortonian (M. Eoc.)
<i>Bradleya proarata</i> Hornibrook 1952	3	Bortonian (M. Eoc.) - Waitakian (E. Mio.)
<i>Cytheropteron wellmani</i> Hornibrook 1952	3	Piripauan (U. Cret.) - Recent
<i>Cytheropteron</i> sp.	3	Bortonian (M. Eoc.) - ?Recent
<i>Limburgina quadrazea</i> (Hornibrook 1952)	3	Mangaorapan (E. Eoc.) - Duntroonian (Lt. Olig.)
<i>Neonesidea</i> sp.	3	Bortonian (M. Eoc.) - Recent
<i>Dutoitella</i> aff. <i>proterva</i> (Hornibrook 1952)	2	Mangaorapan (E. Eoc.) - Runangan (Lt. Eoc.)
<i>Propontocypris</i> aff. <i>herdmani</i> (Scott 1905)	1	Bortonian (M. Eoc.) - Recent
<i>Maddocksella</i> sp.	1	Bortonian (M. Eoc.) - Recent
<i>Oertliella semivera</i> (Hornibrook 1952)	1	Mangaorapan (E. Eoc.) - Duntroonian (Lt. Olig.)

Distribution: Middle Eocene, Bortonian Stage (this study).

Diagnosis: A subrectangular, strongly sexually dimorphic species tentatively assigned to *Actinocythereis* with prominent anterior hinge-ear, dense microreticulation, numerous evenly distributed spines and dorsal and postero-median ridges.

Description: Medium sized, subrectangular, sexually dimorphic: males more elongate than females. Anterior margin symmetrically convex, blunt apically; denticulate rim. Posterior margin bluntly convex, extremity at mid-height. Dorsal margin straight, upward inclined in females, interrupted by well-developed hinge-ear anteriorly, which, in the LV, usually bears a prominent dorsally directed spine. Ventral margin straight. Subcentral tubercle moderately well-developed. Moderately well-developed dorsal ridge and median ridge in posterior half.

Ocular sinus small. Valve surface covered with dense microreticulation and numerous evenly spaced spines often with common bases. One long spine occurs close to margin postero-ventrally. Normal pore canals simple emergent through spines. Inner lamella moderately wide, avestibulate. Radial pore canals straight, about 35 true anteriorly, 25 true postero-ventrally. Hinge holamphidont. Muscle scars consist of a vertical row of four undivided adductors and a single L-shaped frontal ahead.

Remarks: This species differs from *Dutoitella proterva* (Hornibrook) and *Dutoitella hampdenensis* sp. nov. in its ocular sinus, its lack of a distinct primary reticulation, its densely spinose ornament and in its prominent anterior hinge-ear. Other species of *Actinocythereis* lack dense reticulation and for this reason *A. ?reticulospinosa* is only tentatively assigned to that genus.

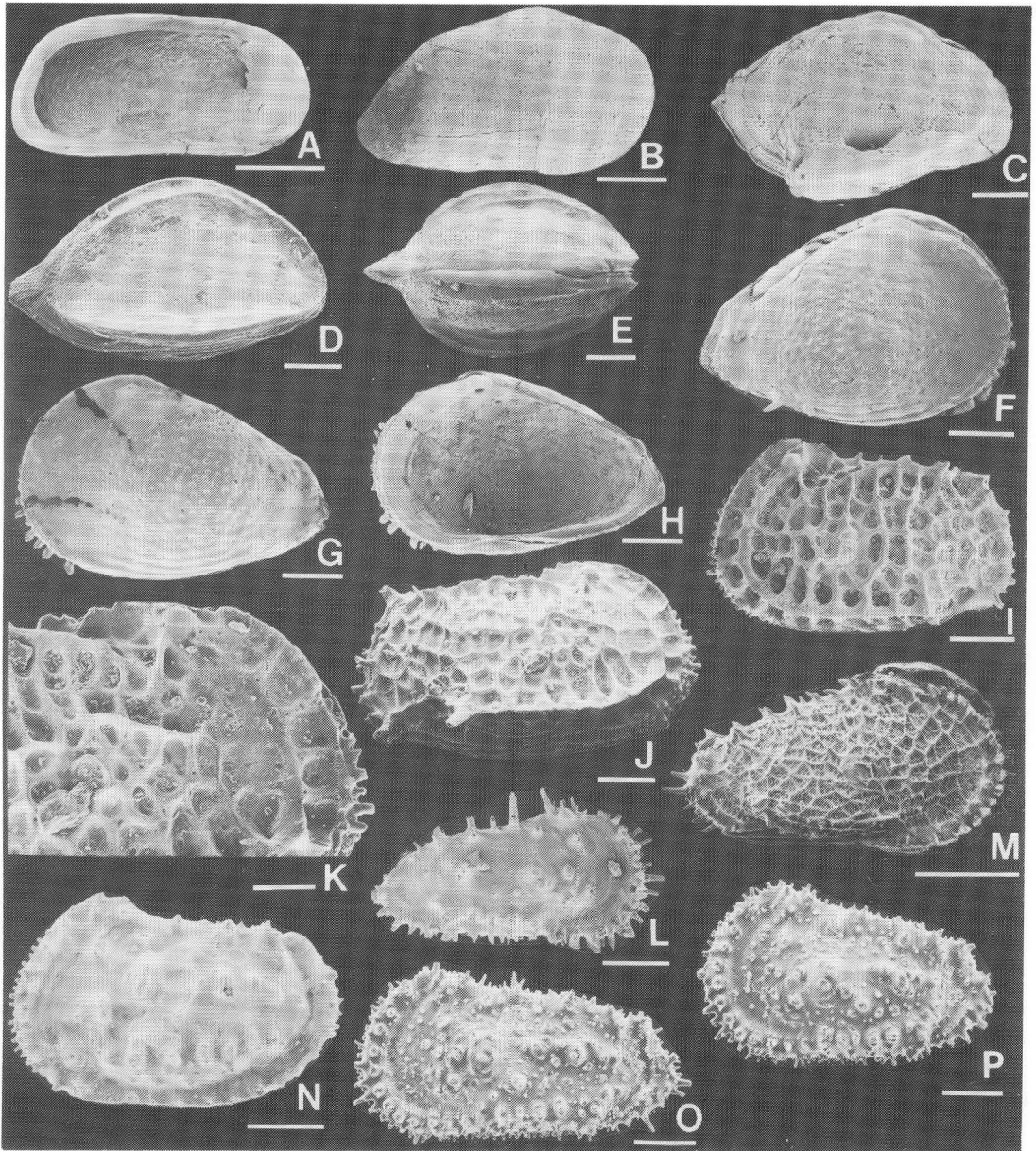


Figure 3. SEM micrographs. All scale bars = 0.2 mm unless indicated otherwise: (A) *Maddocksella* sp., LV, OU 40673, internal lateral view; (B) *Propontocypris* aff. *herdmani*, juvenile RV, OU 40674, external lateral view; (C) *Cytheropteron* sp., C, OU 40675, external RV view, scale bar = 0.1 mm; (D-E) *Cytheropteron wellmani*, C, OU 40676, scale bar = 0.1 mm (D) external RV view, (E) dorsal view of carapace; (F-H) *Protobuntonia hayi*, (F) female C, OU 40677, external RV view, (G) male LV, OU 40678, external lateral view, (H) female RV, OU 40679, internal lateral view; (I) *Bradleya* sp., LV, OU 40680, external lateral view, (J-K) *Bradleya dictyonites*, C, OU 40681, (J) external lateral view of RV, (K) antero-dorsal detail, scale bar = 0.1 mm; (L) *Actinocythereis* sp. RV, OU 40682, external lateral view; (M) *Rugocythereis reticulata*, C, OU 40683, external lateral view of RV; (N) *Dutoitella* aff. *proterva*, LV, OU 40684, external lateral view; (O-P) *Actinocythereis* aff. *thomsoni*, (O) male LV, OU 40685, external lateral view, (P) female LV, OU 40686, external lateral view.

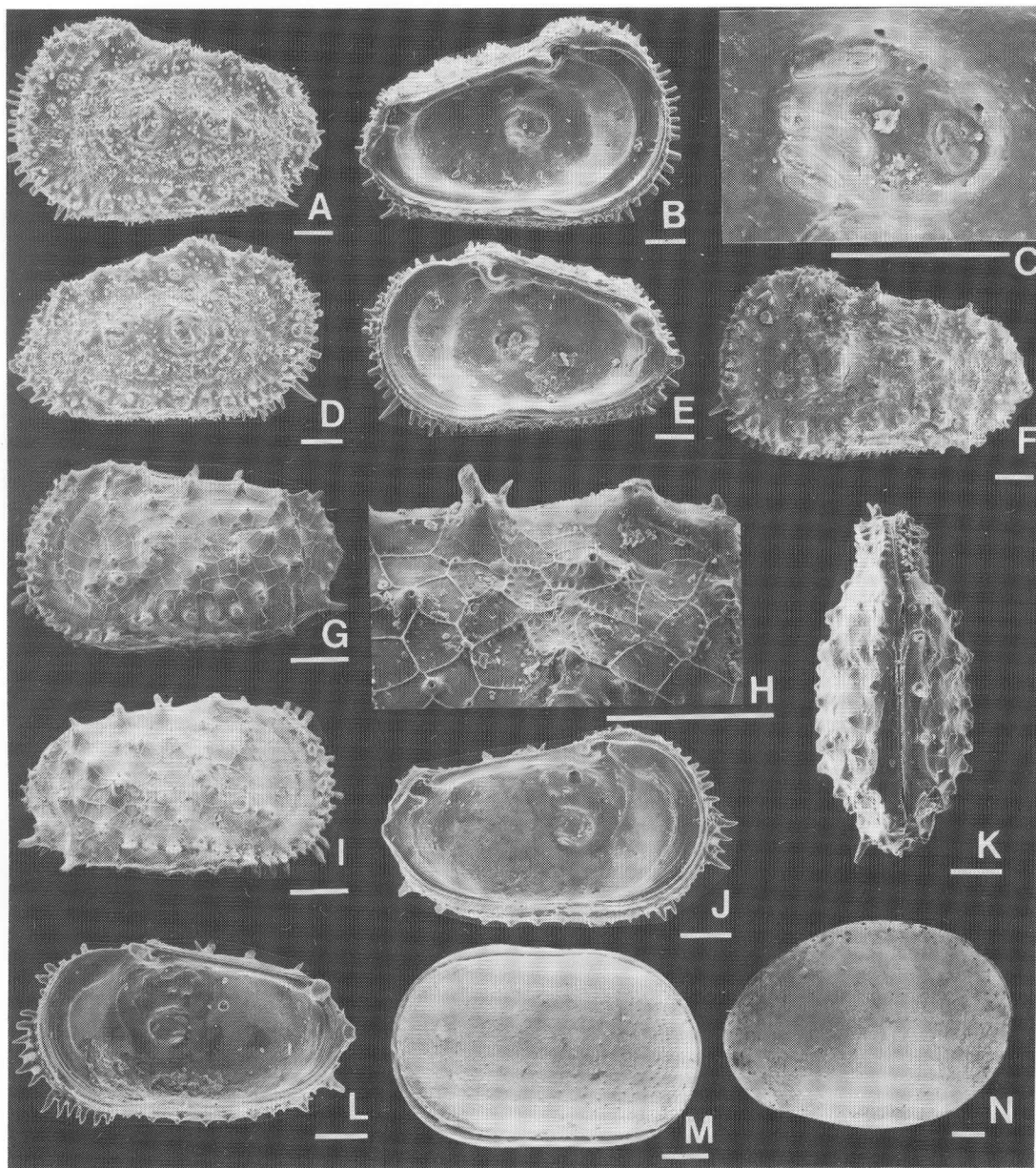


Figure 4. SEM micrographs. All scale bars = 0.1 mm: (A-F) *Actinocythereis? reticulospinosa* sp. nov., (A-C) holotype, female LV, OU 40687, (A) external lateral view, (B) internal lateral view, (C) subcentral muscle scars, (D-E) paratype, female RV, OU 40688, (D) external lateral view, (E) internal lateral view, (F) male C, OU 40689, external lateral view of LV; (G-L) *Dutoitella hampdenensis* sp. nov., (G) LV, OU 40691, external lateral view, (H-I) holotype, RV, OU 40690, (H) external antero-dorsal ornament detail, (I) external lateral view, (J) LV, OU 40692, internal lateral view, (K) C, OU 40691, external dorsal view, (L) RV, OU 40693, internal lateral view; (M) *Cytherella paranitida*, C, OU 40695, external lateral LV view; (N) *Cytherella* sp., RV, OU 40696, external lateral view.

Genus: *Dutoitella* Dingle 1981
 Type species: *D. dutoiti* Dingle 1981

Dutoitella hampdenensis sp. nov. Fig. 4G-L

Etymology: From the type locality.

Type locality and horizon: Middle Eocene, Bortonian Stage of Hampden Coastal outcrop, North Otago, see above for further details.

Dimensions:

	Catalogue number	Length (mm)	Height (mm)
Holotype, C	OU 40690	0.57	0.32
Paratype, LV	OU 40691	0.58	0.32
Paratype, RV	OU 40692	0.68	0.39
Paratype, LV	OU 40693	0.67	0.36

Distribution: Known from the type locality and from the Bortonian of DSDP Site 207 on the Lord Howe Rise.

Diagnosis: A small, subrectangular species of *Dutoitella* with two strong postero-ventral marginal spines. Well-developed spines sparsely distributed on posterior inflated surface; median ridge absent. Secondary reticulation confined to sub-ocular region. Ventro-lateral and anterior marginal spines tend to be clavate.

Description: Small sized, subrectangular lateral outline. Sexual dimorphism not apparent. Anterior margin symmetrically convex with denticulate rim. Posterior margin bluntly convex, extremity just above mid-height. Dorsal margin straight with very weak hinge-ears. Ventral margin straight. Subcentral tubercle weak. Valve surface sparsely but prominently spinose; spines regularly spaced in posterior half, ventro-lateral and antero-marginal spines usually clavate, one postero-marginal and a postero-ventral spine particularly prominent. Fine primary reticulation and weak secondary reticulation confined to sub-ocular region. Normal pore canals simple emergent through spines. Inner lamella moderately wide, avestibulate. Radial pore canals straight, about 23 true anteriorly, 11 true postero-

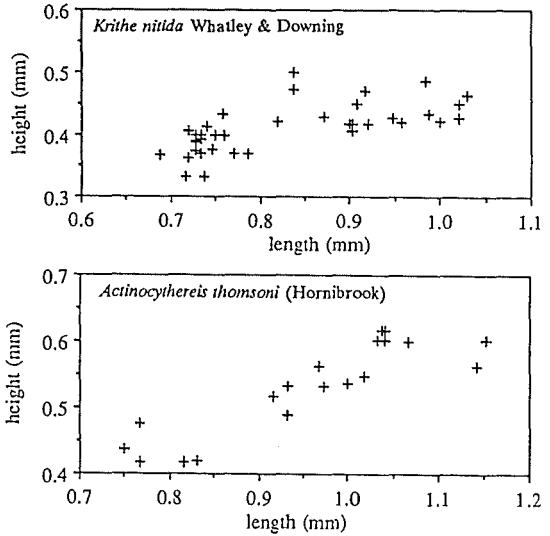


Figure 5. Size variation of *Krithe nitida* and *Actinocythereis* aff. *thomsoni* of this study.

ventrally. Hinge holamphidont, median bar very finely denticulate on dorsal edge. Muscle scars consist of a vertical row of four undivided adductors and a single L-shaped frontal ahead.

Remarks: This species differs from other species assigned to the genus in its strong postero-marginal spines. It also lacks a median ridge and the secondary reticulation is confined to its antero-dorsal surface. The partial development of a secondary reticulum in this species indicates that this is a variable feature diagnostic at neither the species nor generic level. *Trachyleberis proterva* Hornibrook is also considered to belong to *Dutoitella* and is very similar to *D. hampdenensis* differing mainly in having a more concave dorsal margin, more upward curving posterior margin and bearing only one postero-marginal spine. The type specimens of *D. proterva* are densely secondarily reticulate. Two specimens found here lack reticulation but other features, particularly details of outline, conform to that species (Fig. 3N).

DISCUSSION

Ostracods are not common in the Hampden siltstone. The whole 2 kg sample was needed in order to obtain a moderately large number of specimens.

Thus the sample is probably not a good representation of the entire assemblage of the Hampden Formation but contains at least the dominant taxa of the sampled horizon. Within the sample early juvenile specimens of small species are not well represented and may have been removed by winnowing during deposition. Table 1 lists the taxa found, their relative abundance and known stratigraphical occurrence. All species found here have been recorded at other localities of New Zealand especially Canterbury, Otago and Westland, mostly from younger, particularly Late Eocene, strata. Extinction levels are well dated whereas first occurrences are generally not well constrained because of the relatively poor data available for the lower Palaeogene. Sighted trachyleberid taxa indicate a probable shelf depth of deposition. The high proportion of *Krithe* and trachyleberids suggests a palaeodepth no shallower than middle shelf (approximately 100 m). The lack of hemicytherids and low representation of cytherurids are also consistent with this interpretation.

ACKNOWLEDGEMENTS

Fieldwork for this study was carried out in 1991 and supported by a fellowship awarded to the author by the University of Otago, Dunedin. I acknowledge my current Australian Research Council award and thank the S.E.M. unit of the Australian National University, Canberra for their help with the photography. Jeffery Stilwell assisted in the field, his help is also gratefully appreciated.

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