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On *Arcacythere* Hornibrook, 1952 (Cytheracea, Ostracoda, Crustacea), a senior synonym of *Rockallia* Whatley, Frame & Whittaker, 1978

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ABSTRACT — The type specimens of *Arcacythere chapmani* Hornibrook, 1952 (the type species of *Arcacythere* Hornibrook, 1953; Tertiary, New Zealand) have been re-examined and are shown to have internal carapace features identical to those of *Rockallia* Whatley, Frame & Whittaker, 1978. *Rockallia* is known from Cenozoic deep-sea sediments worldwide and from the Oligocene and Miocene of northwestern Europe. The external carapace morphologies of *Arcacythere* and *Rockallia* show only minor distribution of the fossae. *Rockallia* is, therefore, shown to be a subjective junior synonym of *Arcacythere*. An emended diagnosis of *A. chapmani* is given.

INTRODUCTION

The genus *Arcacythere* was erected by Hornibrook (1952) to accommodate the single cytheracean species *A. chapmani* Hornibrook, 1952, which he recorded from the late Cretaceous (Piripauan Stage) to the Middle Miocene (Waiauan Stage) of New Zealand. Whatley *et al.* (1982) noted the similarity of *Arcacythere* to *Rockallia* Whatley *et al.*, 1978, a genus originally described from Holocene and Recent sediments of the Rockall Trough, North Atlantic, but were unable to synonymise them based on the original description and illustrations of Hornibrook. Specimens of *Rockallia* were later found throughout the Southwest Pacific in Cenozoic D.S.D.P. core material and in Oligocene and Miocene strata of northwestern Europe. Whatley *et al.* (1982) considered that *Arcacythere* belonged to the Pectocytheridae, based on its original description and illustration, and erected a new family, Rockalliidae, to accommodate both *Rockallia* and an undescribed Tertiary genus from Argentinian Patagonia.

I have recently recovered from New Zealand Tertiary shelf sediments specimens similar to *Rockallia*. This has prompted a re-examination of the type material of *Arcacythere* and a reassessment of its affinities with *Rockallia*.

MATERIAL

Material examined includes type specimens of *Arcacythere chapmani* housed at the New Zealand Geological Survey, Lower Hutt. The original sample from which these specimens were picked was collected by J.S. Marwick, from the Third Bay, Sandstone Member, Nga Pari Formation (Lillburnian Stage, Middle Miocene) of the Waiau River bank section at Clifden, Southland (New Zealand Fossil Record File Number D45/f8458, grid reference D45/004513, New Zealand map sheet overprint series, 1975). Four specimens from the type locality (two specimens from sample D45/f8466, Upper Shellbeds Member, Park Bluff Sandstone Formation, Waiauan Stage; and one specimen from samples D45/f8475, Lill Sand Member, Park Bluff Sandstone Formation, Lillburnian Stage, and D45/f8476, Third Bay Sandstone Member, Nga Pari Formation, Lillburnian Stage) were made available to me for study and are illustrated in Pl 1, Fig. 1. Other Tertiary material or *Arcacythere* housed at the New Zealand Geological Survey, has also been examined and specimens of late Eocene age (Runagan Stage, from the Kaiata Mudstone, Cape Foulwind, southwestern Nelson, sample K29/f6504) are illustrated here. Figured specimens have been registered at the New Zealand Geological Survey and are catalogued with numbers prefixed OP.

In addition I have recovered specimens of *Arcacythere* from the late Eocene Kaiatan and Runagan Stages (Ashley Mudstone Formation of a Waihao River bank outcrop, South Canterbury, sample J40/f90, and Totora Limestone of Taylors Quarry, North Otago, sample J41/f8244A, respectively) and from the early Miocene Otaian and Altonian Stages (of the coastal outcrop of All Day Bay, North Otago; Gee Greensand Formation, sample J42/f6544 and Rifle Butts Formation, sample J42/f169 respectively). Some specimens from these localities are also illustrated here. Figured specimens have been deposited in the museum collections of the Department of Geology, University of Otago, Dunedin, New Zealand, and are catalogued with numbers prefixed OU.

OBSERVATIONS

Topotypes of *A. chapmani* were examined using the scanning electron microscope (see Plate 1) and transmitted light (see Fig. 1). These techniques allow illustration of important carapace features in greater detail and accuracy than Hornibrook was able to achieve in his drawings of *Arcacythere* in 1952. Internal carapace features are shown in Pl. 1, Figs 3, 4, 8-11, and Fig.1, and are consistent with those of *Rockallia* (see Whatley *et al.* 1978 and Whatley *et al.* 1982). The most significant features in common include: (1) a median hinge element which lacks crenulation, (2) interdigitating adductor muscle scars, (3) a large and subreniform frontal scar, and (4) a large triangular fulcral point which is almost dorsal to the adductor scars. Other internal features such as the normal and radial pore canal number and distribution are also consistent with the generic diagnosis given by Whatley *et al.* (1982) for *Rockallia*.

The overall external morphology, inflation and lateral outline of *A. chapmani* is also similar to that of *Rockallia*. The nature of the reticulate ornament is comparable to *Rockallia* and in some specimens bears weak papillate ridges as it does in some specimens of *Rockallia*. The two large normal pore conuli near the anterior and posterior margins reported in species of *Rockallia* are also present in *A. chapmani*.

The features listed above clearly indicate that *Arcacythere* and

Rockallia are congeneric. Differences between *A. chapmani* and species assigned to *Rockallia* can be seen in details of the external carapace morphology and lateral outline (see emended diagnosis of *A. chapmani* below). These features identify the former as a distinct species but are insufficient to merit a generic distinction.

The above observations indicate that *Arcacythere* is a senior subjective synonym of *Rockallia.*

Order Podocopida Muller, 1894
Superfamily Cytheracea Baird, 1850
Family Rockalliidae Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Genus *Arcacythere* Hornibrook, 1952

Included species:

Arcacythere chapmani Hornibrook, 1952
Rockallia enigmatica Whatley, Frame & Whittaker, 1978
Rockallia eocenica Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Rockallia inceptiocelata Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Rockallia vscripta Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Rockallia woutersi Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Rockallia sp. Whatley, Uffenorde, Harlow, Downing & Kesler, 1982
Arcacythere sp. McKenzie, 1974
Arcacythere cf. *eocenica* Whatley *et al.* 1982, this paper (see Pl.1, Figs 14-15)

Arcacythere chapmani Hornibrook, 1952
(Pl.1, figs 1-13, 18 & 19, Fig. 1)

Emended diagnosis. A species of *Arcacythere* subrectangular in lateral view often with a distinct postero-ventral angle and almost straight ventral margin. Two ridges, sometimes broad, occur parallel and close to the anterior and postero-dorsal margins; the latter extends anteriorly to mid-length. Reticulation robust with vertical components tending to dominate and, in anterior half of carapace, radiate from mid dorsal region.

Remarks: This species is similar to *A eocenica* (Whatley *et al.*) from the Eocene of D.S.D.P. Site 207 in the Tasman Sea, but differs in its robust reticulation and ridges. *A. woutersi* (Whatley *et al.*) from the Oligo-Miocene of northwestern Europe differs in lacking the strong anterior and postero-dorsal ridges present in *A. chapmani*, but is similar in its robust reticulation, a feature presumably reflecting similar relatively shallow water depths at which these two species occurred.

Stratigraphical range. Hornibrook (1952) states that *Arcacythere chapmani* ranges from the Piripauan Stage (Late Cretaceous) to the Waiauan Stage (Middle Miocene). New Zealand records older than Oligocene probably involve different species since they lack an anterior extension of the poster-dorsal ridge, have a more convex posterior outline, and a less robust reticulation (see Pl. 1, Figs 14-17).

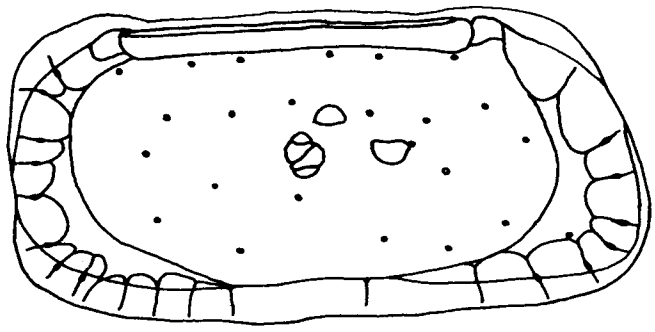


Fig. 1. Female left valve topotype of *Arcacythere chapmani* (OP1146) seen in transmitted light showing muscle scars and pore canals. Length of scale bar = 0.1mm.

Explanation of Plate 1

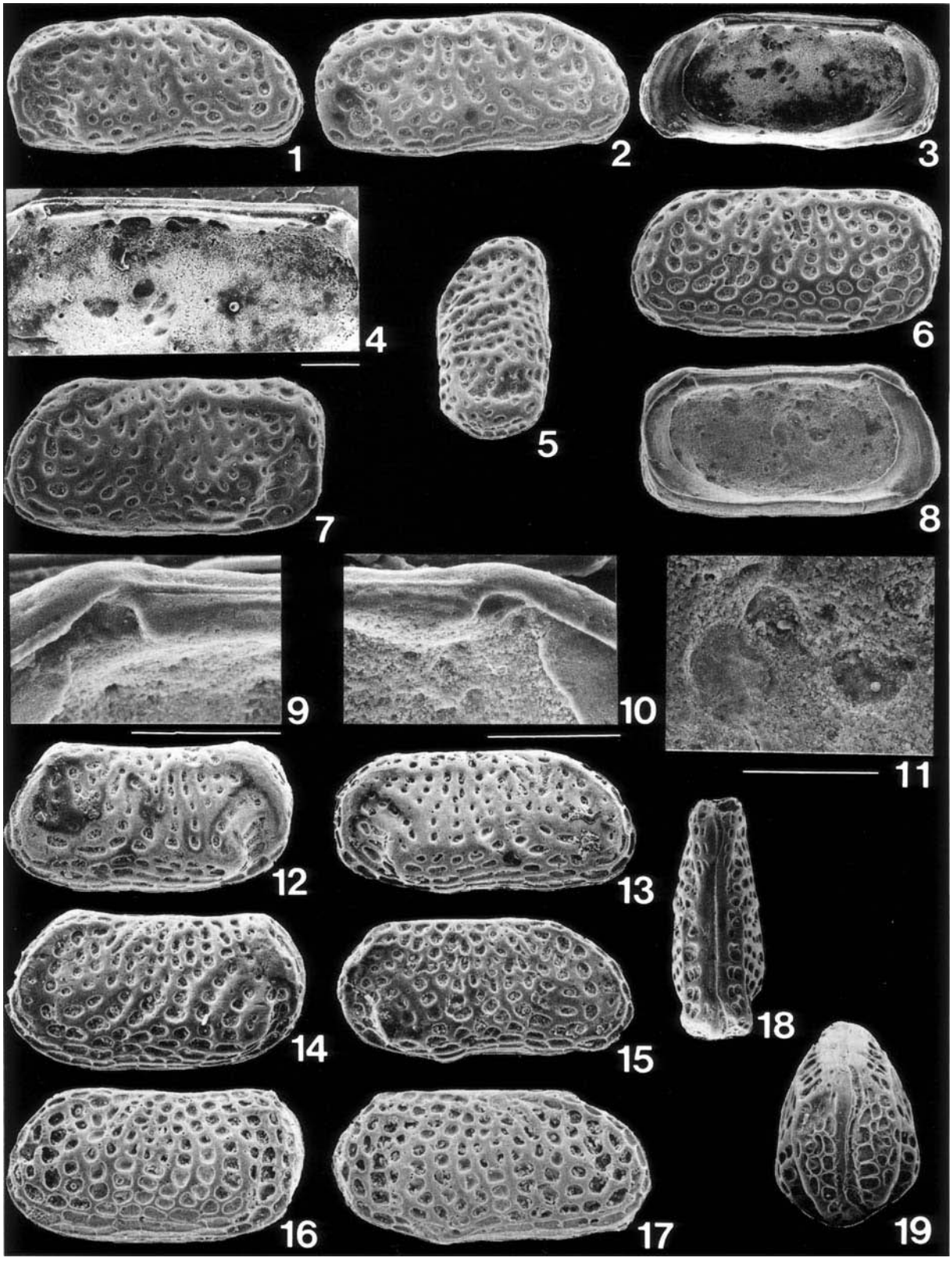
All dimensions are given as length x height in mm. All scale bars = 50μm.

Figs.1-11, 18 & 19 — *Arcacythere chapmani* Hornibrook, all figured specimens are from the type locality, Waiau River bank section, Clifden, Southland, lat. 46° 02.0'S, long. 167° 41.7'E: Fig.1, male RV, OP1147, ext. lat., 0.41 x 0.20, (D45/f8466) Upper Shellbeds Member, Park Bluff Sandstone Formation, Waiauan Stage, middle Miocene; Fig.2, male RV, OP1144, ext. lat., 0.50 x 0.21, (D45/f8467) Third Bay Sandstone Member, Nga Pari Formation, Lillburnian Stage, middle Miocene; Fig. 3, same specimen, int. lat.; Fig. 4, same specimen, detail of hinge, adductors, frontal scar and fulcral point; Fig.5, same specimen, postero-lat. oblique; Fig. 6, female carapace, OP1145, ext. lat. LV, 0.44 x 0.21, (D45/f8475) Lill Sand Member, Park Bluff Sandstone Formation, Lillburnian Stage, middleMiocene; Fig.7, female LV, OP1146, ext. lat., 0.46 x 0.21, (D45/f8466) Upper Shellbeds Member, Park Bluff Sandstone Formation, Waiauan Stage, middle Miocene; Fig. 8, same specimen, int. lat.; Fig. 9, same specimen, detail of posterior part of hinge; Fig. 10, same specimen, detail of anterior part of hinge; Fig. 11, same specimen, detail of central muscle scars and fulcral point; Fig. 18, female carapace, OP1145,dors, 0.44 x 0.21, (D45/f8475) Lill Sand Member, Park Bluff Sandstone Formation, Lillburnian Stage, middle Miocene; Fig. 19, same specimen, post.

Figs 12-13 — *Arcacythere* aff. *chapmani* Hornibrook: Fig.12, female LV, OU39799, ext. lat., 0.48x 0.22, (J42/f6544) Gee Greensand Formation, Otaian Stage, early Miocene, N. Otago, lat. 40° 10.8'S, long. 170° 53.7'E; Fig. 13, female RV, OU39798, ext. lat., 0.42 x 0,21, (J42/f169) Rifle Butts Formation, Altonian Stage, early Miocene, N Otago, lat. 45° 12.0'S, long. 170° 53.0'E.

Figs 14-15 — *Arcacythere cf. eocenica* Whatley *et al.*, both figured specimens are from (K29/f6504) Kataiata Mudstone Formation, Runagan Stage, late Eocene, Cape Foulwind, S.W. Nelson, lat. 41° 44.7'S, long. 171° 29.0'E: Fig.14, female LV, PO1148, ext. lat., 0.40 x 0.21; Fig. 15, female RV, OP1149, ext. lat., 0.40 x 0.20.

Figs 16-17 — *Arcacythere eocenica* Whatley *et al.*, both figured specimens are from (J40/f90) Ashley Mudstone Formation, Kaiatan Stage, late Eocene, S. Canterbury, lat 44° 48.3'S, long. 170° 58.3'E: Fig. 16, female LV, OU39800, ext. lat., 0.42 x 0.22; Fig. 17, female RV, OU39801, ext. lat., 0.43 x 0.22.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