

REVISION OF THE TATE MOLLUSCAN TYPES:
PELECYPODA — NUCULIDAE AND NUCULANIDAE

by N. H. LUDBROOK*

[Read 11 May 1961]

SUMMARY

The paper is the second of a series revising the Tertiary molluscan species described or identified by Ralph Tate. The Nuculidae are represented by three species of *Pronucula*, the Nuculanidae by eleven species belonging to five genera.

INTRODUCTION

All the material redescribed in the present paper is in the Tate type collection belonging to the Geology Department of the University of Adelaide. Holotypes of a few species are located elsewhere, the following abbreviations being used for the collections in which they are housed:

A.U.G.D.: Adelaide University Geology Department.

M.U.G.D.: Melbourne University Geology Department.

A.M.: Australian Museum, Sydney.

I am indebted to the Director and Dr. D. F. McMichael of the Australian Museum, Sydney, for the loan of type material.

PHYLUM MOLLUSCA

Class PELECYPODA

Family NUCULIDAE

Genus PRONUCULA Hedley

Pronucula Hedley, 1902, Aust. Mus. Sydney Mem. 4, 290.

Type species (o.d.) *Pronucula decorosa* Hedley

Pronucula morundiana (Tate).

(pl. 1, figs. 1, 2)

Nucula morundiana Tate, 1886, p. 128, pl. 4, figs. 2a-2c.

Pronucula morundiana (Tate), Ludbrook, 1955, p. 20 (includes references to publication of name in lists).

Diagnosis. A high, tumid, trigonal *Pronucula* with inner margins of valves minutely denticulate; sculpture of equal rounded concentric ribs.

Description. Shell minute, tumid, solid, trigonal, nearly equilateral, posterior side roundly angulate; posterior dorsal margin straight; anterior side rounded. Surface sculptured with regular equal rounded concentric ribs, about 12 per mm., faintly crossed by microscopic radial striae.

Umbo high, tumid, subcentral and directed posteriorly, hinge line arcuate and broad with 5 strong posterior and 8 anterior teeth. Chondrophore broadly triangular. Valve margin thin dorsally, moderately thick and finely denticulate ventrally.

Dimensions. Length 2.8 mm., height 2.8 mm.

Holotype. A.U.G.D., Tate Coll. T.1042.

Type Locality. Muddy Creek, Hamilton, Victoria; ? Muddy Creek Marls.

* Palaeontologist, Geological Survey of South Australia. Published with the permission of the Director of Mines.

Material. Holotype and 9 paratypes on small tablet, 7 specimens from Muddy Creek mounted in 2 rows – 3 in the top row of which the right-hand specimen is the holotype; 4 in the second row. The third row contains 2 valves from Mornington and the fourth row 2 valves from near Morgan (? Cadell Marl Lens).

Stratigraphical Range. Miocene. (?) Pliocene.

***Pronucula tatei* (Finlay).**

(pl. 1, figs. 5, 6)

Nucula semistriata Tate, 1886, p. 128, pl. 4, figs. 5a-5b (*nom. Wood*).

Nucula tatei Finlay, 1924, p. 107; 1927, p. 491 (*nom. mut.*).

Diagnosis. A medium size nearly smooth *Pronucula*.

Description. Shell small, obliquely trigonal, only moderately inflated. Umbo situated at posterior one-quarter; posterior side short and flatly rounded, anterior side produced and rounded; dorsal margins very gently rounded, ventral margin broadly rounded. Umbones high and recurved. Surface sculptured with flat and slightly retroflexed growth folds, becoming more conspicuous ventrally, faintly crossed by microscopic radial striae. Hinge line only moderately broad, with 11 teeth anteriorly and 5 posteriorly. Chondrophore small, oblique. Margin finely and conspicuously denticulate.

Dimensions. Length 5.75 mm., height 4.5 mm., inflation (both valves) 3 mm.

Holotype. A.U.G.D., Tate Coll. T.1045.

Type Locality (here designated). Blanche Point, Aldinga Bay; Blanche Point Marls, Upper Eocene.

Material. Holotype and 9 paratypes on tablet labelled "Eocene, Adelaide; Aldinga". There is nothing on the tablet to indicate which specimens came from the "Turritella clays" (Blanche Point Marls) at Blanche Point and which from the glauconitic sands of Adelaide (i.e. Kent Town) Bore.

Stratigraphical Range. Blanche Point Marls, Upper Eocene.

***Pronucula fenestralis* (Tate).**

(pl. 1, figs. 9, 10)

Nucula fenestralis Tate, 1886, p. 129, pl. 4, fig. 4.

Diagnosis. A minute *Pronucula* with strong coarse cancellate sculpture, the radial ribs becoming obsolete anteriorly and posteriorly.

Description. Shell minute, fragile, translucent, shining, ovate-oblong, somewhat tumid, posterior margin roundly arcuate, anterior side produced and angulate, straight towards the dorsal margin and rounded to the ventral margin. Umbo in the posterior third and directed posteriorly. Surface strongly and fairly coarsely cancellate except at the anterior and posterior where the radial ribs become obsolete and the shell has only concentric ribs. The radial ribs are not developed in the umbonal third which carries fine concentric threads.

Hinge line broad and rounded with five posterior teeth, anterior portion broken but there are probably 8 anterior teeth of which 4 are preserved. Chondrophore small, slightly oblique. Margin obsoletely denticulate in the posterior dorsal portion but smooth elsewhere.

Dimensions. Length 2.25 mm., height 1.875 mm.

Holotype. A.U.G.D., Tate Coll. T.1044.

Type Locality. Table Cape, Tasmania.

Material. The holotype and 2 paratypes, all more or less imperfect.

Observations. This very distinctive cancellate species is similarly sculptured to the Recent *P. decorosa* Hedley and *P. vincentiana* Cotton and Godfrey.

Stratigraphical Range. Oligocene of Table Cape only.

Family NUCULANIDAE

Genus NUCULANA Link, 1807

Nuculana Link, 1807, Beschreib. Nat.-Samml. Rostock. Abt. 3, 155.

Type species (monotypy) "*Arca rostrata* Chemnitz" = *A. pernula* Müller

Subgenus SACCELLA, Woodring, 1925

Saccella Woodring, 1925, Carnegie Inst. Wash. Pub. 366, 15.

Type species (o.d.) "*Arca fragilis* Chemnitz" = *Lembulus deltoideus* Risso, 1826

***Nuculana (Saccella) chapmani* Finlay.**

(pl. 2, figs. 1, 2)

Leda apiculata Tate, 1886, p. 131, pl. 9, figs. 4a, 4b. *non Nucula apiculata* Sowerby *nec Nucula apiculata* Reuss

Nuculana chapmani Finlay, 1924, p. 107 *nom. mut.* for *L. apiculata* Tate *non* Sowerby.

Nuculana chapmani Finlay, 1927, p. 523 *nom. nov.* for *L. apiculata* Tate *non* Reuss.

Diagnosis. An inflated rather broad *Saccella* sculptured with regular angular concentric upturned ribs sharply cut off on the dorsal side which become weaker and obsolete posteriorly.

Description. Shell of moderate size, ovate, broadly subtrigonal, inequilateral, inflated. Umbo situated a little to the anterior, inflated, rounded and recurved. Anterior inflated, margin rounded, posterior shortly and sharply rostrate, posterior-dorsal margin slightly concave and curved upward at the end. Ventral margin strongly arcuate. Lunule broad and well defined. Surface sculptured with fine regular concentric upturned ribs, about 10 per mm. dorsally and separated by linear grooves. The threads are strongest over the anterior and median portions of the shell and in older specimens become weaker and obsolete towards the rostration. The threads turn roundly on the rostrum and become weaker and finer on the lunule as they turn up towards the umbo.

About 15 chevron-shaped teeth in each series on either side of a very small deep chondrophore.

Dimensions. (Holotype.) Length 9.5 mm., height 5.5 mm., inflation (both valves) 4 mm.

Holotype. A.U.C.D., Tate Coll. T.1036A.

Material. Tate's original tablet marked "*Leda apiculata* Tate", with the holotype and 24 paratypes mounted in 4 rows. The top row contains 7 complete specimens of which the holotype is the middle one, all presumably from Aldinga. Row 2 contains 6 specimens, 4 of which marked "4" are from Snapper Point, Victoria; one marked "5" from Table Cape, and one "7" from Camperdown. The third row contains 9 specimens presumably from Adelaide (Kent Town) Bore, only the six on the left belonging to the species. Three small shells on the right do not belong to "*Leda apiculata* Tate" but to a small undescribed *Saccella* from Kent Town Bore. The fourth row has 6 specimens marked "3" from Gellibrand River; one at the right marked "6" from Spring Creek is probably not conspecific with the others and belongs to *Nuculana (Saccella) fontinalis* (Pritchard).

Type Locality. Blanche Point Marls, Blanche Point, Aldinga Bay, S.A. Upper Eocene.

Stratigraphical Range. Upper Eocene to Lower Miocene.

***Nuculana (Saccella) vagans* (Tate).**

(pl. 2, figs. 5, 6)

Leda lucida T. Woods, 1880, p. 3, pl. 1, figs. 5, 5a. *non* Loven.

Leda lucida Tate, 1886, p. 131, pl. 6, figs. 7a, 7b. *non* Loven.

Leda vagans Tate, 1887, p. 188. *nom. mut.* for *Leda lucida* Tenison Woods, Tate, 1886.

Nuculana vagans Tate (sp.) Harris, 1897, p. 345.

Diagnosis. A fairly large robust subventricose *Succella* with variable sculpture of concentric striae and growth lines generally smooth in the umbonal area.

Description. Shell solid, thick, subventricose, triangularly subovate, umbones subcentral, slightly directed posteriorly, anterior side rounded, posterior side shortly rostrate, dorsal margin roundly sloping anteriorly, slightly concave posteriorly. Ventral margin curved and tending to be somewhat straight in the middle, curving sharply up towards the posterior rostration. Surface with fine concentric striae and growth lines except for umbonal area which is generally smooth. Lumule well defined, broad, lenticular, striated. Hinge plate strong, gently angulate, separated by a narrow triangular ligament pit; 13 chevron-shaped teeth and about 4 immature teeth in the anterior series, 13 chevron-shaped and about 7 immature teeth in the posterior series.

Dimensions. Holotype of *Leda lucida* T. Woods length 5 mm., height 3 mm.; Hypotype figured by Tate 1886 length 18 mm., height 11 mm., inflation (both valves) 8 mm.

Holotype. A.M. F.1808; hypotype, figured Tate A.U.C.D. T.1034A; hypotype figured this paper pl. 2, figs. 5, 6, T.1034Q.

Type Locality. Muddy Creek, Hamilton, Victoria; Muddy Creek Marls.

Material. The holotype A.M. F.1808 of *Leda lucida* T. Woods. Two tablets in the Tate Collection; T.1034 with 29 specimens, 14 of which are from Morgan (Cadell Marl Lens), 6 from Muddy Creek, 4 from Snapper Point, 3 from Corio Bay, and 2 from Spring Creek. A complete growth series is represented on this tablet, 5 examples from Morgan and 3 from Snapper Point being longer than the rest. Muddy Creek topotypes are small. Tablet T.1038 with 9 examples in 2 rows, one specimen from Camperdown, 3 from Fyansford and 5 from Gellibrand River.

Stratigraphical Range. Miocene.

Observations. The holotype of *L. lucida* T. Woods is an immature left valve of the same size as the right hand (sixth) topotype of the fourth row of T.1034; specimen T.1034M from Morgan (an immature right valve) is very close to the holotype.

Nuculana (Succella) fontinalis (Pritchard)

(pl. 2, figs. 3, 4)

Leda fontinalis Pritchard, 1901, p. 28, pl. 3, figs. 3, 3a.

Diagnosis. A small tumid subtrigonal *Succella* with an acute-angled rostration, sharp keel and a flattened posterior area.

Description. Shell small, subtrigonal, inequilateral, umbones subcentral, situated a little to the anterior. Anterior side rather sharply rounded, posterior side shortly and sharply rostrate. Anterior dorsal margin slightly convex, posterior dorsal margin nearly straight and but slightly concave towards the rostrum; ventral margin very gently arcuate and tending to be straight in the middle. Surface sculptured with somewhat irregular concentric grooves which become deeper and stronger and more crowded towards the ventral margin. Posterior to the umbones a very broad flat triangular area bounded by a sharp keel.

Hinge plate strong, fairly broad, the anterior and posterior series making an angle of about 120 degrees and separated by a small deeply set broadly triangular ligament pit. Thirteen chevron-shaped teeth in each series.

Dimensions. Length 7.25 mm., height 4.25 mm.

Holotype. M.U.G.D. 1779, paratype 1780; hypotype A.U.C.D., Tate Coll. T.1028.

Type Locality. Bird Rock, Torquay. Jan Jak Formation.

Material. One tablet marked "*Leda embolos*" with 13 topotypes Spring Creek, 2 specimens Fyansford, 3 Snapper Point, one River Murray, one Belmont, one Table Cape.

Stratigraphical Range. Oligocene to Miocene.

Subgenus *SCAEOLEDA* Iredale, 1929

Scaeoleda Iredale, 1929, Rec. Aust. Mus., 17 (4), 158.

Type species (o.d.) *Leda crassa* Hinds.

Nuculana (Scaeoleda) acinaciformis (Tate).

(pl. 2, figs. 7, 8)

Leda acinaciformis Tate, 1886, p. 130, pl. 5, figs. 6a-6b.

Nuculana acinaciformis Tate (sp.). Harris, 1897, p. 349.

Diagnosis. A moderate sized *Scaeoleda*, acutely rostrate, with strong concentric rounded ribs, about 3 per mm. Twelve chevron-shaped and up to 5 immature teeth in each series.

Description. Shell of moderate size, moderately compressed, elongate-subovate, umbo subcentral, anterior side sharply rounded, posterior side acutely rostrate, dorsal margin gently convex anteriorly and slightly concave posteriorly, curved upwards at the posterior end; ventral margin strongly arched. A strongly defined narrow triangular rostral area extending from the umbo to the posterior-ventral margin. Lunule lanceolate, longitudinally ribbed.

Surface sculptured with strong concentric rounded ribs, about 3 per mm., which are directed upwards and separated by grooves narrower than the ribs. Ribs interrupted at the margin of the rostral area.

Hinge line gently arched with 2 chevron-shaped teeth and up to 5 immature teeth on either side of a broad deeply set triangular chondrophore.

Dimensions. Holotype length 17.5 mm., height 8.5 mm., inflation (one valve) 3 mm. Largest paratype length 21 mm., height 10 mm.

Holotype. A.U.G.D., Tate Coll. T.1033A.

Material. The holotype and 22 paratypes on tablet T.1033 in 5 rows, the holotype being the left-hand specimen in the lowermost row.

Type Locality. Muddy Creek, Hamilton, Victoria. ? Grange Burn Coquina, Lower Pliocene.

Stratigraphical Range. Lower Pliocene.

Nuculana (Scaeoleda) woodsi (Tate).

(pl. 3, figs. 5, 6)

Leda inconspicua Tenison Woods, 1879, p. 239, pl. 21, fig. 3 (non A. Adams).

Leda woodsi Tate, 1886, p. 133, pl. 9, fig. 8.

Nuculana woodsi Tate (sp.) Harris, 1897, p. 349.

Nuculana (Scaeoleda) woodsi (Tate). Ludbrook, 1955, p. 20, pl. 1, fig. 5.

Diagnosis. A small compressed *Scaeoleda*, only moderately acuminate rostrate, sculpture of 5 to 8 ribs per mm., about 17 teeth in the posterior series and 26 in the anterior series.

Description. Shell small, compressed, elongate-subovate, inequilateral, umbones situated a little to the posterior, small, and only slightly inflated. Anterior side rounded and somewhat attenuated; posterior side slightly longer than anterior side and moderately acuminate rostrate, dorsal margins nearly straight, ventral margin gently rounded. A well-defined rather broad triangular rostral area extends from the umbo to the posterior ventral margin. Lunule lanceolate, longitudinally ribbed.

Sculpture of fine concentric ribs on the hypotype and generally about 6 per mm. but varying in some specimens from 5 to 8 per mm.; ribs directed upwards and separated by grooves about equal to the ribs, the ribs are weaker on the anterior of the shell.

Hinge strong and gently arched with about 17 close-set chevron-shaped teeth in the posterior series and 26 in the anterior series separated by a narrow deep triangular chondrophore.

Dimensions. Length 12.5 mm., height 6.5 mm., inflation (both valves) 3.5 mm.

Holotype. A.U.G.D., Tate Coll. T.1039J (both valves); Paratype T.1039A (figured pl. 3, fig. 6).

Material. The holotype and 18 paratypes on tablet in three rows. The holotype is a complete specimen marked J, the first on the left of the middle row; the figured paratype marked A is the first on the left of the top row. Holotype and 11 paratypes from Muddy Creek. Two paratypes Table Cape, 3 Spring Creek, 3 Morgan. The specimen from Muddy Creek figured by Tenison Woods as *Leda inconspicua* Reeve is Australian Museum No. F.1800.

Type Locality. Muddy Creek, Hamilton, ? Muddy Creek Marls, Miocene.

Stratigraphic Range. Oligocene to Pliocene.

Observations. *Leda inconspicua* Tenison Woods is practically identical with Tate's immature paratype T.1039D.

GENUS OVALEDA Iredale, 1925

Ovaleda Iredale, 1925, Rec. Aust. Mus., 14 (4), 248, 250.

Type species (o.d.) *Sarepta* (?) *tellinaeformis* Hedley = *Leda obolella* Tate

Ovaleda obolella (Tate).

(pl. 3, figs. 1, 2)

Leda obolella Tate, 1886, p. 129, pl. 5, figs. 3a, 3b.

Nuculana obolella Tate (sp.) Harris, 1897, p. 352.

Sarepta (?) *tellinaeformis* Hedley, 1901, pp. 26-27, fig. 8.

Ovaleda tellinaeformis Hedley. Iredale, 1925, p. 250.

Sarepta obolella (Tate). Chapman and Singleton, 1927, p. 116, pl. 10, figs. 2-7.

Diagnosis. An *Ovaleda* of moderate size with a broadly triangular chondrophore with a narrow vertical triangular resilifer. Fifteen to eighteen hinge teeth on either side.

Description. Shell of moderate size, thin and fragile, ovate-quadrate slightly inequilateral, moderately inflated. Posterior margin bluntly rostrate and rounded; anterior margin roundly truncated, dorsal margin gently sloping from a low angle at the umbo. Ventral margin well rounded. Umbones very small, subcentral, situated slightly to the anterior, slightly recurved. Surface smooth but for close fine concentric striae covering the whole shell. Interior smooth; adductor impressions inconspicuous, the posterior small and subtriangular, the anterior larger and somewhat pear-shaped; pallial line entire. Hinge plate narrow, slightly arched at a very low angle with a broad shallow triangular chondrophore supporting a narrow vertical triangular resilifer extending to the umbo. Hinge with two series of small teeth, on the lectotype 15 in the posterior series of which the 7 near the umbo are more or less curved, the 8 further from the umbo chevron-shaped; 19 in the anterior series of which the 11 near the umbo are more or less curved, the 8 further from the umbo chevron-shaped.

Dimensions (Lectotype). Length 11.5 mm., height 9.5 mm.

Lectotype (here designated). A.U.G.D., Tate Coll. T.1035A.

Type Locality. Muddy Creek, Hamilton, Victoria; ? Muddy Creek Marls.

Material. The lectotype and 11 paratypes on tablet labelled *Leda obolella* Tate. Lectotype and 3 paratypes in the top row from Muddy Creek, in the second row specimen D from Gellibrand River, specimen E from Spring Creek. Of 6 specimens in bottom row 3 are from River Murray, 1 from Fyansford, 1 from Balcombe Bay, and 1 from an unspecified locality.

Two paratypes A.M. C8959 *Sarepta tellinaeformis* Hedley, a number of small specimens A.M. 13243 of the Thetis series examined by Hedley and identified as and labelled *Sarepta obolella* Tate, 3 specimens A.M. C48115 of *Sarepta tellinaeformis* including the hypotype figured by Chapman and Singleton from 33-56 fathoms off Botany Heads.

Stratigraphic Range. Miocene and Recent.

Observations. Like Hedley and Chapman and Singleton, I am unable, in the absence of sufficient material for statistical study, to find any specific characters to distinguish *tellinaeformis* from *obolella*, and in agreement with Chapman and Singleton have included the Recent species in the synonymy. Although I have not seen the type species of *Sarepta*, I have accepted the opinion of Powell (1935, p. 252) that "in its thin rounded shell *Ovaleda* resembles *Sarepta*, but differs in having feeble traces of a rostrum and a small broadly triangulate chondrophore with a normal resilium, quite unlike the narrow oblique resilium of *Sarepta*".

Ovaleda planiuscula (Tate).

(pl. 3, figs. 3, 4)

Leda planiuscula Tate, 1886, p. 130, pl. 5, fig. 2.

Sarepta planiuscula (Tate). Chapman and Singleton, 1927, p. 116, pl. 10, figs. 8-12.

Diagnosis. A very small fragile rather flat *Ovaleda* with about 9 teeth on the anterior side, 5 on the posterior.

Description. Shell very small, thin, very fragile, flattish, roundly quadrate, slightly inequilateral, slightly produced and rounded posteriorly, roundly truncated anteriorly. Dorsal margin very gently arcuate, ventral margin gently rounded. Surface smooth but for fine concentric striae, interior smooth, adductor impressions weak. Umbo subcentral. Hinge plate very narrow, with 9 small chevron-shaped teeth in the anterior series and 5 in the posterior series; chondrophore broadly triangulate, nature of the resilifer uncertain, as with the exception of the figured paratype (pl. 3, fig. 4) the fragile specimens are too firmly stuck on the tablet for safe handling.

Lectotype (designated Chapman and Singleton, 1927). A.U.G.D., Tate Coll. T.1009A.

Type Locality. "Adelaide Bore", Kent Town. Upper Eocene.

Material. The lectotype and 4 paratypes A-E mounted on tablet T.1009.

Stratigraphical Range. Known only from subsurface material of Upper Eocene age intersected in the Kent Town Bore.

Genus *LEDELLA* Verrill and Bush, 1897

Ledella Verrill and Bush, 1897, Amer. Journ. Sci., 4 (3), 54.

Type species (o.d.) *Leda messanensis* Seguenza

Ledella leptorhyncha (Tate).

(pl. 1, figs. 3, 4)

Leda leptorhyncha Tate, 1886, p. 131, pl. 10, figs. 5a-5b

Nuculana leptorhyncha Tate (sp.) Harris, 1897, p. 350.

Diagnosis. A minute ovate-pyriform *Ledella* sculptured with fine concentric threads on the middle and ventral portions, obsolete on the rest of the shell. Thirteen chevron-shaped teeth in both the anterior and posterior series.

Description. Shell minute, ovate-pyriform, ventricose, inflated in the middle, conspicuously compressed and rostrate posteriorly; umbones subcentral, slightly elevated and opisthogyrate, anterior margin rounded, posterior margin acuminate-rostrate, anterior dorsal slope nearly straight, posterior dorsal slope slightly concave, ventral margin evenly convex except for a fairly broad insinuation immediately below the rostrum. Rostrum unicarinate, only slightly elevated. Surface sculptured with concentric threads and microscopic striae. The threads are strongest on the middle of the shell and ventrally; they become obsolete dorsally and both anteriorly and posteriorly. Hinge strong, with 13 chevron-shaped teeth on either side of a small broadly-triangular well-defined chondrophore.

Dimensions. Lectotype length 5.25 mm., height 3.1 mm., inflation 2.5 mm.

Lectotype (here designated), A.U.G.D. T.1041A.

Type Locality. Blanche Point Marls, Blanche Point, Aldinga Bay.

Material. The lectotype and 8 paratypes all of which are complete (both valves) and 3 paratypes which are incomplete. Paratype T.1041L, showing the internal features, is figured (pl. 1, fig. 3). Three topotypes G.S.S.A. 1/60/1. Six specimens Adelaide Children's Hospital Bore 5, 63-64 feet.

Stratigraphic Range. Blanche Point Marls, Upper Eocene.

Observations. The species is known only from the Blanche Point Marls at their type locality and intersected in Adelaide (Kent Town) Bore and foundation test bores at Adelaide Children's Hospital. On his original tablet Tate has not indicated which specimens are from Blanche Point and which from Adelaide Bore. It cannot be said with certainty that the lectotype is the specimen figured by Tate as two specimens are missing from the tablet, the first on the left hand of the top row and the third in the second row. The lectotype is very close to the original figure, but from its relatively bleached appearance it is almost certainly from Blanche Point and not from the bore.

Ledella praelonga (Tate).

(pl. 1, figs. 7, 8)

Leda praelonga Tate, 1886, p. 132, pl. 12, figs. 4a, 4b.

Nuculana praelonga Tate (sp.) Harris, 1897, p. 351.

Diagnosis. A small weakly rostrate *Ledella* which is smooth but for growth striae. Anterior side twice as long as the rostrate posterior side.

Description. Shell very small, transversely subovate, inequilateral, somewhat compressed, smooth but for fine growth striae, which are stronger over the rostrum. Umbo situated at almost the posterior one-third. Anterior side twice as long as posterior, sharply rounded and produced; posterior side shortly and weakly rostrate. Dorsal margin broadly rounded and somewhat angulate at the umbo, ventral margin evenly and broadly convex except for a shallow and weak insinuation just below the rostrum. Hinge strong with 10 chevron-shaped teeth in the posterior series, 13 chevron-shaped teeth in the anterior series, separated by a small subtriangular chondrophore.

Dimensions. Holotype length 4.25 mm., height 2.25 mm., inflation (both valves) 1 mm.

Holotype. A.U.G.D., Tate Coll. T.1040A. Paratype (figured) T.1040B.

Type Locality. Muddy Creek, Hamilton, Victoria. ?Muddy Creek Marls, Miocene.

Material. The holotype and 13 paratypes on tablet. There are three rows at the top of the tablet, the holotype being the middle specimen in the second row and the figured paratype the specimen on the extreme right of the third

row. Except for one valve in the first row marked "2" from Snapper Point and 3 valves marked "T. Cape", all specimens are from Muddy Creek (?Muddy Creek Marls).

There is a second series of 7 specimens in a single row below this, 6 of which marked "1" are from "River Murray" and 2 marked "3" from Spring Creek. Only one from Spring Creek on the extreme right belongs to *L. praelonga*. The other 7 are a distinct and as yet undescribed species well known to me from the Miocene of the Murray Basin.

Stratigraphic Range. Oligocene to Miocene.

Genus *Poroleda* Hutton, 1893

Poroleda Hutton, 1893, Linn. Soc. N.S.W. Macleay Mem. Vol. 86.

Type species (monotypy) *Scaphula* (?) *lanccolata* Hutton.

Poroleda huttoni (Tenison Woods).

(pl. 3, figs. 9, 10)

Leda huttoni Tenison Woods, 1879, p. 239, pl. 21, fig. 2.

Leda huttoni Tenison Woods. Tate, 1886, p. 130, pl. 6, fig. 4.

Nuculana huttoni Tenison Woods. Harris, 1897, p. 351.

Diagnosis. A *Poroleda* with a conspicuous flattened posterior rostral area. Thirteen chevron-shaped teeth in the anterior series, 20 in the posterior, becoming lamellar and imbricating towards the umbo in both series.

Description. Shell depressed, opaque, dull, elongate, subrectangular, slightly rostrate, posteriorly much produced, between the umbo and the posterior margin a triangular flattened rostral area. Umbo very small and but slightly elevated, situated at the anterior one-third. Dorsal margin broadly angulate, slightly convex anteriorly and slightly concave posteriorly; anterior margin narrowly arcuate; posterior margin obliquely truncated; ventral margin gently arcuate.

Hinge line broadly arcuate with 13 chevron-shaped narrow imbricating teeth in the anterior series; 20 narrow imbricating teeth in the posterior row, all chevron-shaped but the two in the posterior series nearest the umbo which are lamellar; the two series separated by a broad triangular chondrophore with a long narrow oblique ligament pit on the posterior side.

Dimensions. Length 12 mm., height 5 mm.

Holotype and one paratype A.M. F.1786; hypotype A.U.G.D., Tate Coll., T.1037.

Type Locality. Muddy Creek, Hamilton, Victoria (? Muddy Creek Marls).

Material. The holotype and paratype A.M. F.1786. Tate's tablet T.1037 with 22 specimens. In the top row 2 marked "1" from Aldinga, the left one of which was figured by Tate; 4 marked "2" from Adelaide (Kent Town) Bore. In the middle of the tablet one specimen ("3") from Table Cape; in the bottom row 13 topotypes from Muddy Creek marked "4" and one marked "5" from Snapper Point.

The two figured hypotypes are (1) the topotype on the extreme left of Tate's tablet, (2) the topotype third from the left in the bottom row. Both are very close to the holotype.

Stratigraphic Range. Upper Eocene (Blanche Point Marls) to Miocene (Muddy Creek Marls).

Observations. Tate figured a specimen from Aldinga (Blanche Point Marls) which is now broken. The Aldinga and Kent Town Bore specimens exhibit recognizable differences from *huttoni* which were noted by Tate (p. 130). The species is variable, however, and there is insufficient material to separate the species with any certainty.

GENUS *LAMELLILEDA* COTTON, 1930

Lamellileda Cotton, 1930, Rec. S. Aust. Mus. 4 (2), 227.

Type species (monotypy) *Lamellileda typica* Cotton

***Lamellileda tatei* (Hedley).**

(pl. 3, figs. 7, 8)

Poroleda lanceolata Tate, 1894, p. 186, pl. 12, fig. 6. (Not *Poroleda lanceolata* (Hutton, 1893) = *Scaphula* (?) *lanceolata* Hutton, 1885.)

Poroleda tatei Hedley, 1904, p. 112 (*nom. mut.* for *P. lanceolata* Tate).

Diagnosis. A subrectangular *Lamellileda* with seven inbricating lamellar teeth in the posterior and seven in the anterior series.

Description. Left valve only. Shell depressed, opaque, shining, sculptured with microscopic concentric striae, elongate-subrectangular, posteriorly much produced, abruptly and somewhat squarely truncated. Dorsal margin nearly straight; slightly convex anteriorly and slightly concave posteriorly; anterior margin rounded, posterior margin straight; ventral margin gently arcuate. Umbo small but elevated, situated at the anterior one-fourth. Hinge line nearly straight, with 7 long lamellar teeth in the narrow posterior series, 7 shorter and also lamellar teeth in the anterior series separated by a broad triangular chondrophore with a deep long and narrow oblique ligament pit on the posterior side.

Dimensions. Length 11.7 mm., height 3.9 mm.

Holotype. A.U.G.D., Tate Coll. T.1001.

Type Locality. Gelibrand River, Victoria.

Material. The holotype only.

Stratigraphic Range. ? Gelibrand Clays, Miocene.

REFERENCES

- CHAPMAN, F., and SINGLETON, F. A., 1927. Descriptive Notes on Tertiary Mollusca from Fyansford and other Australian Localities. Part 1. Proc. Roy. Soc. Vic., 39 (2), n.s., pp. 113-124, pls. 10, 11.
- FINLAY, F. J., 1924. Some Necessary Changes in Names of New Zealand Mollusca. Proc. Malac. Soc. Lond., 16 (2), pp. 99-107.
- FINLAY, H. J., 1927. New Specific Names for Austral Mollusca. Trans. N.Z. Inst., 37, pp. 488-533.
- HARRIS, G. F., 1897. Catalogue of Tertiary Mollusca in the Department of Geology, British Museum (Natural History), Part 1. The Australasian Tertiary Mollusca. British Museum (Natural History), pp. 1-407, pls. 1-8.
- HEDLEY, C., 1901. Some New or Unfigured Australian Shells. Rec. Aust. Mus., 4 (1), pp. 22-27, figs. 1-8.
- HEDLEY, C., 1902-3. Scientific Results Trawling Expedition H.M.C.S. Thetis off the Coast of New South Wales. Mollusca. Mem., 4 (5-6), Aust. Mus. Sydney.
- HEDLEY, C., 1904. On the Change of Name of *Poroleda lanceolata* Tate. Vict. Nat., 21 (8), Dec. 8, No. 252, 112.
- HUTTON, F. W., 1885. Description of New Tertiary Shells. Trans. N.Z. Inst., 17, pp. 313-332, pl. 18.
- IREDALE, T., 1925. Mollusca from the Continental Shelf of Eastern Australia. Rec. Aust. Mus., 14 (4), pp. 243-270, pls. 41-43, map.
- LUDBROOK, N. H., 1955. The Molluscan Fauna of the Pliocene Strata Underlying the Adelaide Plains. Part 2—Pelecypoda. Trans. Roy. Soc. S. Aust., 78, pp. 18-87, pls. 1-6.
- LUDBROOK, N. H., 1959. Revision of the Tate Molluscan Types—Scaphopoda. Trans. Roy. Soc. S. Aust., 82, pp. 141-149, pls. 1-2.
- POWELL, A. W. B., 1935. New Recent and Tertiary Nuculanidae from New Zealand. Proc. Malac. Soc. Lond., 21 (4), pp. 252-255, pl. 27.
- FRITCHARD, C. B., 1901. Contributions to the Palaeontology of the Older Tertiary of Victoria. Lamellibranchs—Part 2. Proc. Roy. Soc. Vic., 14, n.s. (1), pp. 22-31, pls. 2-3.
- TATE, R., 1886. The Lamellibranchs of the Older Tertiary of Australia. Part 1. Trans. Roy. Soc. S. Aust., 8, pp. 96-158, pls. 2-12.

- TATE, R., 1887. The Lamellibranchs of the Older Tertiary of Australia. Part 2. Trans. Roy. Soc. S. Aust., 9, pp. 142-200, pls. 14-20.
 WOODS, J. E. TENISON, 1879. On Some Tertiary Fossils from Muddy Creek, Western Victoria. Proc. Linn. Soc. N.S.W., 3 (3), pp. 222-240, pls. 20-21.
 WOODS, J. E. TENISON, 1880. On Some Tertiary Fossils. Proc. Linn. Soc. N.S.W., 4, pp. 1-20, pls. 1-2.

EXPLANATION OF PLATES

PLATE 1

- Fig. 1. *Pronucula morundiana* (Tate). Holotype T.1042, x 12.5.
 Fig. 2. *Pronucula morundiana* (Tate). Paratype T.1042, left valve, interior, x 12.5.
 Fig. 3. *Ledella leptorhyncha* (Tate). Paratype T.1041L, left valve, interior, x 10.
 Fig. 4. *Ledella leptorhyncha* (Tate). Lectotype T.1041A, right valve, exterior, x 10.
 Fig. 5. *Pronucula tatei* (Finlay) = *Nucula semistriata* Tate. Holotype T.1045, x 12.5.
 Fig. 6. *Pronucula tatei* (Finlay) = *Nucula semistriata* Tate. Paratype T.1045, right valve, interior, x 12.5.
 Fig. 7. *Ledella praelonga* (Tate). Paratype T.1040B, left valve, interior, x 10.
 Fig. 8. *Ledella praelonga* (Tate). Holotype T.1040A, right valve, exterior, x 10.
 Fig. 9. *Pronucula fenestralis* (Tate). Holotype T.1044, right valve, exterior, x 20.
 Fig. 10. *Pronucula fenestralis* (Tate). Holotype T.1044, right valve, interior, x 20.

PLATE 2

- Fig. 1. *Nuculana (Saccella) chapmani* Finlay = *Leda apiculata* Tate. Holotype T.1036A, side view, x 7.5.
 Fig. 2. *Nuculana (Saccella) chapmani* Finlay = *Leda apiculata* Tate. Holotype T.1036A, dorsal view, x 7.5.
 Fig. 3. *Nuculana (Saccella) fontinalis* (Pritchard). Hypotype, T.1028A, exterior, x 7.5.
 Fig. 4. *Nuculana (Saccella) fontinalis* (Pritchard). Hypotype T.1028B, interior, right valve, x 7.5.
 Fig. 5. *Pronucula tatei* (Finlay) = *Nucula semistriata* Tate. Holotype T.1045, x 12.5, interior, right valve, x 5.
 Fig. 6. *Nuculana (Saccella) vagans* (Tate) = *Leda lucida* T. Woods. Hypotype T.1034A, exterior, right valve, x 3.2.
 Fig. 7. *Nuculana (Scaeoleda) acinaciformis* (Tate). Paratype T.1033B, exterior x 5.
 Fig. 8. *Nuculana (Scaeoleda) acinaciformis* (Tate). Paratype T.1033B, interior, x 5.

PLATE 3

- Fig. 1. *Ovaleda obolella* (Tate). Lectotype T.1035A, external view, x 5.
 Fig. 2. *Ovaleda obolella* (Tate). Lectotype T.1035A, internal view, x 5.
 Fig. 3. *Ovaleda planiuscula* (Tate). Lectotype T.1009A, external view, x 10.
 Fig. 4. *Ovaleda planiuscula* (Tate). Paratype T.1009E, internal view, x 15.
 Fig. 5. *Nuculana (Scaeoleda) woodsi* (Tate). Holotype T.1039J, x 5.
 Fig. 6. *Nuculana (Scaeoleda) woodsi* (Tate). Paratype T.1039A, left valve, internal view, x 5.
 Fig. 7. *Lamellileda tatei* (Hedley) = *Poroleda lanceolata* Tate. Holotype T.1001, external view, x 7.
 Fig. 8. *Lamellileda tatei* (Hedley) = *Poroleda lanceolata* Tate. Holotype T.1001, internal view, x 7.
 Fig. 9. *Poroleda huttoni* T. Woods. Hypotype T.1037C, right valve, internal view, x 7.5.
 Fig. 10. *Poroleda huttoni* T. Woods. Hypotype T.1037B, right valve, external view, x 7.5.