TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

ZOOLOGY

VOL. 9 No. 3 25 MAY 1967

Variation in *Laoma* (*Phrixgnathus*) *mariae* (Gray) (Gastropoda: Laomidae)

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Abstract

[*Received by the Editor, 2 September 1966.*]

THE pulmonate laomid species *Laoma mariae* (Gray) is present in New Zealand from the vicinity of Opononi (Hokianga) in the north to Wellington in the south. Considerable variation in size and form occurs within this range. An assessment of this based upon the study of some 50 samples is given. An unrecorded parietal lamella is present at all localities.

INTRODUCTION

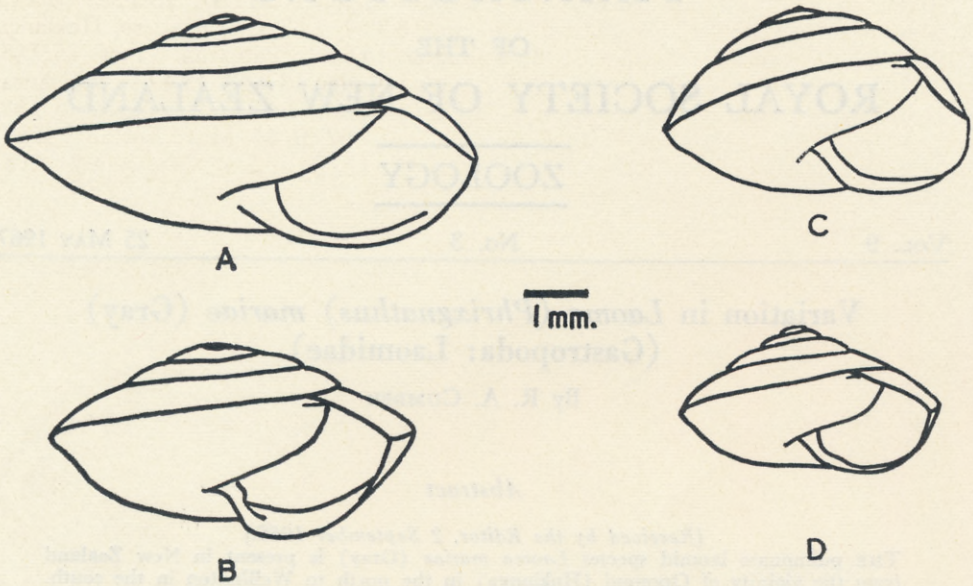
THE distribution of the genus *Laoma* Gray, 1849, is given as New Zealand, Tasmania, southern and eastern Australia, and New Guinea, and Suter (1913) indicates that its "metropolis is New Zealand". Suter, while retaining the genus, utilised the subgenus *Laoma* for those species provided with lamellae entering the aperture, and *Phrixgnathus* for those without such lamellae. Powell (1957) lists these as full genera.

The New Zealand fauna contains a considerable number of small species many of which are undescribed. Some are relatively local, and others widespread. Systematic work necessitates the study of regional variation through examination of widely taken samples.

It seems probable that use of the character of lamellae entering the aperture may be regarded mainly as one of convenience in identifying the various species, for the extent of their development ranges from the very obvious and numerous strong lamellae in *Laoma pirongiaensis* Suter, to the small, single, obscure but consistently present lamella in *L. mariae*. This latter lamella, which has hitherto been unrecorded, is situated on the parietal wall very close to the suture, and extends inwards parallel with the suture from the level of the aperture as a low tapering ridge (Text-fig. 2B).

A form closely resembling *L. mariae* has been collected from a number of localities in the North Cape-Cape Reinga area and in the past has probably been regarded as this species. In these, however, the lamella is absent, and this together with sculptural and other differences suggest that a further species is involved.

Published by the Royal Society of New Zealand, c/o Victoria University of Wellington, P.O. Box 196, Wellington.



Text-fig. 1.—Vertical outlines (camera lucida) of differing forms of *P. mariae*. A, Waiwera specimen of 5½ whorls; B, Orongorongo Range, 5¼ whorls; C, Awakino Gorge, 5¼ whorls; D, Pahiatua, 4¾ whorls.

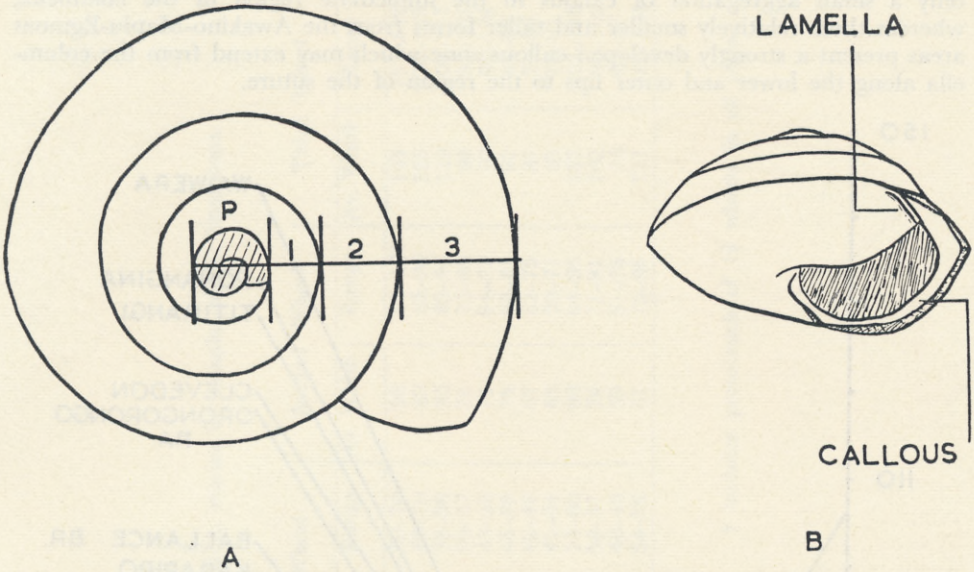
The species *L. mariae* lends itself to the study of variation because of its relatively large size and widespread distribution. The largest form is seen in the Waiwera-South Auckland district where a major diameter of 7.5mm is reached. Shells of a similar number of whorls taken in many more southern localities seldom exceed 4.25mm (Plate 1). Within its north-south range of 400 to 500 miles, the species occurs from near sea-level to heights of 3,000 to 4,000 feet. The habitat varies from dense forest to more open marginal areas with damp, reasonably close cover, where it is taken from beneath ground wood and rotting vegetation.

Methods

Four measurements (Text-fig. 2A) have been used to indicate variation in size and configuration. These are the maximum width of the protoconch, and the widths of whorls 1, 2 and 3 taken from suture to suture near the point of their completion. The consistent aligning of the protoconch allows comparable measurements for shells of differing growth stages in the various samples. Measurements were made directly from above on the levelled shell using a micrometer eyepiece (1mm = 125 units). Twelve samples each of six specimens from widely representative collection areas have been measured and average values used in the construction of Text-fig. 3, which indicates the extremes of variation for the species. Additional data on the sample specimens including size and number of whorls are given in Table I. Camera lucida configuration diagrams for four forms are given in Text-fig. 1, while dorsal and ventral views of the same forms are shown in Plate 1.

Materials from the following collections have been examined. Unless otherwise indicated, collections were made by the author. Awakino Gorge 1948, 24.9.59, 13.9.60, 17.11.62; Ballance Bridge 18.1.59; Clevedon 9.7.58; Tapu Hill Road, Coromandel Peninsula 5.3.57; Foxton, Round Bush 20.9.51; Kahuterawa 27.4.61; Kai Iwi 28.1.48, 16.3.59; Karapiro 26.12.38; Kawhia 19.3.58; Mapiu 10.7.58; Motu

River 12.11.62; Mount Bruce 20.1.61; Mount Egmont 8.11.57, 28.3.58; Mount Messenger 24.1.57, 16.3.59, 13.9.60; Ohakune 8.3.57, 20.3.59; Omapere, Hokianga 21.2.40; Orongorongo Range 1938; Pahiatua 15.6.58; Pahiatua Track 25.9.56, 29.7.58; Piha 30.9.58; Piopio 8.8.61; Pohangina Valley 13.9.60, 13.4.61; Pohokura, H.B. 15.2.57; Porirua .2.40; Stratford 28.11.48; Tarata 3.4.57; Te Araroa 13.8.58, J. M. Hoy; Te Kawa 19.3.59; Te Kuiti 7.11.57, 1.7.62, B. M. May; Titirangi 1937; Uruti 8.8.61; Waewaepa Range 29.3.57; Waioeka Gorge 13.2.57; Waiwera 21.1.63; Wanganui 1940; Wellsford 18.9.58; Wharite 3.9.58.



TEXT-FIG. 2.—A, to show the region of measurement of protoconch and whorls 1, 2 and 3. B, to show the position of the parietal lamella, and white calloused area within the aperture (Uruti specimen).

DISCUSSION

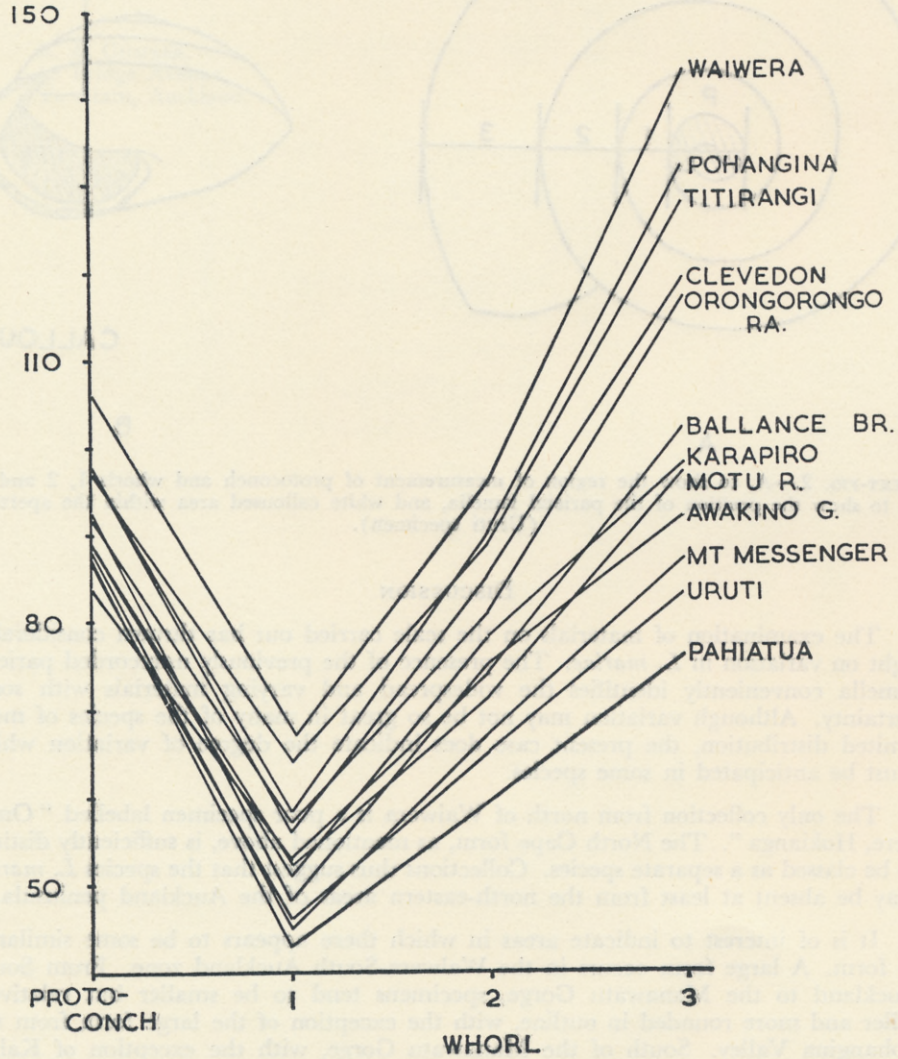
The examination of materials on the scale carried out has thrown considerable light on variation in *L. mariae*. The presence of the previously unrecorded parietal lamella conveniently identifies the widespread and varying materials with some certainty. Although variation may not be so great in many of the species of more limited distribution, the present case does indicate the degree of variation which must be anticipated in some species.

The only collection from north of Waiwera is a poor specimen labelled "Omapere, Hokianga". The North Cape form, as mentioned above, is sufficiently distinct to be classed as a separate species. Collections thus suggest that the species *L. mariae* may be absent at least from the north-eastern areas of the Auckland peninsula.

It is of interest to indicate areas in which there appears to be some similarity of form. A large form occurs in the Waiwera-South Auckland zone. From South Auckland to the Manawatu Gorge, specimens tend to be smaller but relatively taller and more rounded in outline, with the exception of the large form from the Pohangina Valley. South of the Manawatu Gorge, with the exception of Kahuterawa and the Orongorongo Range which have relatively large forms, specimens tend to be smaller and to show a more open umbilicus, e.g., Foxton, Pahiatua, Mount Bruce and Waewaepa Range. Specimens from Foxton and Pahiatua tend

to be rather more glossy than the others. There appears to be some tendency for the protoconch to be more raised in specimens from south of the Manawatu Gorge.

If the genus *Laoma* is retained for those species with abundant callous deposits within the aperture which in turn is usually associated with the production of lamellae, then it would appear that the species in question is best placed in that genus. While consistently retaining the thin elongated parietal lamella, the degree of callousing within the aperture in *L. mariae* (Text-fig. 2B) however, shows considerable regional variation. For example, the large forms taken at Titirangi show only a small aggregation of callous in the immediate region of the columella, whereas those relatively smaller and taller forms from the Awakino-Mapiu-Egmont areas present a strongly developed callous zone which may extend from the columella along the lower and outer lips to the region of the suture.



TEXT-FIG. 3.—Widths of protoconch and whorls 1, 2 and 3 in samples from 12 widely separated localities. Measurements were made with a micrometer eyepiece (1mm = 125 units). Values shown are the averages for six specimens in each sample.

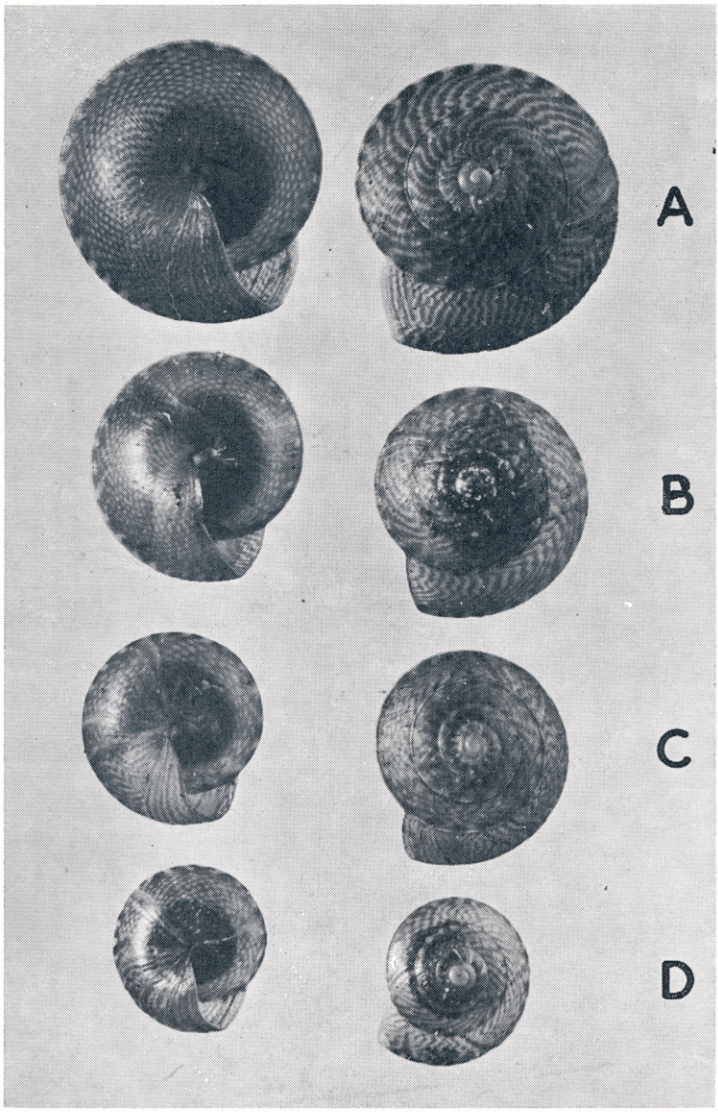


Photo: A. Underhill

Dorsal and ventral aspects of differing forms of *L. mariae*. A, Waiwera; B, Orongo rongo Range; C, Awakino Gorge; D, Pahiatua.

TABLE I.—Summary of Data on *L. mariae* in Samples of Six Specimens.

Collection Site	Date	Protoconch		First Whorl		Second Whorl		Third Whorl		No. Whorls†	Diam. mm.
		Av. Width*	Range	Av. Width	Range	Av. Width	Range	Av. Width	Range		
Waiwera	21.1.63	106	103–112	67	60–70	96	93–104	143	132–152	$5\frac{1}{4}$–$5\frac{1}{2}$	6.25–7.25
Titirangi	1937	97	91–100	64	60–70	89	85–94	128	124–135	$5\frac{1}{4}$–$5\frac{3}{4}$	5.75–7.25
Clevedon	9.7.58	98	94–100	56	53–58	85	82–91	119	108–137	5 –$5\frac{1}{2}$	5.25–5.75
Karapiro	26.12.38	89	85–92	51	39–57	78	71–86	98	92–101	$4\frac{3}{4}$–$5\frac{1}{4}$	3.75–4.75
Motu River	12.11.62	89	84–92	52	43–56	71	64–77	97	90–104	5 –$5\frac{1}{2}$	4.25–4.75
Awakino Gorge	1948	92	90–96	48	46–50	75	68–81	92	81–98	5 –$5\frac{1}{4}$	4.25–4.75
Mount Messenger	24.1.57	88	85–92	45	42–48	67	62–75	87	73–96	$4\frac{3}{4}$–$5\frac{3}{4}$	3.25–4.25
Uruti	8.8.61	87	84–91	46	41–54	65	59–71	83	78–91	5 –$5\frac{1}{2}$	4.25
Pohangina Valley	13.4.61	97	91–113	58	54–60	90	84–96	132	123–146	5 –$5\frac{1}{4}$	5.25–6.25
Ballance Bridge	.8.59	84	79–90	53	50–57	74	71–81	102	96–109	$4\frac{3}{4}$–$5\frac{1}{4}$	3.25–4.25
Pahiatua	15.6.58	87	82–91	43	40–48	59	51–76	76	67–87	$4\frac{3}{4}$–5	3.25–3.75
Orongorongo Range	.9.40	92	88–95	57	54–58	81	75–86	117	110–124	5 –$5\frac{1}{4}$	4.75–5.25

* 1mm = 125 units.

† includes protoconch of $1\frac{1}{2}$ whorls in all cases.

Acknowledgments

The assistance of Mr A. Underhill, Photographer, Department of Scientific and Industrial Research, Auckland, is gratefully acknowledged.

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