

A New Species of Squid, *Histioteuthis Cookiana* from New Zealand Waters

ABSTRACT

Specimens of a Histioteuthid squid, previously recorded from New Zealand as *Calliteuthis reversa* Verrill, are described as *Histioteuthis cookiana* n.sp. The new species is closely allied to *Calliteuthis miranda* Berry from Australia, and from a study of the characters of the genera of the Histioteuthidae it is shown that the two species are best placed in *Histioteuthis*.

INTRODUCTION

While engaged on a revision of the recent Cephalopoda of New Zealand, it became apparent to the writer that records of *Calliteuthis reversa* Verrill referred to a new species closely allied to *C. miranda* Berry, from Australia. This species is diagnosed in the present paper, but a more complete account, including an outline of the internal anatomy, will be given in a monograph of the New Zealand Cephalopoda now in preparation.

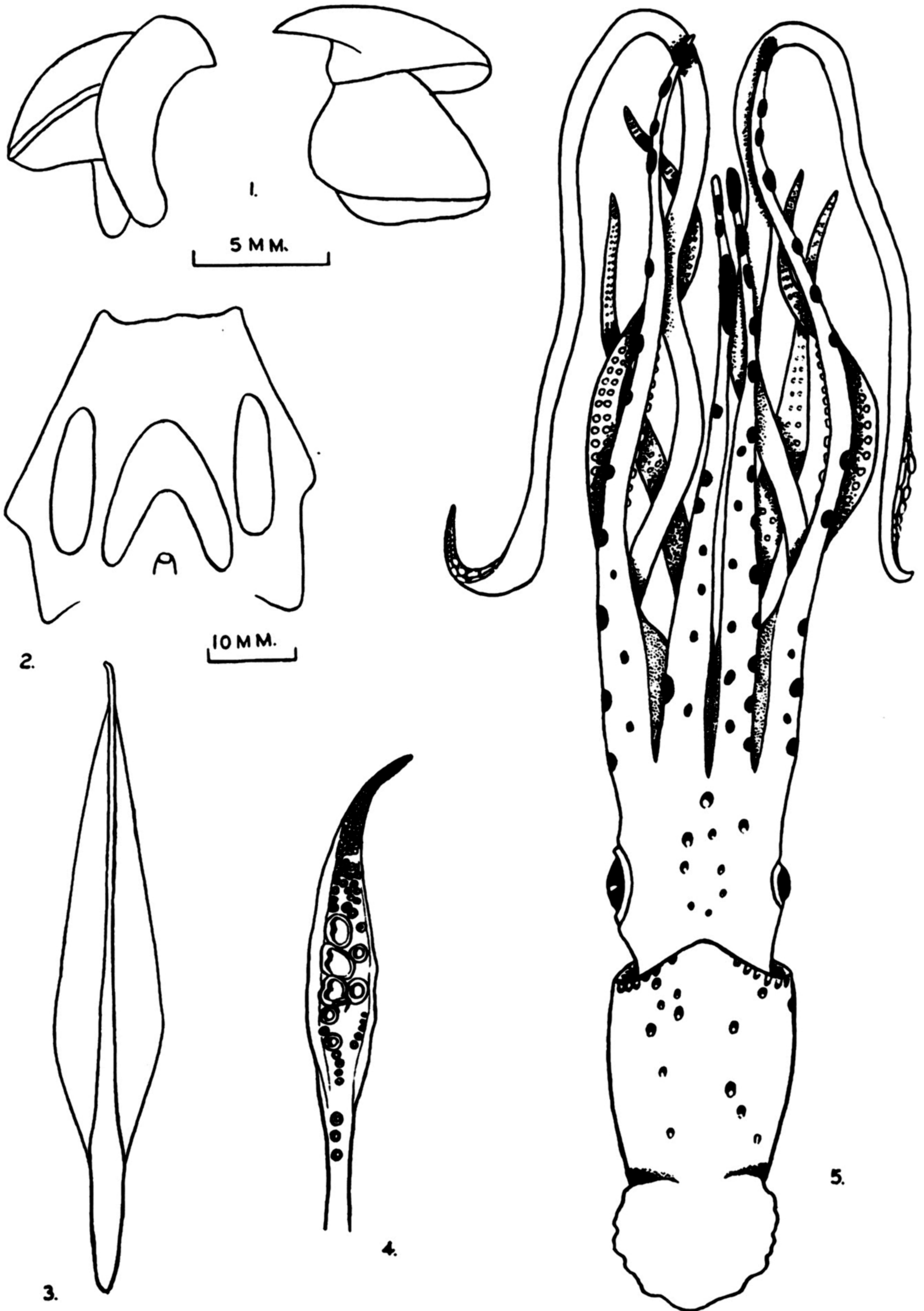
Histioteuthis cookiana n. sp. (Figs. 1-5).

Calliteuthis reversa Verrill, 1880; Hoyle, *Challenger Rep.*, 16, p. 183 (in part, not of Verrill).

Calliteuthis reversa Verrill; Suter, 1913. *Man.N.Z.Moll.*, p. 1055 (not of Verrill).

Animal of moderate size. Body comparatively short, about one-fifth the total length; conical, widest at, or near, the anterior margin and tapering fairly rapidly to a blunt point. On the small range of specimens available, the mantle appears to increase slightly in length proportionately with growth. Width of body about half the length. Mantle thick, tapering to a fairly sharp edge at the anterior extremity. Mantle margin produced anteriorly into a blunt point on the dorsal surface, somewhat retracted anteriorly. Pallial element of the locking apparatus consisting of a poorly developed cartilaginous ridge on the mantle, the cephalic element comprising a corresponding groove on the lateral funnel margin. The apparatus is indistinct and may be lacking in small specimens. Fins usually frayed and incomplete, thin, rounded, fused to mantle margin dorsally, becoming continuous with the mantle posteriorly and extending slightly beyond the posterior extremity of the body.

Head markedly asymmetrical, the left side being more highly developed. The left eyeball is considerably larger than the right, the longitudinal diameter of the left eye socket being approximately twice as long as the right. Funnel fairly short and broad, supported by a pair of thin membranes which run from the dorsal surface of the funnel to the ventral surface of the head. Valves consisting of the usual pair of recurved flaps. Funnel organ rather indistinct in preserved specimens, in the shape of a W, with the outer limbs separated from the central inverted V (Fig. 2). Arms stout, tapering fairly rapidly. The second and third pairs are subequal and one or the other is usually the longest arm. The first and fourth pairs are also subequal, being smaller than the second or third pair, the first pair usually being the shortest. The actual formula varies a little, the generalized



Histioteuthis cookiana n.sp.

Fig. 1—Beaks. Fig. 2—Funnel organ. Fig. 3—Gladius ($\times 1$). Fig. 4—Right tentacle of holotype female ($\times 1\frac{1}{4}$). Fig. 5—Dorsal view of holotype female ($\times \frac{1}{2}$).

formula being 3, 2, 4, 1. Arms rhomboidal in cross-section. The suckers of the sessile arms are arranged in a double row on all arms, those on the fourth pair being conspicuously smaller. Suckers hood-shaped. Horny rings of sessile arms subcircular, with no teeth.

Tentacles retractile and hence variable in length in preserved specimens, but between four and five times as long as the body. Tentacle stalks oval in cross-section towards the base, becoming triangular towards distal third. The tentacles are anchored at the base by a slender muscular cord exactly as described by Berry (1918, p. 223) for *C. miranda*. Tentacle club (Fig. 4) lanceolate, expanding near the base to a width about twice that of the carpus, thence tapering gradually to terminate in a slightly rounded tip. Sucker-bearing portion of club bordered on each side by a comparatively wide marginal membrane. A well-marked dorsal ridge runs along the back of the club. The suckers on the club proper do not commence until the widest portion of the club is reached. They are few in number and are arranged in two rows, a ventral row of three very large suckers with a dorsal row of two smaller suckers which alternate in position with the larger suckers of the ventral row. Proximally, the ventral row is continued by two suckers with diminishing diameters. Distally, there are four moderately large suckers. The rest of the distal portion of the club is covered with small suckers which gradually diminish in diameter. There seems to be little in the way of orderly arrangement, though they may be considered to be in oblique rows—five at first, then four, and finally two. The extreme tip of the club terminates in a slight swelling, with some five slightly larger grouped suckers.

The fixing apparatus commences on the proximal portion of the tentacle club with a dorsal series of closely-spaced alternating suckers and pads. On the right tentacle the series is pad, sucker, pad, sucker, pad; and on the left, gap, pad, sucker, pad, sucker. The ventral series commences with a comparatively large sucker on the right club (sucker on the left) and continues: sucker, pad, sucker, pad, etc., to the end of the carpus (pad, sucker, pad, sucker, etc., on the left). On the carpus proper, continuing towards the base, the arrangement on the right is as follows: pad, pad, sucker, sucker, pad, gap, pad, sucker, gap, sucker, gap, sucker, pad, gap, pad, sucker. The fixing apparatus ceases about half-way down the carpus. Rings of suckers of sessile arms and tentacle club have degenerated in preservative, so it is difficult to be sure if they were originally toothed or not. The indications are that they were smooth. In any case, apart from the large suckers on the manus, they appear to have been very fragile.

The umbrella and rudimentary umbrella are arranged exactly as described by Berry (1918, p. 222) for *C. miranda*. The degree of development of the inter-brachial web varies considerably. Actually, there are two distinct series as regards the degree of development of the web in the seven specimens available. One series to which five of the specimens conform has the web between the dorsal arms from 18 to 27 per cent. of the mantle length. The other series represented by two specimens ranges from 92 to 115 per cent. In no other respects do the two series appear to differ significantly. This problem will be considered more fully later.

Photophores are well developed, the arrangement being somewhat variable. The condition in the holotype female is described in some detail. On the dorsal mantle surface, photophores are few and scattered. There is a slight concentration on the left mantle edge. On the ventral mantle surface photophores are larger and much more numerous, with a heavy concentration along the anterior mantle edge. They are few and scattered along the dorsal surface of the head, with a

group of five small examples above the left eye and twelve larger ones above the right. There is a strong concentration of large photophores on the ventral head surface. The outer surface of the first pair of sessile arms bears a series of five large and a number of scattered smaller photophores over the basal half and a linear series of seven, very large and elongated, extending from the tips proximally. The outer surface of the second pair of sessile arms bears a single row of large photophores on the outside edge and a row of smaller ones on the inside edge with five elongated examples near the tip. The third pair bears a double row of photophores basally and a series of six elongated ones near the tip. The fourth pair has four rows of large photophores at the base which are gradually reduced to a single series at the tip. There are no photophores on the fins, the funnel, or the web. There does not appear to be any external indication of sexual dimorphism.

Variation in external morphology will be dealt with in a later work, where full tables of measurements and comparative indices will be presented. As has been indicated above, the dimorphic development of the dorsal web poses a problem, and this will be briefly considered here. That the difference is not due to sexual dimorphism is demonstrated by the fact that both males and females are found in the "short-webbed" and "long-webbed" series. Nor is the "long-webbed" condition found in young animals alone, as a specimen with a "short" web is intermediate in size between the two divergent specimens. The apparent dimorphism might be a sign of specific difference, but all other characters are consistent throughout the series. It must, then, be due to a tendency towards unusually wide variation in this character. If the two groups of specimens had been collected from separate localities, following current systematic practice in this family, they would have been described as two separate species, perhaps as separate genera.

The beaks (Fig. 1) are blackish-brown in colour, very much as described and figured by Berry (1918, p. 225, fig. 8) for *C. miranda*. The lower mandible bears a sharply raised median carina on the wings which renders the mandibles of this species the most distinctive of any of the New Zealand cephalopods. Radula with seven rows of simple teeth. In general, it agrees very well with *C. miranda* Berry except that the cusp of the median tooth of *cookiana* appears to be considerably longer and the shape of the second laterals differs. Gladius (Fig. 3) thin, plume-like, central rachis extending beyond the wings anteriorly and posteriorly.

Measurements of Holotype.—Total length, 510 mm.; dorsal length of body, 91 mm.; ventral length of body, 77 mm.; length of fins, 30 mm.; width of single fin, 22 mm.; width across fins, 38 mm.; width of body, 42 mm.; width of head across eyes, 33 mm.; length of head, 41 mm.; longitudinal diameter of right eye opening, 20 mm.; longitudinal diameter of left eye opening, 33 mm.; length of funnel, 27 mm.; length of R.1, 150 mm.; length of R.2, 180 mm.; length of R.3, 190 mm.; length of R.4, 160 mm.; length of right tentacle, 370 mm.; length of right tentacle club, 58 mm.; extent of fixing apparatus, 100 mm.; length of web between first pair of dorsal arms, 25 mm.

Localities.—Cook Strait, A. C. Kaberry, 28/11/44 (Holotype); Cook Strait, from stomachs of ling, *Genypterus blacodes* (Bloch and Schn.), six specimens; considerable number of mandibles taken from the stomach of a giant petrel, *Macronectes giganteus*, which came ashore at Wanganui, J. M. Moreland; "Challenger," Station 168, east of the North Island, New Zealand, 8/7/74, 40° 28' S., 177° 43' E., over a depth of 1100 fathoms, one immature specimen taken at surface.

Holotype and six paratypes in Dominion Museum, Wellington.

The generic placing of this species (and the closely allied Australian *C. miranda*) has occasioned a good deal of difficulty. Verrill, in 1880, differentiated his new genus *Calliteuthis* from *Histioteuthis* by the lack of any web between the arms. Berry, in 1918, in describing a new Histioteuthid from Australia, finally placed it in *Calliteuthis*, though with some hesitation. His species, *C. miranda*, known then from a single specimen, had a well-developed web. It is nothing unusual to find generic diagnoses changing through the years, but Allan (1945, p. 333), in describing two juvenile specimens of *miranda*, still used Verrill's lack of an interbrachial membrane as a generic character of *Calliteuthis* while including a species, *C. miranda*, which as an adult at least has a very well developed umbrella. Pfeffer distinguished *Stigmatoteuthis* from *Calliteuthis* by its possession of denticular arm and tentacle suckers and the lack of accessory chitinous structure on the manus. Robson has recently (1948, p. 122) doubted the validity of these distinctions. On the basis of Pfeffer's (1900 and 1912) key to the genera of the Histioteuthidae, *cookiana* cannot be placed in *Calliteuthis* because the manus bears no accessory structures, the arms have a well-developed umbrella, and there are more than three rows of photophores upon the ventral arms. The presence of the well-developed umbrella and the number of photophores on the ventral arms prevent inclusion in *Stigmatoteuthis*. The number of photophores and the possession of a well-marked umbrella mitigate against its inclusion in *Melcagroteuthis*. Sexually mature specimens have seven lobes to the buccal membrane, and there are too many rows of photophores on the ventral arms to permit inclusion in *Histioteuthis*. *Histiotauma* has no trace of a web and no light organs on the dorsal surface of the mantle.

What does become readily apparent from the above is that the genera of Histioteuthids, as at present separated and diagnosed, are a thoroughly artificial assemblage. Practically every new species obtained requires a new generic name. The two species *cookiana* and *miranda* could quite easily form a new genus, but the characters used would make this new genus a composite of the above four genera. The generic distinctions in use appear too narrow to the writer, too little cognizance has been taken of variation, and diagnostic characters are arbitrary and trivial and probably artificial. An assemblage of monotypic genera can convey little in the way of ideas of relationship or phylogeny. The whole family requires revision by some worker with access to types and adequate series. In the meantime, *cookiana* and *miranda* are placed in *Histioteuthis*, to which restricted genus they appear to show most relationship.

Histioteuthis cookiana is close to *H. miranda* (Berry), and there can be no doubt that there is strong genetical relationship, both on morphological and distributional grounds. They are undoubtedly allopatric forms which have diverged up to the threshold of specific difference. *Histioteuthis cookiana* differs from *H. miranda* in the following particulars: The olfactory papilla of *miranda* does not appear to be present in *cookiana*, there are slight differences in the radula, the suckers of the tentacle club are differently arranged in the two species, many more suckers being present on the manus in *miranda*. In addition, there are a number of proportional differences between the two species which may be due to the small range of measurements available for *miranda*. The differences in the tentacle club are well marked and appear quite diagnostic.

LITERATURE CITED

- ALLAN, J. K., 1945: Planktonic Cephalopod Larvae from the Eastern Australian Coast. *Rec.Austr.Mus.*, 21 (6), 317-50.
- BERRY, S. S., 1918: Report on the Cephalopoda. *Biol.Res. . . . F.I.S. "Endeavour, 1909-14, 4 (5), 203-98.*
- HOYLE, W. E., 1886: Report on the Cephalopoda collected by H.M.S. "Challenger" during the years 1873-1876. *Voy.of "Challenger,"* 16, 1-246.
- PFEFFER, G., 1900: Synopsis der Oegopsiden Cephalopoden. *Mitt.Naturhist.Mus.*, 17, 147-98.
- , 1912: Die Cephalopoden der Plankton-Expedition. *Ergeb.Plankton-Exped.Humboldt Stiftung, 2.*
- ROBSON, G. C., 1948: The Cephalopoda Decapoda of the *Arcturus* Oceanographic Expedition, 1925. *Zoologica*, 33 (3), 115-32.
- SUTER, H., 1913: Manual of N.Z. Mollusca, Wellington, N.Z., 1120 pp.