The Rediscovery of *Tonicia cuneata* Suter and *Acanthochites thileniusi* Thiele (Order Polyplacophora) together with the Description of a new Genus and Short Review of the New Zealand Acanthochitonidae.

By Edwin Ashby, F.L.S.

(Communicated by Albert E. Brookes.)

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Plate 40.

Foreword.

Mr. Albert E. Brookes is to be congratulated on his rediscovery of the shell described by Suter in 1908, under the name *Tonicia cuneata,* hitherto only known from the two examples collected by the late Mr. J. C. Anderson in the Bay of Islands. Now, after a lapse of nearly twenty years, Mr. Brookes has rediscovered it 200 miles further south. To him we are also indebted for another important discovery from the same locality, Tauranga Harbour; that of *Acanthochiton thileniusi* Thiele, described by Dr. Thiele in 1910 from the same harbour; the type unfortunately remains in a European Museum. I make my grateful acknowledgments to Mr. Brookes for the gift of the specimens that form the subject-matter of this paper.

Note.—Since the completion of this paper and its placing in the hands of Mr. Brookes, the writer has been informed that the date of publication of his earlier paper "The Acanthoid Chitons of New Zealand," quite unintentionally on his part, antedates the publication of Miss Mestayer's paper entitled " New Zealand Mollusca, No. 3"; a paper that was read on 22nd October, 1924. This unfortunate occurrence makes the writer the author of the names *Notoplax oliveri,* and *N. foveauxensis,* and his specimens and descriptions thereof, the types. These latter are being presented to the Dominion Museum, Wellington, and the rest of the writer's types to the Auckland Museum.

Pseudotonicia n. gen.

Having only 4 slits in the anterior valve, teeth sharp, median valves slits 1/1, tail-valve multislit as in *Notoplax;* the whole of the tegmentum bears numerous minute sense-organs that may have the same function as the "eyes" in the genus *Tonicia* or be a special development of the "megalopores"; gill-rows short, girdle clothed with minute, spaced spicules appearing nude, except under magnification; sutural hair-tufts obsolete or subobsolete.

Family ACANTHOCHITONIDAE Hedley.

Subfamily PSEUDOTONICINAE Ashby.

Genus *Pseudotonicia* Ashby.

PSEUDOTONICIA CUNEATA Suter.

Tonicia cuneata Suter, *Trans. N.Z. Inst.* vol. 40, pp. 360-361, pl. 28, figs. 1-2, 1908.

Craspedochiton cuneata Iredale, *Trans. N.Z. Inst.* vol. 47, p. 485, 1914.

Ashby in "The Acanthoid Chitons of New Zealand," *Proc. Mal. Soc. Lond.* vol. 17, pt. 1, pp. 5-35, pls. 1-4, April, 1926, states: "The character of the anterior insertion plate (4 slits) and the fact that the valves are bestrewn with immense numbers of minute eyes, precludes the possibility of its inclusion under the subfamily Acanthochitoninae."

CLASSIFICATION.

Mr. Brookes has supplied me with four examples of this shell, one a disarticulated paratype (one of the original two specimens) from the collection of the late Mr. J. C. Anderson, now in the collection of Brookes. (2) A very fine specimen in spirit. (3 and 4) Dry, more or less damaged specimens.

For the purpose of comparison with the genus *Tonicia,* I disarticulated an example from my own collection of *T. elegans,* the type species of that genus. All valves have strongly pectinated insertion-teeth; the lateral areas and the end-valves bear radiating rows or bands of eye-dots, and the gills extend the whole length of the foot.

I also disarticulated an example of *Lucilina suezensis,* the type of that subgenus, and found that the insertion-plates were similar to those of the genus *Tonicia*; the only distinction seems to be the position of the mucro in the tail-valve, certainly a non-generic character, and at most can only warrant subgeneric distinction. In the genus *Onithochiton,* the insertion-plate of the anterior valve is pectinated like *Tonicia,* but the insertion-plate of the tail-valve is reduced to a low, smooth and narrow callus. In Suter's *Tonicia cuneata,* the insertion-plate of the anterior valve is quite dissimilar from that of the three genera above referred to, the teeth being unpectinated and sharp, also the gills do not extend the full length of the body. The minute "eyes" mentioned by Suter are present in all valves, but the larger of these apertures has a diameter of only about 12.5 mmm., whereas in *Tonicia* they have a diameter of about 50 mmm., and in *Onithochiton scholvieni* of about 25 mmm. (these measurements are my own); thus it will be noted that whatever may be the function of these "eye-dots" in *cuneata,* they are much smaller than the typical "eyes" of other genera. We are therefore able to determine that the insertion-plate of *cuneata* is certainly Acanthoid in character, though the four to five variable slits, instead of the typical 5 slits of the Acanthochitoninae, and the existence of numerous "eye-dots," separate it from that subfamily. We certainly are justified in its inclusion under the

family Acanthochitonidae. This course is further supported by the discovery by the writer of subobsolete sutural hair-tufts in the specimen in spirit referred to below. The insertion-plate of the anterior valve of the genus *Craspedochiton* is not Acanthoid in character, being deeply festooned as Pilsbry terms it; Iredale must have been unaware of the true characteristics of that genus when he proposed the inclusion of *cuneata* therein.

DESCRIPTION.

General appearance.—Valves reduced, girdle very broad, encroaching on the valves at sutures, shell smooth surface, anterior valve ray-ribbed, lateral area defined by a diagonal fold, pleural area more or less deeply longitudinally grooved, deep wedge-shaped notches margining these grooves, dorsal area well defined, broad, smooth, and beaked, mucro post-median, colour, valves pink, girdle buff.

Anterior valve.—This spirit specimen shows only three ray-ribs, the two disarticulated specimens show four, corresponding to the four slits, as in Suter's type; (Mr. Brookes has now in his collection three specimens showing five distinct rays, with corresponding slits); the surface of shell between ribs is smooth except for slight growth-lines and a few deep cuneiform excavations in upper half of shell.

Median valve.—Dorsal area beaked, smooth, broadly wedge-shaped, shallowly notched at margin (pinnatifid); pleural area with 4 to 6 deep longitudinal grooves margined with deep triangular notches or excavations; lateral area with a distinct fold separating it and pleural area; decoration irregular, and consists of more or less wedge-shaped excavations.

Posterior valve.—Dorsal area as in other valves, mucro post-median several longitudinal grooves similar to pleural area in other valves, posterior portion behind mucro shallow (flattish), slope almost straight, ornamentation consisting of irregular excavations.

Girdle.—Greatly expanded, and occupies fully two-thirds of total width of animal, encroaches greatly at sutures; upper side of girdle "spongy" to the naked eye or under a low-power pocket lense and apparently without spicules, hair-tufts, or pores (as stated by Suter); but under 65 mag. girdle is seen to be clothed with spaced, adpressed, minute spicules, varying in length from 4/200 to 6/200 mm. or 20 to 30 mmm. Underside of girdle clothed with adpressed glassy spicules or modified hair-like scales. With a pocket lens the writer was unable to find any evidence of sutural hair-tufts, but under 65 mag. the existence of three sub-obsolete hair-tufts was noted on the two dry specimens, but under a similar magnification the specimen in spirit was found to possess some evidence of sub-obsolete hair-tufts at all sutures. No sutural pores detected, but slender curved spicules noted, three times the length of the other girdle-spicules, the longest measured being 14/200 mm. or 70 mmm.

Inside.—White, anterior valve 4 slits, equidistant, broad and deep, groove continued to tegmentum, teeth sharp and straight-edged,

articulamentum thick and broad, here and there narrowly ridged, slits corresponding with ray-ribs; median valves slits 1/1, posterior valve irregularly slit as in genus *Notoplax*.

Measurements.—Of spirit specimen, total length 42 mm., width 23 mm. of which the girdle occupies two-thirds, total length of body, *i.e.*, foot and head, 33 mm. of which head occupies 5 mm., width of foot a bare 10 mm., width of head 8 mm., gills post-median, 20 gill-slits counted which commence 4 mm. in front of anal extremity and extend forward 17 mm.

Remarks.—Suter's excellent description compared with the foregoing will give some idea of the margin of variation but he was incorrect in stating that the girdle was almost naked with very few silvery hairs near the margin. I have not seen any marginal fringe and the apparent absence of spicules under a low power is misleading, for minute spicules are distributed all over. Suter was also quite unaware of the sub-obsolete hair-tufts; again, he was incorrect in stating that the teeth in the first seven valves are finely pectinated, because in the usual acceptance of the term as applied to the genus *Tonicia* they are not pectinated at all; a glance at the figure of *Tonicia* will at once show the difference; Suter's statement "with gills extending nearly the whole length of the foot" is hardly correct, as a reference to the within measurements will show that the gills are but little more than half the length of the foot.

I consider *Pseudotonicia cuneata* to be a specialized form belonging to the family Acanthochitonidae; and whereas in the subfamily Cryptoplacinae the slits of the anterior valve are reduced to 3, in this species they are reduced to 4. As this feature is persistent, it will seem advisable to erect for its reception a subfamily Pseudotonicinae, immediately following the subfamily Acanthochitoninae.

Addenda.—Since the completion of the paper Mr. Brookes informs me that he has obtained three additional examples of *Pseudotonicia cuneata*, in each of which the anterior valve possesses 5 rays with corresponding slits in the insertion-plate. It is quite evident that the reduction of slits in this valve to four is not constant, and I have therefore asked Mr. Brookes to correct letterpress making the description read "4 or 5 slits" and I take this opportunity of expressing grave doubts as to whether the existence of the "minute eye-dots" is, taken by itself, sufficient grounds to warrant the retention of the proposed new subfamily Pseudotonicinae; if not, then this genus will have to be relegated to a position under the subfamily Acanthochitoninae.

Habitat.—Brookes collected all his specimens in Tauranga Harbour, opposite the town, in three fathoms. The two damaged specimens referred to were obtained from the mooring chain, and the others from the spoil deposited by the dredge engaged in deepening the approach to the new wharf. Bottom of hard pumiceous formation. The original specimen described by Suter came from the Bay of Islands.

Acanthochiton thileniusi.

Acanthochites thileniusi Thiele, *Rev. des Sys. der Chitonen,* pp. 50-51, pl. 6, figs. 55-58, 1909.

Acanthochites tristis Iredale, *Proc. Mal. Soc. Lon.* vol. 9, pt. 3, p. 155, 1910, not of Rochebrune.

Acanthochites (*Acanthochiton*) *bisulcatus* Wissel, *Zool. Jahrb. Systs.,* vol. 20, p. 614, pl. 21, figs. 28-29 (anatomy), only applies to examples from Tauranga; not of Pilsbry.

Acanthochites zealandicus thileniusi Ashby, "The Acanthoid Chitons of New Zealand," *Proc. Mal. Soc. Lon.,* vol. 17, pt. 1, pp. 13-14, pl. 4, figs. 5-7.

Introduction.—In the writer's paper "The Acanthoid Chitons of New Zealand" (*l.c.*), he gave an English translation of Thiele's description, and commented on points of difference between an example in his own collection that had originally been sent to him by the late Henry Suter, the data as to locality having been lost; it will therefore be unnecessary to reproduce that translation, only quoting the following comments.

"Thiele makes reference to longitudinal grooving in the dorsal areas, and this at first led me to conclude that his shell was conspecific with the deeply-grooved shell hereinafter described under the name *brookesi;* a reference to Thiele's figure of the tail-valve entirely precludes such a possibility. Thiele also described *A. zealandicus* as having longitudinal grooving in the dorsal areas; I therefore conclude that in both cases his remark refers to sub-cutaneous lining, which so simulates grooving that its true character can only be determined by the use of a binocular microscope and lateral lighting."

The rediscovery of *A. thileniusi* at the type locality by Brookes enables the question of the longitudinal grooving in the dorsal areas to be finally settled; he has given me two of his Tauranga specimens, and these show distinct longitudinal grooving in the dorsal areas, but the riblets are about half the width of the corresponding riblets in *Brookesi* Ashby, the grooving much shallower, and their structure when seen under a microscope quite distinct.

Comparison with Allied Forms.—Although I still consider *thileniusi* to belong to what I call the *zealandicus* section of the genus *Acanthochiton,* the very definite grooving and peculiar sculpture of the riblets of the dorsal areas justifies the erection of this species to full specific rank.

In *thileniusi* the dorsal area is a little narrower than in either *zealandicus* or *doubtlessensis,* but very similar to this area in *brookesi*; in both *zealandicus* and *doubtlessensis* longitudinal grooving in this area is absent, but present in *thileniusi* and *brookesi*; in the former the riblets are sinuate and rugose, the grooves between being very shallow, the riblets between the grooves varying in width from about 50 to 62 mmm.; in *brookesi* these riblets are not wavy and rugose but straight and comparatively smooth, and the grooves between much deeper; the width of these riblets varies from about 62 to 100 mmm.; the coarser riblets are formed by the confluence of two narrower ones and often show a shallow mid-groove.

The tail-valves of *zealandicus, thileniusi,* and *doubtlessensis,* are all small and very similar in shape, although the tegmentum of the latter is proportionally smaller; the tail-valve of *brookesi* is large, being three times the size of the others, and the insertion-plate suggests a transition towards the genus *Notoplax,* thus placing that species in a different section of the genus *Acanthochiton.*

The flat, somewhat circular granules in the pleural areas of the median valves, measure in *thileniusi* about 100 by 137 mmm.; in *zealandicus* 90 by 125 mmm.; but in *doubtlessensis* they measure 137 by 200 mmm.

Habitat.—Dredged by Brookes in one and a half fathoms low spring-tide on shells of live *Mytilus,* close to entrance Tauranga Harbour.

Acanthochiton doubtlessensis.

Acanthochiton zealandicus doubtlessensis Ashby, *Proc. Mal. Soc. Lon.* (*l.c.*).

The proposed elevation of Thiele's shell to full specific rank suggests the desirability of similarly elevating *doubtlessensis.* Quoting from my paper (*op. cit.*): "This form differs from *zealandicus* s.s. in the whole shell being much less raised; in the form of the median valves which are very flat and longitudinally short; in the sculpture, the granules being more elongate, definately larger and more widely spaced; in the tail-valve having the posterior slope, behind mucre, less vertical."

I have above supplied the actual measurements of the granules in comparison with allied forms, and have pointed out that the tegmentum of the tail-valve of this species is proportionately smaller than that of its congenors. I hesitated in my earlier paper to grant full specific rank because of the very limited number of localities from which specimens of *zealandicus* were available, and feared the possibility that there might exist a gradual transition from the form from French Pass, the type locality (my specimens from Lyall Bay I consider typical), to the coarsely sculptured form from Doubtless Bay. Reviewing this, and with the concurrence of Mr. Brookes, I now suggest that this form be recognized as a good species and not a subspecies of *zealandicus,* although with *thileniusi* it must be recognized as belonging to that section which we have called *zealandicus* section of the genus *Acanthochiton.*

The Synonymy of New Zealand Acanthochitonidae.

With a brief summary of the author's paper "The Acanthoid Chitons of New Zealand" (*l.c.*).

In his paper on "The Acanthoid Chitons of New Zealand" (*l.c.*), the writer points out some of the relationships between the Australian and the Neo Zealandic faunas, referring briefly to the part the ocean-currents have played in this faunal distribution. Under the heading

EXPLANATION OF PLATE.

FIG. 1.—*Notoplax* (*Amblyplax*) *foveauxensis* Ashby. Foveaux Strait; anterior valve, showing narrow insertion and sharp teeth. Ashby Coll. X6.

FIG. 2.—*Craspedochiton joubertensis* Ashby. Dgd. off Cape Joubert, Northern Australia; holotype anterior valve, showing broad, festooned and fluted insertion plate, for comparison with Fig. 1, which has wrongfully been placed in the same genus. Ashby Coll. X6.

FIG. 3.—*Tonicia elegans* Fremb. Chili. Anterior valve for comparison with Fig. 9, which has been wrongfully assigned to the same genus. Showing narrow insertion plate, highly pectinated and laminated, and scattered eye pits, visible in tegmentum. Ashby Coll. X6.

FIG. 4.—*Acanthochiton thileniusi* Thiele. Tauranga Harb. Plesiotype, anterior valve. Ashby Coll. X6.

FIG. 5.—*Acanthochiton thileniusi* Thiele. Tauranga Harb. Plesiotype, median valve. Ashby Coll. X6.

FIG. 6.—*Acanthochiton thileniusi* Thiele. Tauranga Harb. Plesiotype, tail valve. Ashby Coll. X6.

FIG. 7.—*Acanthochiton doubtlessensis* Ashby. Doubtless Bay. Holotype, tail valve, showing small tegmentum and lateral extension of insertion plate and sutural laminae. Ashby Coll. X7.

FIG. 8*a*—*Pseudotonicia cuneata* Suter. Tauranga Harb. Plesiotype, half median valve, showing longitudinal and cuneiform grooving. Ashby Coll. X7.

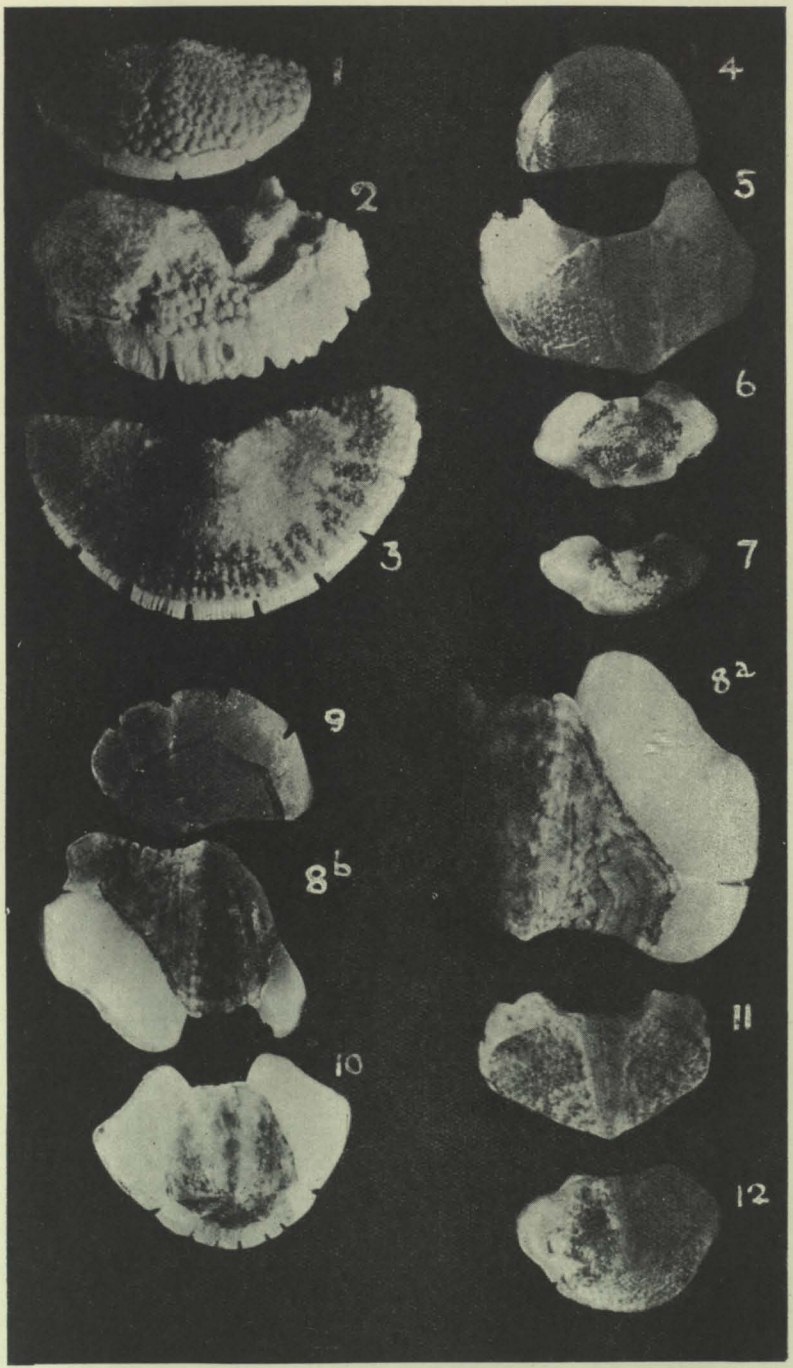
FIG. 8*b*—*Pseudotonicia cuneata*. Same valve as 8*a*, X about 5.

FIG. 9.—*Pseudotonicia cuneata* Suter. Tauranga Harb. Plesiotype, anterior valve, showing broad insertion plate, sharp teeth, 4 slits. Ashby Coll. X about 5.

FIG. 10.—*Pseudotonicia cuneata* Suter. Tauranga Harb. Plesiotype, tail valve, 7 slits. Ashby Coll. X about 5.

FIG. 11.—*Acanthochiton brookesi* Ashby. (?) Auckland. Holotype, median valve, showing longitudinal grooving in dorsal area. Ashby Coll. X7.

FIG. 12.—*Acanthochiton brookesi* Ashby. (?) Auckland Harb. Holotype, tail valve, showing rounded shape, large size of valve, very large tegmentum, posterior insertion plate narrow and notched. Ashby Coll. X7.



Face p. 398.

"*Classification Discussed*" the shell referred to by Iredale and others under the name *Craspodochiton rubiginosus* is shown to have no relationship with that genus, which up to the present is not represented in the Dominion by any known species. A photograph of the insertion-plate of the anterior valve of *Craspodochiton joubertensis* Ashby, is figured; it suggests no affinity with the family Acanthochitonidae; instances are given demonstrating the unwisdom of treating as of generic value purely superficial characters.

The whole of the New Zealand representatives of the subfamily Acanthochitoninae are placed under the following genera and subgenera.

Genus *Acanthochiton* Gray.
Genus *Notoplax* H. Adams.
Subgenus *Loboplax* Pilsbry.
Subgenus *Amblyplax* Ashby.
Provisional genus *Lophoplax* Ashby.
Genus *Cryptoconchus* Burrow.

The fact that the law of priority, as applied to generic names, does not apply to Ordinal or Family names is pointed out, and reference is made to Article 5 (Int. Rules) which reads: "The name of a family or subfamily is to be changed when its type genus is changed." Obviously the genus *Acanthochites* Risso. is the type genus of the group referred to in the said paper, and the author considers that Iredale has advanced no valid reason for the establishment of his family name Cryptoconchidae. Under Article 5 quoted above and Article 4, on changing the generic name of Risso. *Acanthochites* 1826, to that of *Acanthochiton* Gray em. 1821, which antedates it, we should change the family name to Acanthochitonidae Hedley, with the subfamily name Acanthochitoninae Ashby. On the same grounds the writer does not adopt Iredale and Hull's proposal to change the familiar ordinal name of Polyplacophora and the vernacular name of Chiton to Loricata and Loricates respectively. To adopt such a suggestion can serve no useful purpose, and is in the writer's opinion an attempt to do a distinct disservice to workers and students the world over.

CLASSIFICATION ADOPTED.

Class AMPHINEURA.
Order POLYPLACOPHORA.
Family ACANTHOCHITONIDAE Hedley 1916.
Subfamily ACANTHOCHITONINAE Ashby 1925.

Having 5 slits in insertion-plate of anterior valve, sutural hair-tufts in girdle.

Genus *Acanthochiton* Gray em. 1821.

Having 5 slits in insertion-plate of anterior valve, 2 slits in tail-valve, teeth sharp, sutural hair-tufts in girdle.

Acanthochiton zelandicus.

Chiton zealandicus Quoy and Gaimard, 1835, *Voy. Astrol.*, vol. 3, p. 400, pl. 73, figs. 5-8.

Acanthochites zealandicus Pilsbry, *Man. Conch.* vol. 15, p. 16, pl. 14, figs. 9-10; *Proc. Mal. Soc. Lon.*, 2, p. 192.

Acanthochites hookeri in Dieff. *N.Zd.* 2, 262.

Acanthochites spiculosus var. *astringa* Wissel, *Zool. Jahrb. Systs.* vol. 20, p. 612, pl. 21, fig. 25, pl. 23, figs. 28-29 (anatomy), not of Reeve.

Acanthochites (*Acanthochiton*) *bisulcatus* Wissel, *op. cit.* p. 614, pl. 21, figs. 28-29 (anatomy). Note French Pass examples only, not of Pilsbry.

Acanthochites zealandicus Thiele, *Rev. des Syst. der Chitonen*, pt. 1, p. 50, pl. 6, figs. 51-52.

Acanthochiton zealandicus Iredale, *Trans. N.Z. Inst.* vol. 47, p. 425, 1915.

Type from French Pass, in Mus. d'Hist. Nat. Paris.

Acanthochiton doubtlessensis.

Acanthochiton zealandicus doubtlessensis Ashby. "The Acanthoid Chitons of N.Z" (*l.c.*). Type from Doubtless Bay.

Acanthochiton thileniusi.

Acanthochites thileniusi Thiele (*l.c.*) pp. 50-51, pl. 6, figs. 55-58, 1900.

Acanthochites tristis Iredale, *Proc. Mal. Soc. Lon.* vol. 9, p. 155, not of Rochebrune.

Acanthochites (*Acanthochiton*) *bisulcatus* Wissel (*l.c.*), not of Pilsbry. (Only applies to examples from Tauranga.)

Acanthochiton zealandicus thileniusi Ashby, "The Acanthoid Chitons of N.Z." (*l.c.*). Type from Tauranga Harbour in Mus. d'Hist. Nat. Paris.

Acanthochiton brookesi.

Acanthochiton brookesi, Ashby, "The Acanthoid Chitons of N.Z." (*l.c.*) Type believed to be from Auckland Harbour; presented to Auckland Museum.

Genus NOTOPLAX.

H. Adams *P.Z.S.* 1861, p. 385. Type *N. speciosus* from Tasmania.

Having multifissate tail-valve, insertion-plates and teeth sharp, with or without ray-ribs in the anterior valve.

Subgenus Loboplax Pilsbry 1893.

Pilsbry *Naut.* 1893, vol. 3, p. 32. Type *Chiton violaceus*, Quoy and Gaimard.

Having multifissate tail-valve, broad insertion-plate at tail, teeth sharp, great extension of girdle which is naked.

Note.—Ashby points out in *Trans. Roy. Soc. S. Austr.* vol. 45, 1920, p. 289, that Dall's genus *Macandrellus* falls, as it was founded on *Acanthochiton costatus* Ad. and Ang. as type, and that species is a true *Notoplax*.

Notoplax (Loboplax) violaceus.

Chiton violaceus Quoy and Gaimard, *Voy. Astrol.* 3, p. 403, 1835.
Chiton violaceus Gould., *U.S. Expl. Exped.* Moll., p. 331, fig. 420.
Not *Chiton violaceus* Reeve, *Conch. Icon.*, fig. 41.
Chiton porphyreticus Reeve, *Conch. Icon.*, vol. 10, fig. 56, 1847.
Phacellopleura porphyretica, Cp.M.S.
Loboplax violaceus Pilsbry, *Man. Conch.* vol. 40, p. 39, figs. 67-73; *Proc. Mal. Soc. Lon.*, 2, p. 193.
Acanthochites violaceus Wissel (*l.c.*) 20, 616, pl. 21, fig. 30; pl. 23, figs. 31-32 (anatomy).
Loboplax violaceus Thiele (*l.c.*), pp. 37-39.
Macandrellus violaceus Iredale, *Trans. N.Z. Inst.* vol. 47, 1914, p. 425.
Acanthochiton violaceus Ashby, *Trans. Roy. Soc. S. Austr.* vol. 46, 1922, p. 578.
Ashby in "Acan. Chitons of N.Z." gives photographs of one of Quoy and Gaimard's co-types. In Ashby collection.

Notoplax (Loboplax) violaceous var. papilio.

Chiton violaceus var. *papilio* Quoy and Gaimard, *Voy. Astrol.*, p. 520.
Acanthochiton violaceus var. *Papilio* Ashby (*l.c.*), p. 578.
Loboplax violaceus var. *papilio* Ashby, in "Acanthoid Chitons of N.Z." (*l.c.*)
Type in Mus. d'Hist. Nat. Paris.

Subgenus AMBLYPLAX Ashby, 1926.

Ashby, "Acanthoid Chitons of N.Z." *Proc. Mal. Soc. Lon.*, vol. 17, pt. 1, p. 18, type *Notoplax* (*Amblyplax*) *oliveri* Ashby = *Macandrellus oliveri* Mestayer.

Having multifissate tail-valve, posterior insertion-plate narrow, thickened, blunt-edged and fluted; girdle clothed with spicules or irregular, minute scales or both, girdle often asymmetrical.

Ashby, while using the names *Loboplax* and *Amblyplax* subgenerically, points out that they might with equal justice be considered sections only of the genus *Notoplax*, though the arrangement adopted seems the more convenient.

Notoplax (Amblyplax) oliveri.

Notoplax (*Amblyplax*) *oliveri* Ashby. *Proc. Mal. Soc. Lon.* vol. 17, pt. 1, April 1926, pp. 18-20, pl. 1, figs. 4 *a*, *b*, *c*.
Macandrellus oliveri Mestayer, *Trans. N.Z. Inst.*, vol. 56, May 1926.

Ashby supplies photographs and gives a full description of a specimen dredged in 20fms. by Albert E. Brookes, on *Atrina* shell, between Kawau and Tiritiri Islands, Hauraki Gulf.

Notoplax (Amblyplax) foveauxensis.

Notoplax (*Amblyplax*) *foveauxensis* Ashby. *Proc. Mal. Soc. Lon.* vol. 17, pt. 1, April 1926, pp. 20-22, pl. 1, figs. 5 *a, b, c.*

Acanthochiton foveauxensis Mestayer. *Trans. N.Z. Inst.* vol. 56, pp. 585-6, pl. 100, figs. 9-12.

Acanthochiton foveauxensis var. *kirki* Mestayer. (*l.c.*), pp. 586-587, pl. 101, figs. 1-4.

Loboplax rubiginosus Thiele, *Rev. des Syst. der Chitonen,* p. 38, pl. 5, figs. 16-17, 1909, not of Hutton.

Acanthochites rubiginosus Suter, *J. Mal.* 12, 68, pl. 9, figs. 12-17, not of Hutton.

Plaxiphora terminalis Wissel (*l.c.*), p. 609, pl. 21, fig. 22; pl. 23, figs. 23-24 (anatomy), not of Smith.

Acanthochites rubiginosus Iredale, *Proc. Mal. Soc. Lon.* vol. 9, pt. 3, p. 155, 1910. Stewart Island shells, not of Hutton.

Craspodochiton rubiginosus Iredale, (*l.c.*), vol. 11, pt. 2, p. 130, 1914, not of Hutton.

Ashby gives photographs and full description.

Type Foveaux Strait. Presented to Dominion Museum.

Notoplax (Amblyplax) rubiginosus.

Tonicia rubiginosa Hutton, *Trans. N.Z. Inst.,* vol. 4, 1872, p. 180.

Acanthochites costatus Suter, *Proc. Mal. Soc. Lon.,* vol. 2, pt. 5, p. 194, 1897, not of Adams and Angus.

Notoplax (*Amblyplax*) *rubiginosus* Ashby, "Acanthoid Chitons N.Z." (*l.c.*)

Ashby figures a photo of the holotype and shows that it is an entirely different species from the preceding *foveauxensis,* with which it has hitherto been misidentified.

Type from Kapiti Island, West Coast, North Island, near entrance to Cook Strait, in the Dominion Museum..

Notoplax (Amblyplax) mariae.

Acanthochites (*Loboplax*) *mariae* Webster, *Trans. N.Z. Inst.* vol. 40, pp. 254-255, pls. 20, 21, figs. 1-11, 1908.

Acanthochites (*Craspodochiton*) *mariae* Iredale, *Proc. Mal. Soc. Lon.* vol. 9, pt. 2, p. 102, 1910.

Notoplax (*Amblyplax*) *mariae* Ashby, "Acanthoid Chitons N.Z." (*l.c.*)

Ashby figures photos of paratype and gives full description.

Type from Orua Bay, Manukau Harbour; on rocks at low tide. In the Webster collection.

Notoplax (Amblyplax) mariae stewartiana.

Loboplax stewartiana Thiele, *Rev. des Sysl, der Chitonen,* p. 37, pl. 5, figs. 8-12, 1909.

Iredale (*l.c.*) considered this species to be conspecific with the preceding.

Notoplax (*Amblyplax*) *mariae stewartiana* Ashby, "Acanthoid Chitons of N.Z." (*l.c.*)

Ashby figures photos of the holotype which was lent for the purpose by the Museum d'Histoire Naturelle, Paris, and gives full description of same. Type from Stewart Island. In Mus. d'Hist. Nat. Paris.

Notoplax (Amblyplax) mariae haurakiensis.

Notoplax (Amblyplax) mariae haurakiensis Ashby, "The Acanthoid Chitons of N.Z." (*l.c.*)

Ashby gives full description and figures.

Type on Atrina shell in 20fms. Hauraki Gulf, dredged by Brookes. Presented to Auckland Museum.

Genus CRYPTOCONCHUS Burrow 1815.

Having tegmentum reduced in all valves to a linear ridge, insertion-plates broad, anterior valve 5 slits, median valves slits 1/1, posterior valve several slits, girdle leathery, naked, bearing 18 hair-tufts gills extending along the posterior half of foot.

Cryptoconchus Burrow 1915, *Elem. Conch.* 1815, p. 190. Type *Chiton porosus* Burrow.

Cryptoconchus porosus.

Chiton porosus Burrow, *Elem Conch* p. 189, pl. 28, fig. 1.

Acanthochites (Cryptoconchus) porosus Pilsbry, *Man. Conch.* 15, pp. 35-37, pl. 3, figs. 57-62; *Proc. Mal. Soc. Lon.*, p. 193.

Chiton monticularis Quoy and Gaimard, *Voy. Astrol.* 3, p. 406, pl. 73, figs. 30-35, 1825.

Cryptoconchus stewartianus Rochebrune, *Bull. Soc. Philom.* Paris, 1881-1882, p. 194.

Chiton zealandicus Quoy, Hutton, *Trans. N.Z. Inst.*, 4, 183, not of Q. and G.

Cryptoconchus (Acanthochites) porosus Wissel, *Zool. Jahrb.* 5, 319; (*op. cit.*), 20, p. 618, 1904 (anatomy).

Cryptoconchus Thiele (*l.c.*) p. 109.

Cryptoconchus porosus Iredale, *Trans. N.Z. Inst.*, vol. 47, 1914, p. 425.

Cryptoconchus porosus Ashby, "Acanthoid Chitons of N.Z." (*l.c.*)

Ashby figures photographs of co-type of Rochebrune's *C. stewartianus*, in Ashby collection, and gives a description thereof.

Genus LOPHOPLAX Ashby, 1926.

This provisional genus has been formed for the reception of a minute and unique example in which the tail-valve is missing, described under the name *Lophoplax finlayi* Ashby.

ACANTHOID CHARACTERS.

(1) The girdle possesses hair-tufts at the sutures and in front of the anterior valve.
(2) The anterior valve has 5 slits opposite the ray-folds.
(3) In the median valve the insertion plate is well defined, slits 1/1, teeth sharp, neither festooned nor propped.
(4) The girdle, except for hair-tufts, is clothed with minute, more or less circular scales, it also probably possesses a short marginal fringe.

NON-ACANTHOID CHARACTERS.

(*a*) The whole shell is very broad, very elevated and carinated.
(*b*) The tegmentum is longitudinally narrow but very broad laterally, the sutural laminae are ischnoid in character.
(*c*) The great size of the dorsal area, which is the shape of an equilateral triangle and the highly raised longitudinal ribs of the pleural area. The circular scales of the girdle more properly come here than under clause 4 above.

Type *Lophoplax finlayi.*

Lophoplax finlayi.

Lophoplax finlayi Ashby, "Acanthoid Chitons of N.Z." (*l.c.*)

Dredged off Otago Heads in 60fms.; valves figured. In Finlay collection, Dunedin.

Genus PSEUDOTONICIA, 1926.

Characters described at commencement of this paper.

Pseudotonicia cuneata.

Tonicia cuneata Suter, *Trans. N.Z. Inst.* vol. 40, pp. 360-361, pl. 28, figs. 1-2, 1908.

Craspedochiton cuneata Iredale, *Trans. N.Z. Inst.*, vol. 47, p. 425, 1914.

Ashby in " The Acanthoid Chitons of N.Z." (*l.c.*) gives reasons for its non-inclusion in the Subfamily Acanthochitoninae.

Full description and figures given earlier in present paper.

Type in Suter collection, in Wanganui Museum.

INCORRECTLY PLACED IN GENUS ACANTHOCHITON.

Mopalia australis.

Mopalia australis Suter, *Proc. Mal. Soc. Lon.* vol. 7, p. 215, pl. 18, figs. 12-12*a*, 1907.

Acanthochiton australis Iredale, *Trans. N.Z. Inst.* vol. 47, p. 425, 1914.

Ashby in " The Acanthoid Chitons of N.Z." (*l.c.*) comments as follows: " I have not had the opportunity of seeing the type, but the drawings, accompanying Suter's description, show that it has 8 very distinct slits in the insertion-plate of the anterior valve, instead of the Acanthoid 5 slits, this entirely prevents its being placed in the genus *Acanthochiton.* The few setae mentioned by Suter as occurring on the girdle are probably mopaliioid in character, rather than acanthoid, and I do not see any reason for removing this species from the *Mopaliidae* under which family Suter places it." I admit it may not belong to the genus *Mopalia* s.s."

ACANTHOID SPECIES INCORRECTLY REFERRED TO NEW ZEALAND.

Acanthochiton jucundus.

Acanthochites jucundus Rochebrune, *Bull. Soc. Philom.* Paris, 1881-1882, p. 194.

Acanthochites bellignyi Rochebrune (*l.c.*), 1883-1884, p. 37.

Acanthochiton jucundus Ashby, "Acanthoid Chitons N.Z." (*l.c.*)

As this species in a near ally to several of the Dominion shells, I will quote from my paper (*l.c.*): "Through the kindness of Dr. Ed. Lamy, Paris, I have been enabled to compare a median valve of the holotype of *jucundus* with the New Zealand *Acanthochitons*. The median valve of *jucundus* is decorated with extremely even-sized, circular, raised, convex granules, and the dorsal area shows in the non-eroded portion, at sides and towards the apex, deep longitudinal grooving. It differs from *zealandicus, doubtlessensis,* and *thileniusi* in having longitudinally grooved dorsal area; from *brookesi* and the three above named in the flatness of the shell and its smaller, circular granules, it is nearer to *zealandicus* s.s. in the shape of its granules, but in *jucundus* they are more circular; I do not consider it a Dominion shell, and probably the locality of New Caledonia, given for *bellignyi* is correct." Now the rediscovery of *thileniusi* has made it desirable to review the above in face of the distinct grooving of the dorsal area of that species. I find that the grooving in this area in *jucundus* is coarser, and riblets do not show, the rugose and wavy sculpture of that species, the granules in *jucundus,* as before noted, are circular, about 75 to 87 mmm. in diameter, whereas in *thileniusi* they are fully one-third longer than wide and the granules near the dorsal area are twice as long as wide; in *jucundus* the granules are consistently circular and of small size throughout. The only qualification I have to make in the description quoted from my earlier paper, is that the convexity of the granules referred to is slight only and may not be a persistent feature. Type in Mus. d'Hist. Nat. Paris.

Acanthochiton tristis.

Acanthochites tristis Rochebrune (*l.c.*) 1881-1882, p. 194.
Acanthochites tristis as being conspecific with *thileniusi* Iredale, *Proc. Mal. Soc. Lon.* vol. 9, p. 155, 1910.
Acanthochiton tristis Ashby in "Acanthoid Chitons of N.Z." (*l.c.*)

That Iredale's surmise that this species is conspecific with *thileniusi* is without any foundation, will be clear from the following notes which I quote from the earlier paper: "Again I am indebted to Dr. Ed. Lamy for the opportunity of comparing a median valve of Rochebrune's holotype, with the New Zealand species. This median valve is nearest to *mariae* and *stewartiana,* but the shell is more arched and the sculpture less elongate, but it is still more easily separated from any known *Acanthochiton,* by its distinctive dorsal area, which in *tristis* is narrow and quite smooth, except for broad, transverse growth ridges. This cannot be considered a New Zealand shell." Type in Mus. d'Hist. Nat. Paris.

Spongiochiton productus.

Spongiochiton productus Carpenter, 1873. Dall *Proc. U.S. Nat. Mus.* 1882, pp. 272, 283, 286, 289, 290.
Spongiochiton productus Pilsbry, *Man. Conch.* vol. 14, pp. 26-7; vol. 15, p. 7.

Spongiochiton productus Thiele (*l.c.*), p. 36, pl. 5, figs. 4-7; (*l.c.*), p. 199, considers *Spongiochiton* = *Loboplax.*

Acanthochiton carpenteri Pilsbry (*l.c.*), vol. 15, p. 35, pl. 1, figs. 14-22.

Craspodochiton productus Iredale, *Proc. Mal. Soc. Lon.* vol. 9, pt. 2, p. 101.

Ashby in "Acanthoid Chitons N.Z." (*l.c.*) says: "In looking at the figures and descriptions I independently came to the conclusion that *Spongiochiton productus* is near to *Notoplax* (*Amblyplax*) *foveauxensis* Mestayer, in fact it might be that shell."

Iredale pointed out that Carpenter's drawings of the type are labelled "from Port Elizabeth, South Africa," whereas the specimen seems to have been attributed to New Zealand; on these grounds he considered that it was not a New Zealand species. Until some facts are produced to the contrary I think we may well adopt this course."

PHYLOGENY.

I have no hesitation in repeating a statement made in an earlier paper. The hypothesis that the modifications in the insertion-plates of Polyplacophora are due to the influence of ecological conditions over vast periods of time, and that these characters give us the best guide to the species proper place in the Natural Taxis, is increasingly substantiated the more I study this group of Mollusca. I am therefore the more willing to place confidence in those divisions that are based on such features.

In my "Monograph on Australian Fossil Polyplacophora (Chitons)" *Proc. Roy. Vict.* vol. 37 (n.s.) pt. 2, pp. 170-205, pls. 18-22, figs 1-36, I suggest that living Chitons have been evolved along two (at the least) distinct, parallel lines, having come to this conclusion as a result of my investigations in Australian Palaeontology. Up till the publication of the said paper it has generally been accepted that the Palaeozoic forms disappeared somewhere about the Jurassic, or earlier and the type that occur in later Secondary and Tertiary rocks are quite distinct, being the direct progenitors of living forms.

Owing to recent discoveries in the Oligocene (Balcombian) rocks of Victoria, I suggest that my new genus *Protochiton* forms one of the most important missing links and consider this species the progenitor of the Phylum Acanthochitonidae, that family having been derived from Palaeozoic stock along this line and not through the family Lepidopleuridae at all.

The genus *Lepidopleurus* has heretofore been considered the most primitive of all living forms, but it seems certain that the genus *Protochiton* cannot be derived from any member of that genus, for while some of its characters seem less primitive, others suggest an affinity with the Palaeozoic group, which does not exist in the Lepidopleuridae; I submit a Phylogenetic Diagram which will better express my views in this relationship.

PHYLOGENETIC DIAGRAM.