

TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

ZOOLOGY

VOL. 1

No. 22

DECEMBER 18, 1961

[Continued from *Transactions of the Royal Society of N.Z.*, Volume 88, Part 4.]

A Review of the New Zealand Pinnotheridae

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[Received by Editor, March 14, 1961.]

Abstract

THE family Pinnotheridae is represented in New Zealand by a single polymorphic species, *Pinnotheres novaezelandiae*. Previous records of *Pinnotheres pisum* are shown to be erroneous, and the two species are briefly compared.

INTRODUCTION

PUBLISHED information on the New Zealand Brachyura comes from two main sources. First in time were the reports by European workers such as Milne-Edwards, Miers, Filhol and others, who described museum collections obtained by various expeditions to this country. These writers had the disadvantage of examining preserved material, and in many cases were the victims of erroneous recording of collection localities. The second group of papers comes from workers resident in New Zealand who have had more opportunity of making extensive collections, both seasonally and geographically. Undoubtedly the most important papers in the latter group are those of Chilton and Bennett (1929) and Richardson (1949), and both of these recommend a revision of the Pinnotheridae.

Five species of pinnotherids have been recorded from New Zealand, four of which are referable to the genus *Pinnotheres* Latreille, and the fifth is "almost certainly a *Pinnixia*" (*sic*, Lebour 1928). In spite of these records it seems that only one species occurs commonly, but there has been much confusion as to its specific location. Thus Chilton (1906), Thomson (1913, 1921), and Richardson (1949) have regarded the common species as *Pinnotheres pisum* Linnaeus, while Filhol (1885), Young (1929), and Powell (1947) recognise *P. novaezelandiae* Filhol. It is significant that, with the exception of Chilton, none of these authors have recorded both species, and Chilton (1911) stated that he could find "little or nothing" to distinguish them.

Of the other species recorded, *P. latipes* Jacq. et Luc. (1853) may be safely ignored for, as remarked by Filhol (1885), its sole claim to inclusion in the New Zealand fauna results from the recording by Hombron and Jacquinet of Raffles Bay in northern Australia as a New Zealand locality.

The fourth species, *P. schauinslandi* Lenz, has not been recognized since its original description. It is obviously close to *P. novaezelandiae* and will be discussed with that species below.

Lebour's (1928) record of a *Pinnixa* rests on her identification of a zoea taken by the "Terra Nova" Expedition and figured by Gurney (1924: 196). No adults of this genus have even been recorded, and it seems that this larva would be better placed in the Hymenosomidae. Its resemblance to *Pinnixa* lies in the curious enlargement of the fifth and sixth somites of the abdomen into thin lateral plates which overlap the telson. The latter shows some resemblance to *Pinnixa* as figured by Aikawa (1929, Fig. 46) but is even closer to that of the hymenosomids *Halicarcinus* (obtained by the writer) and *Rhynchoplax* (Aikawa, 1929, Fig. 39). Comparing the maxillules of this zoea with those of *Pinnotheres ostreum*, *P. maculatus*, and *Pinnixa sayana* (Hyman, 1924, Figs. 10, 24, and 43) on the one hand, and with the hymenosomids *Halicarcinus* and *Trigonoplax* (Aikawa, 1929, Figs. 49 and 50) on the other, it is found that Gurney's zoea resembles the hymenosomids in the presence of a seta on the basal segment of the endopodite, and in the presence of two groups of setae on the coxa. None of the pinnotherids show these features. Similarly, the maxillae of Gurney's zoea resemble those of *Trigonoplax* (Aikawa, 1929, Fig. 27) in having a coxa bearing a single seta, whereas those of the pinnotherids referred to (Hyman, 1924, Figs. 12, 25 and 44) all have several setae on the coxa. Aikawa considered that Gurney's zoea should be referred to the Hymenosomidae.

N.Z. Records of *P. pisum*

The persistent and interesting records of the European *P. pisum* in New Zealand faunal lists have been originated by Heller (1868), who described material collected by the "Novara" expedition. He could find no difference between New Zealand specimens and those from European waters apart from the fact that "the hind leg seems to be somewhat less hairy". He apparently did not consider this difference justified the erection of a new species.

The inclusion of *P. pisum* by Miers (1876) in his catalogue might be taken as confirmation of this identification. However, as remarked by Hutton (1882), Miers listed all species recorded from New Zealand and much of his material was not of neo-zelanic origin.

Filhol (1885) listed *P. pisum* as indeed he listed all species included in Miers' catalogue, but it appears from the text that he did not personally collect *P. pisum* in New Zealand but referred all his specimens to a new species, *P. novaezelandiae*.

Thomson (1913 and 1921) referred Otago specimens to *P. pisum* whereas Chilton (1911) seemed to have abandoned his earlier view (1906) that *P. pisum* was common and referred his collection to *P. novaezelandiae*.

The records of Borradaile (1916) and Gurney (1924) would seem to carry more weight, since the localities are almost certainly authentic and European material should have been available for comparison. The view of the writer is that these records rest on mis-identification, but the matter will be discussed further below when the species have been described in more detail.

Although Chilton and Bennett (1929) did not revise the Pinnotheridae, they listed the species recorded from New Zealand with the comment: "This is by no means a satisfactory list. *P. pisum* for example is the European species and is probably correctly identified . . ." I am informed by Dr Bennett (pers. com.) that the word "not" has been omitted before "correctly" and this alteration certainly improves the sense of the paragraph.

Comparison of *P. novaezelandiae* and *P. pisum*

The systematic problems of the New Zealand Pinnotheridae were first encountered by the writer when larvae of the common pinnotherid of Banks Pen-

insula were hatched in the laboratory. It was noticed that these larvae differed in the absence of lateral carapace spines from those of *P. pisum* figured by Lebour (1928). In view of this it has been assumed that this species is *P. novaezelandiae*, a view which is supported by the descriptions of Filhol (1885) and Lenz (1901).

In order to determine the differences between adult *P. pisum* and *P. novaezelandiae*, specimens of the former were obtained from Plymouth through Dr Atkins and compared with *P. novaezelandiae* from Sumner.

Before discussing the species further it is necessary to draw attention to the different forms assumed during the life history. This polymorphism is now well established for *P. pisum* (Atkins, 1926, 1958) and for *P. ostreum* (Christensen and McDermott, 1958) but has not previously been described in *P. novaezelandiae*. Briefly it may be stated that three forms occur:—

- (1) the well known mature female with membranous, unpigmented carapace and a typical broad abdomen;
- (2) a hard-shelled orange-brown pigmented form which, although always having a narrow abdomen, may be male or female (this form is usually referred to as the male in older literature);
- (3) a soft-shelled, unpigmented form resembling the hard form in the abdomen and in other features, and including both sexes. The eyes are visible from above in the two latter forms, but are not usually visible in the first.

The following differences apply to all stages:—

- (1) In *P. novaezelandiae* the legs are shorter and stouter than in *P. pisum*.
- (2) In *P. novaezelandiae* the outer margin of the merus of the third maxillipede bears a dense row of hairs along its full length, though these become shorter proximally. In *P. pisum* a dense row of hairs is found along the distal half of this margin only.
- (3) In *P. novaezelandiae* (Fig. 4), both the fixed and movable fingers of the hand bear stout teeth which bite together when the fingers are closed. In *P. pisum* (Fig. 3) the tooth on the fixed finger is obsolete and removed distally from a larger tooth on the movable finger.
- (4) The form of the mandibles is variable in both species. However, in *P. novaezelandiae* (Fig. 6) there are usually several small, acute teeth present on the molar process, whereas in *P. pisum* (Fig. 5) there are commonly only 1 to 3 teeth close to the incisor process.

Differences observed only in hard-shelled forms include:

- (5) The colour pattern. Although the extent of pigmentation varies considerably from one individual to another, all can be referred to a basic pattern (Fig. 1) which is quite distinct from that of *P. pisum* (Fig. 2).
- (6) The tufts of long, plumose setae which fringe the walking legs in this stage occur on both the anterior and posterior margins of the propodus, carpus and merus of the last leg in *P. pisum*, whereas in *P. novaezelandiae* long setae are developed only on the merus of this leg, those on the other segments being quite short. This distinction is lost in mature females as, in both species, the setae of the last legs are reduced to a dense fringe along

the anterior margin of the merus, and a few scattered setae on the posterior margin of the propodus. It is possible that it was this difference that led Heller to remark that the hind legs appear "somewhat less hairy" although there is no evidence as to the sex or stage of his specimens.

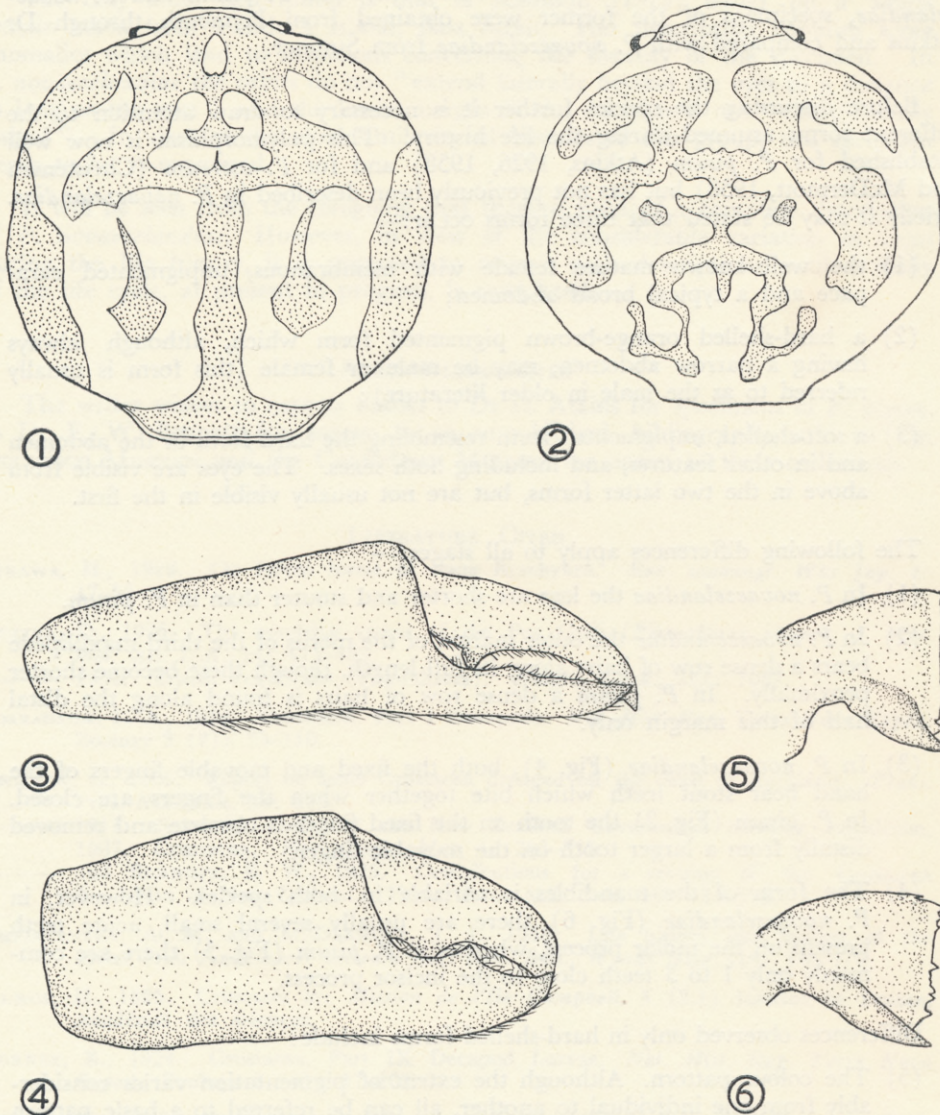


FIG. 1.—*Pinnotheres novaezelandiae*, carapace, hard form, $\times 8$.

FIG. 2.—*Pinnotheres pisum*, carapace, hard form, $\times 8$.

FIG. 3.—*Pinnotheres pisum*, right chela, mature female, $\times 10$.

FIG. 4.—*Pinnotheres novaezelandiae*, right chela, mature female, $\times 10$.

FIG. 5.—*Pinnotheres pisum*, left mandible, $\times 35$.

FIG. 6.—*Pinnotheres novaezelandiae*, left mandible, $\times 35$.

Pinnotheres schauinslandi Lenz.

Lenz gives no indication of the sex or of the hardness of the carapace of the specimens on which he founded this species. However, his descriptions are compatible with the view that he regarded all hard shelled forms as *P. schauinslandi*, while soft shelled forms were referred to *P. novaezelandiae*. The visibility of the eyes from above, the hairiness of the legs, the broader form of the cheliped, and the more powerful and longer legs are all characters which distinguish the hard shelled forms from the mature females. A difficulty which Lenz has overlooked is that all the females of *P. schauinslandi* would have a male-like abdomen, an immature ovary, and never become ovigerous. The relative length of dactylus and propodus of the third maxillipede is variable and not suitable as a systematic character.

Chilton (1911), in discussing the status of *P. schauinslandi*, inclined to the view that it should be united with *P. novaezelandiae* but did not make any final decision.

Identity of New Zealand Specimens

Following the arguments outlined above, specimens from all parts of New Zealand have been examined and all found to be *P. novaezelandiae*. These include the collections of Dominion Museum and Canterbury Museum as well as many made by the writer. Most are from intertidal localities, but some are dredged from up to 10 fathoms. The common hosts are *Mytilus edulis aoteanus* and *Perna canaliculus*, but specimens have also been obtained from *Modiolus neozelanicus*, *Atrina zelandica*, *Spisula aequilateralis*, and *Resania lanceolata*.

It is convenient at this stage to examine the records of Borradaile (1916) and Gurney (1924) of *P. pisum* in New Zealand. Borradaile's record is based on three females (presumably in the mature state) and it should be noted that the differences between *P. pisum* and *P. novaezelandiae* in this form are slight and, in a variable species, easily overlooked. The teeth of the mandibles and of the chelae are the only really reliable features available. In the absence of satisfactory descriptions of *P. novaezelandiae* this identification is understandable.

Gurney's record is based on zoeas, also collected by the "Terra Nova". Unfortunately, Gurney does not figure this zoea so that it is impossible to tell whether lateral spines are present on the carapace or not. Again the difference between the species is easily overlooked since the spines which are absent in *P. novaezelandiae* are quite short and inconspicuous in *P. pisum*. Gurney's determination seems to have been influenced by Borradaile's record of adult *P. pisum* from the same expedition. Gurney described this larva as "the characteristic zoea of *Pinnotheres*. As Borradaile records *P. pisum* from New Zealand . . . no doubt these larvae belonged to this species".

Published Descriptions of P. novaezelandiae.

The type description by Filhol (1885) is short and very general. When specimens of *P. pisum* are compared with this description it is found that they agree in all respects. None of the distinctive characters have been dealt with, so that it is not surprising that confusion has arisen. As stated by Lenz, Filhol's figures are not "precise in all respects". The posterior margin of the male carapace should not be pointed, the eyes of the female should not be shown in dorsal view, the female legs are more slender than shown, the dactylus is omitted on the third maxillipede, and the enlarged view of the chela shows the hairs at the

base of the hand exaggerated and the tooth of the fixed finger obscured. The ventral view of the male omits the posterior lateral extension of each sternum below the leg base.

Lenz (1901) does not offer a complete description but points out several errors in Filhol's work and adds his own description of the chela.

The only other description is that of Rathbun (1923) based on a single female taken from Flinder's Island, Bass Strait. Her description contains some anomalies which lead to suspicions concerning the identity of the specimen. In *P. novaezelandiae* the orbits do not "extend laterally beyond the eyes to a distance as long as the eyes", and the lower margin of the dactylus is not "conspicuously haired". In view of the close similarity of females of this group, this specimen needs to be re-examined.

It will be seen from the foregoing that there is need of a complete description of *P. novaezelandiae*. However, in view of the considerable variation in form during the life history, it is proposed to reserve such descriptions until a study of the life cycle, at present in progress, is completed.

ACKNOWLEDGMENTS

The writer wishes to express thanks to Dr D. Atkins for specimens of *P. pisum*, to Dr E. W. Bennett for access to an unpublished bibliography, and to the Dominion Museum and the Canterbury Museum for access to their collections.

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POSTSCRIPT

A single specimen from the Chatham Islands (see R. K. Dell, 1960, "The Crabs of the Chatham Islands 1954 Expedition". *N.Z.D.S.I.R. Bull.* 139/1) has recently been examined. This proved to be an immature female in the hard form, not a male as stated by Dell. In most respects it is very similar to *P. novaezelandiae*, but it differs in the possession of a ridge of hairs along the upper edge of the dactylus of the cheliped. However, in view of the variability of these crabs a large collection of all stages is needed before the possibility of a new species could be considered.