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1930

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FROM REC. CANT. MUS., VOL. III., PT. 4, PP. 263-279

18TH MARCH, 1930.

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Contributions for a Revision of the New
Zealand Crustacea of the Family Paguridae

New Records of the Genera Centrophorus
and Hoplichthys in New Zealand

By E. F. Thompson.

CHRISTCHURCH, N.Z.

PRINTED BY THE CHRISTCHURCH PRESS COMPANY LIMITED

1930

CARDED 1930

CONTRIBUTIONS FOR A REVISION OF THE NEW ZEALAND CRUSTACEA OF THE FAMILY PAGURIDAE

By E. F. THOMPSON.

It was considered by the late Dr. Chilton that the time was ripe for the production of an illustrated catalogue of the Decapod Crustacea of New Zealand. With this in view, he and E. W. Bennett had already begun the revision of the Brachyura (Chilton and Bennett, 1928), a work which the latter is still carrying on. In furtherance of the same object, I received from him his collection of the Group Anomura, which, together with the material already in the Museum, is probably the largest collection of this group ever assembled in New Zealand.

When work was begun on these specimens, it was expected that the material in the Wellington and Auckland Museums would be available in time for their examination to be incorporated in the same report, but unavoidable delay has necessitated the omission of this material from the present examination.

But a far more serious hindrance to work on this group is the doubtful identity of many of the species. This applies particularly to those described by Filhol (1885). Here the descriptions are far too short for accurate determinations ; and if the figures are correct, few of his species have been seen again. Miers' *Eupagurus spinulimanus* is not at all satisfactorily described, and an examination of Filhol's specimens and Miers' type is almost essential to further progress. The tendency for local workers to identify their specimens with the nearest approach among Filhol's species, however different they may be (assuming Filhol to be inaccurate in the points of difference), while the only method at present available, will only lead to further ambiguity and complexity ; for there is always the possibility that Filhol's figures may be correct, the species being rather local. An interesting case in point is that of *Eupagurus Campbelli* Filhol. This was recorded by Filhol nearly fifty years ago, and was not heard of again till Stephensen (p. 294) records specimens as *Eupagurus (Campbelli* Filhol ?) from the Auckland and Campbell Islands.

This difficulty was realised by the Hon. G. M. Thomson, the pioneer worker in this group in New Zealand, who took steps to obtain a set of named specimens from Filhol ; but this attempt unfortunately failed. When work is done in the manner of Henderson (1888), the absence of types from this country, while regrettable, is not so serious ; but the uncertainty and vagueness introduced by Filhol is anything but desirable.

The present paper, then, aims at recording the chief facts about the specimens of this family, at present in the Canterbury Museum.

I have omitted all reference to forms from the Kermadec Islands, except where the same species is recorded from the truly New Zealand area. This I have done, partly as it was the original intention of Dr. Chilton, partly because I agree that these forms are of Australian rather than New Zealand affinities.

Throughout a reference is given to Alcock (1905), where references up to 1905 will be found, and, except for the original description, I have noted only those subsequent to this date, or where the synonymy required it.

Family PAGURIDAE.

Sub-family PAGURINAE.

PAGURISTES Dana, 1851.

Paguristes subpilosus Henderson.

Paguristes subpilosus Henderson, Chall. Rep. Anomura, 1888, p. 77, pl. VIII., fig. 2.

Alcock, Cat. Indian Decap. Crust., part II., 1905, p. 156.

Borradaile, Brit. Antarctic Exp., vol. III., pt. 1, 1916, p. 95.

Paguristes barbatus (Heller) Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 300.

Two specimens collected on the "Nora Niven" Expedition, fifty miles east of Stewart Island, between 65 and 183 fathoms, in a *Voluta* shell, on sandy bottom. These agree well with Henderson's description. They are certainly closer to Henderson's *P. subpilosus* than to Heller's *P. (Clibanarus) barbatus*. As Henderson points out, there is a similarity between these species, but my specimens agree with Henderson's description in nearly all the points in which they disagree with Heller's. On the whole, I feel it is safer, until the types are compared, especially in view of the opinion expressed by Borradaile, to agree with Henderson in considering the species distinct, a step which involves, temporarily at least, the rejection of Chilton's determination as "*Paguristes barbatus* (Heller)."

ANICULUS Dana, 1852.

The recognition of this genus from New Zealand waters has had a chequered career. It was first recorded by Heller as being found at Auckland during the "Novara" Expedition, but as no subsequent records had been obtained, Hutton (1882) suggested that it should be struck off the list of New Zealand forms, as being a large, warm sea type. Chilton (1911) examined the larger of the two specimens here described, noted how it differed from *Aniculus aniculus*, but stating "differences are perhaps due to age," determined it as the above species. I have now in my possession another specimen of size intermediate between the large form and a specimen from Polynesia (which agrees well with Alcock's description of *A. aniculus*), and notice no diminution in the points of distinction.

In fact, I consider the present specimens to be very distinct from the specimen from Polynesia and from Alcock's description and figure. As I can find no species of this genus to agree with my specimens, I describe it as a new species.

Strangely enough, one of the two specimens (they agree perfectly) is from Cape Maria van Dieman in the extreme north, while the other is from Cook Strait, well south.

The species Heller described from these waters seems to be *Aniculus aniculus*, so the accuracy of his locality must again sink into the realm of doubt from which Chilton raised it; but the fact that the genus occurs in New Zealand as far south as Stewart Island, and that such a large form could remain unrecorded so long, removes at least part of Hutton's objection to its recognition as a member of our fauna.

Aniculus chiltoni n. sp. Plate XLI., figs. a-e.

Carapace with front hardly produced at all in the middle, not acute but widely rounded. Lateral lobes better marked, rounded, bearing a small terminal spine. Anterior lateral edge of the carapace spiny with a few long hairs. Pattern of the carapace, a double arch in front and a stalked U behind. Branchial region practically uncalcified.

Ocular peduncles, with scales well developed, produced on inner margin into a lobe, which bears five spines on the left scale and four spines on the right scale (in the smaller specimen the arrangement is very slightly different), spines with horny brown tips. Peduncle about .8 of width of carapace at base of antennae, rather stout.

Antennules with peduncles exceeding ocular peduncles by a good half of the terminal segment.

Antennae with second segment produced on the inner border into a strong tooth, and on outer border into a spine, not greatly longer than the inner tooth or than the ocular scale. Acicle stout, nearly straight, not quite reaching to the end of the ocular peduncle; outer margin smooth, inner margin with three spines low down; upper margin with one strong, and, higher up, two small spines; whole ending in a couple of spines. (The apparent difference in the illustration between the two sides is due to the fact that the acicle on the right side is turned slightly). Penultimate segment of antennae very short, ultimate segment reaching well beyond ocular peduncle. Flagellum stout, reaching half-way along the dactylus of the left chelipede.

Chelipedes unequal, left slightly the larger. Right with merus triangular in cross section, the outer and inner faces meeting above in a sharp ridge, notched with seven or eight hairy notches, and terminating anteriorly in a strong spine. Inner face smooth, produced on lower margin into three strong spines (this row being

continued down into the previous joint, where there are four more spines), and anteriorly a small spine. (In the smaller specimen there are a couple of small spines between these two groups). The outer face is fairly smooth, with a few hairy bands across it; lower margin forming a rounded ridge with the lower surface. Lower surface fairly flat, with a few hairy tubercles, and only a shallow excavation for the flexure of the carpus. Carpus with outer face rounded, meeting the inner face in a series of five strong spines. Below this row are a few small spines, and then another row of five or so spines. Odd spines are scattered over the surface, and a few ridges, some bearing small spines, and decked with short hairs, are scattered between the spines and over the face. Inner face smooth, flat, but rounding into the lower surface below. Anterior lower margin of this face, along articulation with the propus, with five small spines. Lower surface fairly smooth, produced distally into a ridge which runs across the articulation with the propus. Hand twice as long as broad; fingers about half the length of the hand. Propus with outer margin rounded, bearing on its upper inner margin two rows of spines, the inner marginal one containing about eight, and the outer one about six. Below these is another row of about eight small spines, and smaller spines are scattered all over the surface. Across the face and running between the spiny tubercles are hair-bedecked ridges (characteristic of the genus), but these end very soon on entering on the inner face (which is, for the most part, smooth). Fixed finger with a few, and dactylus with many spines, those on the dactylus being stronger and usually arranged in pairs. Both fingers have their surfaces lined with hair-fringed ridges, but these are much more irregular on the dactylus and the hairs are much longer; in neither case do the ridges go over on to the inner side to any extent. Both fingers have on their opposed margins a series of molarlike teeth, both bear bundles of stiff red hair, and both end anteriorly in a large, inturned, black nail. The inner face of the hand is rounded, with a few hairy tubercles, especially on the fingers.

All the spines on the upper surfaces of the carpus and hand, and many others, have horny brown tips.

The left chelipede is identical with the right, except in the following details:—The inner lower border of the merus has a couple of small spines anterior to the three large ones mentioned for the right; the hand is half as large again as the right and more than half as broad as long, while the hairy rows go slightly further on to the inner face.

The ambulatory limbs gave the following measurements (in mm.):—

	Merus.	Carpus.	Propus.	Dactylus.	Claw.
1st ..	30	20	33	45	3
2nd ..	27	24	33	50	3

1st.—Ambulatory limb with merus laterally compressed, lower ridge with about seven long and several short spines (without brown tips), carpus triangular in section, only upper face showing hairy cross ridges. Upper marginal ridge with five or six brown-tipped spines. Propus with outer face round, inner face flat, smooth. Outer upper face with hairy ridges and few spines. Dactylus with upper surface bearing a ridge of closely set tubercles, each provided with a horny spine, a hairy row running along this ridge and both ending outside the claw. Upper outer surface with semi-circular hairy cross ridges, inner surface with bundles of red hair.

2nd.—Ambulatory limb as for 1st, except that merus is rounder on the outer margin, with only two or three small tubercles on the lower margin; upper ridge of carpus with nine tubercles; propus with more spines on the upper ridge, and a row of about ten small spines, each spine between a couple of hairy cross ridges, on the lower margin; dactylus bordered with a series of spines below.

Abdomen with four appendages on the left side, each consisting of a well formed hairy outer lobe and a vestigial inner one. Corresponding points on right side, marked by clumps of hair; a distinct tergite joins each of these pairs. Tail fan far better developed on the left side than on the right.

Type: A male from 65-183 faths., 50 miles east of Wreck Reef; bottom, soft sand. Other specimen, with carapace less than 40mm. long, from 10 miles N.W. from Cape Maria van Dieman—53 faths.

Of the five species of *Aniculus* already described, this species can be distinguished from *A. strigatus*, as the greatest width of the carapace is far short of the greatest length; from *A. tenebrarum* it differs in that the ocular peduncle does not exceed the front of the carapace in length, while from *A. aniculus* it differs noticeably in the shape of the front, the antennular peduncle exceeding the ocular peduncle noticeably, the shape of the antennal acicle, the relative lengths of the propus and dactylus of the ambulatory limbs, the shape of the merus of the chelipedes, and the whole chelipedes being more spiny and with fewer hairy ridges. The original description of *A. longitarsus* is too incomplete for thorough comparison, but if, as may be inferred from the description, it agrees with *A. typus* (= *A. aniculus*) in all features except the relative length of the dactylus and the carapace pattern, it would still differ from my species in all the other points mentioned. I have not seen the description of *A. elegans*.

In the museum is a large, much damaged specimen labelled "*Aniculus aniculus* Fabr. Loc. Mauritius," which agrees, as far as its broken condition will allow of comparison, with my specimens.

STRATIOTES Thomson, 1899.

Stratiotes setosus Thomson.

Stratiotes setosus Thomson. *Trans. N.Z. Inst.*, vol. XXXI., 1899, p. 185. Alcock, *Cat. Indian Decap. Crust.*, part II., 1905, p. 167.

*Typus in
Cathartes
mus.*

Filhol (p. 490) very briefly describes a species as *Pagurus setosus*, from specimens from Cook Strait, and already so named in the museum. Thomson (p. 185) established a new genus for specimens which he considered to be the same as Filhol's species, but this identification must be regarded as extremely doubtful, till Filhol's specimens are seen, for that author has given the barest of descriptions and his figures differ radically from those of Thomson. Thomson's figures, especially the shape of the left chelipede, differ considerably from my specimens, and this fact is the more noteworthy in that throughout 120 specimens in my possession little variation was observed. I have little hesitation, however, in placing these species here on account of the many points of agreement with Thomson's description. They thus become *Stratiotes setosus* Thomson. If the synonymy suggested by Thomson prove correct, they become *S. setosus* (Filhol). Alcock (p. 167) states, in regard to *Stratiotes*: "The position, and indeed the validity, of this genus are doubtful; it may, perhaps, be identical with *Troglopagurus*. The species upon which it is founded is said by the author to be identical with the species determined by Filhol as *Paguristes* (1) *setosus*."

I cannot agree with Alcock's suggestion that *Setosus* may be synonymous with *Troglopagurus*. If, as I think, my specimens are identical with those of Thomson, then that genus is immediately separated from *Troglopagurus*, by the presence of paired abdominal appendages, one pair on the first abdominal segment of the female, two pairs on the first two segments of the male. I am inclined to place it near to *Paguristes*.

(1) Both Filhol's and Thomson's references name this species *Pagurus*, not *Paguristes*.

Sub-family EUPAGURINAE

EUPAGURUS Brandt, 1851.

Eupagurus novi-zealandiae (Dana).

Bernhardus novi-zealandiae Dana, U.S. Expl. Exp. Crust., pt. I, 1852, p. 440, pl. XXVII, fig. 27.

Eupagurus novi-zealandiae, Stimpson, *Proc. Acad. Philad.* (1858), 1859, p. 251.

Alcock, *Cat. Indian Decap. Crust.*, part II., 1905, p. 176.

Many specimens in the collection, from all round the shores of New Zealand, are referable to this species. The species is remarkably constant, particularly the arrangement of the tubercles on the right hand, variations from the usual pattern being rare and slight. The shape of the front, as drawn by Dana, differs considerably from that of my specimens, but the hands are so characteristic that I have no doubt that the specimens belong to that species.

This species is the commonest pagurid on our coasts, occurring commonly in rock pools about low water.

Eupagurus traversi Filhol.

Eupagurus traversi Filhol, Miss. File Campbell, 1885, p. 422, pl. I., fig. 4.

Alcock, Cat. Indian Decap. Crust., part II., 1905, p. 176.

Several specimen from the tidal zone all round the coast agree fairly well with Filhol's figures and description, and also with Thomson's (p. 179), though the shape of the carpus is rather different, and the relative length of the fore part of the carapace is much greater than illustrated by Thomson. I am inclined, however, to consider my specimens as belonging to the above species. My specimens show little variation, and that chiefly in the degree of hairiness.

Eupagurus stewarti Filhol.

Eupagurus stewarti Filhol, *Bull. Soc. Philom.* (7) VIII., 1883, p. 67.

Alcock, Cat. Indian Decap. Crust., part II., 1905, p. 176.

Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 298.

Several specimens of this species were taken in the "Nora Niven" Cruise. The localities recorded for the specimens collectively were: 10 miles north-east of Port Adventure, 37-41 faths.; 50 miles east of Wreck Bay, 65-183 faths.; Molyneux Bay, 6 miles west of Nuggets, 20-46 faths.; Parangahau Bay, 9 faths.

As will be seen, the first three localities are near the entrance to Foveaux Strait, while one locality is up towards Cape Kidnappers. As on re-examination I found some of the specimens to be *E. cookii*, it is to be regretted that the various samples were not kept separate, for it is now uncertain whether the wrongly identified specimens came from the northern locality or not, so that the fact as to whether the species exists far north of Foveaux Strait is uncertain. As Chilton points out, many of the specimens were found in masses of polyzoan—but in some cases the crab holes lead into small *Turritella* shells in the middle of the mass.

These specimens are certainly distinct from *E. cookii*, but it should be noted that identification of this species with Filhol's species is by no means satisfactory.

Eupagurus kirkii Filhol (not of Miers).

Eupagurus kirkii Filhol, *Bull. Soc. Philom.* (7) VIII., 1883, p. 416, pl. II., fig. 5 (Not *kirkii* Miers, 1884).

Alcock, Cat. Indian Decap. Crust., part II., 1905, p. 176.

Borradaile, Brit. Antarctic Exp., vol. 3, pt. I., 1916, p. 95.

A few small specimens, perhaps referable to this species, are present in the collection.

Eupagurus hectori Filhol.

Eupagurus hectori Filhol, *Bull. Soc. Philom.* (7) VIII., 1883, p. 69.

Alcock, Cat. Indian Decap. Crust., pt. II., 1905, p. 176.

Chilton, *Trans. N.Z. Inst.*, vol. 43, 1911, p. 553.

In the collection there are a number of small specimens from the Kermadec Islands. These agree fairly well with Filhol's description; in fact, this is one of the few cases where my specimens agree with Filhol's description and figure.

From Thomson's, Filhol's, Chilton's and Leaz's records it seems that this species is pretty well spread over the outlying part of the coast of the South Island, as well as the Kermadecs.

Eupagurus thompsoni Filhol.

Eupagurus thompsoni Filhol, Miss. de l'Île Campbell, 1885, p. 423, pl. LI., fig. 6.

Alcock, Cat. Indian Decap. Crust., pt. II., 1905, p. 176.

Eupagurus thompsoni Filhol, Thomson, *Trans. N.Z. Inst.*, vol. XXXI., 1899, p. 183.

Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 298.

I have provisionally referred to this species, a large and rather varied collection of specimens, some of which were formerly identified as such by Chilton. Filhol's original description is insufficient to determine the species with accuracy; but I do not think it safe to assume that his illustration is correct. If his illustration is correct, then these specimens are certainly distinct, the curve in the fingers, arrangement of ridges, shape and nature of carpus, and what can be made out of the front, being different. In fact, in these particulars my specimens are really closer to *E. crenatus* (Borradaile, p. 96), from which they differ in the relative length of the ocular peduncle, the front of the carapace, and the antennular peduncle, as well as in the absence of abdominal plates.

As I have noted above, these specimens are rather variable, particularly in the nature of the upper face of the large hand. This varies from a series of very strong rows, arranged as in *E. crenatus*, but much more prominent, and with the interspaces smooth and concave, to a hand with the ridges but slightly suggested, the interspaces being entirely granular and scarcely concave. The extremes are remarkably different, and, as this is correlated, with a difference in colouring and equal changes in the left hand. I would have given the forms at least subspecific distinctness if it had not been for a series of intermediates.

Eupagurus cookii Filhol.

Eupagurus cookii Filhol, *Bull. Soc. Philom.* (7) VIII., 1883, p. 67.

Alcock, Cat. Indian Decap. Crust., pt. II., 1905, p. 176.

Under this species I have provisionally placed a number of specimens which seem to fall into two distinct groups. One group agrees with *E. cookii* as described by Thomson (p. 176), while the other form agrees far better with Filhol's description and figure. They differ chiefly in the shape and nature of the large hand, the

former type having the large hand semicircular, with a complete elevated and very spinous ridge on the margin, the upper surface being flagged with flat-topped tubercles; the other form has a truncated oval hand, the marginal ridge being far less prominent, little upturned, the upper surface being covered with small spines and the concave areas being much less extensive and definite. A somewhat similar distinction seems to exist between the small hands, and this difference seems to be correlated with a difference in the carpus of the right chelipede, and a difference in the ratio of the length of ocular peduncle to breadth of carapace. As I have as yet no true intermediates, I consider that the two forms will prove specifically distinct, the form described by Thomson being a new species.

Eupagurus intermedius Lenz.

Eupagurus intermedius Lenz, *Zool. Jahrb., Syst.*, XIV., 1901, p. 446, pl. XXXII., fig. 8-10.

Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 297.

Eupagurus norae Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 229. Borradaile, *Brit. Antarctic Exp.*, vol. III., pt. I., 1916, p. 95.

To this species I refer several specimens formerly identified by Chilton as *E. edwardsi* Filhol. The name *E. edwardi* was, however, already occupied by *E. edwardsii* Dana, so Chilton proposed for it the name *E. norae*, and this was accepted by Borradaile. At the same time Chilton declared *E. intermedius* as a synonym of *E. rubricatus* Henderson.

On examining Chilton's specimens, it becomes obvious that *E. intermedius* was not synonymous with *E. rubricatus*, and that the description and figures of *E. intermedius* agreed far better with Chilton's specimens of *E. norae* than did the descriptions and figures of Filhol, from which they differed noticeably. They also disagree in some of the same particulars with Thomson's description and figures, particularly as regards the definiteness of the tubercular rows on the hands.

Till I have been able to have specimens compared with Filhol's types, I prefer to regard Filhol's species as possibly distinct, but in that case the name "*norae*" would be inapplicable, as it was really applied to the species *E. intermedius*. In the somewhat doubtful possibility of its proving distinct, I propose for it the name *Eupagurus chiltoni*.

The younger specimens, as Lenz pointed out, have most of the tubercles of the hand hidden. In such examples there are two obvious ridges on the right hand, not unlike the illustration of *E. spinulimanus* Miers (Miers, p. 63), and the description, as far as it goes, agrees well with these specimens. I would have suggested it as a possible synonym, but that I had seen specimens of "*E. norae*"

(loaned by the Dominion Museum) determined as such by Borradaile, who would doubtless have had access to Miers' type specimen, which is in the British Museum. As this species has not been recorded since Miers' description, a more complete examination and illustration of the type is desirable.

Eupagurus rubricatus Henderson.

Eupagurus rubricatus Henderson, Challenger Anomura, 1888, p. 69, pl. VII., fig. 4.

Alcock, Cat. Indian Decap. Crust., pt. II., 1905, p. 176.

Chilton, *Rec. Cant. Mus.*, vol. I., No. 3, 1911, p. 297.

Several specimens from various localities up and down the East Coast of both islands, have been referred by Chilton to this species. Many of these have a large hand, quite pear-shaped and unlike the rounded form drawn by Henderson, while all my specimens have the hand much more tubucalated than he shows; but the shape of the hand appears to be a growth stage, as I have intermediate stages and it is always in the large individuals (fully twice as large as Henderson's specimens) that the peculiar pear shape is most obvious. Otherwise the specimens and description agree well.

Eupagurus intermedius, which Chilton states "is, I think, undoubtedly the same as this species," must be removed from the synonymy of this species.

PORCELLANOPAGURUS Filhol, 1884.

Porcellanopagurus (edwardsi Filhol ?)

Porcellanopagurus edwardsi Filhol, *Bull. Soc. Philom.* (7) IX., 1884-85, p. 48.

Alcock, Cat. Indian Decap. Crust., pt. II., 1905, p. 191.

Chilton, *Subant. Is. N.Z.*, XXVI, 1909, p. 610.

Stephensen, *Papers from Dr. Th. Mortensen's Pacific Exp.*, XL., 1914-16, p. 294.

A single specimen of the genus *Porcellanopagurus*, dredged in 60 fathoms by Capt. Bollons, at the Snares, is in the collection. Chilton originally identified this specimen as *P. edwardsi* (Chilton, 1909, p. 610). Here he gives a short description and states: "The one I have is a male, and agrees in general with Filhol's description." It seems to me, however, that the facts that it belongs to this genus and came from a fairly close locality, are the only points in favour of the identification. Certainly Filhol's figures differ decidedly from this specimen. In a record of a specimen determined as "*Porcellanopagurus (edwardsi* Filhol ?)" Stephensen (p. 294) states: "The right chela is extremely heavy, exactly as drawn by Chilton," while Borradaile (p. 97) quotes Chilton's description of this specimen and notes the differences between it and the "*Terra*

Nova” specimen, as though Chilton’s one was certainly *P. edwardsi*. But, as Chilton gave me to understand, in his identification of this specimen, he had nothing more than Filhol’s “Miss. de l’Ile Campbell” to go by, and so while this may very possibly be Filhol’s species, I consider that, until this specimen has been compared with Filhol’s, the assumption that it is Filhol’s species is based more on probability than on that author’s account.

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EXPLANATION OF FIGURES.

PLATE XLI.—*Aniculus chiltoni* n. sp.

- Fig. a.—Ocular scales (x 5).
 Fig. b.—Inner face of merus of right chelipede (x 1).
 Fig. c.—Outer surface of right chelipede (x 1).
 Fig. d.—Left antennal acicle (x 3).
 Fig. e.—Front of carapace (x 1).

