

# THE ANNALS

AND

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XLI.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—Series II., No. 1. *On the Results of Deep-sea Dredging during the Season 1890-91.* By J. WOOD-MASON, Superintendent of the Indian Museum, and Professor of Comparative Anatomy in the Medical College of Bengal, and A. ALCOCK, M.B., Surgeon I.M.S., Surgeon-Naturalist to the Survey.

[Continued from vol. viii. p. 362.]

[Plates XIV. & XV.]

Family *Psolidopodidæ*, fam. nov.

Olfactory flagellum of antennules simple. Mandible deeply divided into molar and incisive processes and furnished with a 2-jointed palp. The exopodite of the first maxillipede is a broad and abruptly incurved falciform plate which does not terminate in a flagellum, and is not expanded at the outer margin into a process. The exopodites of the second and third maxillipedes are undivided, porrect, and membranous flagella. The thoracic appendages from the second to the eighth inclusively have the third (ischiopodite) and fourth (meropodite) joints fused, and are hence all 6-jointed with

the exception of the third pair, in which the sixth and seventh joints are in addition fused, and there are hence only five distinct joints; those of the fourth pair are formed as in the Crangonidæ, but, instead of terminating in a subchela, end in two equal and movable blades forming a scissors-like organ; those of the fifth pair, which are the shortest and weakest of the limbs, bear a probably expansile pencil of setæ at the distal end of the propodite, which is the functional last joint of the limb, the dactylopodite being reduced to a minute rudiment; the sixth, seventh, and eighth pairs form a backwardly increasing series of walking legs; the five last pairs are devoid of all traces of epipodites and exopodites.

The thorax is firmly articulated to the abdomen by a strong hinge.

In addition to the functional gills, which are five pleurobranchiæ attached to the posterior thoracic somites from the tenth to the fourteenth inclusively, there is present, on the arthro-dial membranes of the thoracic appendages from the ninth to the thirteenth inclusively, a series of five small conical papillæ, which correspond both in number and in position to the arthrobranchiæ of the Glyphocrangonidæ, and are, there is little doubt, to be interpreted as vestiges of gills of the same category.

The body is exceedingly spiny and terminates in front in a powerful recurved rostrum, which is toothed on all its four margins.

#### PSALIDOPUS, gen. nov.

Body moderately compressed, in shape somewhat like *Pulemon*. Integument firmly chitinized though thin, covered throughout dorsally, from the apex of the rostrum to the end of the sixth abdominal somite, with long symmetrically arranged needle-shaped spines, and between the spines with microscopically small setæ, which are evenly and regularly distributed, and give to the surface a minutely granulated appearance up to the base of the caudal swimmeret, upon which they become developed into a furry pubescence.

The carapace is produced in front into a long ascendant curved rostrum fully twice its own length measured from the frontal to the posterior margin in a straight line; its anterior margin is armed on both sides with four spines, which may be termed the antennular, antennal, branchiostegal, and subbranchiostegal spines respectively, and with a stout blunt subtriangular deflexed process, against the inner margin of which the rudimentary eye-peduncles are firmly retracted;

a distinct marginal raised rim extends from the subbranchiostegal spines backwards on each side, increasing towards the posterior margin, being especially well-marked posterolaterally, where it rises into a strong and bold ridge, forming at each end of the carapace the posterior boundary of a deep groove; the ridge with the groove concentric therewith constituting the thoracic element of a strong thoracico-abdominal hinge.

The branchiostegites are abruptly inflected, and their free margins, which are closely applied to the bases of the legs, are widely but obtusely angulated inwards opposite to the interval between the first and second pairs of legs anteriorly, while posteriorly they give off a triangular process which abuts against the posterolateral face of the eighth thoracic sternum, and thus serves not only to keep the two elements of the thoracico-abdominal hinge in constant relation of apposition with one another, but also to divide that which answers to the afferent branchial cleft in *Astacus* into two parts, an inferior and a superior: in the former of these the free margin of the carapace is in such close contact with the leg-bases as to leave no passage for water to enter; the latter, on the contrary, is a wide and rigidly-patent oval aperture placing the branchial chamber of its own side in direct communication with the subabdominal cavity, and forms the exclusive inlet for the water required for respiration: whence it follows that all the water which enters the branchial chambers must do so by way of the subabdominal cavity, and that during life a constant circulation must be maintained in this cavity; in the female, in which the special afferent branchial apertures are larger than in the male and the subabdominal cavity forms a spacious brood-pouch, the constant circulation of water in the latter must secure a more perfect aeration of the eggs than would otherwise occur; there is no doubt, in fact, that we have here to do with a mechanism for securing the due aeration of the eggs similar to that which exists in *Encephaloides Armstrongi* and other deep-water *Brachynra* (Ann. & Mag. Nat. Hist. (6), vii. pp. 259, 266, et 267), wherein the branchial cavities communicate with the brood-cavity by means of canals in the hinder angles of the cephalo-thorax and, the ordinary direct channels being closed, water for respiration is derived from the brood-cavity.

The rostrum is compressed, and presents four longitudinal spiny ridges—one dorsal, two lateral, and one ventral; the spines of these are all sharp, slender, forwardly curved and inclined, and decrease in length from the base towards the obsoletely bifid apex of the rostrum. The dorsal ridge is

continued to the posterior margin of the carapace; its spines are larger, more compressed, and less inclined, though more curved, than those of the rostrum, and subequal, with one or two shorter and slenderer ones intercalated between them here and there. In addition to the dorsal ridge the carapace bears on each side four other longitudinal rows of spines: the first of these runs quite close and subparallel to the dorsal ridge from one end of the carapace to the other; the second commences with the antennular spine, curves slightly downwards and then slightly upwards to the cervical suture, whence it takes a straight course to the hinder margin, running parallel to the dorsal ridge; the third consists of the antennal spine and of two spines on the posterior half of the cephalic portion of the carapace; the fourth, of five or six spines commencing with the branchiostegal spine, and runs along the middle of the prominent efferent branchial canal, and like the second has its spines connected by a ridge.

The surface of the part of the branchiostegite coinciding with the subjacent branchial chamber is raised into a longitudinally oval convex-topped elevation, which is fringed at the edges with strong spines and bears an irregular row of five or six along its middle. Between the branchial elevation and the almost horizontally inflected portion of the carapace are some smaller spines roughly in the same straight line with those on the efferent branchial canal.

The abdomen is armed along the middorsal line with a spiniferous ridge similar to that of the cephalothorax and extending almost without interruption from the base to the apex, being absent only in the basal half of the fifth tergum, on the sides of its terga and pleura with symmetrically arranged spines similar in form to those of the dorsal ridge, and on the edges of each of its pleura with several exceedingly long and slender needle-like spines, besides smaller ones; the number, form, arrangement, size, and direction of these spines, which vary within small limits in all of the above respects from specimen to specimen, will be best understood by reference to the accompanying figures. The first abdominal somite is produced in front on each side at the junction of the tergum with the pleuron into a short, stout, bifid, and incurved process, which forms the abdominal element of the thoracico-abdominal hinge, and is received into the groove in the hinder margin of the side of the carapace already described. The pleura of the second abdominal somite are much more expanded in the female than in the male. The telson is elongate-triangular or obclavate in outline, its margin being at first rounded and then tapering in

straight or very slightly concave lines to the triangular apex; its dorsal surface, which is covered with a furry coating of minute appressed spinules, is transversely convex and traversed longitudinally by a deep groove, while its ventral surface is deeply excavated gutter-like and glabrous.

The eye-peduncles are very small and immovably retracted outwards against the extraorbital angle, being ankylosed at base to the ophthalmic sternum; a distinct constriction limits off a wider and almost spherical apical or corneal portion from a narrower basal portion; the latter bears on its inner and inferior side, near the base, a minute papilla; the corneal portion is smooth and polished, and does not exhibit the slightest trace either of superficial faceting or of subjacent pigmentation; the eyes appear, in fact, to be in exactly the same degenerate condition as those of *Nephropsis Stewarti*, and it is certain can be capable at most of appreciating differences in the intensity of the light.

The peduncle of the antennules is subcylindrical; its first joint is about equal to the two remaining joints taken together, crested on the infero-internal margin, the crest running into an acicular spine some distance from the apex, and produced at its outer base into an oval digitate scale-like process; the second and third joints subequal, the latter armed with an acicular spine about the middle of its extero-superior face; flagella equal in length, the outer the thicker (much the thicker in ♂), and bearing olfactory filaments to within a short distance of its extremity.

The second joint of the antenna is armed with three spines on the outer apex; the scale is a narrow, firmly chitinized, oblong plate, with an acute triangular somewhat inturned point; it is strengthened and stiffened not only by its greatly thickened outer margin, which terminates some distance from the apex of the part in a prominent spine, but also by a stout midrib and a slight thickening of the apical and inner margins. The flagellum is very long.

The mandible is very distinctly divided into molar and incisive processes by a deep and almost rectangular notch, in which the palp is lodged. The incisive process is a thin, excessively sharp, and slightly recurved knife-like plate. The stout molar process may be described either as an irregular four-sided prism with one angle broadly rounded off or as an irregular three-sided prism with one side convex; its trapezoidal or subtriangular masticatory surface is concave with sharp edges. The palp is robust, two-jointed; the apex, with the greater part of the inwardly directed outer edge of its oval terminal joint, is beset with stiff setæ.

The coxopodite of the first maxillæ is much shorter and wider than the basipodite; the endopodite is a short, simple, and undivided finger-shaped joint with a few setæ on its outer apex, and the exopodite appears to be represented by a firmly chitinized round conchoidal plate, the convex face of which is turned downwards and backwards.

The coxopodite of the second maxillæ is but little shorter but much narrower than the basipodite, not extending nearly so far towards the middle line; the basipodite is subdivided; the endopodite differs from that of the first maxillæ only in being somewhat larger; the anterior lobe of the scaphognathite is much broader than the posterior lobe, in which the apical fringe is developed into excessively long and fine setæ.

In the first maxillipedes the coxopoditic plate is rudimentary and furnished with limp hairs, the functional jaw being entirely formed by the basipodite; the endopodite is a narrow slightly curved and knife-like pointed plate, the exopodite is a broad and abruptly incurved falciform plate, and the epipodite is two-leaved.

The second maxillipedes have only five distinct joints, the third and fourth joints of the typical malacostracous limb being indistinguishably fused together; the first joint bears a triangular epipodite, the second a long, tapering, undivided and membranous exopodite, the third is about as long as the second, but only about half its thickness, the fourth is short, about half as long as the third, the fifth is broadly subtriangular and does not enter into the formation of the functional jaw, which is wholly formed by the very short and broad wedge-shaped sixth joint.

The external maxillipedes present only five distinct joints, the sixth and seventh, as well as the third and fourth, joints being indistinguishably fused together. The first and second, which are ankylosed together, are short, stout, and subequal: the first bears a small oval and subpedunculated hard process, probably representing an epipodite; the second, a flagellar exopodite, similar to that of the second maxillipedes; the third joint, forming the functional jaw, is an obclavate compressed sclerite, and is strongly curved to the configuration of the underlying appendages; its inner margin bears no fringe of setæ; the fourth and fifth joints are slender, cylindrical, and fringed with narrow, transverse, scale-like rows of setæ on the inner edge; the fourth is a little shorter than the third and exactly half of the fifth, which latter is almost straight, and tapers beyond the middle of its length very slightly and gradually to a bluntish point bearing a few stiff setæ.

The legs of the first pair are built upon the same plan as

those of the Crangonidæ, which they closely resemble, and from which they chiefly differ in their scissors-like extremity. They present but six distinct true joints, one of the blades of the terminal scissors having to be interpreted as a movably articulated prolongation of the propodite, and the third and fourth joints being all but indistinguishably fused together. The first two joints are short. The third joint, which is strongly curved like the corresponding joint of the external maxillipede, increases slightly in thickness from the base to the apex, where its upper margin is prolonged into a sharp needle-like spine preceded by a few spinules. The fourth joint, short and obconic, also bears a similar spine in corresponding position. The fifth joint, or propodite, is oblong and somewhat compressed, it bears at the distal end two equal and movably articulated toothed knife-like blades—one answering to the fixed prolongation of the propodite, the other to the dactylopodite of the typical crustacean chela,—which are evidently capable of playing upon one another like the blades of a pair of scissors or shears.

The legs of the second pair are also only six jointed, the third and fourth joints being all but indistinguishably fused together. They differ remarkably in form from the preceding. The first two joints are as in the legs of the first pair. The third joint is a cylindrical rod armed with a few minute spinules on the upper margin, which terminates in a sharp spine. The fourth joint is also cylindrical, but shorter and much thinner than the preceding, and unarmed. The fifth joint, likewise cylindrical, is about half as long as the preceding and tapers slightly to its apex, where it bears a compactly coned pencil of possibly expansile setæ. The sixth joint is a minute, transversely elongated, nodular rudiment, lodged in a notch of the upper and outer margin of the distal end of the propodite.

The three remaining pairs of legs are quite different from their predecessors, and are substantially alike, differing from one another only in length and in the degree to which the fusion of their third and fourth joints has been carried. They are typical ambulatory limbs. The second only slightly exceeds the first, while the last, owing mainly to the great elongation of its propodite, greatly exceeds the second in length. They are roughly cylindrical and are armed below and on the contiguous parts of their sides throughout with sharp spinules, which in the fourth joint or meropodite assume an arrangement in two rows on the ventral edges of the joint, while the apices of the meropodite and of the obconic carpopodite each bear one median dorsal and at least one

lateral outstanding spine larger than the rest. In the last of these legs the third joint is fixedly united to the fourth, the division between the two perfectly retaining its primitive distinctness; in the second the union is more perfect, but the division may be readily made out on the inner side; while in the first the union is more perfect still, and the primitive distinctness of the parts is scarcely traceable; so that the fusion of the two joints in question becomes more and more perfect as we pass from behind forwards until at last it is no longer possible to distinguish them. The compound joint is curved, like its predecessors in the series, to fit the convex ventral surface of the thorax. Their terminal joint forms a stoutish curved and acuminately-pointed claw. There is no trace either of epipodites or of exopodites on any of the legs.

The protopodites of the abdominal appendages are long, being more than half the length of the rami in the first pair, and less than half their length in the succeeding pairs. The apical half more or less of their carinated outer margin is armed with small spines, which increase in length towards the apex, near to which there is usually a single spine that is much larger than the rest. Near their base on the posterior face a transverse suture divides them into a long distal and a short and incomplete proximal joint. Their rami are all long-lanceolate and undivided membranous plates, with the exception of the inner ramus of the first pair; this is in both sexes only about one third the length of the outer and is pyriform or obclavate in outline; flat and flexible and fringed with setæ on both edges in the female, it appears convex and stiff and glabrous and somewhat subulate or acuminate in the male, owing to the apical half more or less of its edges being folded up into a sort of tube, and owing to the fringe of its outer margin being reduced to short and simple setæ; the outer ramus of the first pair is in both sexes narrower than either of the rami of the succeeding pairs. In the appendages of the second to the fifth pairs inclusively the inner ramus is shorter and narrower than the outer, and is furnished near its base on the inner side with a short cylindrical *appendix interna*, provided at its apex with minute hooks for attachment to its fellow of the opposite side. In the second pair in the male there arises from the inner ramus, in front of and slightly internal to the *appendix interna*, a tapering finger-shaped *appendix masculina*, and the second joint of the protopodite is subdivided by a false joint into two approximately equal parts.

The rami of the sixth pair of abdominal appendages are firmly chitinized, rigid, oval plates, the outer almost twice the

width of the inner; the former is strengthened by a stout midrib and by a thickening of the outer margin, which terminates a good way from the apex in a prominent spine of the same size and character as that of the antennal scale; an inflexible diæresis extends inwards from the base of this spine up to the midrib. The inner ramus is strengthened by a similar midrib, from near the base of which a ridge extends obliquely inwards and backwards to the inner margin.

The legs of the first to the third pairs of opposite sides touch one another in the middle line, and their sterna are hence invisible without dissection; those of the last two pairs, on the contrary, are wider apart and their sterna are plainly visible and have the form of an inverted T, the cross stroke of which is, in the hinder and larger of the two, produced forwards, between the bases of the legs of the last pair and over its own down-stroke, as an acute angular ( $\delta$ ) or semicircular ( $\varphi$ ) plate, beneath the sides of which the genital apertures can in the male be concealed.

The branchial formula is as follows:—

Somites and their appendages.	Podo-branchiæ.	Arthro-branchiæ.	Pleuro-branchiæ.
VII.....	0(ep.)	0	0 = 0 + ep.
VIII.....	0(ep.)	0	0 = 0 + ep.
IX.....	0(ep.r.)	r.	0 = 0 + r. + ep.r.
X.....	0	r.	1 = 1 + r.
XI.....	0	r.	1 = 1 + r.
XII.....	0	r.	1 = 1 + r.
XIII.....	0	r.	1 = 1 + r.
XIV.....	0	0	1 = 1
	2ep. + ep.r.	+ 5r.	+ 5 = 5 + 5r. + 2ep. + ep.r.

35. [*Psalidopus Huæleyi*, sp. n. (Pl. XIV. figs. 1, 2, 7.)

♀. Stouter. Thoracic and abdominal sterna unarmed. No tubercle between the last spine of the dorsal ridge and the posterior margin of the carapace.

Colour in life brilliant old-ivory white or straw-colour.

	millim.
Total length from apex of rostrum to tip of telson in a straight line .....	141
Length of rostrum from supra-orbital margin in a straight line .....	51.5
Length of carapace from supra-orbital to posterior margin .....	28.5
Length of abdomen from middle of anterior margin of first tergum to tip of telson .....	63
Length of telson .....	19.5
Length of antennal scale .....	21
Width of " " .....	6
Length of antennular flagella .....	37

A single ovigerous female was taken on April 12, 1888,  $7\frac{1}{2}$  miles east of N. Cinque Island, Andaman Sea, in 490 fathoms.

It carried twelve very large eggs, which in spirit measure no less than  $3.8 \times 2.7$  millim.]

36. *Psalidopus spiniventris*, sp. n.

(Pl. XIV. figs. 3-6 a, 8; Pl. XV. figs. 1-10.)

♂ ♀. Slenderer. Two posterior thoracic and all the abdominal sterna with an erect spine in the middle line. A conical tubercle between the last spine of the dorsal ridge and the posterior margin of the carapace.

Colour in life deep-sea pink with white points.

	Male. millim.	Female. millim.
Total length from apex of rostrum to tip of telson in a straight line.....	106	128.5
Length of rostrum from supra-orbital margin in a straight line (tip gone in male) .....	40	51.5
Length of carapace from supra-orbital to posterior margin .....	20	25
Length of abdomen from middle of anterior margin of first tergum to tip of telson .....	47	59
Length of telson .....	15	18
Length of antennal scale .....	16	19
Width of " " .....	3.3	5
Length of antennular flagella .....	37	35

An adult male and female, with one young specimen, were obtained at Station 116, 405 fathoms.

A small pair, in which the rostrum is much larger in the female than in the male, have come to light in the sorting of past seasons' collections. They were taken 8 miles S.E. of Cinque Island, Andaman Sea, in 500 fathoms.

Colour in life "more of a boiled lobster tint" [*i. e.* than other Crustaceans obtained at the same time and described in the same notes as pink and blood-red], "deepest on the spines" (*G. M. Giles*).

EXPLANATION OF THE PLATES.

PLATE XIV.

*Fig. 1.* *Psalidopus Huxleyi*, ♀, from the left side. Nat. size.

*Fig. 2.* The caudal swimmeret of the same, from above. Nat. size.

*Fig. 3.* *Psalidopus spiniventris*, ♀. Peduncle of the left antennule, from above.  $\times 4$ .

*Fig. 4.* Left antennal scale of the same, from above. Nat. size.

- Fig. 5. Left leg of the first pair of the same, from the outside.  $\times 4$ .  
 Fig. 6. Left leg of the second pair of the same, from the outside.  $\times 4$ .  
 Fig. 6a. Apex of propodite of same, to show the rudimentary nodular dactylopodite.  
 Fig. 7. *Psalidopus Huxleyi*, last thoracic sternum with bases of legs of last pair of female. Nat. size.  
 Fig. 8. *Psalidopus spiniventris*, last thoracic sternum with leg bases of male. Nat. size.

## PLATE XV.

- Figs. 1, 1a. *Psalidopus spiniventris*, mandible.  $\times 5$ .  
 Fig. 2. First maxilla.  $\times 5$ .  
 Fig. 3. Second maxilla.  $\times 5$ .  
 Fig. 4. First maxillipede.  $\times 5$ .  
 Fig. 5. Second maxillipede.  $\times 5$ .  
 Fig. 6. Third maxillipede.  $\times 2$ .  
 Fig. 7. Left abdominal appendage of the first pair in female.  $\times 2$ .  
 Fig. 8. Left abdominal appendage of the second pair in female.  $\times 2$ .  
 Fig. 9. Left abdominal appendage of first pair in male.  $\times 2$ .  
 Fig. 10. Left abdominal appendage of second pair in male.  $\times 2$ .

XLII.—Description of a new Genus and some new Species of  
*Heterocera* from Central America. By HERBERT DRUCE,  
 F.L.S.

Fam. *Ægeriidæ*.

*ÆGERIA*, Fabr.

*Ægeria armasata*, sp. n.

Primaries and secondaries hyaline, with a slightly yellowish tinge, the costal, outer, and inner margins of the primaries edged with yellowish brown, the veins of both wings yellowish brown, those of the secondaries being the darkest; the fringe of the secondaries dark brown. The underside of both wings light yellow. The palpi and front of the head yellow; the antennæ dark brown, yellowish at the base; the thorax and abdomen blackish brown, with a yellow line at the base of the abdomen; the anal tuft yellowish brown; the legs orange, banded with black.

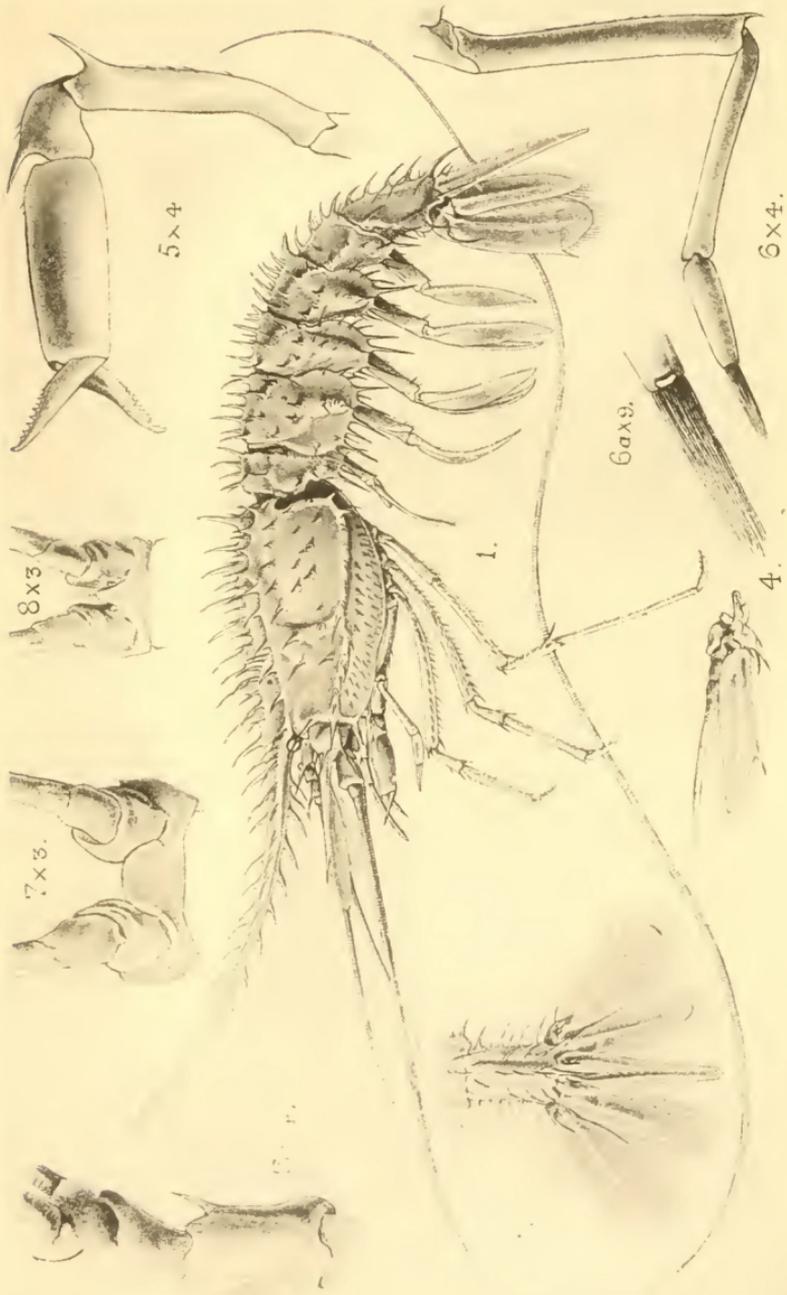
Expanse  $1\frac{1}{4}$  inch.

*Hab.* Mexico, near Durango city (*Becker*).

A fine species, very distinct from all others known to me.

*Ægeria mardia*, sp. n.

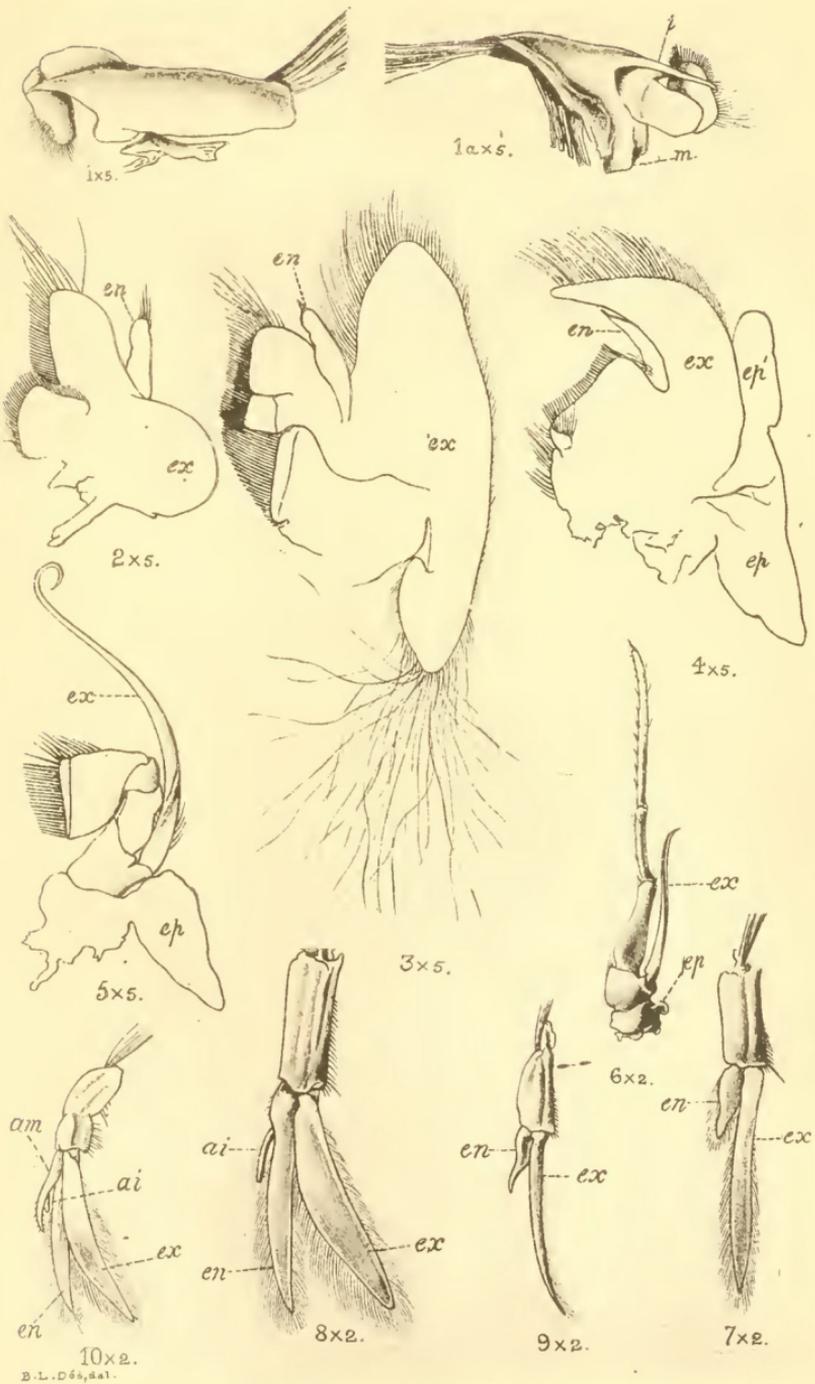
This species is allied to *Ægeria tryphoniformis*, Walker,



1, 2, & 7 *PSALIDOPUS HUNLEYI*.

3-6, & 8 *P. SPINIVENTRIS*.





B.L. D6s, dal.

PSALIDOPUS SPINIVENTRIS

