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PATERNOSTER ROW.

apical system may have been resorbed, as they should have existed at the adapical extremities of the truncated ambulacra in the early and normal phase of the animal's existence. There is no sign of their having been carried down to remain in their terminal position at the ends of the ambulacra.

There is a small hole in the middle of interambulacrum 2 which does not look like a mere chance puncture inflicted after the death of the animal, as it seems to have been partly healed up by a fresh deposition of calcite from within. The hole may be the result of the activity of some boring parasite, but whether such an agent could cause the remarkable irregularities that exist in the test seems very doubtful.

The following are a few important measurements of the test:—

	mm.
Length (ant. rad. to post. interrad.)	36
Breadth (at right angles to above)	31
Height (including apical system)	30
Ambitus	115
Diameter of peristome	10
Length of apical system	7·75
Breadth of apical system	5
From rad. III to nearest point of apical system	14·5
" " V " " " " " "	10

5. The Decapods of the Genus *Gennadas* collected by H.M.S. 'Challenger.' By Stanley Kemp, B.A.*

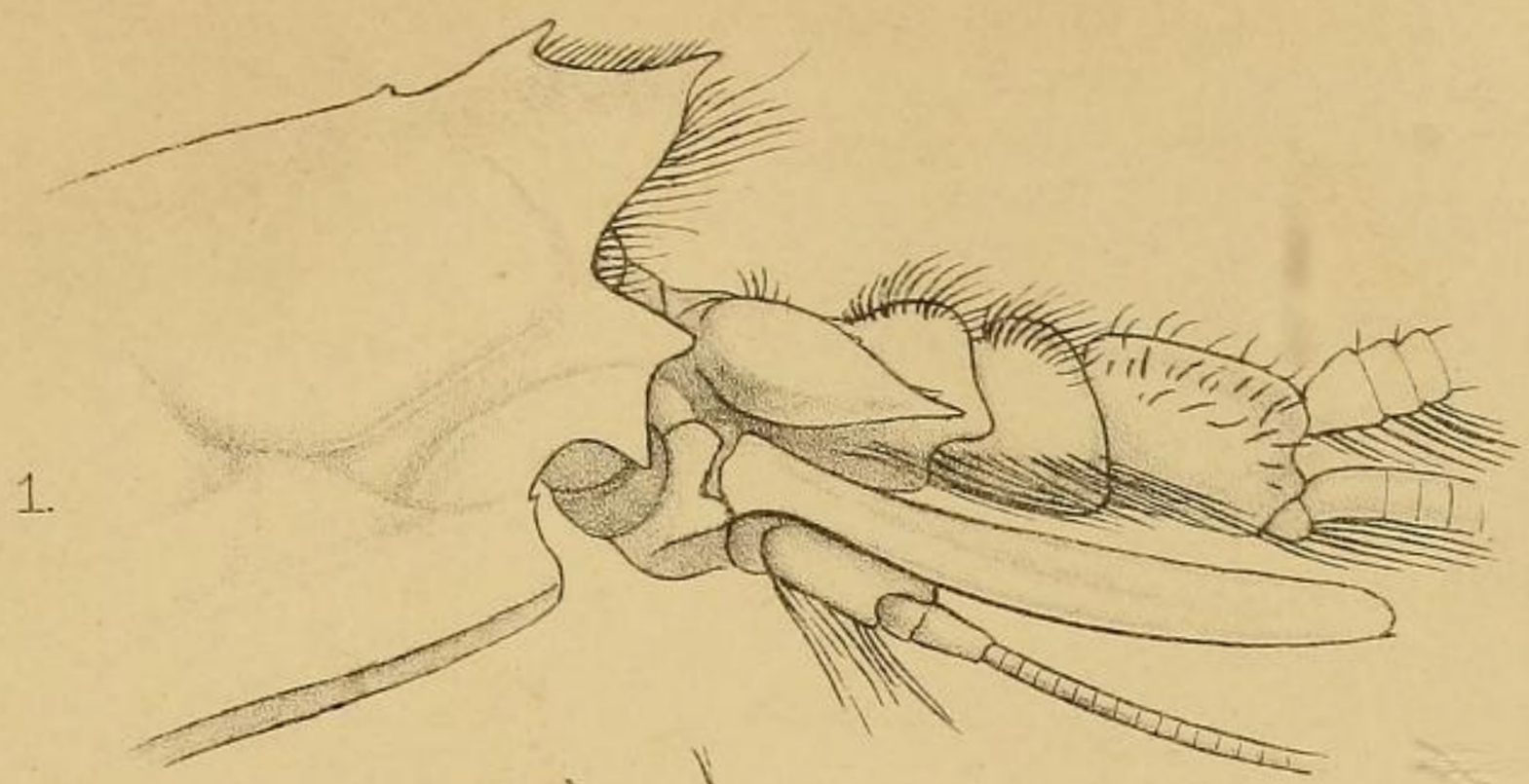
[Received June 7, 1909.]

(Plates LXXIII.–LXXV.†)

In 1881 ‡, Spence Bate established the genus *Gennadas* for the reception of certain abyssal Penæidæ found by the 'Challenger' Expedition. He recognized two species, *G. parvus* and *G. intermedius*, but his descriptions and figures, viewed from the standpoint of our present knowledge, are hopelessly inadequate. Since 1888, when the full Report on the 'Challenger' Crustacea Macrura appeared, several authors have recorded *Gennadas parvus*, but owing to the imperfections in the original description it may be doubted whether much reliance can be placed on their determinations.

Only quite recently has any good basis been formed for future work. Bouvier, in 1906 §, outlined a scheme for the identification of six Atlantic species and emphasized the value of several characters as specific determinants; by means of these species he

* Communicated by Dr. W. T. Calman, F.Z.S.
† For explanation of the Plates see pp. 729 & 730.
‡ Ann. Mag. Nat. Hist. Sept. 1881, p. 91.
§ Bull. Mus. Océanog. Monaco, 80, 1906.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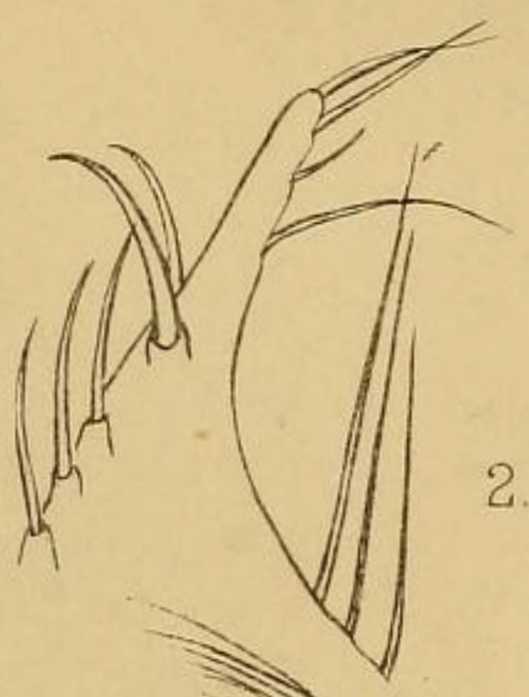
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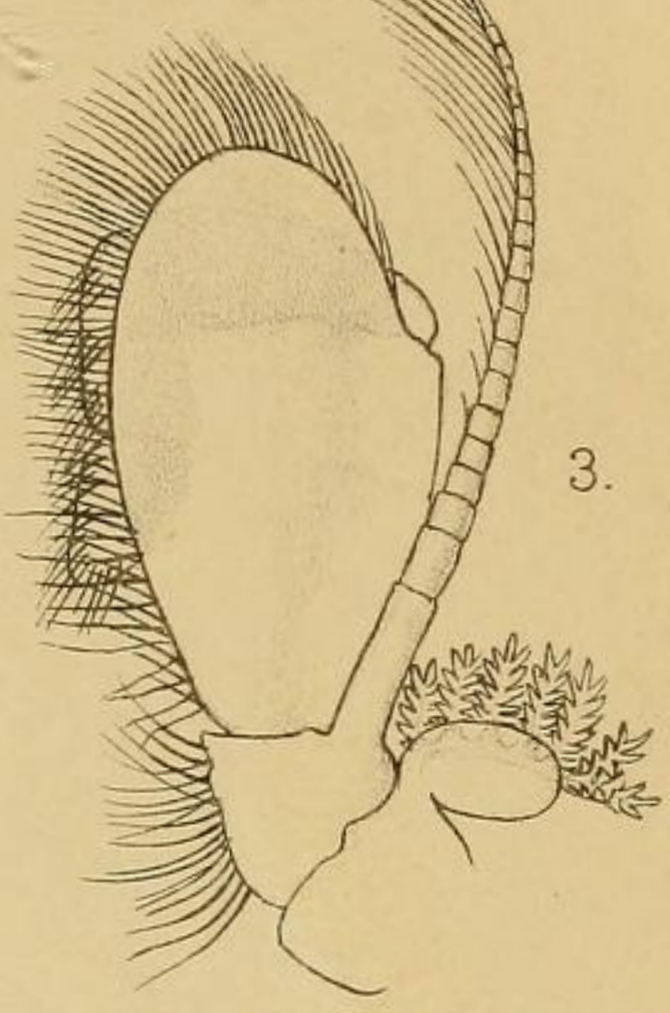
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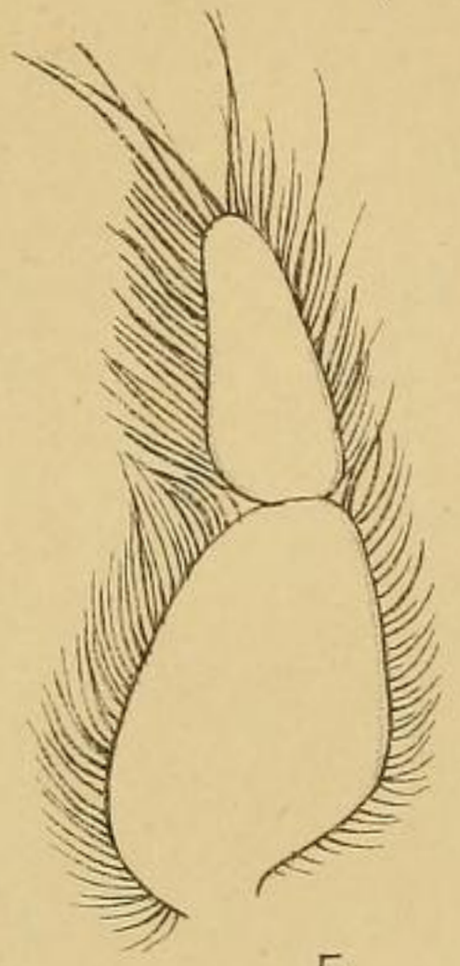
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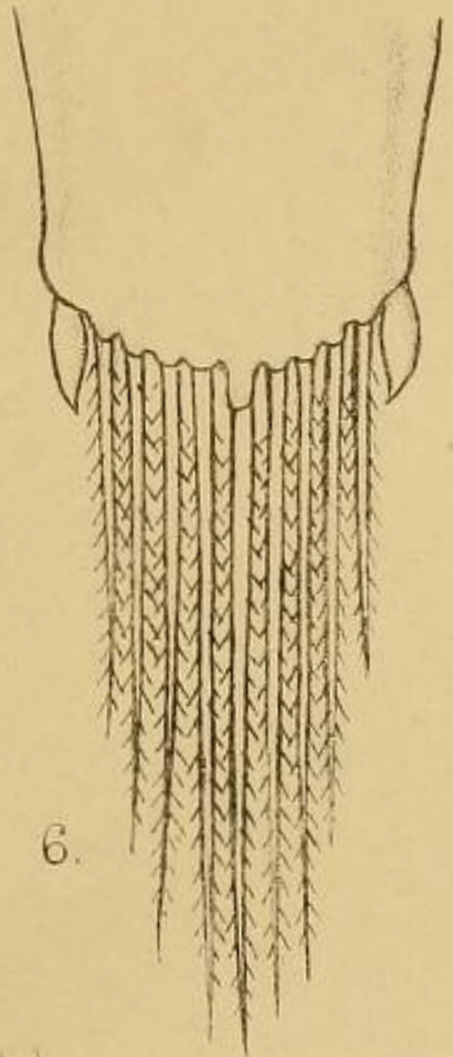
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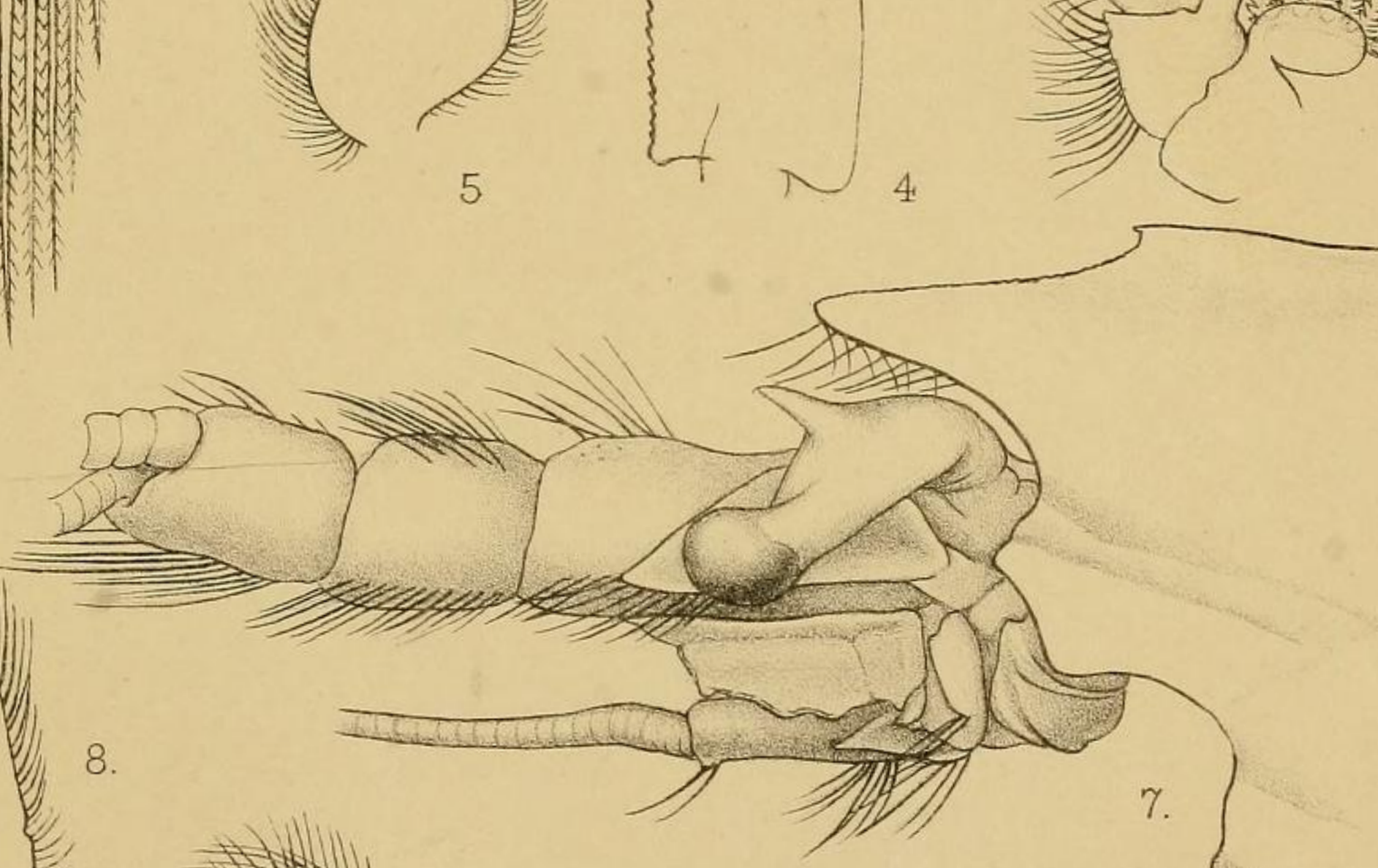
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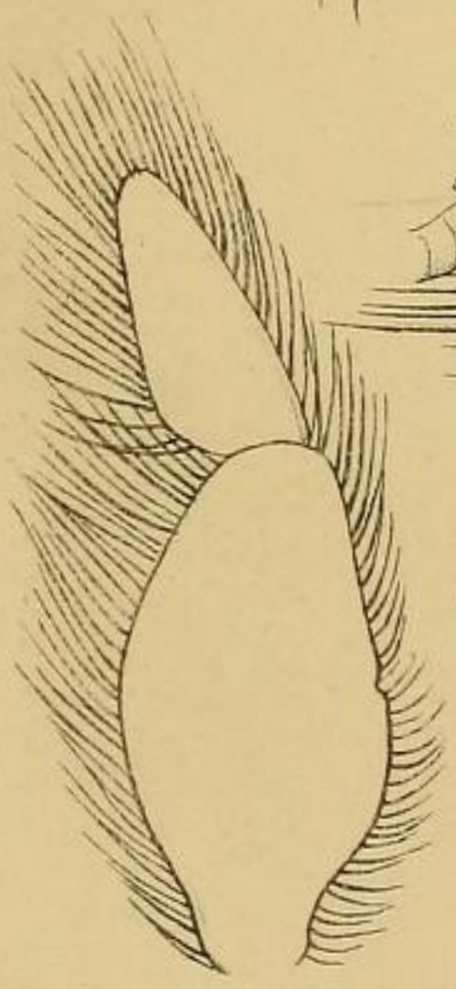
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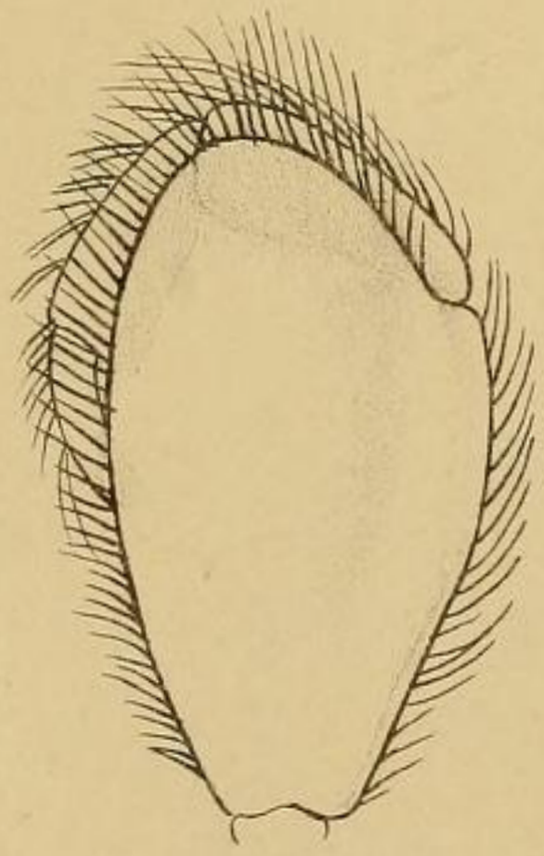
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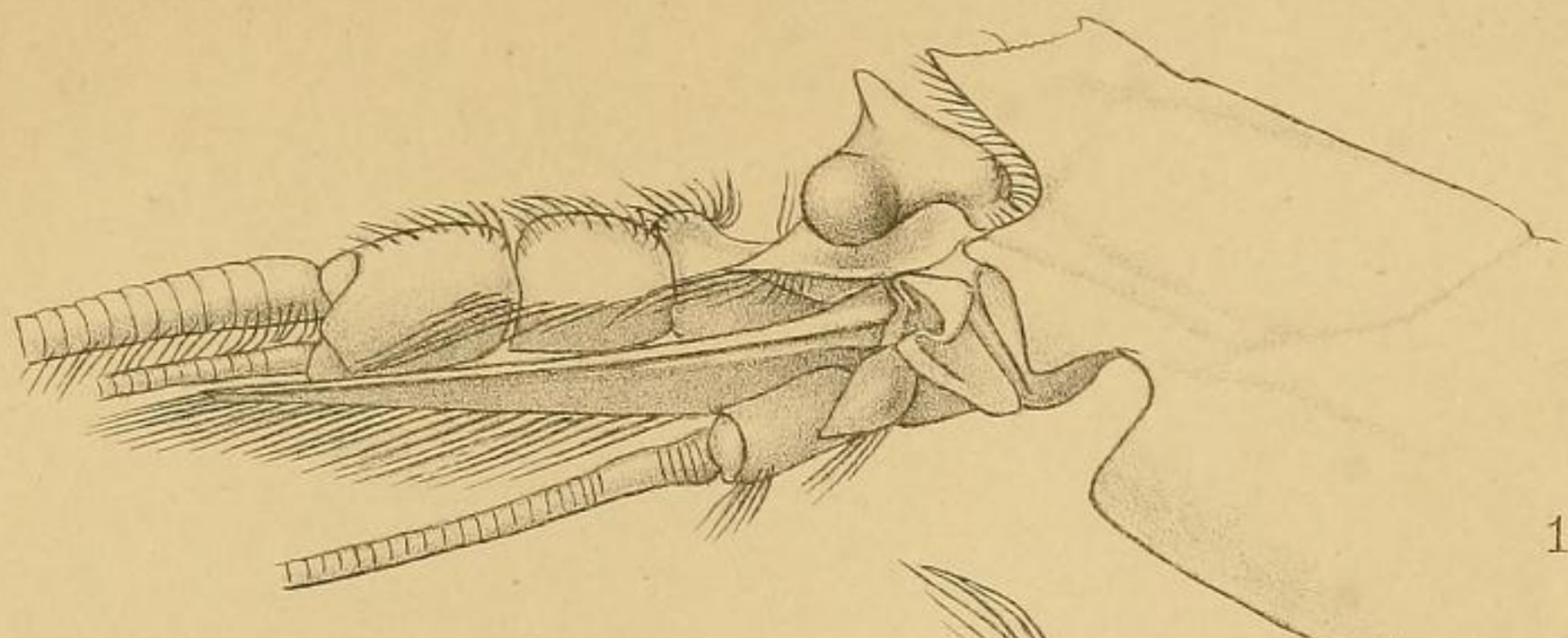
12.

G. M. Woodward del. et lith.

West, Newman imp.

1–6. GENNADAS PARVUS.

7–12. GENNADAS INTERMEDIUS.



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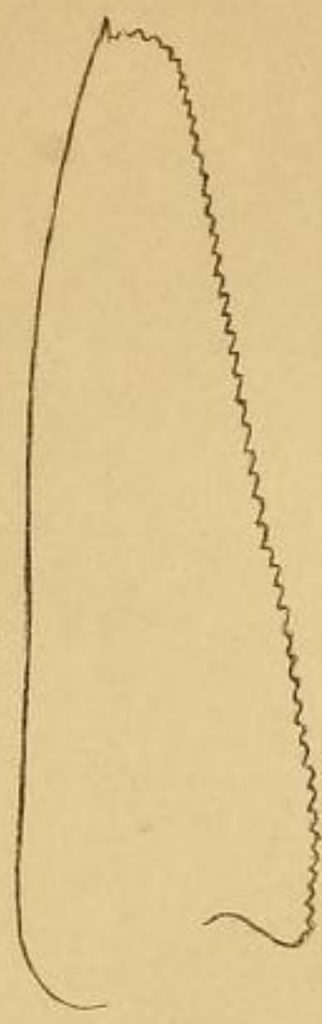

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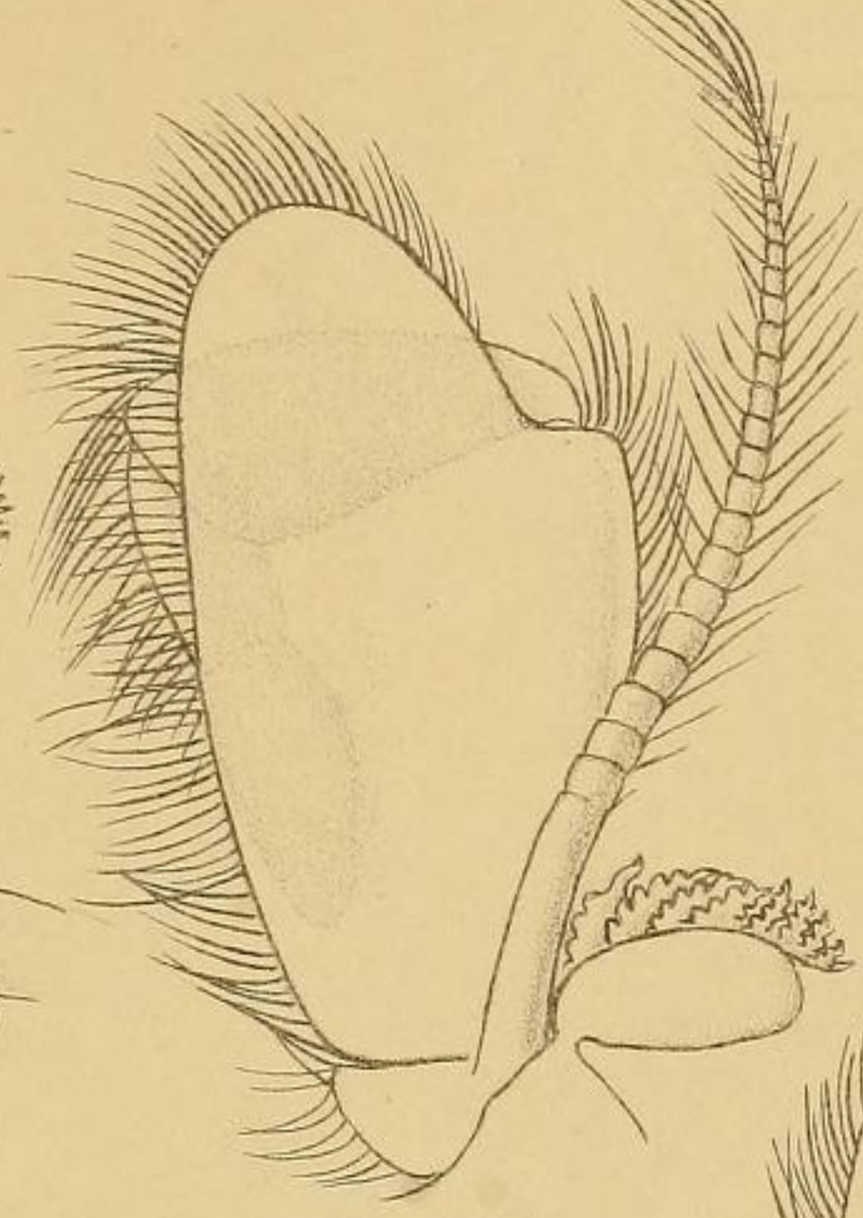

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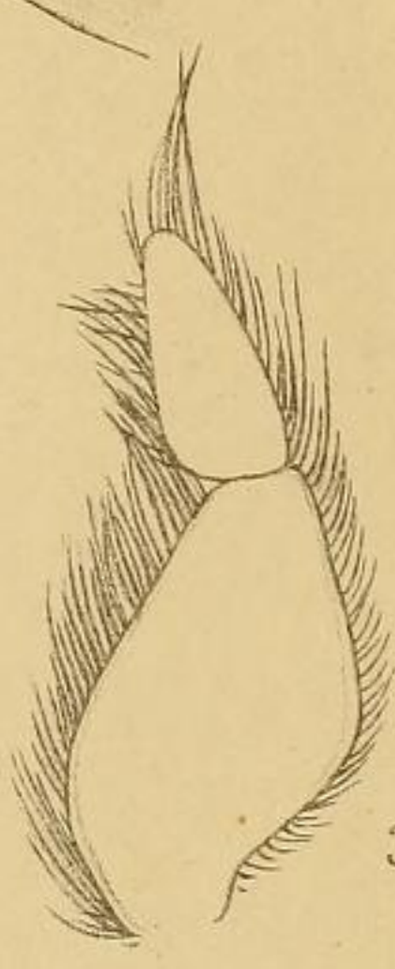

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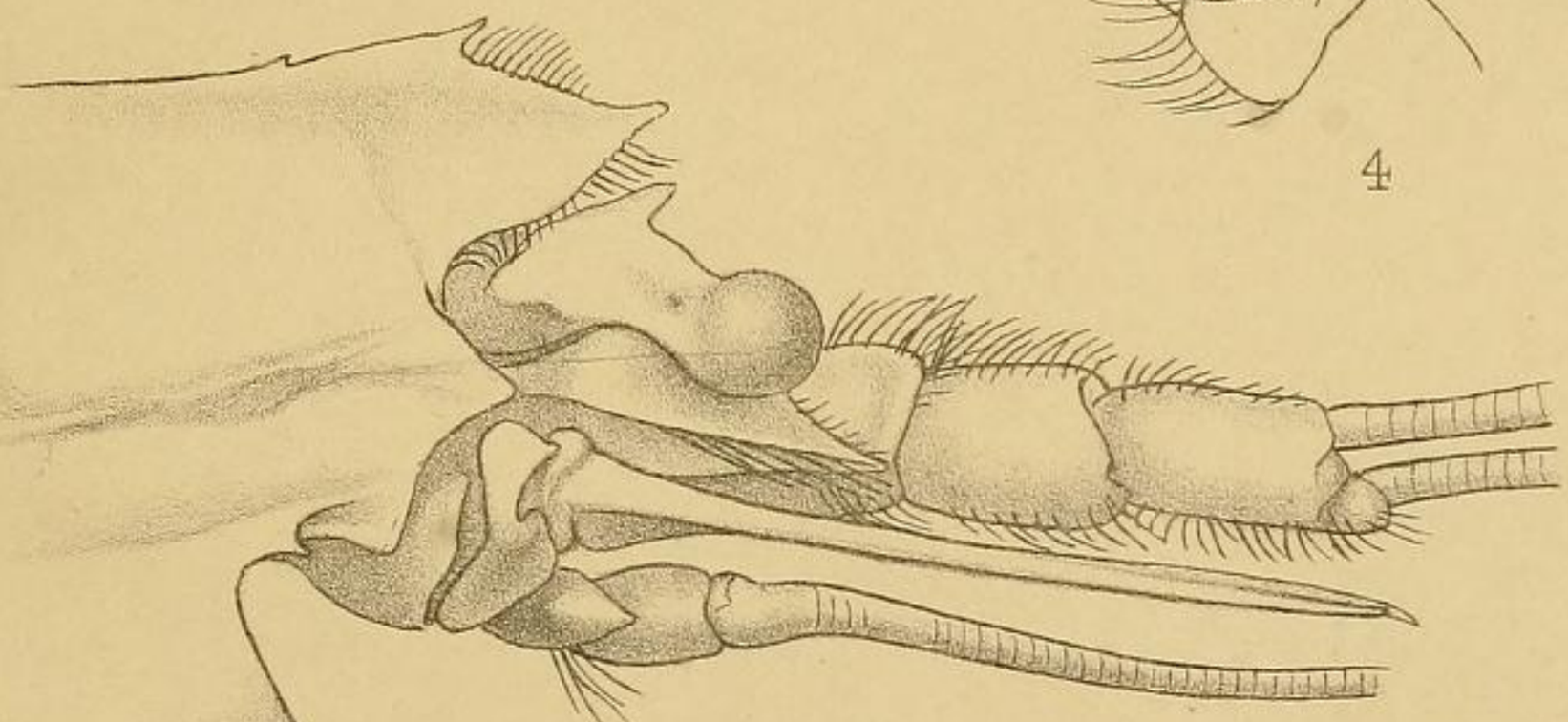

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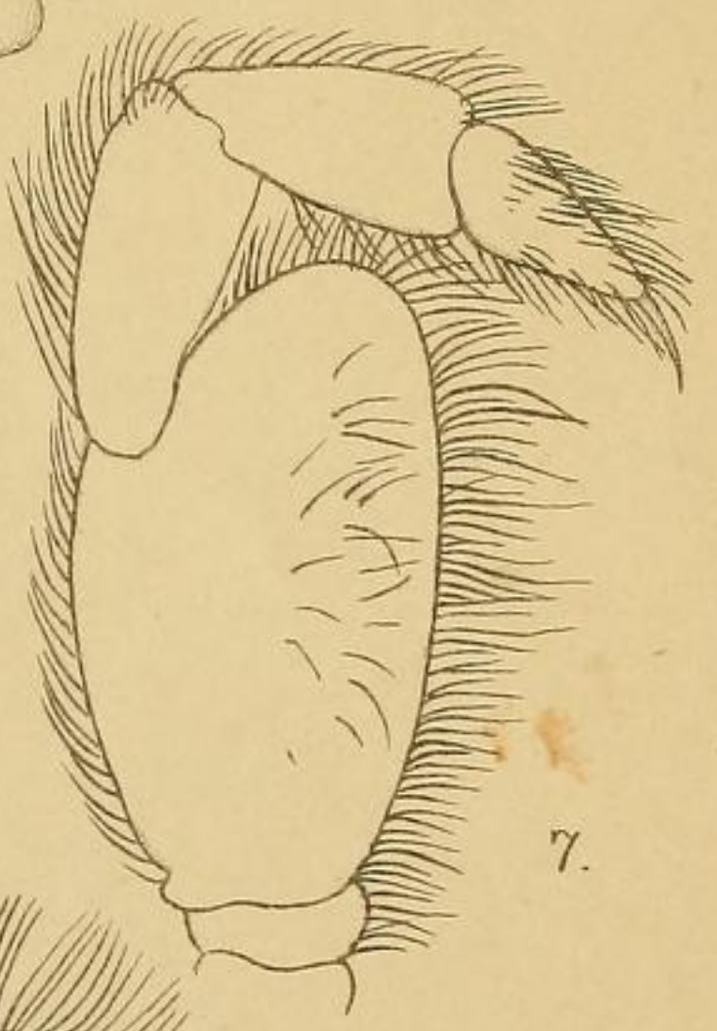

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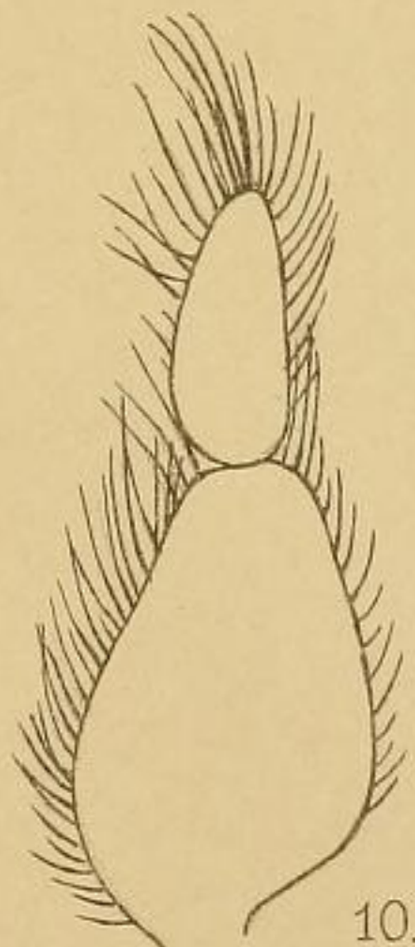

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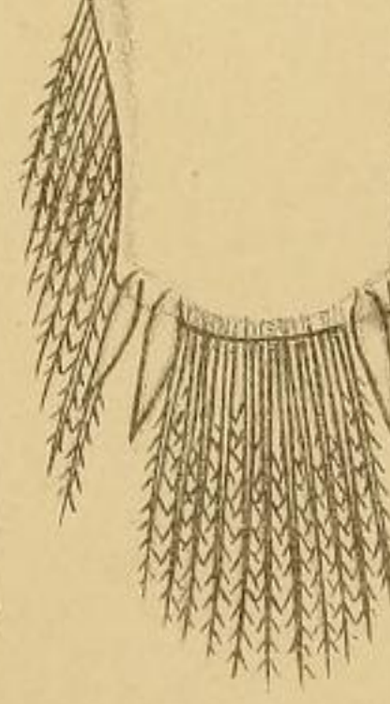

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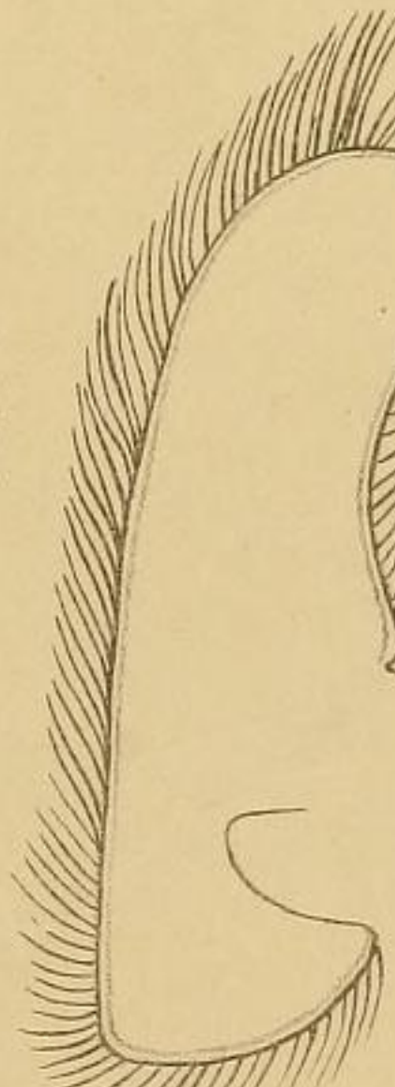

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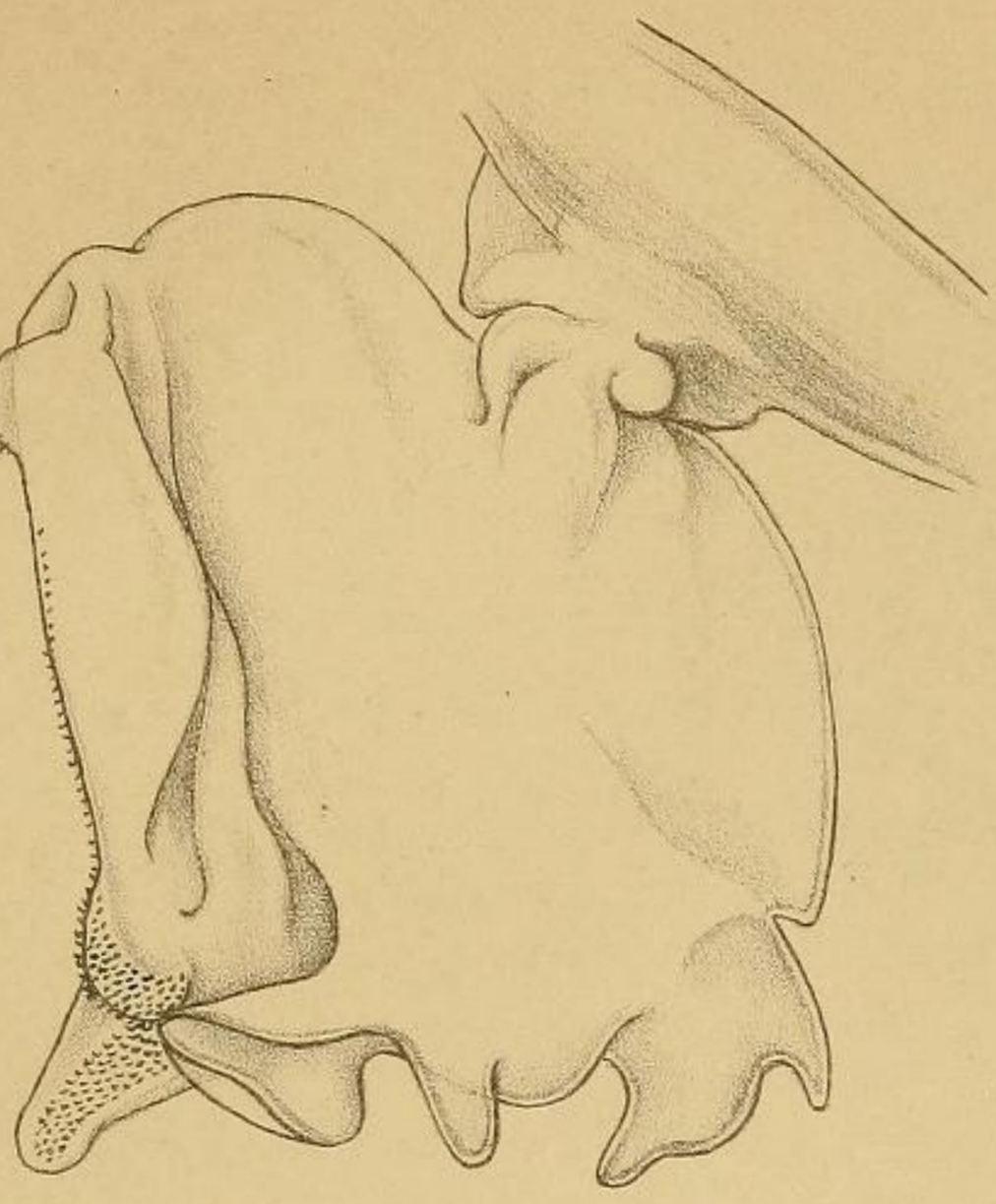
G.M.Woodward del.et lith.

West, Newman imp.

1–4. GENNADAS BOUVIERI.
5–11. GENNADAS CALMANI.



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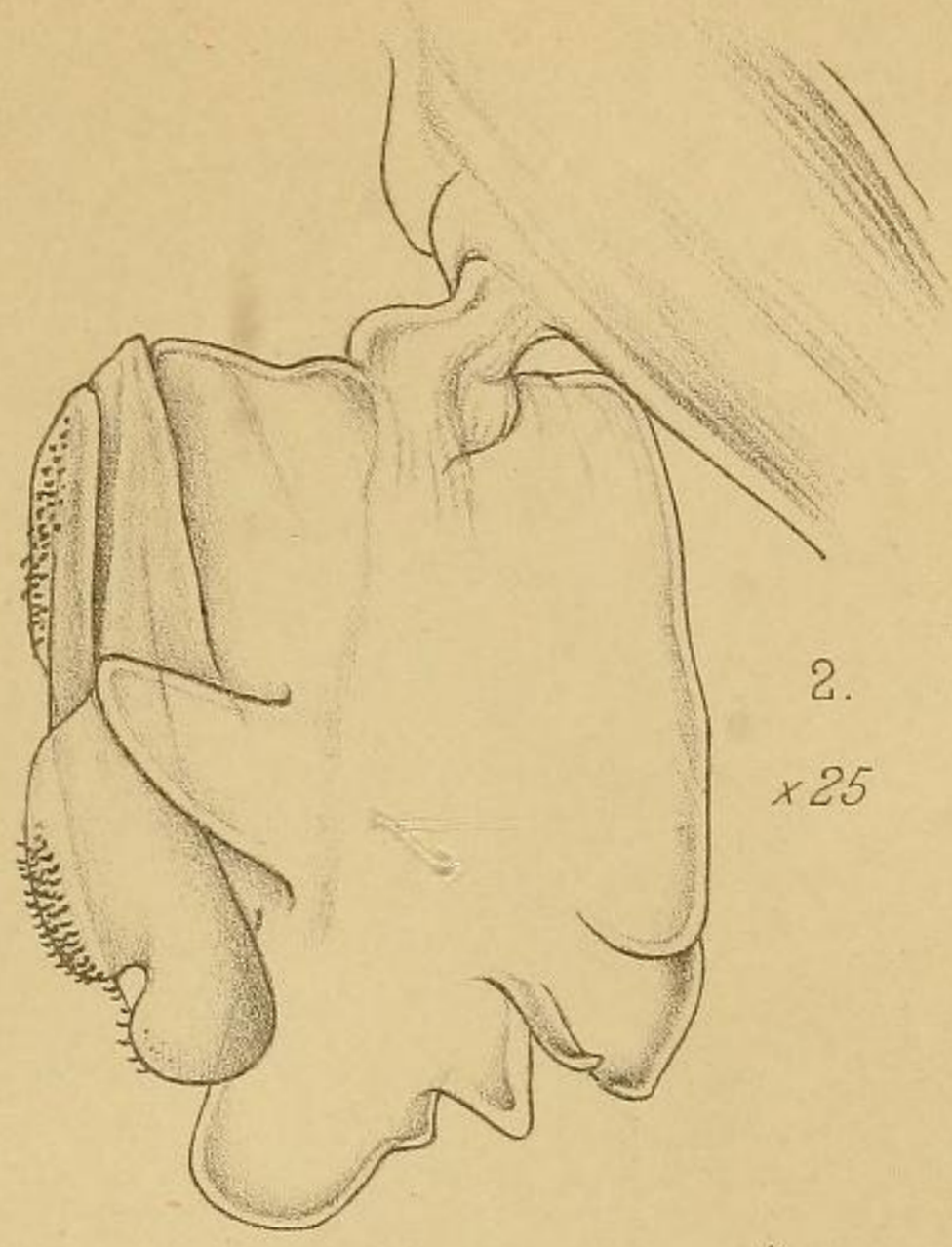

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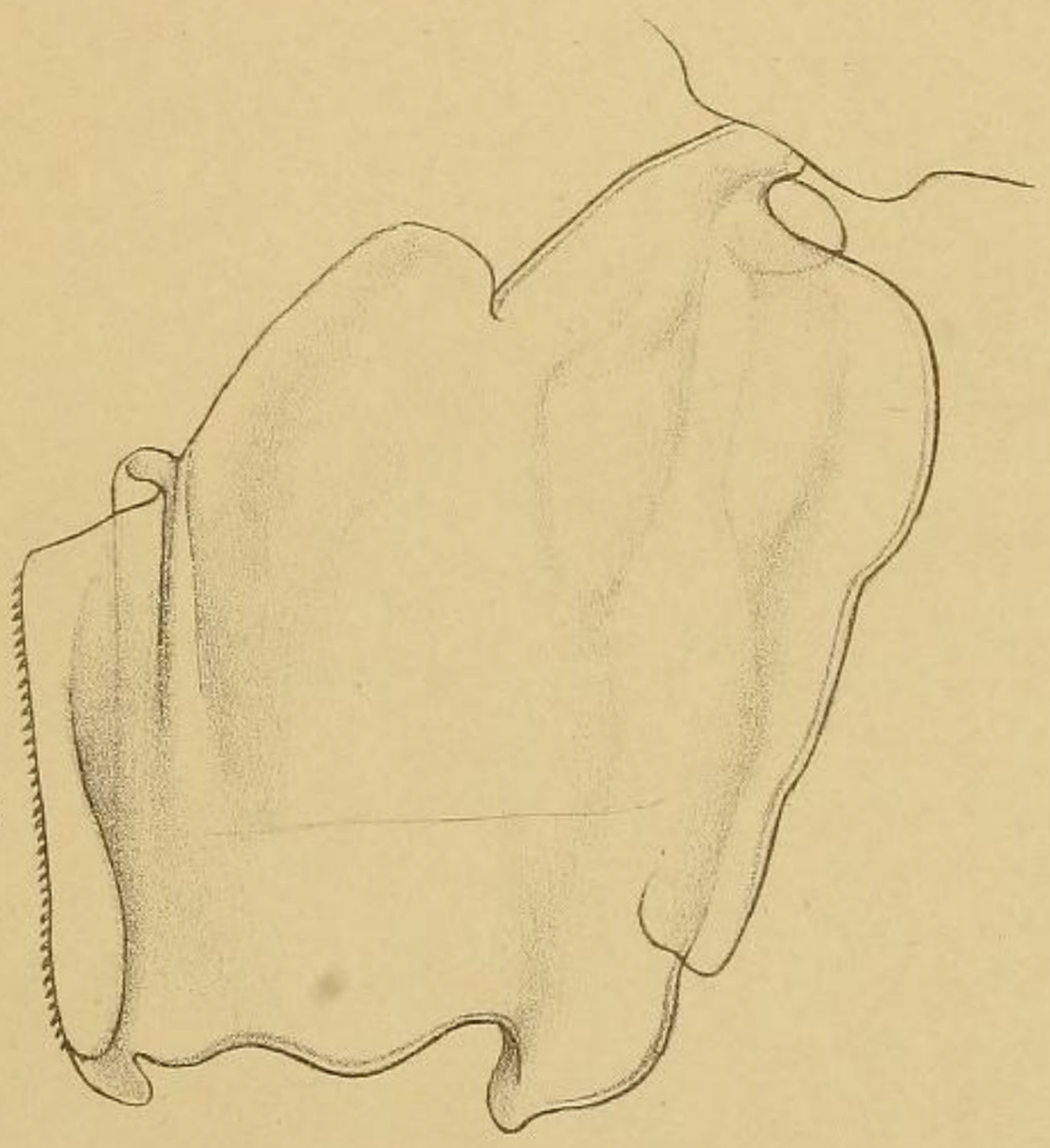

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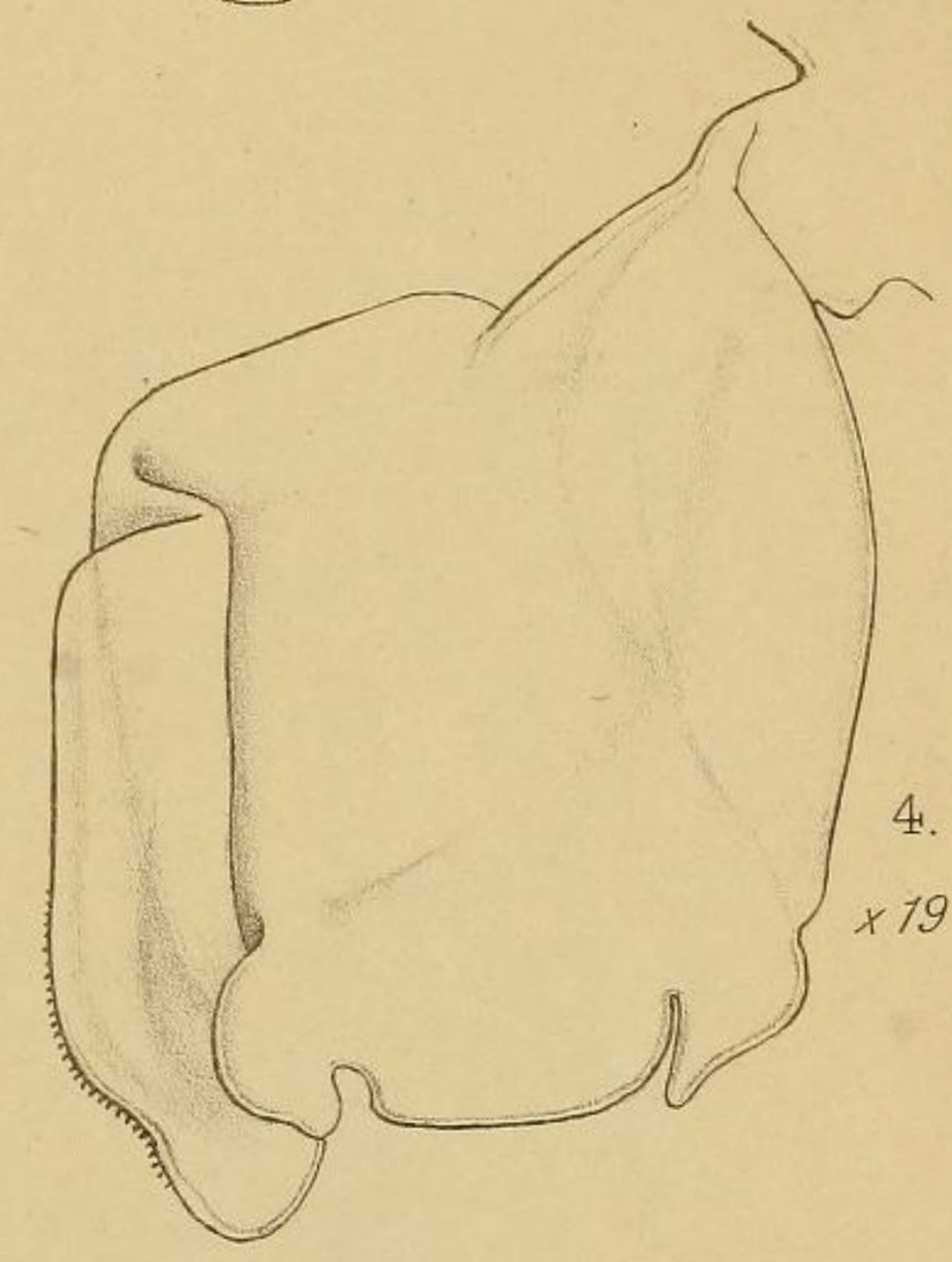

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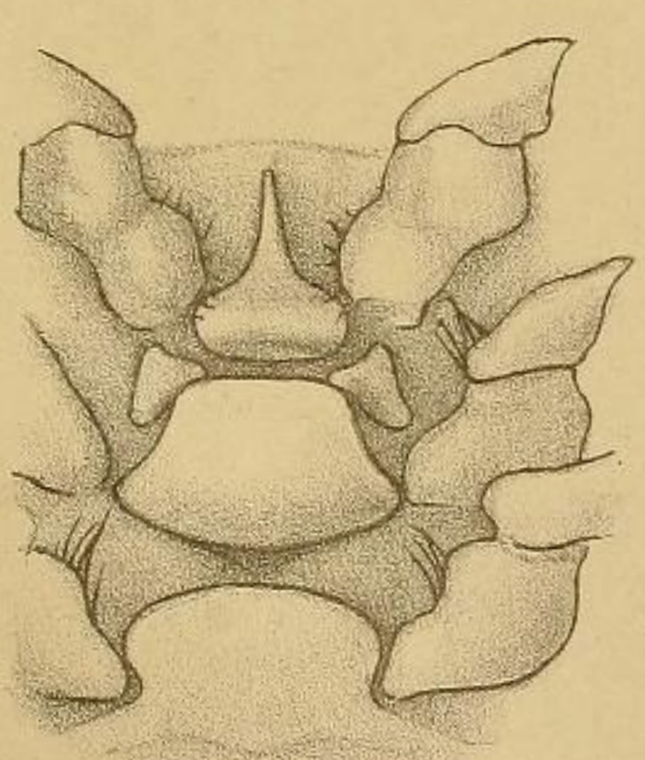

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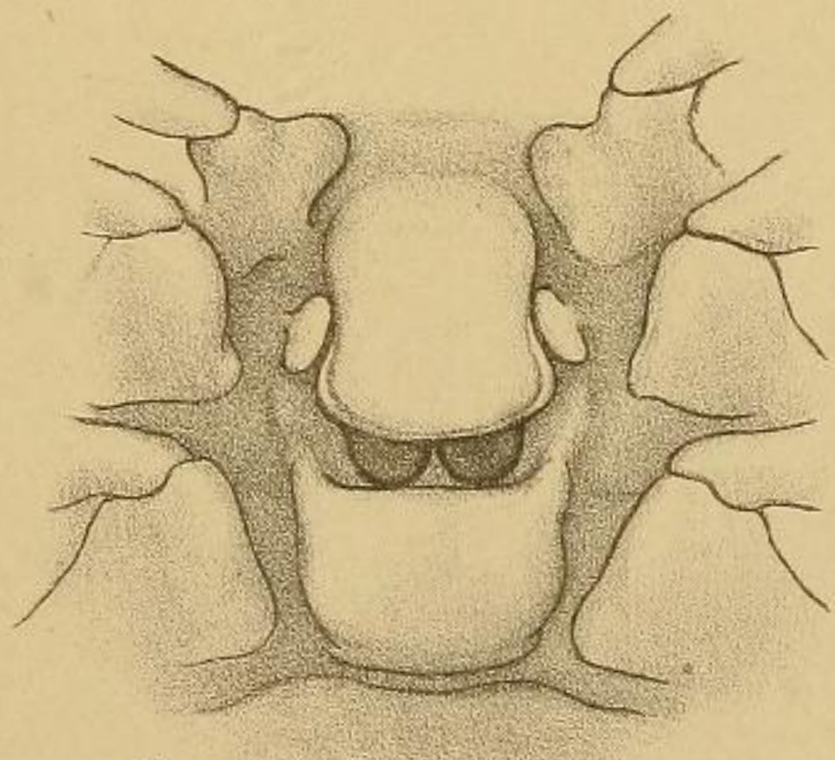

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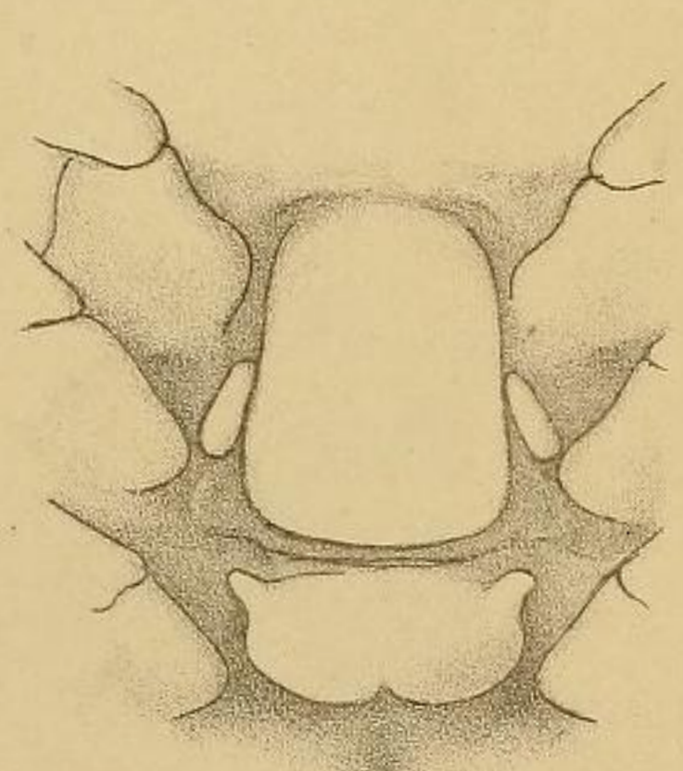

7. ×20

G.M.Woodward del.et lith.

West, Newman imp.

1. GENNADAS PARVUS. 3. GENNADAS INTERMEDIUS.
2. GENNADAS SCUTATUS 4-5 GENNADAS CALMANI.
6-7 GENNADAS BOUVIERI.

was able to trace the derivation of the genus from the more primitive *Benthesicymus*. This short paper was followed in 1908 * by a lavishly illustrated memoir on the Penæidæ collected by the Prince of Monaco, containing fuller treatment of the same species in addition to valuable information on other genera. These two papers have greatly facilitated any further work on the subject and the revision of the 'Challenger' material has in consequence been robbed of much of its difficulty.

Before going further it is, however, necessary to refer to the generic status of the species belonging to this group. In 1882 † S. I. Smith described, under the name of *Amalopenæus*, a genus which differs from Spence Bate's *Gennadas* only in the total suppression of the podobranchs on the first three pairs of pereiopods. For some time it was thought that Spence Bate's determination of the branchial formula was incorrect—a not unreasonable hypothesis; Alcock, however, stated in 1901 that these gills were present in certain specimens of *Gennadas* from Indian waters, and an examination of the type species in the British Museum establishes the correctness of Spence Bate's observation.

On the other hand, specimens of *Amalopenæus elegans* from the N.E. coast of America show no trace of these gills, thus confirming Smith's determination and that of several subsequent writers.

The question now arises whether the presence or absence of these gills is of itself a factor of sufficient importance to justify the retention of two distinct genera—for it is almost certain that no other characters are available for their separation. Although the literature of the subject contains numerous references to this question, Bouvier, strangely enough, makes no mention of it ‡ in his memoir on the material collected by the 'Princesse-Alice.'

The nomenclature of the species is perhaps a matter of minor importance, if the relationships of the various forms are fully understood. Podobranchs are rarely found on the thoracic limbs of Decapoda Natantia; they are most frequently present in the Penæidea, and in such a tribe, which abounds in primitive characters, the absence of these gills is rightly regarded as a feature of great importance, for it indicates in no uncertain way the degree of specialization to which the species has attained §. I have consequently retained *Amalopenæus* as a distinct genus and consider Bouvier's group, Benthesicymæ, to comprise three

* Rés. Camp. Sci. Monaco, xxxiii. 1908.

† Bull. Mus. Comp. Zool., Harvard, vol. x. 1882.

‡ Bouvier (*loc. cit.*, 1908) regards *Amalopenæus* as a synonym of *Gennadas* and, in reference to the gill formula, merely states that it is the same as that of *Benthesicymus*. This is certainly inaccurate for at least one of the species he was dealing with, viz. *Amalopenæus* (*Gennadas*) *elegans*.

§ Although the determination of the complete gill formula in these species is a matter of some difficulty, the presence or absence of podobranchs on the first three pereiopods can be observed with the greatest ease. The podobranch in *Gennadas* (Pl. LXXIV. fig. 6) is an outgrowth from the base of the epipod; in *Amalopenæus* a considerable space intervenes between the epipod and the lowest gill (an arthrobranch).

genera, *Benthesicymus*, *Gennadas*, and *Amalopenæus*, the first being the most primitive and the last the most highly specialized.

The species of *Gennadas* and *Amalopenæus* are by no means easy of determination. The best characters are undoubtedly those afforded by the membranous expansion of the endopods of the first pleopods of the male (known as the *petasma*) and by the sternal plates of the cephalothorax (the *thelycum*) in the female.

These characters are of course of little value in very young specimens, but they appear to afford trustworthy indications in all examples upwards of one half the maximum length of the species.

So far as at present known there is extremely little variation in the form of the adult petasma, but this is not necessarily the case with the thelycum, for Bouvier (1908, *loc. cit.*) has instanced several variations in the case of *Amalopenæus valens*, Smith. Although it might be expected that seasonal variations depending on the degree of sexual maturity of the individual would be manifest in both thelycum and petasma, it must be noticed that there is no evidence of this in the case of *Amalopenæus elegans*, a species of wide Atlantic distribution and of common occurrence.

Bouvier has indicated other characters of great value in the determination of the different species. Of these, the most important are the form of the antennary and infra-antennary angles, the proportional length of the second and third joints of the antennular peduncle, the proportional lengths of the ultimate joint of the mandibular palp and of the merus, carpus, and chela of the first three pairs of pereiopods. Valuable information is also afforded by the form of the antennal scale and by the presence or absence of a stout median spine on the first abdominal sternum.

The specimens referred by Spence Bate to *Gennadas parvus* and *G. intermedius* are for the most part fairly perfect; the majority of those recorded in the 'Challenger' Report are preserved in the British Museum, and the types of both species are extant. The specimens missing are four in number, viz. :—

St. 137. 35° 59′ S., 1° 34′ E. Recorded as *G. intermedius*.
St. 159. S. of Australia.
St. 250. N. Pacific.
St. 289. S. Pacific.
} Recorded as *G. parvus*.

The result of an investigation of the remaining specimens, seventeen in number, is indicated in the table on p. 721.

If these results be accepted, it will be seen that Spence Bate was quite as unfortunate in his treatment of this genus as Hansen has shown him to have been with *Sergestes*.

In the following systematic notes no attempt has been made to correct the many inaccuracies which disfigure Spence Bate's work. The condensed descriptions and figures will, it is hoped, prove sufficient for the recognition of the type species and the two forms described as new. The various shapes assumed by the lobes and folds

Spence Bate's identification.	Station.	Locality.	Sex.	Author's identification.
	45	M. of Delaware R.	♂	*Amalopenæus elegans*, Smith.
	101	Off Sierra Leone.	♀	Not determined.
	120	Off Pernambuco.	♂	*Gennadas intermedius*, Sp. Bate.
	206	Off Manila.	♀	*Gennadas bouvieri*, n. sp.
	220	N. of New Guinea.	♀	
	do.	do.	♀	
	do.	do.	♀	Not determined.
Gennadas parvus	230	S. of Japan.	♂	TYPE.
	232	do.	♀	*Gennadas calmani*, n. sp.
	do.	do.	♀	
	do.	do.	♂	
	do.	do.	♂	
	235	do.	♀	
	237	Off Yokohama.	♀	
	267	N. Pacific.	♂	*Gennadas scutatus*, Bouvier.
Gennadas intermedius	106	Off Sierra Leone.	♂	TYPE.
	?	Off Bermuda.	♂	Not determined.

of the petasma are so complicated that they almost defy adequate textual treatment; the necessary information is consequently conveyed solely by the figures.

All that is at present known of the habits of *Gennadas* and *Amalopenæus* goes to prove that they are free-swimming forms which never live on the ocean bottom. It is probable that all the specimens found by the 'Challenger' were caught during the ascent of the net; the depths given can therefore be accepted only as indications of the soundings at the different stations.

GENNADAS PARVUS Spence Bate. (Plate LXXIII. figs. 1–6; Plate LXXV. fig. 1.)

Gennadas parvus, Sp. Bate, Ann. Mag. Nat. Hist. Sept. 1881, p. 192, and 'Challenger' Crustacea Macrura, 1888, p. 340, pl. lix.

? *Gennadas parvus*, Wood-Mason, Ann. Mag. Nat. Hist. Feb. 1891, p. 189, and Oct. 1891, p. 286.

? *Gennadas parvus*, Alcock, Desc. Cat. Indian Deep Sea Macrura, 1901, p. 46.

? *Gennadas parvus*, Rathbun, U.S. Fish Comm. Bull. for 1903 (publ. 1906), p. 907, fig. 60.

St. 230. S. of Japan. 26° 29′ N., 137° 57′ E. Trawl. 2425 fathoms. One male, the type specimen, 25 mm.*

The rostral crest (Pl. LXXIII. fig. 1) is elevated above the dorsal carina of the carapace; its frontal margin is rather strongly convex. It bears the usual fringe of setæ between the apex and the dorsal spine, while behind the latter there is a small tubercle situated on the dorsal carina of the carapace. Both the antennary

* Measured from the apex of the rostrum to the tip of the telson.

and infra-antennary angles are strongly acute and a very small branchiostegal spine is present. The distance between the cervical and post-cervical grooves, measured dorsally, is about one-third the distance from the post-cervical groove to the hinder edge of the carapace. The mid-dorsal carina is not evident behind the latter groove.

The eyes are in very poor condition, one missing and the other badly damaged. The second joint of the antennular peduncle is very short; measured dorsally it is less than half the length of the ultimate segment. The antennal scale (Pl. LXXIII. fig. 4) is three times as long as broad and not much narrowed apically; the convex outer margin terminates in a minute spine, which hardly extends as far forward as the lamella.

The ultimate joint of the mandibular palp (Pl. LXXIII. fig. 5) is fully as long as the width of the first joint. In the second maxilla the anterior lobe of the internal lacinia is not constricted behind its apex and is not narrower than the adjacent lobe of the external lacinia. In the latter lacinia the anterior lobe is about one and a half times the width of the posterior. The endopod (Pl. LXXIII. fig. 2) is furnished with two stout curved spines behind the apex, beyond which the narrow distal prolongation bears four setæ on the inner margin. The endopod of the first maxillipede reaches slightly beyond the exopod. The third segment is one and a quarter times the length of the second; the fourth segment is extremely minute. Three stiff curved spines are situated on the inner distal margin of the basal joint. In the second maxillipede the merus (Pl. LXXIII. fig. 3) is rather less than twice as long as broad; its anterior prolongation (*i. e.* the portion extending beyond the insertion of the carpus) is about one-third the total length of the segment.

The first pair of pereiopods is missing. In the second pair the carpus is nearly half as long again as the chela, and the dactylus is distinctly shorter than the palm. The carpus of the third pair is exactly the same length as the merus and more than twice the length of the chela; the dactylus is slightly shorter than the palm.

The abdomen is carinate only on the sixth somite and the median spines on the sterna are all very blunt and inconspicuous. On the lower margin of the telson there are basally two rounded lobes. The apex (Pl. LXXIII. fig. 6) is rather broad and convex. A short stout spine marks each outer angle; between these there are nine plumose setæ of which the middle one is the longest.

The petasma is very complex; its numerous lobes and folds are shown in Pl. LXXV. fig. 1.

This species bears a close superficial resemblance to *Amalopenæus elegans**. Apart from the generic character—the presence

* My statement (Fisheries, Ireland, Sci. Invest. for 1905, V. 1906) that *G. parvus* and *A. elegans* are synonymous I now regard as erroneous. The mistake is probably traceable to the close resemblance of the two forms and to the fact that an authentic example of *A. elegans* occurs in the collection under the name of *G. parvus*.

of podobranchs on the first three pairs of pereiopods—*G. parvus* is distinguished by the greater distance between the cervical and post-cervical grooves, by the strongly acute infra-antennary angle, by several details in the oral appendages, and by the form of the petasma.

GENNADAS INTERMEDIUS Spence Bate. (Plate LXXIII. figs. 7–12; Plate LXXV. fig. 3.)

Gennadas intermedius, Sp. Bate, 'Challenger' Crustacea Macrura, 1888, p. 343, pl. lviii. fig. 3.

St. 106. Off Sierra Leone. 1° 47′ N., 24° 26′ W. Trawl. 1850 fathoms. One male, the type specimen, ca. 48 mm.
St. 120. Off Pernambuco. 8° 37′ S., 34° 28′ W. Trawl. 675 fathoms. One male, ca. 46 mm.* (sub *G. parvus* Sp. Bate.)

This species is evidently one of the more primitive species of *Gennadas*, and is closely allied to *G. alicei* Bouvier. Both the specimens are unfortunately in bad condition.

The rostral crest (Pl. LXXIII. fig. 7) is only slightly elevated above the dorsal carina of the carapace, presenting a marked contrast to that found in the preceding species. The inferior margin is not convex. The fringe of setæ between the apex of the rostrum and the dorsal spine was evidently present originally, although scarcely a trace of it now remains. The antennary and infra-antennary angles are both bluntly rounded and very obtuse; the emargination between them is shallow, but not altogether missing as in *G. alicei*. The branchiostegal spine is wholly absent in the type specimen, but an exceedingly minute point is visible on one side of the second example. The hinder part of the carapace is distorted and crushed in both specimens; the distance between the cervical and post-cervical grooves (measured dorsally) is however great, probably one-half the distance from the post-cervical groove to the hinder margin of the carapace. The mid-dorsal carina is traceable throughout the length of the carapace, although faint in the posterior half.

The eyes are in bad condition, but the width across the cornea seems to be less than in *G. alicei*. The second joint of the antennular peduncle, measured dorsally, is equal in length to the third joint. The antennal scale is broken in every instance, but it is evident that it is not strongly narrowed apically.

The distal joint of the mandibular palp (Pl. LXXIII. fig. 8) is slightly longer than the width of the first joint. In the second maxilla the anterior lobe of the internal lacinia is constricted behind its apex, and is distinctly broader than the adjacent lobe of the external lacinia. In the latter lacinia the anterior lobe is fully one and a half times the width of the posterior lobe. The apex of the endopod has not exactly the same character in the two

* In the bottle with this specimen there is a label in Dr. Hansen's writing, which reads—"Agrees with the type of *G. intermedius*, Bate, not with *G. parvus*."

specimens. In the type (Pl. LXXIII. fig. 9) there are four curved dorsal spines, two long setæ at the apex of the short distal prolongation and one short spine on the inner margin. In the second example (Pl. LXXIII. fig. 10) there are three dorsal spines, a much longer distal prolongation, and six short spines on the inner margin.

The endopod of the first maxillipede falls short of the apex of the exopod. The oval third joint is twice the length of the second; the fourth joint, when present, is very minute. The basal joint bears two curved spines on its inner distal margin. The merus of the second maxillipede (Pl. LXXIII. fig. 11) is rather less than twice as long as wide, and its anterior prolongation is not more than one-quarter the total length of the joint.

In the first pair of pereiopods the carpus, which is about the same length as the chela, is three-quarters the length of the merus. In the second pair the carpus is one and a half times as long as the chela, while the dactylus is evidently shorter than the palm. The carpus of the third pair is fully as long as the merus, the chela is about half the length of the carpus, and the dactylus is considerably shorter than the palm.

Each of the abdominal sterna bears a blunt and inconspicuous tubercle; the sixth somite alone is dorsally carinate. The lower margins of the telson are bluntly bilobed at the base. The apex is broken in the type; in the second specimen (Pl. LXXIII. fig. 12) it is narrow, truncate, and is armed with a pair of stout spines at each outer angle, between which are four plumose setæ.

The petasma (Pl. LXXV. fig. 3) is almost identical in the two specimens.

The resemblance of this species to *Gennadas alicei* is very marked, and it is by no means improbable that the two forms will eventually turn out to be specifically identical; in this case the name given by Spence Bate claims priority.

The chief points of difference between *Gennadas intermedius* and Bouvier's description and figures of *G. alicei* lie in the presence of a rather obscure infra-antennary angle in the former species, and in the forms assumed by the internal lacinia of the second maxilla and by the merus of the second maxillipede. The petasmata of the two species are similar.

GENNADAS CALMANI *, sp. n. (Plate LXXIV. figs. 5–11; Plate LXXV. figs. 4 & 5.)

St. 232. S. of Japan. 35° 11′ N., 139° 28′ E. 345 fathoms. Two males, two females, 49–56 mm.

St. 236. S. of Japan. 34° 7′ N., 138° E. Trawl. 565 fathoms. One female, 55 mm.

St. 237. Near Yokohama. 34° 37′ N., 140° 32′ E. Trawl. 1875 fathoms. One female, 53 mm.

* This species is associated with the name of my friend Dr. W. T. Calman, to whom I am indebted for much valuable advice and for every facility for work during my visit to the British Museum.

The rostral crest (Pl. LXXIV. fig. 5), except for the greater prominence of the dorsal and apical spines, agrees closely with that of *G. parvus*. The antennary and infra-antennary angles are both acute: the latter is rather more bluntly rounded than the former. The branchiostegal spine is prominent. The distance between the cervical and post-cervical grooves, measured dorsally, is less than one-third the distance from the post-cervical groove to the hinder margin of the carapace. Both the grooves are faint dorsally and do not interrupt the strong median carina which extends the whole length of the carapace.

The second joint of the antennular peduncle, measured dorsally, is fully three-quarters the length of the ultimate joint. The antennal scale (Pl. LXXIV. fig. 9) is rather less than three times as long as its greatest width and is remarkable for its extremely narrow apex. The convex outer margin terminates in a rather strong spine, which scarcely reaches as far forward as the lamella.

The ultimate joint of the mandibular palp (Pl. LXXIV. fig. 10) is a little shorter than the width of the basal joint. In the second maxilla (Pl. LXXIV. fig. 8) the anterior lobe of the internal lacinia is very strongly constricted behind the apex, but is not broader than the adjacent lobe of the external lacinia. The anterior lobe of the latter lacinia is very broad—about twice the width of the interior lobe. The tip of the endopod is long and narrow; it bears four terminal setæ and four curved dorsal spines behind the apex. The endopod of the first maxillipede reaches a little beyond the exopod. The third joint is practically twice the length of the second, and the fourth joint is extremely minute. The basal joint bears three curved spines on its inner distal margin. The merus of the second maxillipede (Pl. LXXIV. fig. 7) is lest than twice as long as wide; the anterior prominence measures about two-sevenths the total length of the joint.

In the first pair of pereiopods the carpus and chela are of equal length; each is about two-thirds the length of the merus. In the second pair the palm is almost one and a half times as long as the dactylus, the whole chela being rather more than three-quarters the length of the carpus. The carpus of the third pair is four-fifths the length of the merus; the chela is exactly half the length of the carpus and the palm is not appreciably longer than the dactylus.

The sixth somite alone is dorsally carinate. All the abdominal sterna bear a blunt and inconspicuous median tubercle with the exception of the first, which carries a very strong sharply pointed spine in the same position. This character, which is equally definite in both sexes, will probably prove of considerable specific value: it does not seem to occur in any of the species described by Bouvier.

The apex of the telson is rounded and furnished with a series of long plumose setæ (eleven in one fairly perfect example). One specimen (Pl. LXXIV. fig. 11) bears a pair of stout spines as

each of the outer angles; in another only a single spine is found in this position.

The petasma (Pl. LXXV. fig. 4) is a comparatively simple structure and is remarkably small for such a large species. The thelycum (Pl. LXXV. fig. 5) bears some resemblance to that of *G. alicei*. The triangular plate between the bases of the third pair of pereiopods is not traceable in one of the females examined.

This species occupies a somewhat primitive position in the genus *Gennadas*. It is readily distinguished from all forms hitherto described, by the use of the characters suggested by Bouvier, by the prominent spine on the first abdominal sternum, and by the extremely narrow apex of the antennal scale.

GENNADAS BOUVIERI *, sp. n. (Plate LXXIV. figs. 1–4; Plate LXXV. figs. 6 & 7.)

St. 206. W. of Manila. 17° 54′ N., 117° 14′ E. Trawl. 2100 fathoms. One female, 28 mm.
St. 220. N. of New Guinea. 0° 42′ S., 147° E. Trawl. 1100 fathoms. Two females, 26 and 28 mm.

The rostral crest (Pl. LXXIV. fig. 1) is of much the same form as in *G. parvus*; the apical and dorsal teeth are, however, rather less prominent and the inferior margin is not so decidedly convex. The carapace is dorsally carinate throughout its length. Both the antennary and infra-antennary angles are acute and strongly pronounced, and the branchiostegal spine is distinct though very small. The cervical and post-cervical grooves are very closely approximate dorsally, the distance between them is scarcely more than one-fifth the distance from the post-cervical groove to the hinder margin of the carapace.

The second joint of the antennular peduncle, measured dorsally, is about the same length as the ultimate joint. The antennal scale (Pl. LXXIV. fig. 2), which is rather narrower distally than in *G. parvus*, is a trifle less than three and a half times as long as wide. The outer margin terminates in a short spine which extends slightly beyond the apex of the lamella.

The ultimate joint of the mandibular palp (Pl. LXXIV. fig. 3) is rather shorter than the greatest width of the basal joint. In the second maxilla the anterior lobe of the internal lacinia is slightly constricted behind its apex and is rather narrower than the adjacent and similarly constricted lobe of the external lacinia. The anterior lobe of the latter lacinia is one and a half times the width of the posterior lobe. The endopod is produced to a narrow apex furnished with two terminal setæ and four curved spines on the dorsal aspect. The endopod of the first maxillipede is about the same length as the exopod. The third joint is almost twice the length of the second; the fourth joint, though small, is rather more evident than in the preceding species. The basal joint bears three curved spines on its inner distal margin. The

* Professor E. L. Bouvier.

merus of the second maxillipede (Pl. LXXIV. fig. 4) is not quite twice as long as wide; the anterior prominence is almost one-third the total length of the joint.

In the first pair of pereiopods the carpus, which is slightly shorter than the chela, is three-fifths the length of the merus. In the second pair the dactylus is equal in length to the palm, the whole chela being a little shorter than the carpus. The merus of the third pair is very distinctly shorter than the carpus, the chela is rather more than half the length of the carpus, and the dactylus is almost as long as the palm.

The sternum of the first abdominal somite bears a large and stout median spine; on the succeeding somites this is reduced to a blunt tubercle. The sixth somite alone is dorsally carinate. The telson is squarely truncate apically and is furnished with five plumose setæ between the usual pair of stout lateral spines.

The three females differ slightly in regard to the thelycum. One example (Pl. LXXV. fig. 6) shows the dark yellow and toughly chitinized spermatophores partially inserted beneath the large rounded plate, lying between the third and fourth pairs of legs. A second specimen is as nearly as possible identical with this, but the spermatophores are wholly covered by the thelycal plate. In the third example, which shows no spermatophores, the posterior plate is much shorter than the other two (Pl. LXXV. fig. 7), but it is possible that this is due, at least in part, to the contracted condition of the specimen.

Attempts to remove the spermatophores proved unsuccessful, for their inner ends are very firmly fixed (probably cemented) in a pocket or spermatheca lying beneath the plate.

Gennadas bouvieri differs from all the other species in the 'Challenger' collection in the proportional lengths of the merus and carpus of the third pair of pereiopods. It takes rank in the second section of Bouvier's synoptic table, along with *Gennadas talismani*, *G. tinayrei*, and *G. valens*. We have no precise information concerning the branchial formulæ of these three species, but from Smith's account * it seems probable that *valens* is a true *Amalopenæus*.

Gennadas scutatus Bouvier. (Plate LXXV. fig. 2.)

Gennadas scutatus, Bouvier, Bull. Mus. Océanog. Monaco, no. 80, 1906, figs. 8 & 13, and Rés. Camp. Sci. Monaco, xxxiii. 1908, p. 42, pl. viii.

St. 267. N. Pacific. 9° 28′ N., 150° 49′ W. 2700 fathoms.
One male, 21 mm.

The ultimate joint of the mandibular palp is only a trifle shorter than the width of the basal joint. The third joint of the endopod of the second maxillipede is wider than in Bouvier's figure, and the fourth joint is much less prominent. With the

* Rep. U. S. Fish Comm. for 1882 (1883), p. 402.

exception of these details the specimen agrees in every respect with the French author's account. The petasma (Pl. LXXV. fig. 2) is almost identical with the text-figure published in 1906.

The presence of podobranchs on the first three pairs of pereiopods indicates that this form, like the four species already described, is a true *Gennadas*.

AMALOPENÆUS ELEGANS Smith.

St. 45. Off the mouth of the Delaware R. 38° 34′ N., 72° 10′ W. Trawl. 2500 fathoms. One male, 24 mm.

The solitary specimen, which is without trace of podobranchs on the first three pereiopods, is in all respects typical of this well known Atlantic species.

Three of the specimens present in the collection have not been determined :—

St. 101. Off Sierra Leone (sub *G. parvus* Sp. Bate).

This specimen, which is partially devoured by a parasitic worm, is figured in the 'Challenger' Report. Its condition is so bad that any attempt at identification is out of the question.

St. 220. N. of New Guinea (sub *G. parvus* Sp. Bate).

A single female from the above station is easily recognized as distinct from the two *G. bouvieri* occurring in the same haul. It appears to represent an undescribed species, but it does not seem advisable to attempt a description without more abundant material.

St. ? Off Bermuda (sub *G. intermedius* Sp. Bate).

The petasma of this small specimen, which was caught at the surface, does not appear to have assumed its adult form.

The following list of references may be of value to future workers at this group. So far as I am aware, it comprises all species referred to *Gennadas* (*sensu lato*) which have not been noticed in the present paper or in Bouvier's memoir :—

Gennadas carinatus Smith. N.E. Atlantic and Arabian Sea.
Smith (sub *Benthesicymus ? carinatus*), Rep. U.S. Fish Comm. for 1882 (1884), p. 396, pl. x. figs. 6 & 7.
Alcock & Anderson, Journ. As. Soc. Bengal, lxiii. 1894, p. 147.
Alcock, Desc. Cat. Indian Deep Sea Macrura, 1901, p. 46.
McGilchrist (*G. carinatus* ?), Ann. Mag. Nat. Hist., March 1905, p. 236.

Gennadas borealis Rathbun. Aleutian Is.
Rathbun, Proc. U.S. Nat. Mus. xxiv. 1902, p. 887.
Rathbun, Harriman Alaska Exped. x. 1904, p. 147, figs. 88 & 89.

Gennadas propinquus Rathbun. Hawaiian Is.
Rathbun, Bull. U.S. Fish Comm. for 1903 (1906), p. 907, fig. 61.

Gennadas sp. Ecuador.
Faxon, Mem. Mus. Comp. Zool. Harvard, xviii. 1895, p. 207.
Gennadas sp. Hawaiian Is.
Rathbun, Bull. U.S. Fish Comm. for 1903 (1906), p. 907, fig. 62.

It is much to be regretted that so little is known concerning the branchial formulæ of many of the species. At present only one undoubted species of *Amalopenæus* is known—*A. elegans* Smith, though it is probable that the form described by Smith as *valens* also belongs to the same genus. Six species, viz., the four described in this paper along with *G. scutatus* Bouvier and *G. carinatus* Smith belong to *Gennadas* (*sensu stricto*). In all the remaining species precise information concerning the branchial formula is lacking. Even those who are not disposed to admit the existence of two distinct genera will recognize the value of the character for splitting the group into workable sections.

EXPLANATION OF THE PLATES.

PLATE LXXIII.

Gennadas parvus Sp. Bate.

Fig. 1. Lateral view of the anterior part of the type specimen. × 10.
2. Apex of the endopod of the second maxilla. × 65.
3. Second maxillipede. × 11½.
4. Antennal scale. × 11.
5. Mandibular palp. × 24.
6. Apex of telson. × 26.

Gennadas intermedius Sp. Bate.

Fig. 7. Lateral view of the anterior part of the type specimen. × 6.
8. Mandibular palp. × 5½.
9. Apex of the endopod of the second maxilla of the type specimen. × 30.
10. Apex of the endopod of the second maxilla of the second specimen. × 30.
11. Part of the endopod of the second maxillipede. × 5½.
12. Apex of the telson. × 26.

PLATE LXXIV.

Gennadas bouvieri, sp. n.

Fig. 1. Lateral view of the anterior part of the carapace. × 7½.
2. Antennal scale. × 8½.
3. Mandibular palp. × 10½.
4. Second maxillipede. × 14.

Gennadas calmani, sp n.

Fig. 5. Lateral view of the anterior part of the carapace. × 5⅕.
6. Part of the second pereiopod, showing the epipod, podobranch, and two arthrobranchs *in situ*. × 9.
7. Part of endopod of second maxillipede. × 6.
8. Second maxilla. × 6½.
9. Antennal scale. × 4.
10. Mandibular palp. × 7.
11. Apex of the telson. × 21½.

PLATE LXXV.

Gennadas parvus Sp. Bate.

Fig. 1. Petasma, right side. × 17.

Gennadas scutatus Bouvier.

Fig. 2. Petasma, left side. × 25.

Gennadas intermedius Sp. Bate.

Fig. 3. Petasma, right side. × 16.

Gennadas calmani, sp. n.

Fig. 4. Petasma, left side. × 19.
5. Thelycum. × $7\frac{1}{2}$.

Gennadas bouvieri, sp. n.

Fig. 6. Thelycum, showing spermatophores *in situ*. × 20.
7. Thelycum of another specimen. × 20.

6. Notes on a Young Walrus (*Odobœnus rosmarus*) recently living in the Society's Gardens. By P. CHALMERS MITCHELL, M.A., D.Sc., Hon. LL.D., F.R.S., Secretary to the Society.

[Received June 11, 1909.]

(Plate LXXVI.*)

The Society received on Nov. 23, 1908, two young examples of the Atlantic Walrus, *Odobœnus rosmarus*. The animals came from Franz Josef Land and were cubs born in the spring of the same year, and probably, therefore, under nine months old. It was stated that whilst the whaling ship, which brought them from the Arctic region, was in harbour, the animals were allowed to go to the bottom, ropes being tied round their shoulders to prevent their escape, and the sailors were of the opinion that they fed themselves there although they had no views as to what the food was. On the other hand, they had been fed on the voyage until their arrival in England, on whale's blubber. On their arrival at the Gardens, the only food that they would take at first, and which afterwards they appeared to prefer, was horses' fat. They took this from the hand in small pieces, and as they sucked it in, made a slobbering sound with their protruded lips. Whatever food they took, either from the hand, or from the ground, or from a bucket mixed with salt and water, they always sucked in small pieces, and would take only when it was soft and slippery. As fat is not a sufficient diet, every effort was made to get them to take something more nutritious. After a good deal of persuasion they were induced to take fresh fish, cleared of bones and cut into strips; they preferred cod to haddock or whiting, and would not touch filleted herring. They ate greedily the soft viscera of cod, such as liver and roe, and portions of the intestines. They also took mussels and scallops removed

* For explanation of the Plate see p. 732.