

III. — PALLENOPHIS AND RIGONA, WITH DESCRIPTION OF A NEW SPECIES.

BY J. C. C. LOMAN, AMSTERDAM. (WITH 6 TEXTFIGURES).

*Pallenopsis* is one of the earliest-known Pycnogonids, yet it also may boast of being well-nigh the most misunderstood. Its name and exhaustive characteristics were published not until 1880 by Wilson, but as early as 1804 Latreille gave an account of an animal by the name of *Phoxichilus phalangioïdes*, which lately proved to be a true *Pallenopsis*. For this original description I beg to refer to my newly published article.<sup>1)</sup>

Wilson has given the following diagnosis of his new genus:

„Body slender as in *Phoxichilidium*, segmented. Rostrum cylindrical. Abdomen slender, simple. Antennae with four joints, large and chelate. Palpi rudimentary, composed of a single joint. Accessory leg present in both sexes, ten-jointed. Legs slender, dactylus with auxiliary claws. Two very unequal pairs of large ocelli.”

He further mentions the peculiar glandular duct near the middle of the fourth joint of the legs in the male which he supposes to be perhaps of generic significance.

The number of known species amounts to more than thirty, which I have enumerated in the following table. They have been arranged after the depths they were caught in. Moreover I have given in the list some characteristics of the animals, clearly showing the most important special differences.

Depth. Most species belong to the genuine deepsea-forms, however not a few are found in shallow water; of some others, the depth they live in, is unknown. Moreover the same species sometimes was met with both in the abyss and in much smaller depths. In general the probabilities are that deep-sea-species at the same time often occur in shallow water. In the list only the greatest depth is quoted.

Segmentation. Most of the species have distinct segments, but there are some with a short and rigid trunk, all segments having grown together, admitting of no movement. Still others stand between those extremes. The segmentation of *P. patagonica* (or of its synonyms) is sometimes perfect, sometimes less distinct. The cause of these differences is

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1) Loman, Les Pycnogonides et les règles de la nomenclature zoologique, in: Tijdschr. Ned. Dierk. Vereen. (2), 14, 1915, p. 187.

unknown, yet it seems not improbable that they are partly occasioned by disparity of age.

**Scape of chelifores.** We find the like differences with the segments of the chelifores as with the segmentation of the trunk. Most species possess a scape, distinctly divided into two pieces; and the type of the genus, *Phoxichilus phalangioides*, so correctly described by Latreille in 1818, makes no exception. However, among the spoils of the Siboga-Expedition, published in 1908, there were three animals with a totally undivided scape. This quality was accompanied by an indistinct segmentation of the body, by the possession of long auxiliary claws, and by the small ovigera of the female, which have by ankylosis fewer segments than the normal number of ten. At the time I included those forms in a new sub-genus *Rigona*. At present already nine of them are known, which are marked with an asterisk (\*). But still others, as 16. *P. sibogae*, 29. *P. fluminensis* Kr. and 31. the Japanese species from Sagami-Bay, agree in some respects with *Rigona* (scape of chelifores inarticulate, strong auxiliaries, ankylosis of female oviger); whilst the segmentation is quite distinct, the trunk not being condensed. Comparative examination will be required to make out the real significance of these differences.

**Where found.** *Pallenopsis*-species are found everywhere, with the exception of the arctic seas. The most northern are 5. *P. plumipes* Meinert and 7. *P. tritonis* Hoek, both from the Atlantic ocean. The majority of captures were made in southern regions, and especially the antarctic and sub-antarctic seas prove to be the habitat of a good many of them.

Owing to want of room not every locality has been inserted in the list. And as we have to make allowance for the synonymy of several species, it cannot be wondered at that some names have fallen out. Thus, following the lead of others, I accepted *P. patagonica* Hoek to be the same animal as *P. glabra* Möbius, as *P. hiemalis* Hodgson, and as *P. patagonica*, var. *elegans* of Hoek. In the same way *P. gaussiana* and *P. setigera* of Hodgson are synonyms of *P. vanhoeffeni* Hodgson. Finally, we know almost for certain that *P. holti* Carpenter is the female of *P. tritonis* Hoek. But on the other hand there are four authors who gave the same name of *P. fluminensis* to four animals, most probably not belonging to one species, i. e.: Kröyer, Böhm, Hoek and Schimkéwitsch. Though they were taken into the list, yet a careful investigation of the types will be needed to settle this question. For if we find for instance at n<sup>o</sup>. 17 the feet to be covered by numerous long hairs (after Böhm), and Kröyer (n<sup>o</sup>. 29) only mentions some rows of short hairs, there is reason enough to be very sceptic about the species being identical. (Compare Schimkéwitsch and Meinert).

Auxiliary and main claws. The quotient varies between 0 and  $\frac{5}{8}$ . Most of the true *Pallenopsis*-species have small auxiliaries, and therefore the quotient never attains  $\frac{1}{2}$ . On the other side *Rigona* possesses the longest auxiliaries and the quotient never sinks under  $\frac{1}{2}$ .

Eyes. A single species (8. *P. tydemani* Loman) has no eyes at all, a few show small or rudimentary eyes, but the majority, even of the abyssal forms, possess four eyes, the two foremost generally being larger than the posterior ones. They are quoted in the list as „normal”. Sometimes this last characteristic has been disregarded by the authors, on the contrary they emphatically describe the four eyes to be of a size. Yet I believe that in all these cases closer inquiry and better examination will prove them to be of a different size<sup>1)</sup>.

Male oviger. In my list the male ovigers are always called „normal”, i. e.: „robust, ten-jointed”. The only exception to this rule has been found in 13. *P. spicata* Hodgson, with a remarkable form of the male oviger<sup>2)</sup>. But as only a single specimen of the species is known, we are not, perhaps, allowed to entirely exclude accident or monstrosity.

Female oviger. As „normal” I mentioned the ten-jointed, but much weaker than in the males. Species, having fewer segments, coalesced by ankylosis, are given apart.

Legs, especially 1. Tibia. Some animals have hairless, smooth legs; others, we know, are grown over with very short hairs; others again show long, woolly or even feathered hairs; a few, finally, are described as possessing spiny feet.

I have had an opportunity of comparing the length of the legs and of the body, in several species. The latter has been measured from the frontal margin in the middle line to the origin of the abdomen. The result of this comparison is that there are species (4. *P. californica* Schimkéwitsch) with excessively long legs, nearly eleven times longer than the trunk, whereas for instance this quotient in 15. *P. villosa* Hodgson comes to rather more than four and a half. There does not seem to be a profound difference between the forms with a condensed body and those with clearly visible segments. For the feet of *Rigona* are much shorter and thicker, it is true, but in the same way the length of the trunk diminishes, the quotient remaining unaltered.

1) Compare Meinert, who has carefully reexamined the original type of *P. fluminensis* in the Copenhagen Museum.

2) Calman, The Pycnogonida of the „Terra Nova”, 1915, p. 44.

Number	Pallenopsis-species, and author.	depth in meters	segmentation	scape of chelifores	where found
1	<i>pilosa</i> HOEK.	to 3800	distinct	2-jointed or indist. 2-jointed	Antarctic Seas
2	<i>mollissima</i> HOEK.	3500	distinct	2-jointed	off Yedo; and California
3	<i>oscitans</i> HOEK.	3000	distinct	2-jointed	W. of Azores
4	<i>californica</i> SCHIMKÉWITSCH.	2500	distinct	2-jointed	Gulf of Panama
5	<i>plumipes</i> MEINERT.	1800	distinct	2-jointed	Atlantic 61° N. Lat. 13° W. Long.
6	<i>longirostris</i> WILSON.	1000	distinct	2-jointed	E. Coast of N. Amer.
7	<i>tritonis</i> HOEK.	930	distinct	2-jointed	Faroe Channel
8	<i>tydemani</i> LOMAN.	800	distinct	2-jointed	Postillon Islands; Java Sea
9	<i>forficifer</i> WILSON.	670	distinct	2-jointed	E. Coast of N. Amer.
10	<i>macronyx</i> BOUVIER.	420	distinct	2-jointed	Shetland-Islands; Antarctis
11	<i>brevidigitata</i> MÖBIUS.	404	distinct	2-jointed	E. Africa: Dar-es-Salaam
12	<i>meridionalis</i> HODGSON.	385	distinct		Winter-Quarters, Gauss-Expedition
13	<i>spicata</i> HODGSON.	350	distinct	inarticulate	Winter-Quarters Gauss-Expedition
14	<i>patagonica</i> HOEK.	315 to 1000	distinct or less distinct	2-jointed or indist. 2-jointed	not far from Patagonia, etc.
15	<i>villosa</i> HODGSON.	180	distinct	2-jointed	Coulman Island, Discovery-Expedition
16	<i>sibogae</i> LOMAN.	80	distinct	inarticulate	Kwandang Bay, N. Celebes

auxiliaries: main claws	eyes	male oviger	female oviger	legs, espec. 1. tibia
$\frac{1}{4}$ to $\frac{1}{3}$	normal	normal	normal	numerous long, thin hairs
$\frac{1}{4}$	rudimentary	normal		short silky hairs
small	rudimentary	normal		rows of very short hairs
minimal	normal	normal		rows of short hairs
minimal	four little eyes		normal	plumose hairs
$\frac{1}{4}$	normal	normal	normal	sparsely hairy
$\frac{1}{4}$	normal	normal	normal	very short hairs
$\frac{1}{4}$	no eyes found	normal	normal	rows of short hairs
$\frac{1}{3}$	normal	normal	normal	sparsely hairy
0	normal	normal	normal	rows of short hairs
0	normal	normal	normal	rows of short hairs
0				
0		club-shaped, 7-jointed		not conspicuously setose
$\frac{2}{3}$	normal	normal	normal	numerous very small hairs
$\frac{1}{3}$	normal	normal	normal	woolly hairs
$\frac{2}{3}$	normal		very feeble, 7-jointed; ankylosis	some feathered hairs

Number	Pallenopsis-species, and author	depth in meters	segmentation	scape of chelifores	where found
17	fluminensis BÖHM.	80	distinct	inarticulate	Coast of Patagonia; strait of Magelhan.
18*	spinipes CARPENTER.	80	indistinct	inarticulate	Maldives; Admirantes
19*	virgatus LOMAN.	73	indistinct	inarticulate	E. from Sumbawa
20*	hoeckii MIERS.	67	indistinct	inarticulate	Thursday Island, Torres Strait
21*	ovalis LOMAN.	36	indistinct	inarticulate	Paternoster Islands, E. I. Archipelago
22	fluminensis HOEK.	35	distinct	indistinctly 2-jointed	off Bahia
23	lanata HODGSON.	25	distinct	2-jointed	Scotia Bay, Antarctis
24*	crosslandi CARPENTER.	20	indistinct	inarticulate	Coast of British E. Africa
25*	rigens LOMAN.	13	indistinct	inarticulate	Jedan Islands, E. I. Archipelago
26*	van höffeni HODGSON.		indistinct	inarticulate	Winter-Quarters, Gauss-Expedition
27	phalangioides LATREILLE.		distinct	2-jointed	Australian Sea
28	johnstoniana WHITE.		distinct	2-jointed	Southern Sea
29	fluminensis KRÖYER.		distinct	inarticulate	off R. de Janciro
30*	obliqua THOMSON.		indistinct	inarticulate	Lyttelton Harbour, N. Zealand
31	sp.? LOMAN.		distinct	indistinctly 2-jointed	Sagami-Bay, Japan
32	fluminensis SCHIMKÉWITSCH.		distinct	inarticulate	Strait of Magelhan; Abrolhos Islands
33*	aculeata LOMAN.		indistinct	inarticulate	Dunedin, N. Zealand

auxiliaries: main claws	eyes	male oviger	female oviger	legs, espec. 1. tibia
$\frac{2}{3}$	normal		7-, 8-, 9-jointed, weak	numerous long hairs
$\frac{2}{3}$	normal	normal	8-jointed, weak	spiny
$\frac{4}{5}$	normal	normal		smooth
$\frac{2}{3}$	normal	normal	9-jointed, ankylosis	smooth
$\frac{3}{4}$	normal		7-jointed, ankylosis	smooth
$\frac{2}{3}$	four, of a size	normal		stout hairs
small	normal	normal	normal	richly setose
$\frac{5}{6}$	normal		8-jointed, ankylosis	feathered spines, on finger-like processes
$\frac{3}{4}$	normal		8-jointed, ankylosis	smooth
strong auxiliaries		?		coarse setae
		normal		
		normal		
a little more than $\frac{1}{2}$	normal	normal		rows of short hairs
$\frac{3}{3}$	four, of a size		8-, 9-jointed ankylosis	few spiny hairs
$\frac{2}{3}$	normal	normal		rows of short hairs
over $\frac{1}{2}$	normal	normal	8-jointed, ankylosis	rows of short hairs
$\frac{2}{3}$	normal		7-, 8-, 9-jointed, ankylosis	spiny

The characteristics of the true *Pallenopsis*-species are:

- 1°. Body slender, distinctly segmented, lateral processes separated.
- 2°. Feet long and thin.
- 3°. Male ovigers strong, ten-jointed.
- 4°. Female ovigers much shorter and weaker, ten-jointed.
- 5°. Eyes as a rule small; sometimes rudimentary or wanting.
- 6°. Auxiliary claws small (at the utmost nearly half of main claw), minute or wanting.
- 7°. Scape of chelifores two-jointed.
- 8°. Mostly found in deep water; some species occurring also in shallow water.

The sub-genus *Rigona* is distinguished by the following points:

- 1°. Body short, the segments grown together, lateral processes not separated, often coalesced.
- 2°. Feet short, thick-set and robust.
- 3°. Male ovigers normal, ten-jointed, strong.
- 4°. Female ovigers reduced, much feebler, at the most nine-jointed; segments more or less coalesced.
- 5°. Large eyes; ocular tubercle clumsy.
- 6°. Auxiliary claws long, from over half the main claw to five-sixths of it.
- 7°. Division of immovable scape of chelifores indistinctly or scarcely visible.
- 8°. Found in shallow water.

Besides *Pallenopsis fluminensis* of different authors 13. *P. spicata* Hodgson, 16. *P. sibogae* Loman and 31. the Japanese species of the Sagami-Bay do not square with this scheme. Their holotypes need renewed and closer inquiry before we can judge of them.

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*Pallenopsis (Rigona) aculeata* n. sp.

Occurrence. Dunedin, New-Zealand, 4 ♀. Depth? Collection Leiden Museum. K. Suter.

Trunk indistinctly segmented (Fig. A), the somites grown together. Lateral processes likewise coalesced, with two or three very small conical tubercles distally. First segment equal in length to the two following,



produced over the base of the proboscis. Ocular tubercle at the front margin, conical from the base. Anterior eyes a little larger than posterior.

Proboscis (Fig. B) cylindric, directed obliquely downwards, with conically rounded apex.

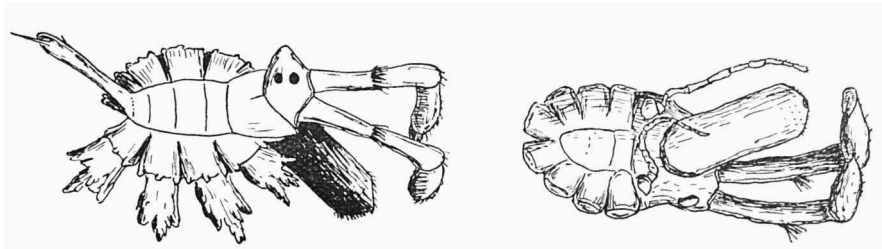


Fig. A.  
*Pallenopsis (Rigona) aculeata* n. sp. ♀. Dorsilateral view of body. Legs omitted, except first coxae of right side.

Fig. B.  
*Pallenopsis (Rigona) aculeata* n. sp. ♀. without legs. Ventri-lateral view.

Abdomen (Fig. A) long, directed obliquely backwards.

Chelifore (Fig. A, B) with undivided scape, showing on a low ridge at the upper side a row of small spiny hairs.

Palp (Fig. C) an oval papilla between the bases of chelifore and oviger.



Fig. C.  
*Pallenopsis (Rigona) aculeata*  
n. sp. ♀. Palp.



Fig. D.  
*Pallenopsis (Rigona) aculeata* n. sp. ♀.  
Left female oviger.

Oviger (Fig. D) short, curved in the form of an  $\zeta$ , composed of nine joints. The fifth joint is the largest, but nearly equal in length to the fourth; the sixth is half the length of the fifth. The seventh and eighth joints are coalesced, longish, but thinner. The last two are still smaller and bear stiff setae.

Legs (Fig. E) short, with conspicuous lateral line. Second coxa nearly thrice the length of the first, which bears dorsally strong conical processes. Third of the length of the first. Femur stout, thick-set, in the centre of the ventral side it has an excrescence, a kind of hunch. The first tibia is shorter and thinner, with its distal end produced dorsally into a conical process, carrying a strong spine; the second tibia is elon-

gated. The tarsus is very small, the propodus slightly curved. The terminal claw is short, about one third of the length of the propodus; the auxiliaries are nearly two-thirds of the main claw. The limbs bear dorsal spines on the coxae, the femur and the first tibia; ventral ones on the

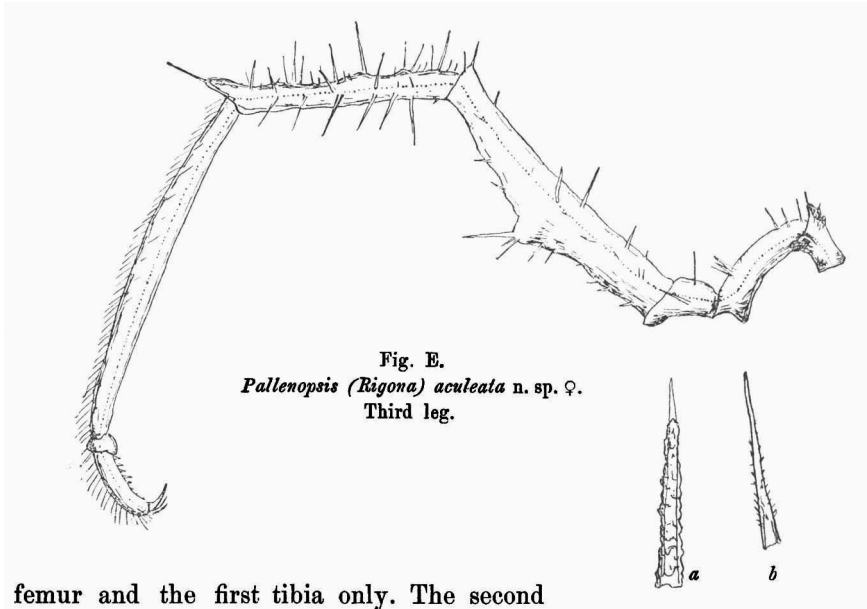


Fig. E.  
*Pallenopsis (Rigona) aculeata* n. sp. ♀.  
Third leg.

femur and the first tibia only. The second tibia and the propodus are covered dorsally with rows of stiff setae. Propodus with small ventral spines, very small near the distal end.

Most of the large spines are covered with mud (Fig. Fa). When cleaned and seen under the microscope they appear to be feathered, showing small lateral barbs (Fig. Fb).

Fig. F.  
*Pallenopsis (Rigona) aculeata*  
n. sp. ♀. Spines of first tibia,  
magnified. *a* covered with mud;  
*b* clean one.

Measurements in mm.:

- Length of trunk:  $2\frac{3}{4}$ .
- Length of proboscis: 2.
- Length of abdomen:  $1\frac{1}{2}$ .
- Length of third leg: 22.
- Length of female oviger:  $2\frac{1}{4}$ .
- Longest spines:  $\frac{3}{4}$ .

Remarks. Of the four specimens only one (the type) is an adult female, with the genital apertures on the second coxa of the legs, and

with nine-jointed ovigers. The remaining three are young ones, probably also females, with ovigers not yet fully developed, seven- or eight-jointed; the genital pores indistinct. It is evident therefore, that the normal number of joints of the female ovigers is reached only in a very late stage. Although many females of other species are described as having likewise but seven- or eight-jointed ovigers, it may be asked if they were all truly adult specimens. And, when looked at in the proper light, is it not better to consider those seven- or eight-jointed ovigers as not being full-grown; and not as the result of coalescence?

The type of *Pallenopsis (Rigona) aculeata* n. sp. resembles *Phoxichilidium obliquum* of Lyttelton Harbour, New Zealand, and perhaps ampler researches may prove them to be synonyms. But Thomson assures: „The ovigerous legs are about 10 mm. long . . . . . The legs of the 3rd pair are 31 mm. long.” And as the feet are furnished with few spines only, and the four eyes are of one and the same size, I have not ventured for the present to identify the two species.

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