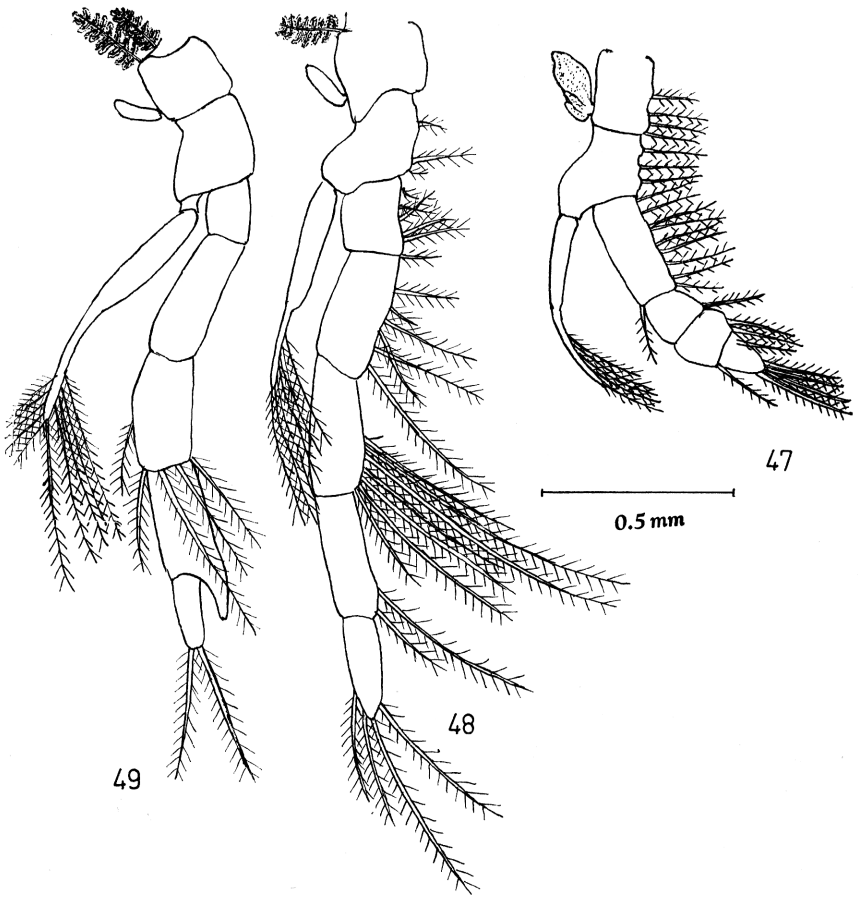
**Distribution and Remarks.**

Fig. 50.

In 1863 FRITZ MÜLLER described some decapod larvae from Desterro in southern Brazil. His larva no. 3 was captured in several specimens ranging in size from 1.2 to 3 mm. He gives a full figure (Fig. 18) of a *Solenocera* in the third Protozoea stage and the front part of carapace with rostrum and first antenna of possibly a first Mysis (Fig. 22). In 1893 ORTMANN describes some larvae from the German Plankton Expedition der Humboltstiftung. His larvae were from 5 to 10 mm and one of the larger of them (his Pl. IV, Fig. 5) must belong to the second Mysis stage. ORTMANN's larvae were taken in the Florida current off Bermuda,




Figs. 47–49. *Solenocera muelleri*. Second Mysis. Figs. 47–48, second and third maxillipedes. — Fig. 49, first pereiopod.

J. No. 45, 47, and along the coast of northern Brazil in the southern Aequatorial Current, J. No. 218, 228, 231, 232, 235, 246. Although the spines on abdomen and carapace of his larvae were not the same as those pictured by MÜLLER, he suggests that his larvae and the larvae described by MÜLLER could belong to the same species, only representing different stages of development. The fact that they both were found at the coast of Brazil gave him further support for this suggestion, and he therefore named his larvae *Opisthocaris muelleri* nov. sp.

In this present material I have larvae of both first and second Mysis of a *Solenocera* from the coast of Brazil and comparing these both with MÜLLER's figures of his third Protozoea and ORTMANN's figures of a second Mysis, I come to the conclusion that the larvae from these three collections are different developmental stages of the same species, which I therefore have named *Solenocera muelleri*.

If we first compare my first Mysis with MÜLLER's third Protozoea we see that both have branchiostegal and branchio-lateral spines, further MÜLLER's larva has a lateral swelling with two spines on the carapace

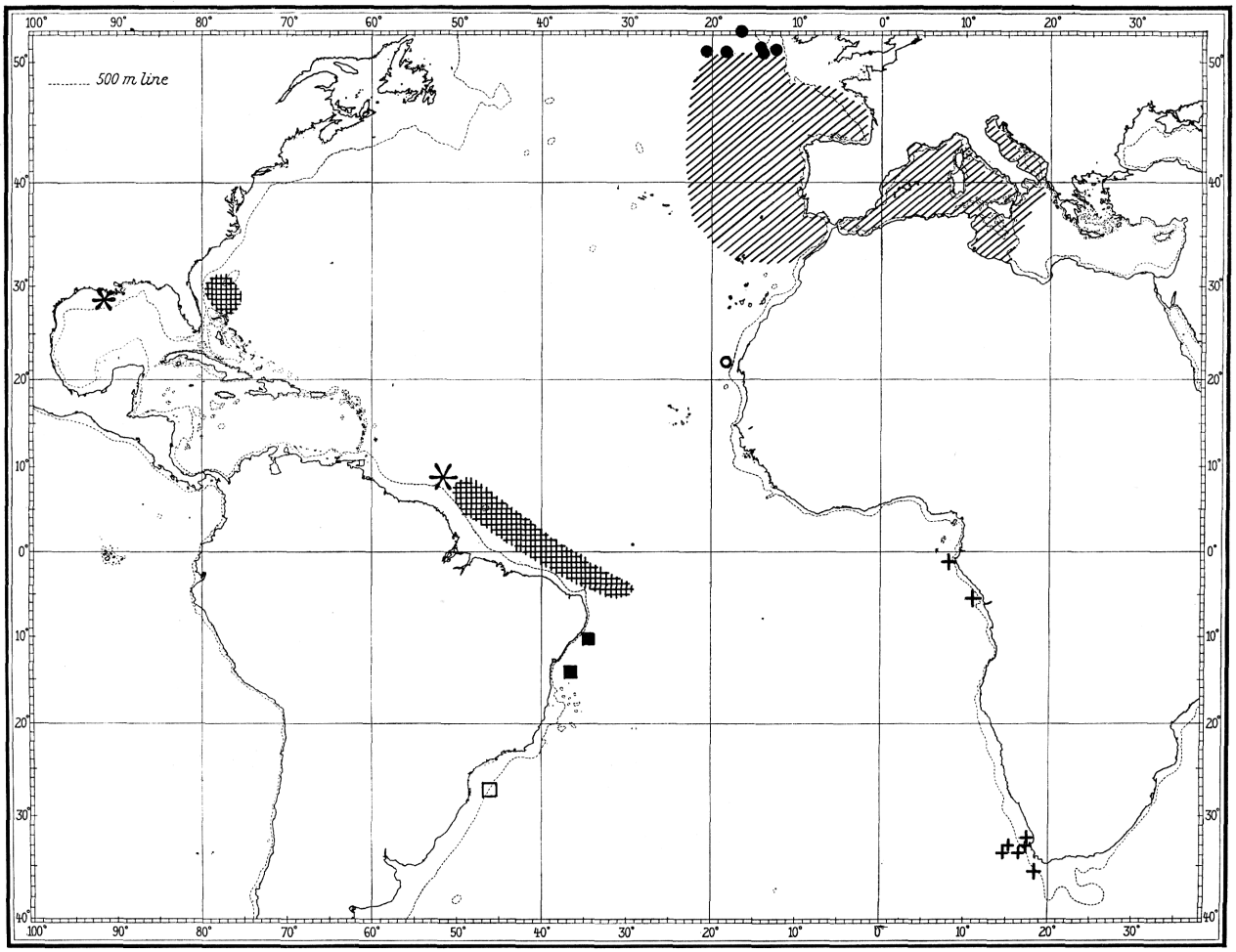



Fig. 50. Map of distribution.

above the branchiostegal spines, which also is present in my first Mysis only with three additional small spines. This swelling is the developing branchiostegal lobe which appears in the second Mysis where the swelling has disappeared. On the abdomen MÜLLER only pictures a dorsal and a lateral spine; it is very likely that the dorso-lateral spines of the Mysis stages not have developed in the Protozoea. Further MÜLLER has by mistake moved the pair of pre-hepatic spines up in the middle line and pictured them as a single spine, which easily can happen, as they are very small and can be overlooked in a poorer microscope than we have to-day. This must be the case as no *Solenocera* larva has more than one dorsal spine placed directly in the medial line between the dorsal organs. This explanation also holds good for a few of the other missing spines, or probably these have not yet been developed in the Protozoea. MÜLLER further pictured the latero-posterior marginal spine as one of the branchio-lateral spines not noticing the difference in shape and size. Comparing ORTMANN's figures with mine of the second Mysis, it is seen, that they generally agree, ORTMANN only missing smaller details, because of his less detailed drawing. He mentions neither branchiostegal spines, or branchio-lateral spines, nor the vestigial bud of the latero-posterior marginal spine. He also only pictures one dorsal spine on the abdomen. But his showing of both a post-antennal spine and a latero-hepatic spine is very characteristic, as such spines not are found in any other known species. Further the long hairs of

the abdomen and the woolly carapace are also characteristics of importance. I think therefore that it is justifiable to regard them all as larvae of the same *Solenocera* species. If we do so we have a species which is found east of Florida and along the Brazilian coast down to Desterro in southern Brazil on about 28th southern latitude.

When trying to discover which adult *Solenocera* this larva belongs to we are on much less solid ground. Only it must be one of the most common *Solenocera* species from this area, because the larvae are so relatively numerous and frequent. Further as the larva has in general features some resemblance to the larva of *Solenocera membranacea*, it can be suggested as a possibility, but not more, that this larva is the larva of *Solenocera vioscai*, BURKENROAD, which is the *Solenocera membranacea* of the western hemisphere and is known from the Venuzuelan coast and from the coast of Louisiana.

If we compare the Mysis larva of *Solenocera membranacea* with the same stage of *Solenocera muelleri* we find a strong resemblance. They have both an elongate carapace with a large rostral plate, which is smallest in *S. membranacea*, a little larger in *S. membranacea* subsp. *capensis* and nearly twice as large in *S. muelleri*. They all have branchiostegal lobes with three spines, and here the lobes are largest in *S. membranacea* and smallest in *S. muelleri*. The postantennal spine in *S. membranacea* has been replaced by a post-orbital spine, but, as already mentioned, it is in *S. membranacea* placed between the antennal and the orbital spine, so that these two can be identical. Further we have in all species many lateral spines, and on the anterior part of the carapace *S. muelleri* has lost the following two spines, which are present in *S. membranacea*: the medio-gastric spine and the supra-hepatic spine, instead *S. muelleri* has three small branchio-lateral spines which are not found in *S. membranacea*, but these spines are largest in the first Mysis and nearly gone already in the second Mysis, and the same goes for the latero-posterior marginal spine which is well developed in the first Mysis but lost in the second Mysis. The strongest disagreement between them is that the medio-posterior marginal spine is paired in *S. muelleri*, but single in *S. membranacea* and *S. membranacea* subsp. *capensis*. Finally all these species are strongly hairy on carapace and abdomen with some very characteristic long hairs; these hairs are least numerous and shortest in *S. membranacea* and largest in size and number in *S. muelleri*, *S. membranacea* subsp. *capensis* is placed in between. The hairs are in all three species placed in very much the same groups. On the abdomen the spine formulae are the same for all three species. On the telson *S. muelleri* has two lines of dorsal teeth not found in *S. membranacea* and *S. membranacea* subsp. *capensis*.

The appendages are very much the same in all three and have a fleshy mandibular palp and strongly carnivorous mouth appendages; the thoracopods and uropods in the second Mysis are much alike. Therefore, although we have no proof, it is most likely that *Solenocera muelleri* is the larva of SMITH's *S. membranacea* from Venuzuela and BURKENROAD's *S.* sp. larva *vioscai* from Louisiana. If this later is proven to be true they all have to bear the name *Solenocera muelleri*.

## *Solenocera* sp. larva *aequatorialis*

Figs. 51–65.

### Localities.

**Mysis II:**

"Discovery" St. 276. 5°54′00″ S–11°19′00″ E 110–0 m. 5.8.1927. B.M. 1 spec.

### Description.

#### Mysis II.

The sample contained only a single specimen which had been partly dissected earlier. The figures have therefore been drawn after the three separate pieces found in the sample, and appearing as parts of the same specimen.

*Carapace.*

Formula: 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 15. 17. 18. 19. 20. 21. 22. 24. 26. 27. 28. (29). 30.

The rostrum is well developed and a little curved with a strong carina on the carapace including 3 teeth. At the posterior base of the rostral carina a small anterior dorsal organ is placed; the posterior dorsal organ, in front of the medio-posterior marginal spine, is also diminutive.

Along the margins to each side of the rostrum is a large, ventrally curved, supra-orbital spine reaching over and beyond the eye. Behind it and still a little more laterally of the margin arises a smaller spine underneath the second antenna and the eye, the antennal spine. Behind this and for about one third of the length of the carapace is developed a pair of dominant wings, the alae branchiostegalis, which are very characteristic for this species. Their free margins are edged with brims of filamental teeth, the branchiostegal teeth. Along the medial part of the carapace the margin is without such brims, which only start again in the posterior third of the carapace, the branchio-lateral brim-teeth. On the latero-posterior corner of the carapace is a short spine, the latero-posterior marginal spine, covered with a toothed filament; above it is the poster-branchial groove spine, a lamella-shaped spine with filamental teeth on its dorsal margin. Finally, posteriorly in the medial line, the medio-posterior marginal spine forms a short backwards pointing spine, which in its most distal part is split into two pointed tips.

On the carapace, but inside the margin is the dorsal or epicardiac spine, which is unpaired and placed in the medial line far back on the carapace. To each side of it is a post-cardiac spine. This is the only species known with such a spine, except *S.* sp. larva *sumatransis*, where a branchio-cardiac groove spine has moved into this position in the third and fourth Mysis stages. Behind the antennal spine is the long curved post-antennal spine; it is placed a little nearer to the longitudinal medial line of the carapace than the antennal spine, and this makes it open to discussion whether it is a post-antennal or a post-orbital spine. On the diagram Fig. 1 both are shown, but except for *S. muelleri* I have considered them as post-antennal spines. In *S.* sp. larva *aequatorialis* alone the spine is placed behind the antennal spine, arising from a hump on the carapace placed in line with the supra-orbital spine. Further the post-orbital spine is placed inside the cervico-branchial groove which reaches the carapace margin anteriorly between the supra-orbital spine and the antennal spine. But in *S.* sp. larva *aequatorialis* this groove is displaced due to the hump at the base of the "post-antennal" spine, and reaches the margin between the rostrum and the supra-orbital spine. For these reasons I have chosen to use the same name as in the previously described larvae and call this spine the post-antennal spine. Farther back between this and the post-cardiac spine is another spine, the latero-hepatic spine, which is much smaller than the two in front of it and of about the same size as the following paired spines. To each side of the anterior dorsal organ are the medio-gastric spines placed in front of the not very distinct cervical groove. Behind the medio-gastric spines and the cervical groove are the pre-hepatic spines, and behind them again the supra-hepatic spines, the latter are not only a little behind the pre-hepatic spines, but also in front of the dorsal spine and placed a little more laterally on the carapace than the pre-hepatic ones. Finally the branchio-cardiac groove is present, but without any spines.

*Abdomen.*

Formula, segments I–V. 1. 2. 3., segment VI. 1. 3. 4.

The first five abdominal segments have each a well developed pleuron as a free curve ventrally from the tergum. The terga have laterally on their posterior margins, a little above the middle, an incision which is stronger on the fifth segment than on the preceding ones. All the segments have a strong backwards-pointing spine which is straight on the first abdominal segment but backwards curving on the following segments. At the base of this spine on the dorsal ridge of the segment are several small accessory spines. On the sixth segment a double row of thin, accessory spines is found along the whole dorsal ridge. The first five segments have a lateral and a dorso-lateral spine both well developed and of about equal sizes,

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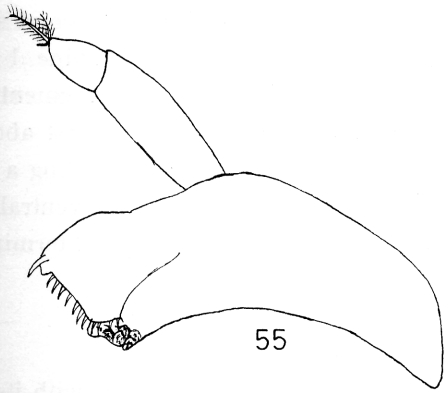
Figs. 51–58. *Solenocera* sp. larva *aequatorialis*. Second Mysis. Fig. 51, carapace, from dorsal. — Fig. 52, same, from lateral. — Fig. 53, abdomen. — Fig. 54, last part of sixth segment, telson and uropods. — Fig. 55, mandible. — Fig. 56, labium. — Fig. 57, first maxilla. — Fig. 58, second maxilla.



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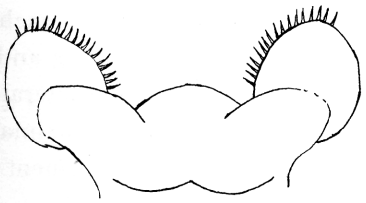

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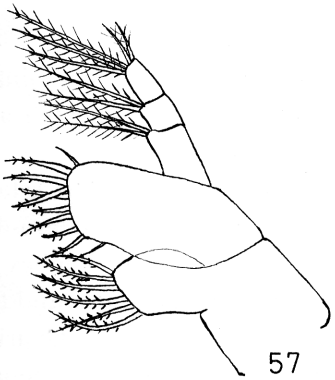

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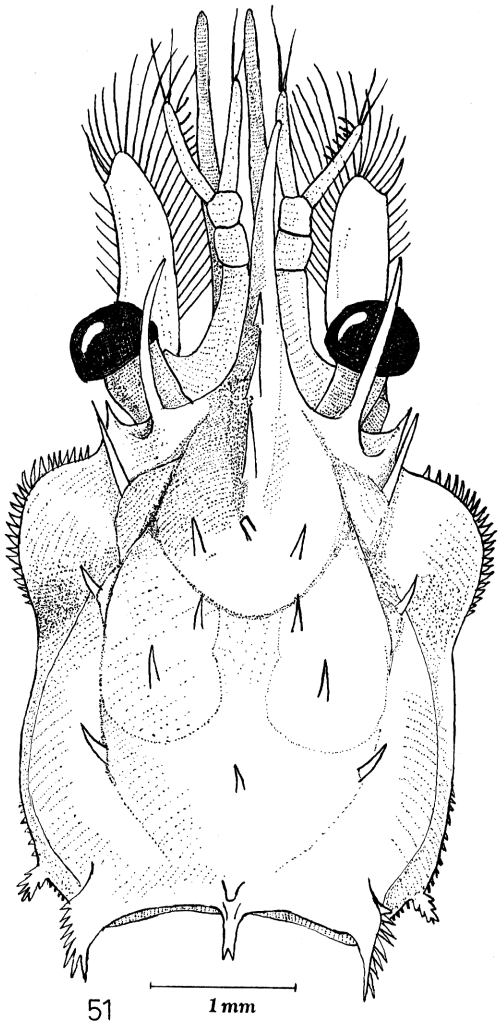
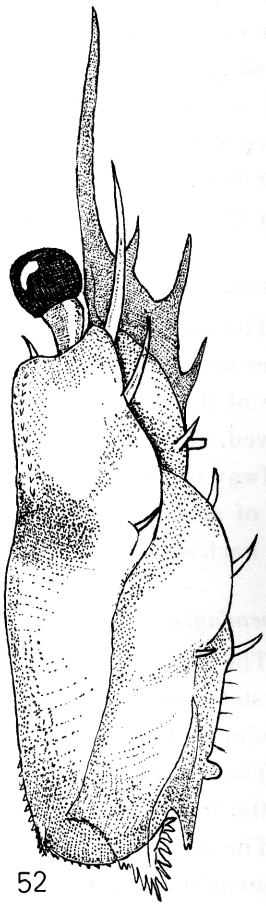
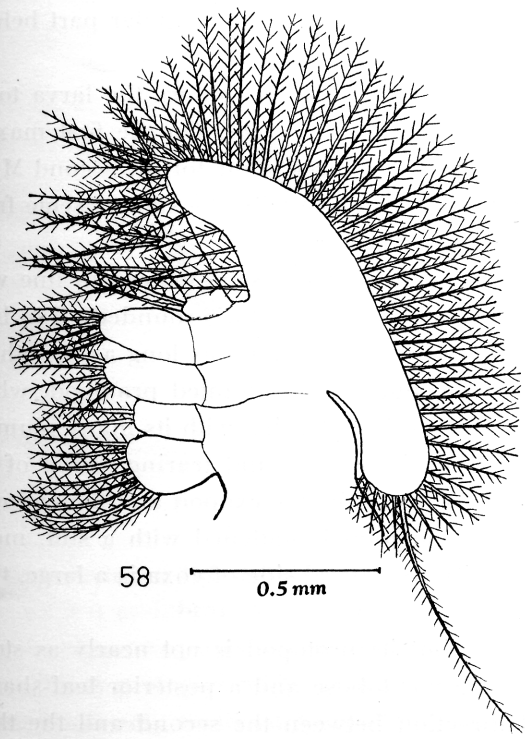


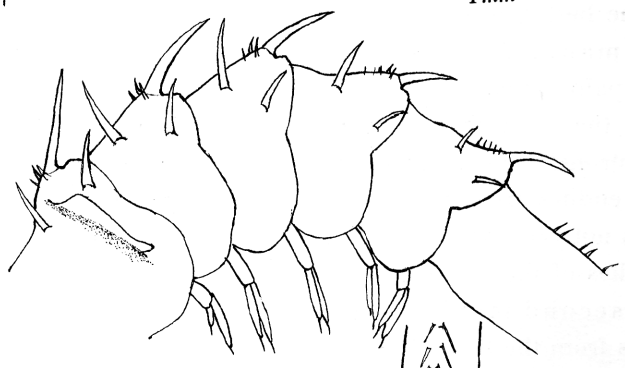
51 1 mm



52 1 mm



58 0.5 mm



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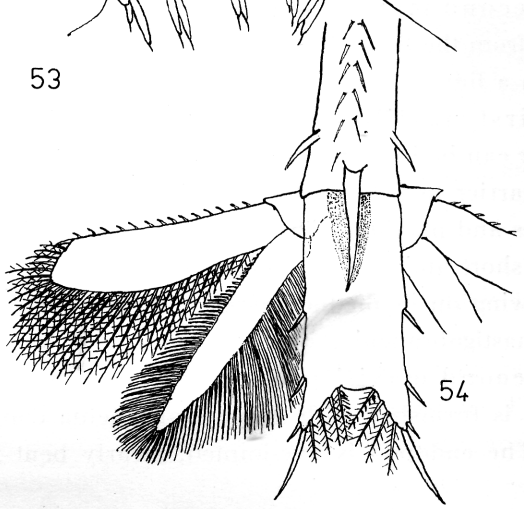

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half the length of the dorsal spine. The sixth segment has a dorsal spine, and below this is a second spine on each side situated on the place of the dorso-lateral spine, but its direction is that of a lateral spine. I have here called this spine the dorso-lateral spine, indicating that the lateral spine is missing on this segment, but substituted by a pair of small ventro-lateral spines, supporting the uropods from below. The first abdominal segment has its lateral process, which in this species is a long, lamellar membrane standing a little below the dorsal spine, running between the dorso-lateral and the lateral spines and reaching ventrally to near the beginning of the free pleuron. Shortly after its beginning it reaches its greatest height, it terminates as a spiny tip (Fig. 53).

*Telson.*

The telson is about $2^1/_2$ times as long as wide with nearly parallel sides. The furca is open, with its two inner sides forming an angle of nearly 60°, but with a flattened lobe at the bottom of the cleft. On each medial side of the cleft are four plumose setae. The terminal spine on each furcal branch is very long and a little curved. At its lateral base is the first of the three lateral spines, the last one is placed on the lateral margin halfway out on the telson plate and the second one midway between nos. 1 and 3. The two proximal spines are of about equal sizes, the most distal one a little smaller. The dorsal spine of the sixth segment reaches far backwards over the telson.

*Appendages.*

The first antenna has the usual three joints, but with a very deep arch on the proximal joint from which the statocyst is developing on the ventral side of the joint. The two flagella of the first antenna are short and unjointed, the lateral one has olfactory hairs.

The antennal scale of the second antenna is setose on nearly its whole margin. The setae are longer on the medial than on the lateral side. A well developed curved spine is placed on the latero-distal corner.

The labrum is short, and the labium is cleft nearly to the bottom with the lateral lobes divided into a movable arm and a setose, rounded plate at the end. They seem well fitted for reaching round the mandible and the labium outside the mouth opening, and thus for keeping the food within reach of the grinding molar part—the best developed part of the mandible—and for pushing the ground food into the mouth opening.

The mandible has small, pointed teeth in the incisor part and a strongly developed molar part behind it. The palp is two-jointed.

Both the first and the second maxillae are not strongly developed; this also shows the larva to be not so strongly carnivorous as those of *S.* sp. larva *sumatransis* or *S.* sp. larva *danae*. On the first maxilla the two endites are of medium size, and the endopod, consisting of the usual three joints for the second Mysis stage, is not very strong, but it is furnished with very long setae reaching in line with the shorter setae from the endites of the protopod.

The second maxilla has the four endites tipped with a line of stiff, plumose setae placed in line with the ones from the five-jointed, normally shaped endopod. The exopod or scaphognath is rounded off in both ends with a line of plumose marginal setae of which the most distal one is three times as long as the others.

The first maxillipede has as usual for *Solenocera* a very wide, but thin two-jointed protopod, which like a bar can be held transversely to the longitudinal line of the animal thus shaping with its many plumose setae a barrier to prevent food-particles to escape backwards during the cutting and tearing action of the mandibles and maxillae. The protopod is the main functional part of the limb; the exopod and the endopod are only short and of less functional importance. The first endopodial joint is flattened with a stiff, membranous wing on its medial margin. The endopod is four-jointed. On the lateral side of coxa is a large, two-winged mastigobranchia.

The second maxillipede is a little longer than the first one, but its protopod is not nearly as stout. The coxa is furnished with a mastigobranchia composed of an anterior lobose and a posterior leaf-shaped section. The endopod is five-jointed, clearly bent in a medial direction between the second and the third joints.