In the basal joint of the first antenna a cavity has begun to develop, and the static nerve has grown into sense-cells in the epithelium of the cavity, thus starting the development of the statocyst. The two flagella have increased further in length, as with each preceding moult, and in most species they have from the second Mysis stage started to become annulated. In some species the olfactory hairs have started to develop in groups medially on the two flagella. The three-jointed stem has developed more setae than in the first Mysis stage.

The second antenna has developed further, especially its endopodial flagellum which now reaches to near the tip of the rostrum, in some species even in front of the rostrum.

The mandible has developed more cutting and crushing teeth on its masticatory parts, and the palp is now two-jointed as in the adult, but not yet provided with quite so many setae as later. The first maxilla is similar to that of the preceding stage, only with a little stronger endite parts; the exopod, if not already lost in the first Mysis, has now definitely disappeared. On the second maxilla the exopod and the four masticatory endites have grown, but the endopod is either only of the same size as in the first maxilla, i. e. relatively reduced, or it has started an actual reduction and reaches now in no case so far forward as the exopod, but only to the middle of it.

No distinct changes have taken place in the first maxillipede from the previous stage, in both stages the endopod is divided into four joints. On the second maxillipede the endopod has reached the full number of five joints, whereas the first Mysis only had two to four joints in its endopod. The third maxillipede has five endopodial joints already from the first Mysis and is thus, as mentioned, already from that stage the largest of the maxillipedes and the only one with the full number of five endopodial joints. In the second Mysis the third maxillipede has further enlarged, being now much longer than the first and second ones.

The chelae on the 3 first pairs of pereiopods have developed further, but they are not yet functioning and have still setae on their tips. The second, distal joint has widened to give space for the muscles of the movable fingers of the chelae. The two last non-chelate pereiopods are well developed. The pleopods have each developed an unjointed protopod, and an unjointed exopod and endopod, each tipped with a few embryonic setae, but yet unfunctioning. The uropods and their brim of setae have enlarged.

Mysis III

The description of this and the following stage can only be based on *S.* sp. larva *sumatransis* and *S.* sp. larva *danae* as the only hitherto known *Solenocera* species with more than two Mysis stages.

The toothed edge of the carapace has now entirely disappeared or only a tiny part of it is left in the branchiostegal area and on the posterior marginal teeth. The ridge on the rostrum has become more compressed and keel-shaped and may have added an extra tooth. Except for the rostrum, the spines on the carapace and the abdomen have become relatively smaller, and the carapace itself is more stream-like than before. The lateral process on the first abdominal segment has elongated and reaches nearly the ventral margin of the pleuron. The telson is more squarish.

The flagellum of the second antenna has grown reaching beyond or much beyond the tip of the rostrum. The molar part of the mandible and the coxa-endite of the first maxilla have developed further. The three maxillipedes are now much more powerful organs, and the same is the case with the exopodial swimmerets of the pereiopods. Also the pleopods have developed further.

This description is—as mentioned above—only based on two species both with more than two Mysis stages. In such species the development of the limbs seems to be much slower than in species with only two Mysis stages before the postlarval stage. Thus larvae with several Mysis stages have, for instance, in the second Mysis stage appendages of a much less finished shape than in species where the second Mysis is the last Mysis stage.

Mysis IV

Within *Solenocera* a fourth Mysis stage has only been found in *S.* sp. larva *sumatransis*. Here the fourth Mysis is still more like an adult *Solenocera* than the previous stage. It has smaller spines, longer and more

compressed rostrum with a higher rostral keel on the carapace, a more stream-lined carapace, and a stronger abdomen, telson and tail-fan. In this species a pair of small spines has developed dorsally on the telson near its base. The pleopods are larger, but the pereiopods have not changed much, perhaps they have elongated a little. The maxillipedes are a little better developed.

No further number of Mysis stages is at present known for this species or for any species of the genus *Solenocera*, but it must be expected that a fifth Mysis stage exists in some *Solenocera*.

First Postlarva.

In more coastal forms of the *Solenocera* like *Solenocera membranacea* and probably several others (*S. muelleri* and *S.* sp. larva *aequatorialis*) the second Mysis is followed by the first postlarval stage in which considerable changes take place. These changes are so important that it is justified to speak of a complete metamorphosis. At least the changes are so considerable that it is impossible from the last Mysis to conclude what adult it will develop into, even if we should know the corresponding adult, which may not be the case for several of the here described larvae.

In the change from the last Mysis to first Postlarva all the spines of the carapace except for a few anterior spines are lost in the only species, *Solenocera membranacea* of which the Postlarva is known. As the adult *Solenocera*, so far known, not have all the fantastic spines and teeth of the *Solenocera* larva, we are justified in assuming that they are lost also in all other species of *Solenocera* with the ecdycis from the last Mysis to the first Postlarva. This makes the establishment of connections between Mysis stages and adult forms all too risky without direct observation of the moulting, or when not considering an area where a single species is so strongly dominant in numbers that the relation between an abundant larva and an equally abundant adult is fairly reasonable.

The above is valid for the typical coastal forms, but in the more oceanic species and possibly also in the species from certain tropical regions where growth is slower, the Mysis stages are not limited to two, but a third, a fourth or even more Mysis stages may follow as described in this paper for *Solenocera* sp. larva *danae* and *S.* sp. larva *sumatransis*. Therefore in these cases the length of the larval life will be much extended, and only after a series of several Mysis stages the Postlarva will appear and develop through several moultings into the adult and sexually ripe shrimp.

SPECIAL PART

DIAGNOSIS FOR THE LARVAE OF *SOLENOCERA*

Smaller Penaeid larvae in either Protozoea or Mysis stages, with three Protozoea and two to five Mysis stages.

The carapace in the Protozoea has along the whole margin or on parts of it and on the marginal spines toothed filaments, which partly remain through the younger Mysis stages. The carapace is spiny, more so in the older stages. At least the older Protozoea and all Mysis stages have the carapace more or less covered with spines. Long, bushy hairs extend often from the surface of the carapace and abdomen. The rostrum has never spines ventrally, a large rostral plate is often found at its base. Both anterior and posterior dorsal organs are present on the carapace. Older Protozoea and all Mysis have a spiny abdomen.

The mouth-appendages indicate carnivorous habits, the incisor part of the mandible is strongly developed, usually with several pointed teeth. The molar part is much smaller. The mandibular palp is at the most two-jointed. The basi-endite of the first maxilla has strong teeth. The pereiopods are well-developed in the later stages. Mastigobranchiae are in all Mysis larvae found on all maxillipedes and pereiopods except number five.

Solenocera membranacea, H. MILNE-EDW.

Figs. 3–14, 22, 23.

Penaeus membranaceus, H. MILNE-EDW. 1837, p. 417.
Penaeus siphonoceros, PHILIPPI, 1840, p. 190, pl. 4, Fig. 3.
Solenocera philippii, H. LUCAS 1850, p. 223, pl. 7, II, Fig. 1.

Larva:
Solenocera siphonocera, LO BIANCO 1904, p. 31, pl. 10, Figs. 39, 40.
Solenocera membranacea, J. HELDT 1938, p. 123–126, 190–196, with Figs.
Solenocera membranacea, J. HELDT 1955, p. 29–50, pl. 1–12.

Localities.

Many specimens of Protozoea I, II, III, Mysis I, II, Postlarva I from near Naples (6 miles north of the island Ischia in line with Cuma on the Mainland), 100 m depth, taken in all depths from bottom to near surface, but most abundant in the lower water layers. June 1964.

Protozoea III:

Locality unknown, British Museum.

Mysis I:

Dana St. 10598–III, 51°00′ N–12°31′ W, 800, 600, 400 mW. 18-8-1957: 4 spec.
— 10598–IV, 51°00′ N–12°31′ W, 1400, 1200, 1000 mW. 18-8-1957: 2 spec.
— 10987–II , 50°54′ N–14°08′ W, 200, 150, 125 mW. 25-8-1958, 1 spec.
— 11311–II , 52°26′ N–16°30′ W, 200, 150, 125 mW. 19-8-1959, 2 spec.

Mysis II:

Dana St.	4008–III,	21°40′ N–18°00′ W, 300 mW,	16-3-1930, 1 spec.
—	9308 ,	51°00′ N–20°36′ W, 1500 mW,	27-8-1954, 1 spec.
—	9804 ,	51°00′ N–18°00′ W, 200, 150, 125 mW.	20-8-1955, 1 spec.
—	9804 ,	51°00′ N–18°00′ W, 600, 400 mW.	21-8-1955, 1 spec.
—	9806 ,	50°55′ N–14°00′ W, 100, 50, 25 mW.	21-8-1955, 3 spec.
—	9806 ,	50°55′ N–14°00′ W, 1000, 800 mW.	21-8-1955, 1 spec.
—	10598–III,	51°00′ N–12°30′ W, 800, 600, 400 mW.	18-8-1957, 2 spec.
—	10598–IV,	51°00′ N–12°30′ W, 1400, 1200, 1000 mW.	18-8-1957, 1 spec.

Description.

Protozoea III.

Fig. 10.

This stage has already been described by HELDT in 1938, 1955, but there are certain points which can be added to her description.

Carapace:

Formula after the figure: 1. 2. 3. 5. 7. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. 23. 24. 25. 26. 27. 29. 30.

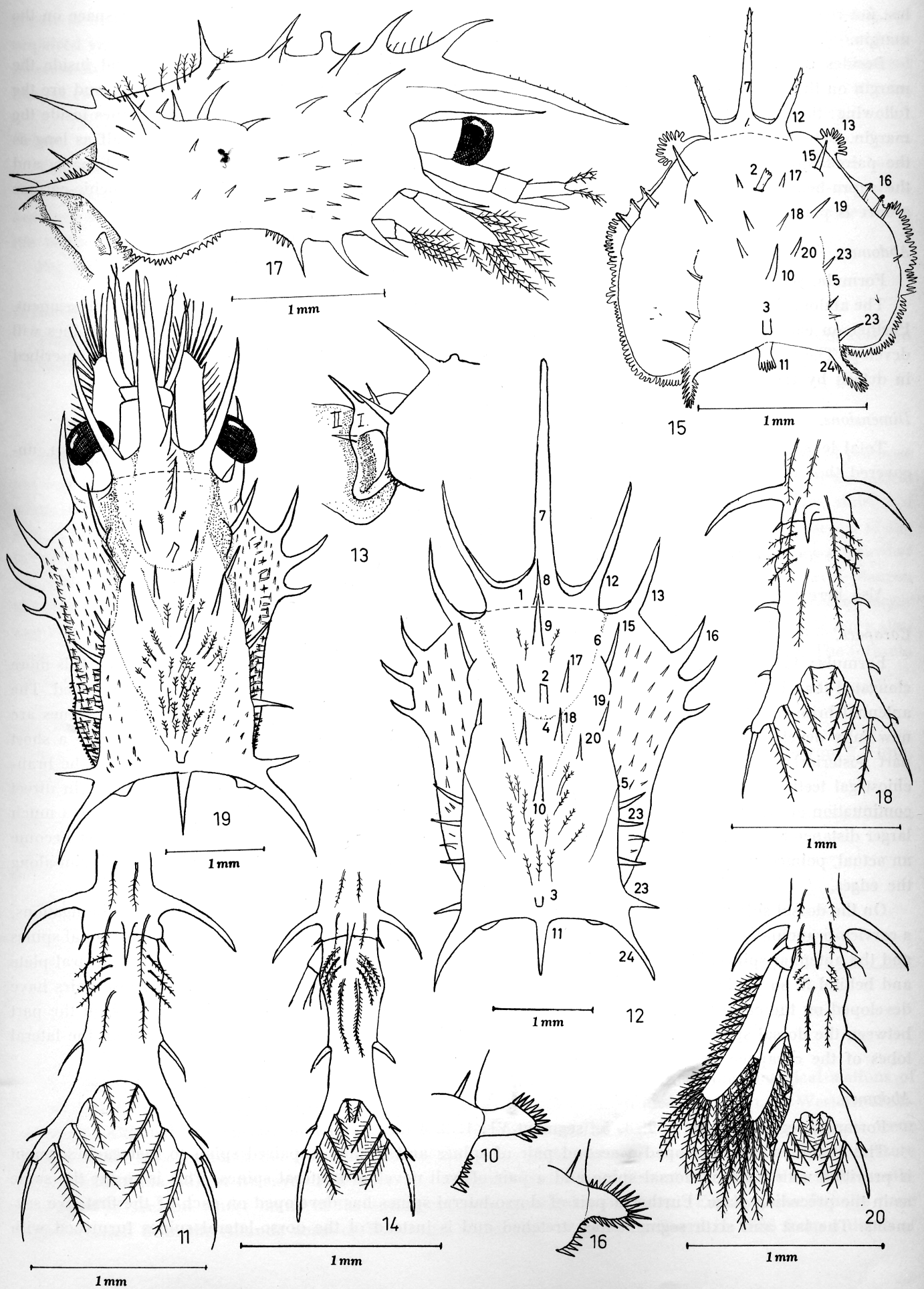
Madame HELDT (1938, 1955) when describing this and the following stage has arranged the spines in two semicircles on each side of the carapace, but their placement is more definite and fits into the general plan of *Solenocera*, shown in this paper Fig. 1. The formula for the Protozoea is given above.

In front of the carapace proper is the rostral plate (1) just extending as a curved plate from the carapace. This plate varies very much in the different species. It can be even longer than wide or only short as in this species, or it can in some species be entirely missing. This plate, when present, carries the rostrum and the supra-orbital spines, which both are well developed in this species and have fine hairs at their surfaces. Both the anterior and posterior dorsal organs are of medium size. The frontal organ has small sensory papillae at its tip. Of the grooves on the carapace only the branchio-cardiac groove on each side is weakly suggested. The unpaired epi-cardiac spine is present and as always, when present, the largest of the spines placed outside the margin of the carapace. Behind this spine and pointing in the opposite direction, going from the posterior margin of the carapace, is the medio-posterior marginal spine which in the Protozoea carries serrate marginal brims. In some of the specimens the spine can be seen clearly through the brims, and it will appear as a naked spine in the following stage.

The antennal spines are not yet developed, but on their place is a brim edged by the supra-antennal teeth. Also this will in the following stage be replaced by proper antennal spines. Remaining along the margin of the carapace behind the supra-antennal brim is a large branchiostegal, toothed brim and penetrating into its anterior part are three branchiostegal spines still in the embryonic form and not yet reaching outside the brim. This brim passes directly into the branchio-lateral brim which is continuing the marginal brim with its toothed edge until it reaches the postero-branchial spine (No. 24). This spine points posteriorly as a continuation of the branchiocardiac groove, and is found in all *Solenocera* larvae as one of their characteristica. The spine is here, as shown in the figure, flattened and rhomboid, only at its distal part it is covered with the toothed larval brim which seems one of the characteristica for this species. There is a distinct open space between the teeth on the postero-branchial spine and the posterior part of the branchio-lateral teeth, the

Fig. 10–14. *Solenocera membranacea*. Fig. 10, postero-branchial groove spine of third Protozoea. — Fig. 11, telson of first Mysis. — Fig. 12, carapace of second Mysis. — Fig. 13, posterior part of carapace and first and second abdominal segments of second Mysis, especially showing the lateral process on the first abdominal segment. — Fig. 14, telson of second Mysis.

Fig. 15–20, *Solenocera membranacea* subsp. *capensis*. Fig. 15, carapace of first Protozoea. — Fig. 16, postero-branchial groove spine of third Protozoea. — Fig. 17, carapace with some appendages and first abdominal segment of first Mysis. — Fig. 18, telson of first Mysis. — Fig. 19, carapace with first and second antennae of second Mysis. — Fig. 20, telson and left uropod of second Mysis. — Numbers attached to Fig. 12 and 15 refer to the numbers in Fig. 1.


17
1 mm
15
1 mm
13
19
1 mm
12
1 mm
18
1 mm
11
1 mm
14
1 mm
10
16
20
1 mm

last not reaching right to the basis of the postero-branchial spine, but leaving a distinct open space on the margin.

Besides the already mentioned unpaired epicardiac spine several paired spines are found inside the margin on the surface of the carapace. They are all well developed and of about average size, and are the following: the post antennal spines behind the antennal brim are the largest of the paired spines inside the margin. Between them and the anterior dorsal organ is the medio-gastric spine only about half as long as the paired spines. Behind this spine is a triangular arrangement, the pre-hepatic, the latero-hepatic, and the supra-hepatic spines. Farther backwards on the carapace along the only suggested branchio-cardiac groove is placed a series of three to five branchio-cardiac or lateral spines.

Abdomen.

Formula, segments I–VI: 1. 2.

The abdomen is six-segmented with a large dorsal spine and a pair of large lateral spines on each segment. Further on each segment is a pair of tiny bulbs where in the following stage the dorso-lateral spines will develop. The rest of the animal, the abdomen, the telson and the appendages, has already been described in details by HELDT (1938, 1955). For any further details is referred to these descriptions.

Dimensions.

Total length 4.5 mm, length of carapace without rostrum 1.5 mm, width 1.8 mm, rostrum 0.7 mm, uncovered thoracal segments plus abdomen 1.8 mm, abdomen 1.3 mm.

Mysis I.

Fig. 11.

Also here is referred to the description by HELDT (1938, 1955).

Carapace.

Formula: 1. 2. 3. (4). 5. (6). 7. 8. 9. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. 23. 24. 26. 27. 30. It is more elongated than in the stage before this, and the toothed brims along its margins are somewhat reduced. The antennal brim has been replaced by a pair of strong antennal spines. The three branchiostegal spines are now fully developed, and from the carapace the branchiostegal brim with its teeth is reduced to a short part posteriorly of the branchiostegal spines. Further there is now an open, bare space between the branchiostegal teeth and the following branchio-lateral teeth, in the Protozoea these two groups were in direct continuation of one another. Finally the brims have also been reduced in their posterior part leaving a much larger distance between the branchio-lateral teeth and the branchial spine. The last spine has further become an actual, pointed spine, not flat and lamellar as in the Protozoea, but it has still a partly toothed brim along the edges.

On the dorsal side of the carapace a cervical groove has started to develop together with its prolongations, a cervico-branchial groove on each side reaching forwards into the concavity between the supra-orbital spines and the antennal spines. The rostrum is elongate and provided with a dorsal tooth both on the rostral plate and behind it, so we have both a rostral tooth and an epigastric-rostral tooth. Further, plumose hairs have developed on the carapace mostly on its medial part in front of the anterior dorsal organ and on the part between the dorsal spine and the posterior dorsal organ. Finally a few spines have appeared on the lateral lobes of the carapace below the branchio-cardiac groove.

Abdomen.

Formula, segments I–V: 1. 2. 3. 5., segment VI: 1. 2. 4. 5.

The abdomen has developed a second pair of spines and a third unpaired spine so that each segment is provided with a strong dorsal spine and a pair of well developed lateral spines. This is so far the same as in the preceding stage. Further a pair of dorso-lateral spines has developed on each of the first five segments. The last and sixth segment has stretched and is instead of the dorso-lateral spines furnished with

a pair of smaller ventro-lateral spines. Finally on each of the first five segments, but not on the sixth, an unpaired ventral spine is present. The segments have on their dorsal surfaces a few fine, plumose hairs which increase in number and size towards the posterior segments of the abdomen. The first abdominal segment has on each side developed a small, leaf-shaped lateral process.

Telson.

The telson (Fig. 8) is Y-shaped with a massive stem with two rows each with four long, plumose hairs. The branches of the furca terminate with a long, curved spine, and on both lateral margins of the telson are three shorter spines, two, one behind the other, near the tip of each branch and the third a little above the bottom of the cleft.

For the appendages see HELDT 1938 and 1955.

Dimensions:

Total length 7 mm, length of carapace without rostrum 2.3 mm, width of same about 1.8 mm, rostrum 1.5 mm, abdomen 2.5 mm.

Mysis II.

Figs. 12–14, 22.

The whole larva has grown considerably and the spines of the carapace are larger, the numbers of plumose hairs on the carapace and the abdomen have strongly increased in number and size, and each of the lateral wings of the carapace, nearly naked in the first Mysis, is in the second Mysis covered with many short, but soft, spiny hairs. The grooves of the carapace are deeper and more distinct, and the most posterior of the lateral spines has moved out on the base of the postero-branchial spine. The teeth of the carapace are further reduced, only few of the posterior branchio-lateral teeth are present. On the abdomen the lateral pleuron has started to develop. The telson plate and the proximal pair of lateral marginal spines have become larger and the latter are pointing dorsally in a right angle to the surface of the plate. The plate itself is more slim than in the first Mysis. On the first abdominal segment the lateral process has enlarged (Fig. 13). The formula for the carapace is: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.

Dimensions:

Total length 12 mm, length of carapace without rostrum 3.5 mm, width of same 2.5 mm, rostrum 2.3 mm, abdomen 5.5 mm.

Approximate dimensions of stages in mm.

	Protozoea III	Mysis I	Mysis II
Total length.....	4.5	7	12
Carapace.....	1.5 × 1.8	2.3 × 1.8	3.5 × 2.5
Rostrum	0.7	1.5	2.3
Abdomen	1.3	2.5	5.5

Distribution and Remarks.

Fig. 23.

This species is known from the Mediterranean where it has been taken near the biological stations of Napoli and Tunis and along the Adriatic coast of Italy and Jugoslavia, all localities from the Western Mediterranean. Although the species nowhere has been recorded from the eastern Mediterranean it may occur there. Further it is found in the Northern part of the subtropical region of the Atlantic down to the Azore Islands and in the Gulf of Biscaya. The larvae are carried with the Gulf Stream as far north as to the south-west coast of Ireland where many of the specimens here recorded were fished. Finally three females have been recorded from the Atlantic coast of Venezuela at the Gulf of Paria by SMITH in 1886 from a depth of

31 fathoms. On these specimens, together with two specimens from Louisiana (see further under *Solenocera muelleri*) BURKENROAD (1934) has established a new species *Solenocera vioscai*. The adult of *Solenocera membranacea* has been taken at 50–800 metres near the bottom on sand or mud, into which it digs. The larvae are recorded farther out in deeper water where they have been transported by the currents.

According to the investigation by HELDT (1955) only two Mysis stages exist in this species. The second Mysis is followed by the first Postlarva, which also has been found by me.

Solenocera membranacea, subspecies *capensis*

Figs. 15–21, 23.

Localities:

Protozoea III:

Discovery St. 100 B. { 33°20′ S–33°46′ S. / 15°08′ E–15°18′ E. } 5–0 m, 30.9.1926. B. M. 4 spec.

Mysis I:

Discovery St. 102. 35°29′20″ S–18°33′40″ E, 50–0 m, 28.10.1926, B.M. 1 spec.
— — 260. 33°06′30″ S–17°45′15″ E, 100–0 m, 19.7.1927, B.M. 1 spec.
— — 277. 1°44′00″ S–8°38′00″ E, 63 m, 7.8.1927, B.M. 2 spec.

Mysis II:

Discovery St. 89. 34°05′15″ S–16°00′45″ E, 50–0 m, 28.6.1926, B. M. 1 spec.
— — 99 A. 33°20′00″ S–17°17′00″ E, 5–0 m, 27.9.1926, B.M. 1 spec.
— — 99 E. 33°11′00″ S–17°26′00″ E, 5–0 m, 27.–28.9.1926. B.M. 22 spec.
— — 100 B. { 33°20′00″ S–33°46′00″ S, / 15°08′00″ E–15°18′00″ E } 5–0 m, 30.9.1926, B.M. 16 spec.
— — 102. 35°29′20″ S–18°33′40″ E, 50–0 m, 28.10.1926, B.M. 3 spec.
— — 276. 5°54′00″ S–11°19′00″ E, 150 m, 5.8.1927, B. M. 17 spec.

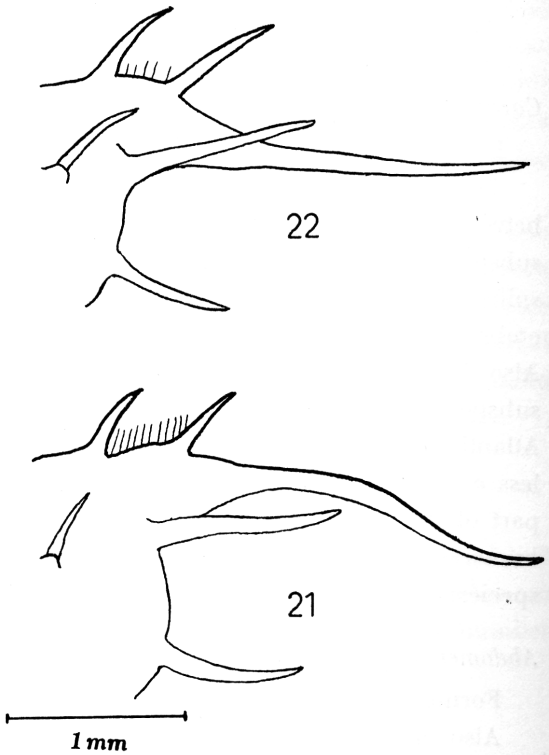
Description.

This subspecies from the southern Atlantic around Cape the Good Hope is very closely related to the North Atlantic species from the Mediterranean and eastern North Atlantic, and in the adult described from South Africa by BARNARD in 1950 no distinction from the North Atlantic form is noted, but when examining the larvae from "Discovery" taken in this South African region and as far north as Cape Lopez in the republic of Gabon, W. Africa, I observed that they in certain characters differ from the North Atlantic larvae. This justifies the establishment of a new subspecies for the African form from the South Atlantic on the larva alone, because the adult to these larvae must also have similar characters differing from the North Atlantic *S. membranacea*. This can easily be overlooked when only examining one type and for the other type relying on the literature. In general it can be said that the subspecies *capensis* is a bit larger and stouter, and that its spines, except the rostrum, are shorter than in the Mediterranean species. The spines extending from the margin of the carapace are more robust and curved in the subspecies *capensis*. This can best be seen on Figs. 21, 22, which show the nearly straight rostrum and supra-orbital spine and the slender and only slightly curved antennal spine in *Solenocera membranacea* (Fig. 22). Fig. 21 presents subspecies *capensis* showing the strongly downwards bent and double curved rostrum, the robust, double curved supra-orbital spine and the upward curved, robust antennal spine. The postero-branchial groove spine is of a different shape in the Protozoea, and the placement of its toothed brims also differs. Also the shape of the telson and the placement of its marginal spines differ. But the differences between the two forms are not larger than that the formula

for the carapace remains the same for both through all the known larval stages.

Returning to the adult there is the species *S. africanum* which STEBBING has described in 1917 as very close to *S. membranacea*. BALSS, 1925, has expressed doubt as to the validity of STEBBING's species. BALSS's view has been confirmed by BURKENROAD, 1934, who suggests that *S. africanum* is a "varietal form of *S. membranacea*". BARNARD, 1950, maintains the two species *S. membranacea* and *S. africanum*, of the latter later a total of 28 specimens have been found in the South African Museum, the relatively small number of the former in the same collection is not given.

When returning to the Discovery material of larvae from the Cape district, it can be stated that all the larvae belong to this species, but that they all differ in the same, only minor characters from the Mediterranean and North Atlantic larvae of *S. membranacea*. These South African larvae include not less than 48 specimens taken at 8 different localities, but although they are from two different years they have all been taken in June–October. One would have expected that if two closely related species *S. membranacea* and *S. africanum* occur in the Cape Water, both species would be present in a larval collection of that size. As this is not the case, I am unable on the present material to throw more light on the problem of one or two species, but as the larvae show smaller, but distinct differences from the North Atlantic larvae of *S. membranacea* I have chosen to call them *S. membranacea* subsp. *capensis*. Later investigations must decide whether they are the larvae of *S. africanum* or whether the whole stock in South Africa, both *S. membranacea* and *S. africanum* is one species, as suggested by BALSS and BURKENROAD.



Figs. 21–22. Frontal part of carapace of second Mysis, from lateral. Fig. 21, *Solenocera membranacea* subsp. *capensis*. — Fig. 22, *S. membranacea*. The figures show the bent rostrum in the subspecies *capensis* and the more straight rostrum in *S. membranacea* as well as the longer and more delicate spines in the latter.

Protozoea III.

Figs. 15–16.

Carapace.

Formula: 1. 2. 3. 5. 9. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. 23. 24. 25. 26–27. 29. 30. The formula for the carapace is the same as in the North Atlantic form, but the carapace is a little stouter and perhaps a little wider in the South African form, and the postero-branchial groove spine (Fig. 16) is a little different in shape from the same spine in the other form. In the North Atlantic form the free part of this spine is rhomboid and the brim of teeth is only found on the two distal sides of the rhombe (Fig. 10). The branchio-lateral filament and its teeth do not reach back to the postero-branchial groove spine, but leave an open space in between along the carapace margin. In the subspecies *capensis* these brims coalesce and the teeth cover the whole free part of the postero-branchial groove spine. Further the spine itself is not rhomboid as in the Mediterranean form, but pointed and a little downwards turned whereas the Mediterranean turns upwards. The rostral plate seems a little deeper or longer in subspecies *capensis* than in the North Atlantic *membranacea*, and the sides or lateral wings of the carapace are already in the Protozoea III covered with a dense layer of fine, soft, embryonic hairs giving the surface of the carapace a shaggy surface, whereas the sides form a thin, hyalin membrane in the North Atlantic form.

Dimensions:

Total length 4.5 mm, length of carapace without rostrum 1.8 mm, width of same 2.0 mm, rostrum 0.6 mm, abdomen 1.3 mm.

Mysis I.

Figs. 17–18.

Carapace.

Formula: 1. 2. 3. (4)*. 5. (6). 7. 8. 9. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. 23. 24. 26. 29. 30.

The carapace is a little more robust and hairy than in the North Atlantic form, for instance the hairs placed between the rostral tooth and the epigastric rostral tooth are in the North Atlantic form only few, whereas subspecies *capensis* has a whole series of hairs on the rostral carina between the two dorsal teeth on the rostral spine. Also on the lateral wings of the carapace, where the carapace in the Protozoea III was woolly with embryonic hairs, are now soft, spine-shaped hairs in a much larger number than in the North Atlantic form. Also the plumose hairs on the posterior part of the carapace in the median section are more numerous in subspecies *capensis* than in the North Atlantic form. The postero-branchial groove spine has in the North Atlantic form still left a little of the rhomboid shape at the basal part of the spine, but in *capensis* the spine is less narrow proximally which is the protozoeal form of the spine. It gives a natural basis for the new distal part of the spine which is conical, missing the rhomboid wing characteristic for the Northatlantic *S. membranacea*. The dentated filament is in the first Mysis only covering the proximal part of the spine in both species.

Abdomen and Telson.

Formula, segments I–V: 1. 2. 3. 5., segment VI: 1. 2. 4. 5.

Also these are a little more robust in *capensis*, but the most characteristic difference is the placement of the lateral spines on the telson plate. In the North Atlantic form the two most distal spines are placed on the distal half of the branch of the furca, but in *capensis* (Fig. 18) only one spine is found here. The next spine is first seen near the bottom of the furcal cleft but still on the branched part of the furca. The third spine is placed nearly half way up on the uncleaved part of the telson plate. Further the bottom of the cleft is clearly concave in the North Atlantic form, but convex in the subspecies *capensis* due to a small process which has started to grow out from the telson plate at the bottom of its furcal cleft. This difference in the telson plate can very clearly be seen, and is perhaps the best way of distinguishing between the two forms when only one form is available and no direct comparison possible. But also the geographical distribution gives a clear neutral zone between their areas of occurrence. The North Atlantic form reaches down to the Azores and the larvae may perhaps be taken down to the tropic of Cancer. The subspecies *capensis* is found in the Cape water of South Africa and the larva have been taken till towards Equator (Discovery St. 276, 277), possibly the adults may occur northwards to Cape Lopez, West Africa.

Dimensions:

Total length 7.5 mm, length of carapace without rostrum 2.5 mm, width of same 2 mm, rostrum 1.6 mm, abdomen 2.7 mm.

Mysis II.

Figs. 19–21.

Carapace.

Formula: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. 23. 24. 27.

The size is the same in the two forms, but the cuticle is thicker in *capensis* which gives the preserved material a darker colour. This was also the case in the two preceding stages. Further, the spines emerging from the margin of the carapace are more curved in *capensis* than in the North Atlantic form, where the spines are more straight, delicate and longer except for the rostrum, as can be seen by comparing Figs. 21 and 22. The difference in shape of rostrum is clearly seen in the figures. In *S. membranacea* from the North Atlantic the ventral line of the rostrum is straight and parallel to the longitudinal axis of the animal, and the dorsal line is first bending down from the rostral ridge of the carapace towards the thinner part of the free rostral spine. In subspecies *capensis* there are no straight lines in the rostrum. The ventral line curves

* A bracket around the number here and in the following indicates that the present spine is rudimentary or vestigial in this stage.