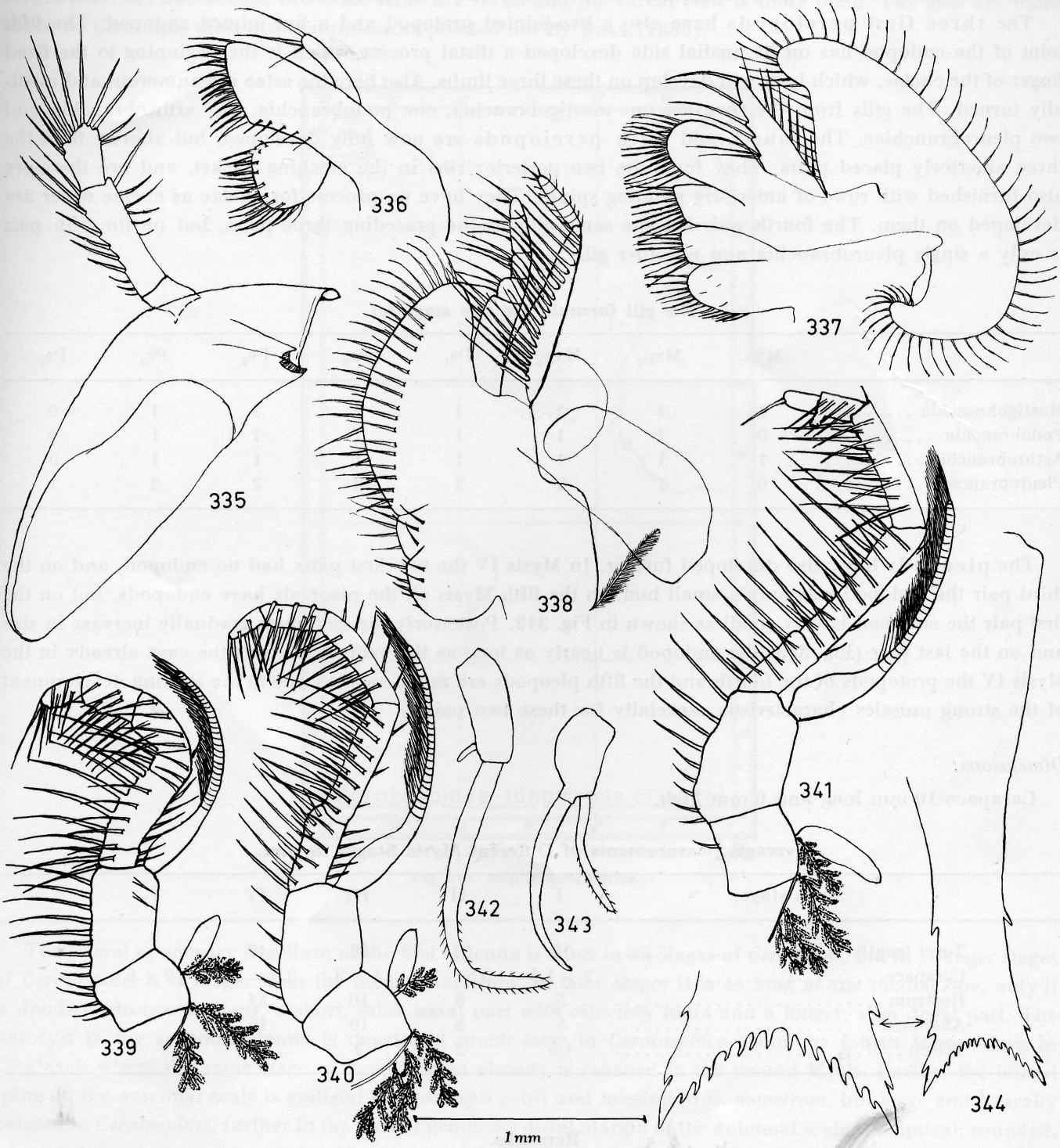
with Boas (1880), only he makes no distinction between arthrobranchiae and pleurobranchiae, and the podobranchiae he considers as part of the mastigobranchiae. The arthrobranchia on the first maxillipede is the one Boas refers to as: one little gill. With these explanations my countings of gills for this stage agree with those of Boas.

The endopod of the second maxillipede has developed numerous very long and stiff setae, which now are



Figs. 335–344. *Cerataspides longiremis*. Fifth Mysis. Fig. 335, mandible. — Figs. 336–337, first and second maxillae. – Figs. 338–340, first, second and third maxillipedes. — Fig. 341, first pereiopod. — Fig. 342, first pleopod with a rudimentary endopod. — Fig. 343, fifth pleopod. — Fig. 344, telson.

found along the medial margins both of the protopod and the endopod, as well as along the endopod and here even in three lines. Most of those setae which do not extend from the medial margin are at their base turned so that their free tips point medially constituting a part of an extremely small-meshed basket. The exopod is a strong swimmeret.

The third maxillipede. What is noted for the second maxillipede is also valid for the third, only this limb is a little longer, but the setae on it are somewhat shorter than those on the second maxillipede. Further the third maxillipede has two pleurobranchiae instead of only one on the second.

The three first pereiopods have also a two-jointed protopod and a five-jointed endopod. The fifth joint of the endopod has on its medial side developed a distal process which is the beginning to the fixed finger of the chelae, which later will develop on these three limbs. Also here the setae are numerous and medially turned. The gills from the coxa are one mastigobranchia, one podobranchia, one arthrobranchia and two pleurobranchiae. The fourth and fifth pereiopods are now fully developed, but shorter than the three anteriorly placed pairs. They form the two posterior ribs in the catching basket, and are therefore also furnished with rows of anteriorly pointing spines. They have no process for chelae as chelae never are developed on them. The fourth pair has the same gills as the preceding three pairs, but on the fifth pair is only a single pleurobranchia and no other gills.

The gill formula for this stage is:

	Mxp_1	Mxp_2	Mxp_3	Pe_1	Pe_2	Pe_3	Pe_4	Pe_5
Mastigobranchia	1	1	1	1	1	1	1	0
Podobranchia.....	0	1	1	1	1	1	1	0
Arthrobranchia	1	1	1	1	1	1	1	0
Pleurobranchia	0	1	2	2	2	2	2	1

The pleopods have also developed further. In Mysis IV the two first pairs had no endopod, and on the third pair the endopod was only a small bud. In the fifth Mysis all the pleopods have endopods, but on the first pair the endopod is very small as shown in Fig. 342. Posteriorly the endopods gradually increase in size and on the last pair (Fig. 343) the endopod is nearly as long as the exopod. As was the case already in the Mysis IV the protopods of the fourth and the fifth pleopods are much swollen due to the starting development of the strong muscles characteristic especially for these two pairs.

Dimensions:

Carapace 10 mm long and 6 mm high.

Average Measurements of Different Mysis Stages in mm.

Mysis stage:	I	II	III	IV	V
Total length.....	13	21	26	40	
Carapace.....	2 × 1.5	3.5 × 2	4 × 3	6.5 × 4.5	10 × 6
Rostrum	5	8	10	14	
Abdomen	5	8	10	16	
Telson	1.5	2	2	4	

Remarks.

It appears from the preceding pages that there is a clear distinction between *Cerataspis* with up to two now known species, *C. petiti* and *C. monstrosa*, and *Cerataspides* with only one known species *C. longiremis*.

It is therefore reasonable to retain the generic distinctions as they were made by BONNIER 1899 when naming the larvae.

The following differences can be mentioned: The characteristic post-orbital and pterygostomian horns found in *Cerataspis* but lacking in *Cerataspides;* further *Cerataspis* has a not-spiny abdomen, whereas *Cerataspides* has both dorsal, ventral and lateral spines on the abdominal segments. The telson is more penaeid in *Cerataspis* with a more closed furca which only has six setae along the medial margin of each lobe; in *Cerataspides* the numbers of the same setae are seven and the furcal cleft is more open. The gills are more obose in *Cerataspis* than in *Cerataspides* as pointed out by BOAS (1880).

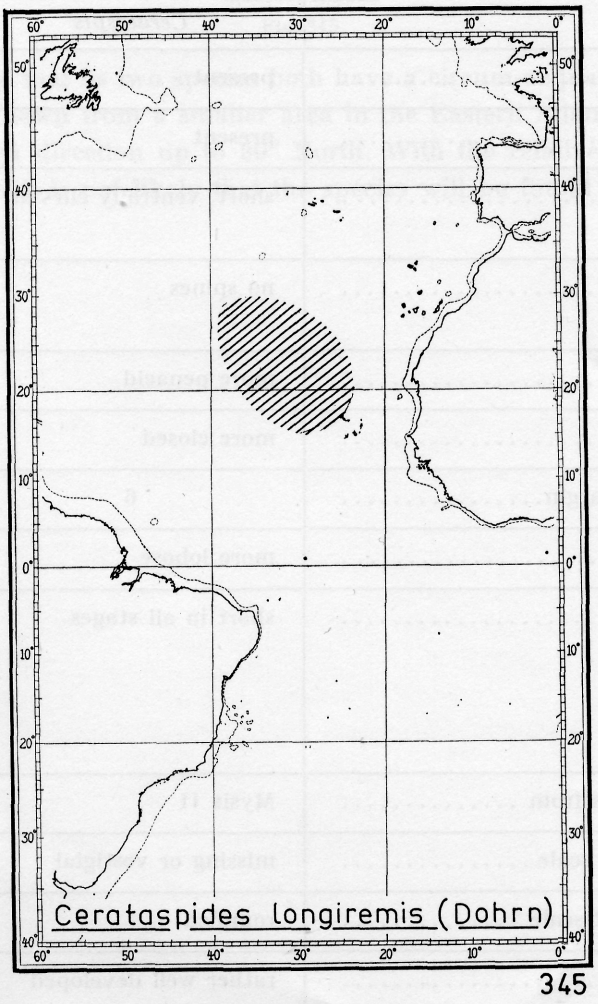


Fig. 345. Map of distribution.

The lateral or sensory flagellum of the first antenna is short in all stages of *Cerataspis,* but in younger stages of *Cerataspides* it is longer than the medial flagellum, in later stages it is as long as the medial one, only it is divided into two sections, a short, thick basal part with olfactory hairs and a longer, slim distal part. The statocyst in the second antenna is developed much later in *Cerataspides*—from the fourth Mysis—than in *Cerataspis* where the same stage of development already is reached in the second Mysis. Further the lateral spine on the antennal scale is vestigial in *Cerataspis petiti* and missing in *C. monstrosa,* but large and laterally pointed in *Cerataspides,* further in the former genus the distal margin of the antennal scale is elliptical, rounded, whereas it is nearly square cut in older stages of *Cerataspides.* In the mandible the molar part is much better developed in *Cerataspis* than in *Cerataspides,* in the latter it is only very small, and the incisor ridge is long and nearly straight against shorter and curved in *Cerataspis.* Both genera have three joints in the mandibular

palp. On the second maxilla the fifth Mysis of *Cerataspides* has a most characteristic series of spines on the lateral margin of the endopod which is missing in *Cerataspis*. Also the first maxillipede has in *Cerataspides* more and better developed spines arranged in two lines on the protopod, in *Cerataspis* the number of spines is much lower.

The second and third maxillipedes in both genera are in the different Mysis stages much more pereiopods than in the Caridea larvae, but this is more or less the case with most Penaeid larvae. Both the maxillipedes and the following pereiopods have in *Cerataspides* an enormous armament of long and stiff spines in more

Summary of Main Differences between Mysis Larvae of:

	Cerataspis	*Cerataspides*
Carapace, post-orbital horns	present	absent
Carapace, pterygostomian horns	present	absent
Carapace, rostrum	short, ventrally curved	straight, very long and spiny
Abdomen	no spines	with dorsal, ventral, and lateral spines
Telson, form	more penaeid	less penaeid
Furcal cleft of telson	more closed	rather open
Furca, no. of setac on medial margin	6	7
Gills, form	more lobose	less lobose
First antenna, sensory flagellum	short in all stages	longer or of equal length with med. flag. In later stages divided in a thick proximal olfactory part and a slim distal part
First antenna, statocyst develops from	Mysis II	Mysis IV
Second antenna, lateral spine on scale	missing or vestigial	large
Second antenna, distal margin of scale	rounded	square-cut in Mysis V.
Mandible, molar part	rather well developed	very small
Mandible, incisor part	rather short and curved	longer and more straight
Second maxilla, endopod. Mysis V	no series of spines on lat. margin	a series of spines on lateral margin
First maxillipede, protopod	only marginal spines	larger spines in 2 series
Maxillipedes and pereiopods, catching and filtering basket is	rather weakly developed	strongly developed
First to third pereiopods, chelae	start developing in Mysis I	start developing in Mysis V
First and second pleopods, endopods	develop from Mysis I–II	develop in Mysis V

than one line and all pointing mainly in a medio-anterior direction, thus shaping an ideal catching and filtering basket for detritus and smaller animals. This basket is not nearly so well developed in *Cerataspis*. On the other side the chelae of the three first pairs of pereiopods have first started weakly to develop in the fifth Mysis stage of *Cerataspides*, a stage of development which already was reached in the first Mysis of *Cerataspis*.

Finally the endopods of the two first pleopods develop earlier in *Cerataspis* than in *Cerataspides*.

With all these differences the placing of the three species in two closely related genera is absolutely justifiable, *Cerataspis* with the two species *C. petiti* and *C. monstrosa* and *Cerataspides* with the single species *C. longiremis*.

Distribution.

Fig. 345.

For *Cerataspis* it was shown that its two species both have a circum-aequatorial distribution. *Cerataspides longiremis*, however, is only known from a smaller area in the Eastern Atlantic, from North of the Canarie Islands and in a north-western direction up to 30° North. With the relatively large number of specimens known from a so limited area it is not likely that the species will be found in the future in other parts of the oceans.

Summary Table of Measurements in mm of the Different Larval Stages described in this Paper.

		Protozoea III	Mysis I	Mysis II	Mysis III	Mysis IV	Mysis V
Solenocera membranacea	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			
Solenocera membranacea subsp. *capensis*..	total length	4.5	7.5	12			
	carapace	1.8 × 2.0	2.5 × 2.0	3.4 × 2.5			
	rostrum	0.6	1.6	2.2			
	abdomen	1.3	2.7	5.6			
Solenocera sp. larva *danae*	total length	6.0	12.5	22	30		
	carapace	2 × 2	3 × 3	6 × 6	9 × 7		
	rostrum	2	6	9	?		
	abdomen	2	3	6	8		
Solenocera sp. larva *barbata*	total length	4					
	carapace	1 × 1.2					
	rostrum	1					
	abdomen	1.6					
Solenocera sp. larva *elongata*	total length	2.8					
	carapace	0.9 × 0.9					
	rostrum	0.8					
	abdomen	1					
Solenocera sp. larva *sumatransis*	total length		6	10	17	22	
	carapace		2 × 2	3 × 3	5 × 5	7 × 5	
	rostrum		1	1.8	2.7	3.5	
	abdomen		2.5	3.7	7	11	
Solenocera sp. larva *aequatorialis*	total length			12			
	carapace			3.5 × 3			
	rostrum			2.2			
	abdomen			5.5			
Solenocera muelleri	total length	(1.2)	5	8.5			
	carapace		1.5 × 1	2.2 × 1.3			
	rostrum		1	1.5			
	abdomen		2	3.6			
Solenocera novae-zealandiae	total length	4					
	carapace	1 × 1					
	rostrum	0.8					
	abdomen	1.5					
Solenocera sp. larva *nodulosa*.....	total length			14			
	carapace			6 × 4			
	rostrum			2			
	abdomen			5			
Cerataspis petiti	total length		8.5	10.5	16	23	27
	carapace		4 × 2.5	4.5 × 3.0	7 × 4	10 × 5	12 × 7
	rostrum		1	2	2.5	3	4
	abdomen		2	2.5	4	7	7.5
Cerataspis monstrosa	total length		10	12	15	22	27
	carapace		4 × 3	5 × 4	6 × 4.5	10 × 6	11 × 7
	rostrum		1.5	2	2.5	3	4
	abdomen		2.5	3	4	6	8
Cerataspides longiremis	total length		13	21	26	40	
	carapace		2 × 1.5	3.5 × 2	4 × 3	6.5 × 4.5	10 × 6
	rostrum		5	8	10	14	
	abdomen		5	8	10	16	

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