The uropods (Fig. 32) have changed. The exopod is much more elongate with nearly parallel lateral margins. The endopod has enlarged to about two thirds the length of the exopod, and it has now become functional. The endopod is furnished with few, but well-developed, plumose setae.

Dimensions.

Total length 6 mm; length of carapace 2.2 mm, width of same 0.8 mm; rostrum 0.1 mm; abdomen 2.6 mm; telson 0.8 mm.

Mysis V

Figs. 33–43.

Development.

The thorax has elongated and the carapace has become more flat, like a horizontal sail over the thorax. In a cross-section the carapace and the thorax now form a semi-circle which is dorsally convex. The abdomen is unchanged. The telson plate itself is unchanged, but its setae are reduced further, nos. 4 and 7 have shortened. First and second antenna are stronger, eye and eye-stalk larger. First maxillipede has a larger gnathobasal crista on the basale and an exite on the coxa. The first pereiopod is as large as the second maxillipede, the second pereiopod is present as a small bud. The uropod is nearly fully developed with a latero distal hooked spine on the exopod and a functional endopod.

Thorax.

The thorax and carapace have continued to flatten out.

Abdomen.

Unchanged.

Telson.

A further reduction has taken place in its setae (Fig. 34). Seta no. 4 is still plumose, but very short. Nos. 5 and 6 are unchanged and still long and plumose. No. 7 is shorter.

Appendages.

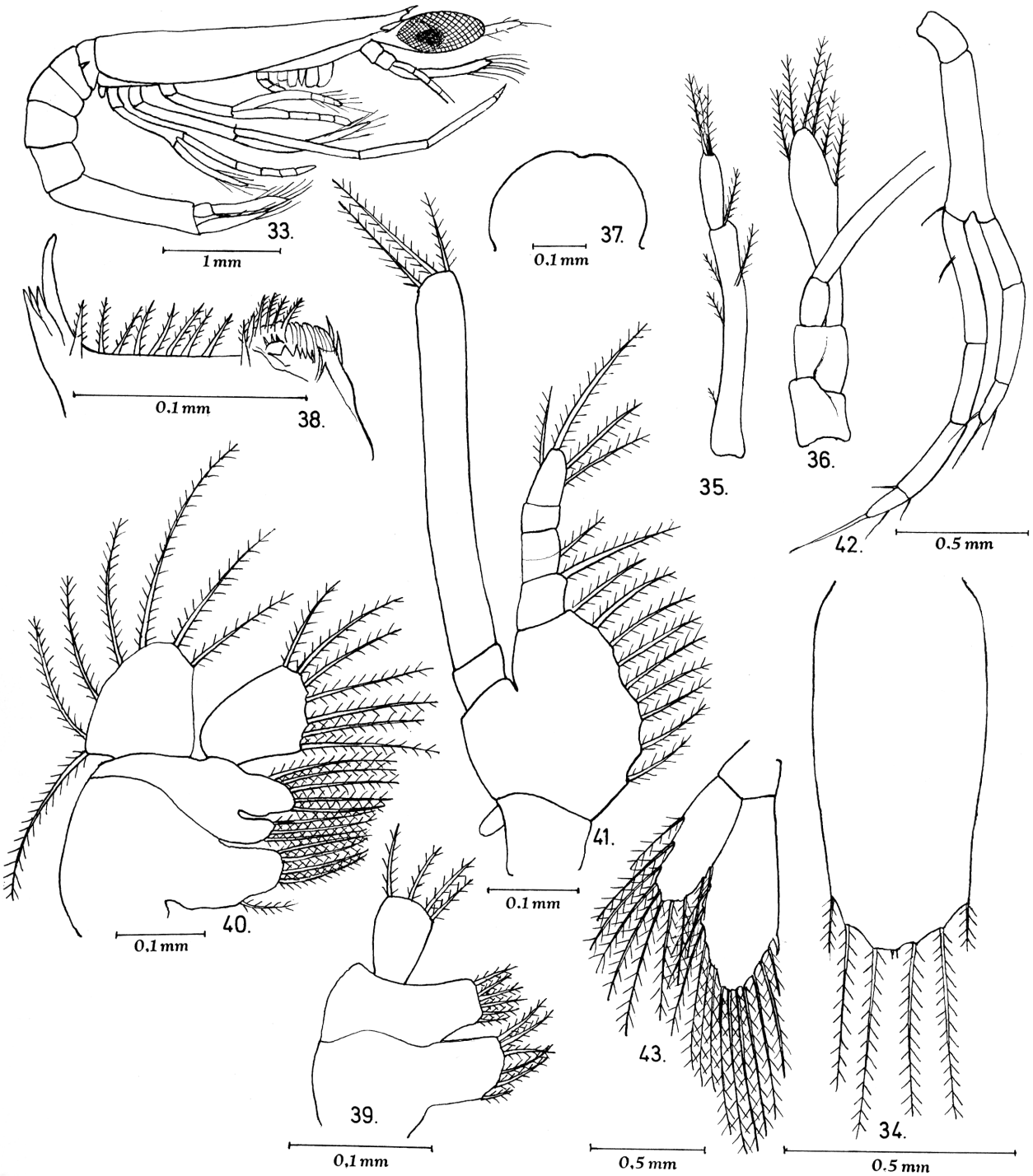
The first antenna (Fig. 35) has still only two joints, both of which have grown stronger. The distal one represents the flagella. Some plumose spines have developed on the basal joint, both along the lateral and medial margins, and the new distolateral spine from the last stage has grown in size, but is still a normal, straight, plumose seta.

Also the second antenna (Fig. 36) is stronger, and both protopodial joints have developed a longitudinal furrow with inside apodemes for the muscles, like a double stem, one part for the exopod and another for the endopod. The endopodial flagellum is stronger at the base. As it is always broken on the captured specimens its length cannot be determined. The compound lateral eyes have enlarged, especially the eye stalks, pushing the elliptical eyeball forward. The labrum (Fig. 37) is a semicircular plate with an incision in the middle of its margin.

The teeth of the mandible (Fig. 38) have developed further. The primary incisor teeth are more compressed, the secondary ones are still plumose, showing their origin, but they seem more chitinised, a little stouter and more straight. Also the molar teeth are changed, starting as individual and separated cones they have now broadened, reached each other and through reciprocal pressure become leafshaped. Between them and on the inside to them have grown ordinary "incisor" plumose spines, but these disappear again. These spines are only found on the border between incisor and molar part and seem to indicate a temporary overlapping of the two parts.

The labium is still very small, with its two lobes far apart.

The first maxilla (Fig. 39) is divided into coxa and basale, each with a masticatory medial lobe of nearly equal size. The coxa-endite is still slightly larger than the basi-endite, but both have stiff, plumose setae of



Figs. 33–43. *Amphion reynaudi*, Mysis V. Fig. 33, in total from lateral. — Fig. 34, telson plate. — Figs. 35–36, first and second antenna. — Fig. 37, labrum. — Fig. 38, incisor and molar edge of mandible. — Figs. 39–40, first and second maxilla. — Fig. 41, first maxillipede. — Fig. 42, first pereiopod. — Fig. 43, uropod with exopod larger than endopod.

medium length. The endopod is now fully turned 90°. In the second Mysis the endopod was parallel with the endites on the coxa and basale, now it is at a right angle to them with its longitudinal axis in prolongation of the protopod. While in the earlier stages the endopod appeared to function together with the protopod endites, now it has a more separate function in pushing the food particles forward. The endopod has developed a fourth seta.

The second maxilla (Fig. 40) has also started to change. The coxa seems to dominate but it still has only a single lobe, and also the basale still has two lobes as in the previous stages. The endopod is turned medially,

not distally as on the first maxilla, and functions as the fourth masticatory lobe. All four "lobes" are furnished with very long plumose setae on their medial margins. The exopod is still turned forward; it has only its anterior lobe, but most lateroposteriorly a backward-pointing lobal part has started to develop.

The first maxillipede (Fig. 41) has the coxa reduced to a stalk and the basale is enlarged. The coxa has a small, lateral, fleshy lobe near the border to the basale; this will later develop into a gill. The medially pointing crista on basale is larger, strongly chitinised and lined with stiff, plumose setae. The exopod is a long, flexible rod. Its five joints seem to have coalesced, only the first joint is clearly delimited from the rest. On the distal tip of the exopod are three long, stiff plumose setae. In the endopod joints 2 and 3 are coalesced, but the spine on the disto-medial edge of no. 2 is still present. The tip has 4 stiff setae. The second and third maxillipedes are unchanged; the third maxillipede is the largest.

The first pereiopod (Fig. 42) is now a functional limb although not fully developed. The protopod consists of a short coxa, about twice as long as wide, and a much longer basale, more than five times as long as wide. The endopod is the most fully developed of the two branches. It is four-jointed with the three first joints long and fully developed, but with joint 4 short and tipped with a strong seta. On some of the other joints are placed a few setae. The exopod is three-jointed with a few plumose, swimming setae on the last joint. The second pereiopod is only a tiny bud.

The uropod (Fig. 43). The first lateral seta on the exopod has been replaced by a hooked spine, and the number of setae on the medial margin has increased. The endopod which in the previous stage had only a few setae on the tip and the disto-medial margin has now setae also on the lateral margin.

Dimensions.

Total length 6.5 mm; length of carapace 2.7 mm, width of same 1 mm; rostrum 0.1 mm; abdomen 2.6 mm; telson 0.8 mm.

Mysis VI

Figs. 44–52.

Development.

Last abdominal segment elongated. Teeth on mandible further developed; endopod on first maxilla more narrow; endopod of first maxillipede three-jointed. Second pereiopod bifurcate with two-jointed protopod, but still nonfunctional.

Thorax.

The thorax and carapace have widened a little more.

Abdomen.

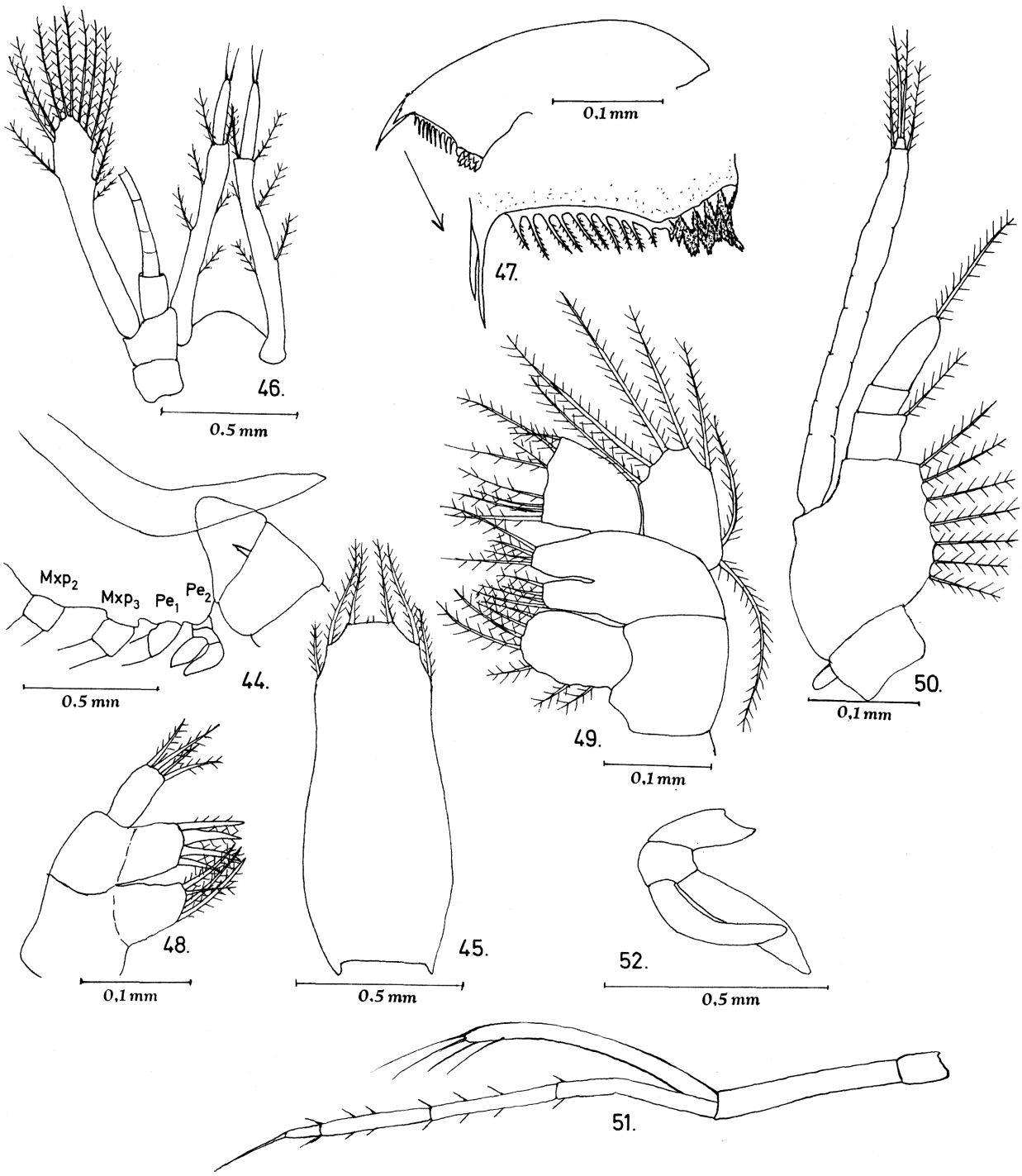
The last segment is now about six times as long as wide.

Telson.

The plate (Fig. 45) has grown to a length of 1 mm, but the setae are practically unchanged; perhaps the small setae no. 7 have become a little shorter before disappearing in the following stage.

Appendages.

The first antenna (Fig. 46) remains stout. It has now developed three setae placed with equal distances on each side of the proximal joint medially and laterally. On the mandible (Fig. 47) the secondary incisor teeth are shorter and stronger and the molar part seems more compact. In the first maxilla (Fig. 48) the setae on the basi-endite are fewer but they are more conical, and the endopodial joint is slimmer and tipped with four stiff setea. The second maxilla is shown in Fig. 49. In the first maxillipede (Fig. 50) the crista on the basi-endite has enlarged. The endopod has from now on only three joints, as joints nos. 2 and 3 have coalesced as have nos. 4 and 5. The exopod has only one small distal joint, the rest is ringed and without clear articulation.



Figs. 44–52. *Amphion reynaudi*, Mysis VI. Fig. 44, posterior part of thorax and anterior part of abdomen. Fig. 45, telson plate. — Fig. 46, metope and first and second antenna from ventral. — Fig. 47, mandible. — Figs. 48–49, first and second maxilla. — Fig. 50, first maxillipede. — Fig. 51, first pereiopod. — Fig. 52, second pereiopod.

The first pereiopod (Fig. 51) is now the longest of the appendages. Short setae are placed along the endopod. The second pereiopod is short, bifurcate, nonfunctional (Fig. 52). The protopod is divided into a longer coxa and a shorter basale, and the exopod and endopod are leaf-shaped. The uropod is almost unchanged.

Dimensions

Total length 7 mm; length of carapace 2.8 mm, width of same 1.2 mm; rostrum 0.1 mm; abdomen 3 mm; telson 0.8 mm.

Mysis VII

Figs. 53–57.

Development.

The carapace has widened and has now the shape typical for an older *Amphion*. Only two pairs of setae, nos. 5 and 6, are left on the telson which has started to narrow distally. The medial flagellum of the first antenna is showing as a small bud. Second pereiopod functional, but not yet with full length. Third pereiopod a small bud. The endopod of the uropod reaches the tip of the telson plate.

Thorax.

The thorax has become longer and the carapace wider so that the larva from now on has the typical shape of an older *Amphion*. The convoluted lobes of the hepatopancreas have appeared and are best developed in the anterior part of the thorax. These branched lobes which are characteristic for and only found in *Amphion* and the *Phyllosoma* larva have, together with the similarity in the thoracopods and mouth appendages caused some earlier investigators to see a close relationship between these two larval forms.

Abdomen.

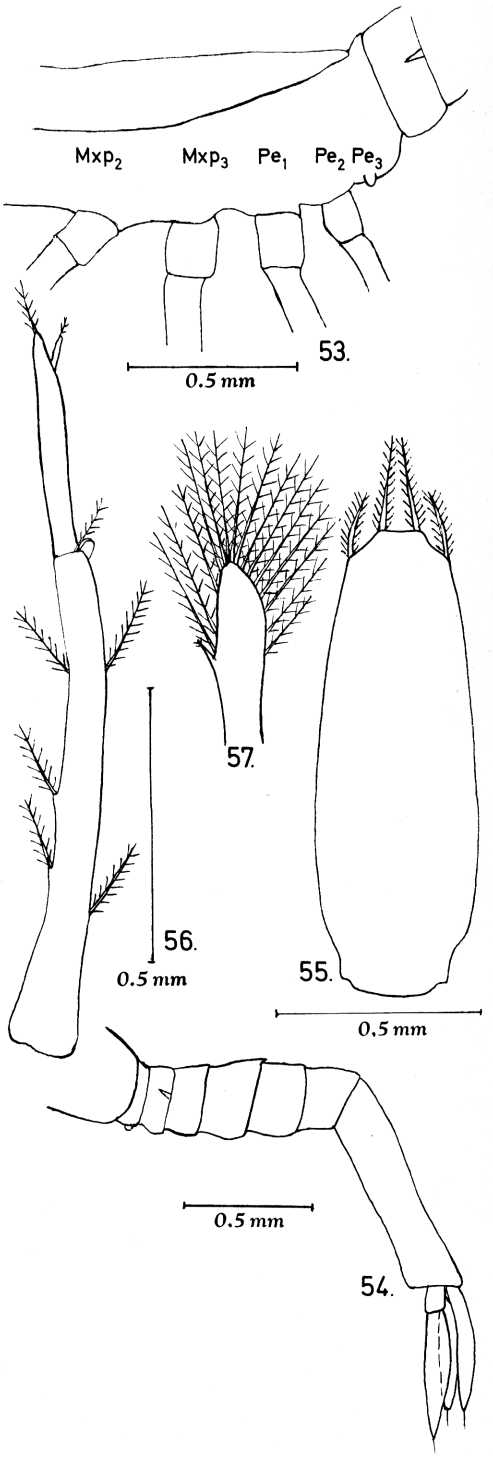
The last abdominal segment has become stouter and is as long as the anterior five abdominal segments together (Fig. 54).

Telson.

The telson plate (Fig. 55) has enlarged a little, its length being three times its largest width. The plate has started to narrow distally. The number of setae is reduced, as both nos. 4 and 7 have disappeared and 5 is reduced to half its earlier length.

Appendages.

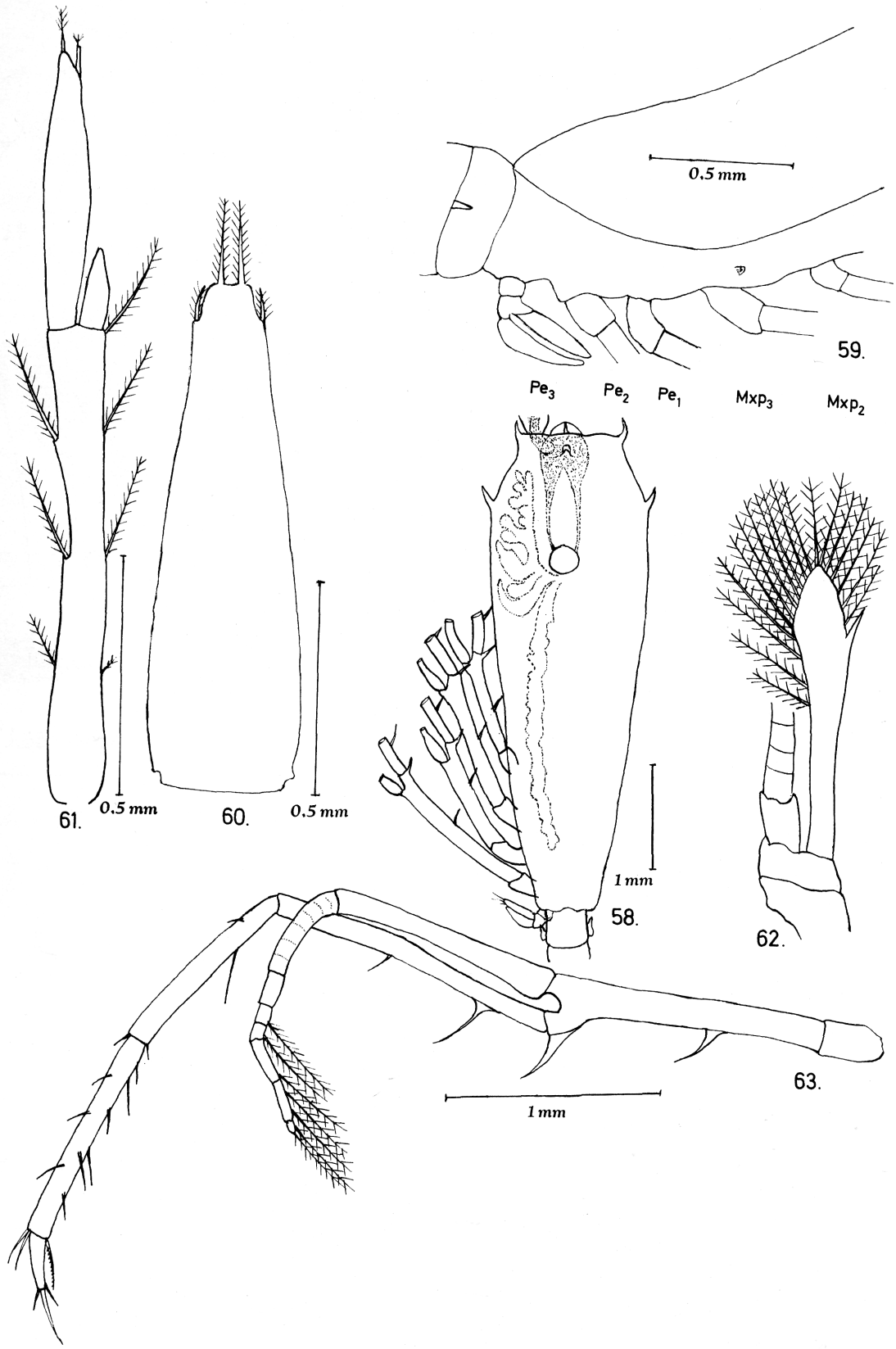
The first antenna (Fig. 56) has grown in length and stoutness and the unjointed lateral flagellum has elongated. The medial flagellum has appeared, but only as a small bud. In the second antenna the most lateroposterior of the setae on the antennal scale (Fig. 57) has changed into the antennal spine, but its former existence as a seta is still indicated by a tuft of small hairs at the tip. The second pereiopod has grown to a little more than half the length of the first pereiopod. The protopod has elongated, with the basale now reaching nearly its full length. The exopod has long plumose swimming setae and is locomotory. The endopod is divided into five shorter joints and is nearly twice as long as the exopod. The third pereiopod appears as a small bud. On the uropod the exopod and endopod have developed a little further.



Figs. 53–57. *Amphion reynaudi*, Mysis VII. Fig. 53, posterior part of thorax and anterior part of abdomen. — Fig. 54, abdomen, telson and left uropod. — Fig. 55, telson plate. — Fig. 56, left first antenna from dorsal. — Fig. 57, distal part of antennal scale.

Dimensions.

Total length 8 mm; length of carapace 3.5 mm, width of same 1.5 mm; rostrum 0.1 mm; abdomen 3.2 mm; telson 1.1 mm.



Figs. 58–63. *Amphion reynaudi*, Mysis VIII. Fig. 58, carapace and first part of abdomen from dorsal, showing metope, brain with anterior dorsal organ, oesophagial commissura hepatopancreas, proximal part of limbs and lateral process. — Fig. 59, posterior part of thorax and first part of abdomen. — Fig. 60, telson plate. — Fig. 61, first left antenna from dorsal. — Fig. 62, part of second antenna. — Fig. 63, third maxillipede.

Mysis VIII

Figs. 58–63.

Development.

Elongation of thorax and carapace; development of hepatopancreas; reduction in setae on telson; a posterior narrowing of the telson plate. Growth of the medial flagellum of first antenna; further developments of pereiopods. Third pereiopod nonfunctional but with two-jointed protopod and leaf-shaped exopod and endopod; rudimentary gill on third maxillipede and in some larvae also on first pereiopod.

Thorax.

The thorax (Fig. 58) is more elongate. The hepatopancreas is more branched with a main lobe consisting of a stem with blind, lateral branches running from the front intestine to near the front of the thorax. On each side an unbranched hepatopancreas lobe runs backwards to near the posterior border of the thorax.

Abdomen.

Unchanged.

Telson.

The telson plate (Fig. 60) has narrowed posteriorly; in the first third of its length its sides are nearly parallel, but in its posterior two thirds they narrow towards the tip. This can also be seen in the setae no. 5 which, besides being shorter, now are situated nearly in line with number six.

Appendages.

In the first antenna (Fig. 61) the lateral flagellum has grown much stouter; especially the tip with the two aesthetascs has widened, and also the medial flagellum has grown from a tiny bud to a lobe about three times as long as wide. The antennal spine on the antennal scale of the second antenna (Fig. 62) has lost its last setae, and is now definitely developed as a spine.

From the second maxillipede to the second pereiopod the typical catching basket is developing with large spine-like "rose thorns" on the basale and the inner margin of the endopod (see Fig. 63). This basket is known for different pelagic decapods as *Phyllosoma* larvae and *Cerataspides longiremis*. It is only found in true pelagic Crustacea and must be very effective in catching pelagic organisms, partly as a trap, partly as an active apparatus. The second pereiopod (Fig. 58) is now fully developed, but the third pereiopod (Fig. 59) is still nonfunctional. It has a two-jointed protopod with two equally large joints, the coxa and the basale and an unjointed, but lobed exopod and endopod. A small gill bud has developed at the base of the third maxillipede and in some specimens also at the first pereiopod. This is the first larval stage in which the beginning of the gill development can be observed.

Dimensions.

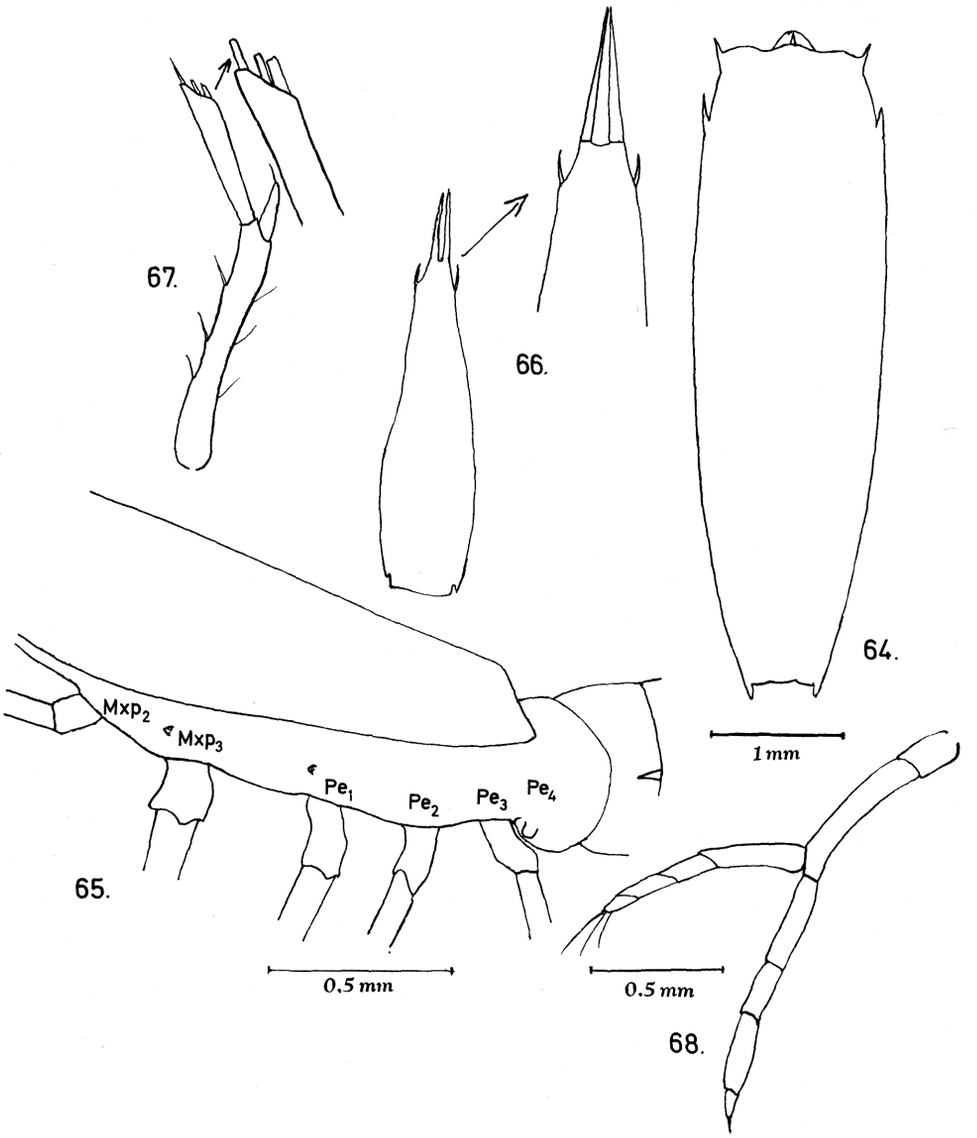
Total length 9 mm; length of carapace 4.5 mm, width of same 1.6 mm; rostrum 0.1 mm; abdomen 3.2 mm; telson 1.2 mm.

Mysis IX

Figs. 64–68.

Development.

Carapace longer and more widened posteriorly, where it ends in two small lateral lobes pointing backwards. The telson plate further narrowed posteriorly, seta no. 5 more reduced. Lateral flagellum of first antenna broader distally and with three aesthetascs; the medial flagellum is tipped with one seta. Third pereiopod half as long as second pereiopod, the fourth pereiopod present as a small bud. Rudimentary gill-buds at the base of the third maxillipede and first pereiopod.



Figs. 64–68. *Amphion reynaudi*, Mysis IX. Fig. 64, carapace and metope from dorsal. — Fig. 65, posterior part of thorax and anterior part of abdomen. — Fig. 66, telson plate. — Fig. 67, left first antenna from dorsal. — Fig. 68, third pereiopod.

Thorax.

The thorax and carapace (Fig. 64) have further elongated and the widening and flattening of the carapace has reached farther backwards. The carapace has two small posterolateral lobes pointing backwards, which gives a more free movement between thorax and abdomen during the coming stages where a further development of the abdomen takes place.

Abdomen.

The development has up to and including stage IX been very slow with little or no growth.

Telson.

The telson is still more narrow and pointed distally and seta no. 5 still smaller (Fig. 66).

Appendages.

In the first antenna the two flagella have developed (Fig. 67). The lateral flagellum has widened distally; it is still unjointed but more flattened. The medial flagellum has a small seta on the tip. The catching basket

shaped by the two last maxillipedes and the thoracopods has developed, and the third pereiopods are closing the basket posteriorly. On the third pereiopod (Fig. 68) the basale has grown to about three times the length of coxa. The exopod is jointed but not with distinctly delimited joints, and it is furnished with only a few small setae at the tip. The endopod is a little longer than the exopod, its joints nos. 1 and 3 are the longest. In the next stage no. 3 will be divided into two joints, when the endopod reaches its full length. The fourth pereiopod is present as a small bud. Small gill buds are present at the base of third maxillipede and first pereiopod.

Dimensions.

Total length 9.5 mm; length of carapace 5 mm; width of same 1.6 mm; rostrum 0.1 mm; abdomen 3.2 mm; telson 1.2 mm.

Mysis X

Figs. 69–80.

Development.

Telson is still more pointed posteriorly, with only setae no. 6 and vestigial no. 5. Labrum circular in outline with a notch in the medial line. Mandible furnished with a line of long secondary incisor teeth. Endopod of first maxilla reduced. The exopodial leaf of second maxilla enlarged with a backwards-pointing lobe. First maxillipede with coxa reduced, mastigobranchiae enlarged, basale with growing masticatory endite, endopod more setose. Third pereiopod developed in length and shape as the anterior ones. Fourth pereiopod half as long and now closing the catching basket posteriorly. All five pleopods developed as small buds.

Thorax.

The thorax and its carapace have grown in length and width, and the posterolateral lobes, which in the previous stage were more pointed, are now more rounded.

Abdomen.

The abdomen (Fig. 80) has grown a little and the pleurae have started to develop a free lobe for covering and protecting the growing pleopod buds.

Telson.

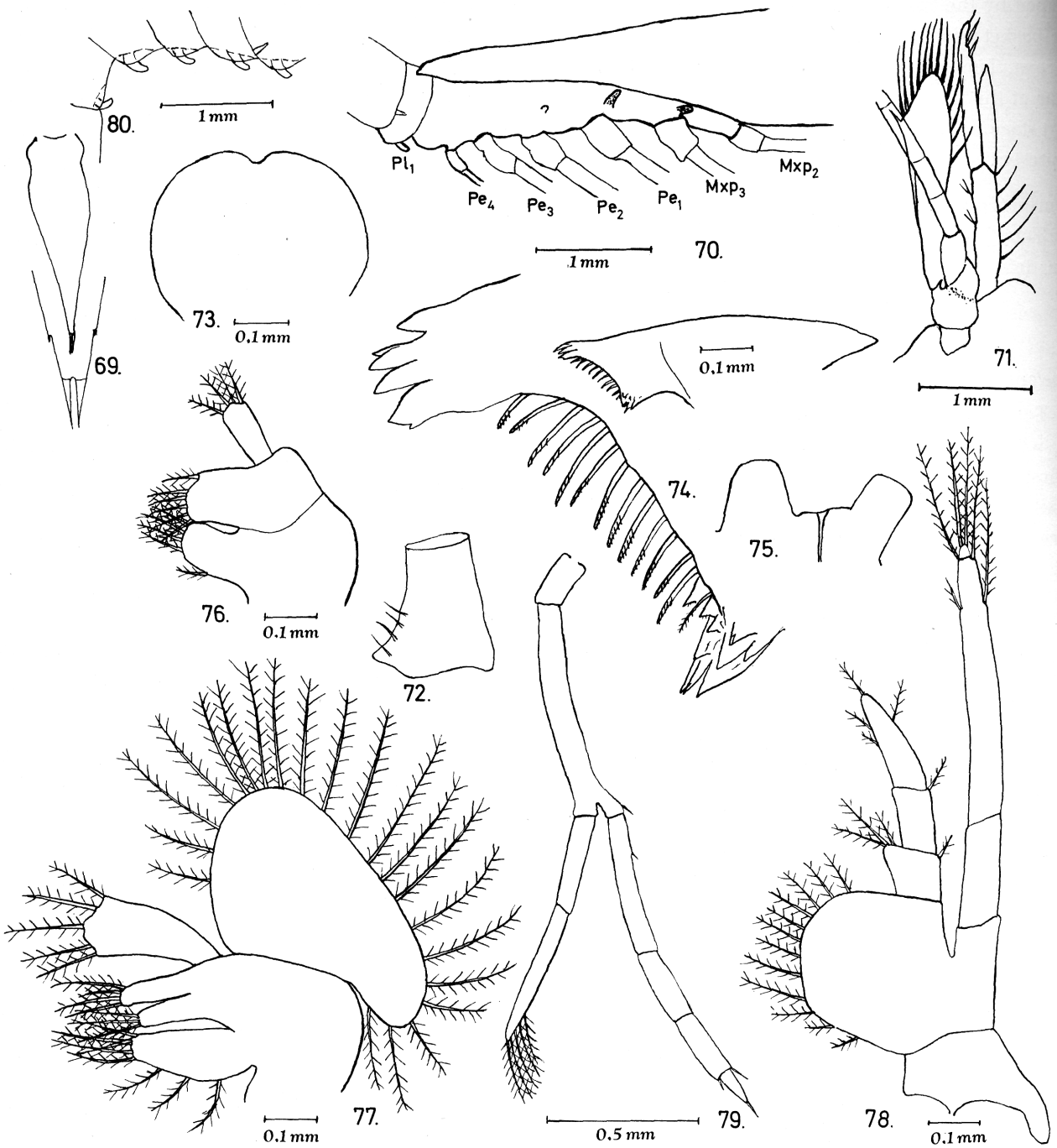
The telson is further pointed posteriorly, and the sixth pair of setae has become very short; in some specimens a tiny vestige of no. 5 can still be noticed; in others it is absent (Fig. 69).

Appendages.

The protopod of the first antenna has at the base of its curved lateral margin (Fig. 72) a line of stiff setae where the opening for the statocyst should be. Farther up on the lateral margin (Fig. 71) are two small groups of sensory hairs and on the medial margin is a line of stiff plumose setae. Both flagella have enlarged, but are still unjointed; the lateral flagellum has grown most on its lateral side so that the three aesthetascs which in stage IX were placed at the square-cut distal end, now are placed distally on the medial margin. On the basale of the second antenna (Fig. 71) the small process of stage IX at the base of the flagellum has developed to a clearly hook-shaped spine. The flagellum is stouter at its basal part and has probably (all flagella were broken off near the base) developed more joints. The labrum is now a circular plate with a small incision in the middle of the margin (Fig. 73).

In the mandible the corpus mandibulae has elongated; the primary incisor teeth and the molar teeth have been compressed towards the margins and the area of the secondary incisor teeth is much enlarged. The secondary incisor teeth stretch now over two thirds of the cutting-edge, leaving only 1/6 each to the primary incisor teeth and the molar teeth. The secondary incisor teeth, placed at the medial margin, are long and styliform with stiff hairs on the distal third of their length (see Fig. 74). These teeth seem flexible at their base but only in a direction parallel to the cutting edge. They seem to function excellently for grating. No palp develops on the mandible.

The labium is short with two small, squarish horns (Fig. 75), separated by a medial plate and forming an angle of about 120° to this plate.



Figs. 69–80. *Amphion reynaudi*, Mysis X. Fig. 69, telson plate. — Fig. 70, posterior part of thorax and anterior part of abdomen with gills and basal part of limbs. — Fig. 71, first and second antenna. — Fig. 72, basal part of left first antenna from dorsal. — Fig. 73, labrum. — Fig. 74, mandible. — Fig. 75, labium. — Figs. 76–77, first and second maxilla. — Fig. 78, first maxillipede. — Fig. 79, fourth pereiopod. — Fig. 80, ventral part of abdomen showing beginning pleopods and beginning pleural plates.

The first maxilla (Fig. 76) is comparatively reduced in size, the setae on the basiendite are less stout; the numbers of setae on coxa- and basi-endite have increased a little; they are now more like a brushing organ and not a tearing and cutting organ as in Mysis VI. The endopod is still more reduced and has only 4 distal setae.

On the second maxilla the coxa-endite, the two basi-endites, and the endopod have become more narrow, like fingers, with a brush of plumose setae on their tips. On the exopod the backwards-turning corner has begun to form a lobe pointing posteriorly (Fig. 77).