

MEMOIR II.

On the Genus Mysis, or Opossum Shrimp.

THE Mysis, or Opossum Shrimp, a Genus instituted by Latreille, appears to have been hitherto noticed by very few Naturalists, and to the bulk of such even as devote themselves to Zoology alone, they may be said to be wholly unknown; those few who have had opportunities of observing them, although they have given us some imperfect notion of their structure, have left their singular economy a mere blank, from a practice hitherto much too prevalent, of attending almost solely to the more remarkable differences which distinguish one genus or species from another, as if this was the only object worthy our attention, whilst those circumstances of structure and economy which give a real interest to natural history are either neglected or overlooked. The object of this Memoir therefore, will be to make the Opossum Shrimps more generally and perfectly known, and to display the more remarkable traits in their economy, and may thence be considered as having novelty to recommend it to the attention of the curious; at the same time it may be observed, that the Marsupial Quadrupeds or Opossums, (although so long and so well known) having lost little of their original interest with the admirers of the works of creation, induces a hope, that a somewhat similar economy displayed for the first time in an animal of a very inferior order, may not be without its attractions; if in addition to these circumstances we take into account the *extraordinary peculiarities of structure*, which these animals present to

our notice, in being provided with a *quadruple* row of feet or members, and with hands vastly more complicated and beautiful than in man, or any known creature, there could hardly be found a subject more worthy to engage our contemplation, or more capable of inspiring us with adoration of the Divine Perfection, as manifested in the minuter works of creation.

It will hardly be credited that such interesting peculiarities could have remained unnoticed, when it is known, that the Opossum Shrimps are in these climates the most common of all the Crustacea, that they abound to such a degree, as to astonish by their countless myriads, and that (unlike all the other animals of their class) they offer themselves freely to our view when we stroll along the margin of our estuaries, where, particularly in spring and summer, they may be observed forming an almost continuous band or column of some feet in breadth, extending along either margin of the tide, from the sea up to where the water becomes almost fresh. If we stop to consider so singular a piece of negligence, it only furnishes a proof of the little attention that has hitherto been paid to this class of animals.

The Opossum Shrimps belong to a small group of the Crustacea, at present embracing but three or four Genera, which it is proposed to develope in succeeding Memoirs, as they are for the most part nondescript, and in other respects highly interesting; this group has been designated by modern systematists as a *family*, under the title of Shizopoda or Fissipedes, from the singular circumstance of having all their feet or members divided to their very origin into two parts or limbs, the inner limb being constructed for progression and the seizing of their prey, and the outer one for swimming and the giving that motion to the water which is essential to the respiratory organs; which organs, with a view to the due oxygenation of their circulating fluid, are as it were wrapped around the base

of this limb, and fully exposed to the action of the ambient fluid: in the other Crustacea to which they most nearly approach in appearance, as the Shrimps, Prawns, and Lobsters, it may be observed, that there is a single row of *five* feet on each side, (and they are hence designated by the family title of Decapoda) and these adapted to crawling, except some of the anterior pairs, which are generally chelate or formed into a kind of pincers; and further, that the branchia or gills, which are attached to the outer part of their base, are reflected backwards and upwards, and entirely protected and concealed by the sides of the shell or cephalo-thoracic-clypeus.

The number of feet in this Genus, and in such of the Shizopoda as are thoroughly known, is *eight* in each of the *four rows*, in all thirty-two feet! of which sixteen are adapted to prehension, and sixteen to swimming. We plainly perceive in this instance, how organization modifies the habits of these two descriptions of Crustacea, the Shizopoda being almost always found swimming near the surface of the water, whilst the Decapoda with extended tails, (Macroura) as the true Shrimps. &c. are obliged to confine their perambulations to the bottom; these latter it is true are not altogether incapable of swimming, but when they do, it is evidently an effort, and effected solely by means of the subcaudal fins: it results from the above economy, that these, clear the bottom of numerous impurities, and by their predacious habits, keep in check the mollusca, annelides, &c. below, whilst those, (the Shizopoda) effect the same purpose in the supernatant element, where the medusæ and lighter portions of extraneous matter, furnish an equally abundant stock of nutriment; thus the ocean is freed from much of its impurity, and the balance of nature sustained.

Confining our views to the Genus Mysis or Opossum Shrimp, it may be observed by reference to the magnified figure, Plate I. fig. 1. that its general appearance approx-

imates much to that of the Shrimps and Prawns, but independent of the number and structure of the feet and branchia above stated, the abdomen, which is always kept extended, is furnished with fins of a very peculiar structure, Plate I. fig. 9, added to which, the female is provided with a post-thoracic pouch, Plate I. fig. 1. *u.* composed of four concave valves, which are articulated inside the base of the two posterior pair of legs, and strongly ciliate or pectinate where they meet in front: of these valves the posterior are the most capacious, and exterior to the others; it is within this pouch, that the eggs are received when excluded from the ovarium, and enveloped in a mucous or subgelatinous secretion, and gradually developed without any visible attachment to the parent. The ova when first received into the pouch, are considerably more advanced than those of the Shrimps, Crabs, &c. on their first expulsion, and by no means so numerous, a circumstance more than compensated by the rapidity with which one brood succeeds to another during the whole of the spring and summer months: the number of broods produced by one individual, as well as the time occupied in their evolution, have not been determined, but the changes which the embryo undergoes in configuration are sufficiently obvious; in the present instance, these cannot be considered as metamorphoses, but simply a gradual development of parts, hence the Shizopoda may be regarded as one exception to the Crustacea undergoing transformations, another character by which they are separable from the true Shrimps, &c. to which they bear the same relation that the Syren among the reptiles (amphibia) does to the family of Lacerta. The first change which is perceptible in the ova after their reception into the maternal pouch, is a slight elongation at one end, and the appearance of two short members at each side, Plate I. fig. 10, *b*; this elongation which proves to be the tail, increasing in length, shortly after, becomes forked at the end, accompanied by

a proportional growth in the four lateral members fig. 10. *c.* and which are the rudiments of the two pair of antennæ in the perfect animal, the embryo going on thus with a progressional developement from day to day, begins to assume a more complete form, and an approximation to that of the parent, fig. 11, in which stage the divisions of the abdomen, the tail, the pedunculate eyes, and the various members are sufficiently distinct; a still more close resemblance to the perfect animal is attained before the young are finally excluded, which is effected by the parent spreading open the valves of its pouch, when the whole brood emerge at once into the ambient element, and in most of the species, continue associated with the community from which they sprang: the slight differences which they now present, (and which are necessary to be known in order to preclude the possibility of their being mistaken for individuals of a different species,) affect only the inner rows of feet, the sub-abdominal fins, the outer antennæ and the tail; the first of these, in place of the multi-articulate termination seen in Plate I. fig. 8. *a.* have but one or two short joints and a curved claw fig. 12, superadded to the end of the tibiæ, and hence this division of the limb is shorter in proportion; the sub-abdominal fins consist only of a linear joint surmounted by a few bristly hairs, and do not put on the elegant appearance seen in fig. 9; the outer antennæ differ in no other respect than in the ciliated scale which is attached to their base, being shorter and less developed, as is also the brush of hair in the males fig 5; the three intermediate scales of the tail are proportionably shorter, but yet present the character peculiar to the species, in their form, indentations, and appendages, so as to testify the acuteness of Dr. Leach in having fixed upon this part to distinguish the species from each other.

What is further remarkable of the embryo, is the way in which they are arranged within the pouch from the

moment they assume an elongated form; their heads being towards the breast of the mother, with the curvature of the tail part suited to that of the outline of the pouch, the convexity being at the same time invariably on the belly side, fig. 11, which is the more singular, since the curvature of the perfect animal, and of other embryo Crustacea is as invariably in a quite opposite direction; after this manner, they lie closely compacted together, and present a perfectly symmetrical arrangement, easily observed from the translucency of the valves of the pouch, and the large size and blackness of their eyes.

This curious and extraordinary piece of economy can hardly fail to be regarded by the Physiologist as equally interesting with that of the Opossums, and other Marsupial Quadrupeds, and of a much more unaccountable nature; for in these last, although the object of the Creator is not obvious, yet we can understand the manner in which it is carried into effect, the young being excluded from the uterus when they have scarcely attained a fourth part of the growth of the embryos of other animals—naked, helpless and blind, they are received into the abdominal pouch of the mother, and by some wonderful instinct, or by the mother's agency, attached each to one of the teats which are situated within it, from whence, when sufficiently grown, they make occasional sallies, until able entirely to provide for themselves; in the Opossum Shrimp on the contrary, we comprehend the object, but are completely at a loss to account for the manner in which it is brought about, for these animals have nothing analogous to teats, the embryos have no visible attachment to the mother, appear to be in no capacity to take food, nor to carry on the respiratory function. It is nevertheless probable, that the secretion in which they are immersed, constitutes the source of their nutrition, whether taken in by suction or by absorption; yet if we admit this, what are we to think of the function of respiration thought to be equally neces-

sary with nutrition to the continuance of life and the evolution of the fœtus, as the subgelatinous secretion appears to exclude the direct influence of the ocean upon the respiratory organ, which moreover does not appear to be developed until the moment prior to their exclusion from the pouch, this circumstance, taken in conjunction with the suspicions of some Physiologists as to the oxygenation of the fœtal blood, may lead to such further observations as may tend to throw some new light upon this still obscure function in the fœtus.

To the Philosophical Naturalist, who delights to trace the changes which parts are made to assume in figure and use, in contiguous groups of beings, so as to fit them for different modes of life, the Opossum Shrimp must prove highly interesting, for independent of the peculiar structure or modification of its feet before noticed, and which renders it essentially natatory, it points out to us in the clearest manner possible, by the changed appearance of its three anterior pairs* of feet, that what have been considered in the Crabs and Lobsters, &c. (Decapoda) as three pair of auxiliary jaws or *Pedi-maxillæ*, are no other than the above members in a disguise which seems to appropriate them in a decided manner to the service of the mouth; for in the Decapoda there are (as the name of the family implies) but five pair of feet, and three pair of auxiliary jaws, which jaws being added to the front of the series of feet in the Opossum Shrimps, increases their number to eight pairs, of which the sixth, reckoning upwards, are not to be distinguished in structure from those posterior to them.

The males in this Genus appear to be much less numerous than the females, and differ principally in being smaller, and in the substitution of a peculiar organ between the last pairs of feet (Plate I. fig. 13, 14.) instead

* The peculiar structure of the limbs, being subdivided into two, renders necessary this unauthorized application of *pairs*.

of the valvular pouch of the other sex ; they have further the addition of an appendage at the bifurcation of the inner antennæ, so densely tufted as to resemble a brush, (Plate I. fig. 5 ;) it is probably this appendage which has induced Naturalists erroneously to assign to *Mysis*, *trifid* interior antennæ.

Hitherto, the Opossum Shrimps have not been observed further South than the precincts of the English Channel, but they occur as far to the North as the icy seas of the Polar regions, where they must exist in very great abundance during the summer season, as they are said by O. Fabricius to constitute one of the principal sources of nutriment to the Whale, which taking in myriads at a gulp, separates them from the water by means of its complicated strainers, and swallows the congregated pabulum which they now form, at leisure ; we should hardly give credence to the fact, that an animal so disproportioned, should constitute the food of this Leviathan, did we not perceive that the peculiar structure of the mouth, and smallness of the gullet in these enormous creatures (the Mysticete Whales) is in perfect accordance, and fits them for separating small and soft animals of every kind from the sea water, while it precludes the power of masticating, or of swallowing bodies of even moderate size : abundance in this instance, makes up for the individual smallness of the prey, and these little animals must be allowed to be a much more substantial food than the medusæ, upon which the whales are also understood to feed. In these climates, the Opossum Shrimps serve as food to the herring and pilchard, and probably to many other fishes, and although by their numbers they might tempt the epicure to serve them up in the aggregate, as they do the young fry of fish in some parts of the world, the species with which we are best acquainted are so little particular in their food as to counteract any design we might form upon them ; this objection however, does not apply to the oceanic species,

nor indeed to the others, provided they are taken where the water is pure and saline, and at a distance from rivers and towns. The Opossum Shrimps in common with all the smaller Crustacea, are animals which require the best eyes and instruments to observe properly, and the most detailed sculpture to represent, if therefore the accompanying figures seem minute, they are rude when compared with the originals.

It is in looking closely into the structure of these little animals, that we see the *perfection* of the Divine Artist; nature's greater productions appear coarse indeed to these elaborate and highly finished master-pieces, and in going higher and higher with our magnifiers, we still continue to bring new parts and touches into view. If for instance, we observe one of their members with the naked eye—which may be the utmost stretch of unassisted vision—with the microscope it first appears jointed, or composed of several pieces articulated together—employing a higher magnifier, it appears fringed with long hairs, which on further scrutiny gain a sensible diameter and seem to be themselves fringed with hairs still more minute; many of these *minute* parts are evidently jointed, and perform sensible motions, but what idea can we form of the various muscles which put all these parts in movement, of the nerves which actuate them, and the vessels which supply them with the nutrition essential to their growth and daily expenditure, all of which we know from analogy, they must possess.

The magnified figures in Plate I. and II. may furnish some faint idea of the delicacy and elegance of most of the parts in the Opossum Shrimps, particularly that of the sub-abdominal fins Plate I. fig. 9, of the tail Plate II. fig. 2, and above all, that of the hand of the second pair of feet, fig. 3, which is at once complicated and beautiful, and one of the most elegant microscopic objects that can be conceived.

These, and all the other magnified sketches, with which it is intended to illustrate the smaller subjects in the progress of these memoirs, will tend to show, how absurd it is to think of communicating a clear idea of almost any minute animal without them, and how idle to rest satisfied with representations of the *natural size*, since so much that is worthy to be seen and admired, and which appears necessary to the right understanding of their true nature remains invisible to the unaided sight.

In these little animals when young, and particularly in *Mysis Vulgaris*, the circulation can be better observed than perhaps in any other of the Crustacea. The Heart, which is situated under the centre of the corselet behind, is of an elongated form, (Plate I. fig. 15, *b*;) at its fore part it gives off an anterior aorta, which going towards the head is speedily veiled from the sight by the opacity of the matters contained in the stomach (*a*) and intestine, over which it runs; at its opposite end in like manner it furnishes a posterior aorta, (*c*) which may be traced to the end of the tail; at each side, it further appears to receive a vessel of smaller size, which is probably the united trunks of the pulmonary veins, reconveying the aërated blood from the branchia, again to go the round of the circulation; the pulsations of the heart are so rapid as to resemble vibrations, and together with the blood it is so transparent and colourless, that but for the globules of the latter we should hardly be able to trace the course of the circulation, and which in the figure is represented by little arrows. On observing with attention the termination of the posterior aorta at the end of the tail, a periodical action may be noticed, as if of the opening and closing of a valvular opening on each side, accompanied each time by the filling of the corresponding end of a vessel of considerable size, lying on each side of the intestinal canal, (*d*) these vessels or veins, propel the blood towards the heart by successive

contractions of their muscular fibres, as represented in the figure, and seem to be lost at length in a great sinus or auricle, lying beneath the heart; whether this is really the case or not, remains to be ascertained by dissection, there can scarcely be a doubt however, that the two large veins constitute the *Venæ portæ*, and ultimately send their blood to the Branchia: a somewhat similar appearance, is presented by the venous system of the Caligi, and it is not improbable that in both of these, a valvular communication will actually be found to exist between the posterior commencement of the above described *Venæ portæ* and the abdominal cavity, into which cavity, we may suppose the fluids to be finally poured by the continuations of the arteries, and by the excretories of the alimentary canal, taking into consideration at the same time, that no lacteals or lymphatic system has been proved to exist in any of the invertebrated animals. Whether these appearances, independent of dissection, warrant such a view of the circulation or not, Physiologists will be enabled the better to appreciate its probability, by referring to a somewhat similar contrivance in the molluscos genera of *Aplysia* and *Sepia*, first brought to light by the immortal labours of the first comparative anatomist of the age. See Cuvier, *Memoires pour servir a l'Hist. Nat. des Mollusques*.

If the Opossum Shrimps are the prey of numerous inhabitants of the ocean, they are themselves equally destructive to animals less in size and power, being however rather omnivorous, than strictly carnivorous, seizing and eating every animal substance which the current or the tide carries along with it, and contending like vultures for the possession of the larger masses, nothing tends however to establish more unequivocally their rapacious nature, than the circumstance, that when confined together in a vessel of sea water, they even kill and devour one another.

That the Natural History of the Opossum Shrimps may be rendered as complete as the state of our knowledge permits, and for the satisfaction of the Scientific Naturalist, and the Systematist, the following short description of the Genus has been drawn up, which may be passed over by the general reader.

The *Corselet* or cephalo-thoracic-clypeus, resembles that of the Prawns, without however being remarkably prolonged in front.

The *Eyes* are very large, spreading, and on rather long pedicles.

The *Antennæ* or feelers, consist of an inner and an outer pair; the former, arise from between the eyes, are composed of three robust basil joints, of which the uppermost is short and supports two long multi-articulate setæ, the innermost of these setæ is shorter, and carried straight in front, while the outermost spread out in a lateral direction; the latter or outer pair of antennæ, are placed upon a lower level than the former, originate from the inner side of the anterior lamina or scales, and end in a single long multi-articulate seta, extended downwards and outwards by the animal in swimming.

The *anterior Lamina*, or scales which accompany the outer antennæ, correspond with the same members in the Shrimps and Prawns, but are longer in proportion, and vary in their shape, so as to furnish characters for the distinction of the species.

The *Mouth*, situated as in the Shrimps below the base of the antennæ in front, is provided with a labrum, and with a bilobate under lip, a pair of palpigerous toothed mandibles, and two pair of complicate foliaceous maxillæ or jaws. The Palp has its first joint much abbreviated, the second and third, broad, and strongly pectinate on the margin.

Feet: Unlike all the other Macroura, (in which the three anterior pair of feet are disguised and appropriated

to the immediate service of auxiliary jaws) the whole series of feet to the number of eight pair, are thoroughly developed, and further, present us with a very peculiar construction, being all divided to the basil joint or coxæ, into an outer and an inner branch; the former corresponding with the flagrum in the Decapoda, having each a branchia wrapped around their first joint, and ending in a pluri-articulate plumose member, adapted to swimming; the latter or inner division, constitute the true feet, and except in the two anterior pair, end in a many-jointed tarsus surmounted by a small hook, this part in the two anterior ones, being reduced to two joints, of which the extreme joint resembles a kind of hand more or less complicated, particularly beautiful in the second pair, being furnished with a marginal row of jointed spines, most elegantly toothed on their opposite edges.

Valvular pouch. Attached to the base of each of the inner divisions of the two posterior pairs of feet in the female, is a large concave scale, strongly pectinate in front, of which the posterior is the outermost, largest, and most concave, lapping considerably over the anterior scale, so as to admit of a considerable extension of the size of the pouch which they form, by meeting each other in front, in order to accommodate its capacity to the growth of the ova and young brood.

In the *male* in place of the valvular pouch of the female, we perceive attached to the inner part of the last pair of feet only, a single small hollow scale on each side, ciliate in front, and provided with a marginal row of slender hooks at the apex: these are probably an appendage of the male organs, which have a similar situation in the Shrimps.

The *Abdomen* or caudal extremity, consists of five joints, furnished beneath with as many pair of fins or natatory members, each fin composed of a *single* elongate flattish scale, plumosely ciliate on its outer margin. We

have in this structure of the sub-abdominal fins, which is not found in any other of the Macroura, another instance, of the modifications which parts undergo in the hands of Omnipotence, so as to adapt them to the peculiar habitudes of the animal ; in Mysis they are *wholly* adapted to swimming, and therefore present the most simple arrangement, but in the other Macroura, as they also serve to receive and mature the ova, they are necessarily larger and more complicate, and are each composed of two articulate branches supported on a common basis.

The *Tail* is composed of five scales, articulated to the last segment of the abdomen ; the middle scale, varying in shape and armature, has been considered by Dr. Leach, as affording the best and most obvious specific characters ; of the lateral scales, the outer ones are the largest, and *also* present considerable difference in shape in the different species.

Of the different Species of Opossum Shrimp.

THE species of this Genus as yet known, are but few, and appear to be principally littoral, frequenting the shores and shallow parts of the sea, and the estuaries of rivers.

The *Mysis Fabricii* of Dr. Leach,* enumerated by Otho Fabricius in his Fauna Groënlandica, under the title of *Cancer oculatus*, and very imperfectly figured, (see Plate II. fig. 11, 12) is one of the longest known, and the type of the Genus ; it has been lately more satisfactorily developed by Mons. Desmarests in his work “sur les Crustacés” Plate 40, fig. 6. This species is distinguished by the middle scale of the tail being *obtusely* and deeply notched, and at the same time spinous on its edges : the outer scales of the

* *Mysis, cauda lamella intermedia apice obtuse emarginata : lamellis exterioribus apice rotundatis.* Linn. Trans. Vol. XI. p. 350.

tail, according to Fabricius, are rounded—in Mons. Desmarests figure, they appear obtusely pointed; he also figures the anterior scales as obtusely pointed, serrated, and ciliated all round their margin (as in *M. vulgaris*), and the front of the corselet obtuse. The *Mysis Fabricii* inhabits the sea about Greenland, and constitutes with the *Mysis pelagicus*, the principal food of the whale, (*Balæna mysticetus*.)

Dr. Leach having observed that some of the *species* of *Mysis*, had the middle scale of the tail notched, while in others it remained entire, has divided the Genus into corresponding sections; the former species or *Mysis Fabricii*, together with the two following species, belong to the section with a notched tail, the remainder are referable to his second section.

Mysis Leachii, (the *M. spinulosus* of Dr. Leach.*) The specific names hitherto imposed, not being consecrated by long usage, and being founded in a too partial knowledge of the Genus, such of them as seemed likely to mislead, have been changed for others less objectionable; thus the specific appellation given by Dr. Leach to the present species, would be equally applicable to the most of those with which we are acquainted, the same may be said of the trivial name *flexuosus* employed by Muller. The *Mysis Leachii*, although not sufficiently distinguished from the following species, by the characters assigned in the note, appears to differ obviously in colour and habitudes, and although the former is rather a doubtful guide, yet in the absence of more precise distinctions may be found an useful auxiliary. Colour when alive, pellucid cinereous. Eyes black, red at their base. Laminae of the head with a black longitudinal line and spots, every segment of the body with a reddish rust coloured arborescent spot. Tail

* *Mysis*, cauda lamella intermedia externe spinulosa, apice acute emarginata: lamellis exterioribus acuminatis, latissime ciliatis. Linn. Trans. Vol. XI. p. 350.

fin spotted with the same colour mixed with black. Discovered by Dr. Leach on the Scottish coast in the Frith of Forth near to Leith, where it was observed in *great abundance* in the pools left by the tide. Found with fry from the middle of June to the middle of July, the females being more numerous than the males. Length $1\frac{1}{4}$ inch. Dr. Leach refers to this species, the *Cancer flexuosus* of Muller (Zool. Dan. p. 34 t 66), as well as *Cancer multipes* of Montagu, both of which are more probably referable to the following, viz.

Mysis Chamæleon * Plate 2, fig. 1 to 10. This species resembles the former so much in size, and in some of its characters, that it would appear to have been hitherto confounded with it. *Mysis Chamæleon* differs however obviously, in the form of the outer laminae of the tail, which are but very slightly taper, and very obtuse at the point; the notch in the middle lamina, is furnished with a margin of smaller spines than those on the outer edge which ends on each side in a straight and stout spine; the adjoining edge of the innermost of the lateral scales, is also spinous, although the spines are not very obvious, from the plumose ciliae which cover them. The anterior scales are very long, nearly linear, obliquely truncated at the end, with a spine at the outer angle of the truncation, and are ciliated *only* along the inner edge and at the extremity. The Clypeus ends in an obtuse point, and has a short spinous point anteriorly at the sides.

Nothing can shew the fallacy of colour in distinguishing the species, more clearly than the variety of tints which *Mysis Chamæleon* assumes, as it occurs here in the river Lee and Harbour of Cove, and which have suggested its trivial name; in the upper part of the river below the City of Cork, it occurs of different shades of grey, inclin-

* *Mysis*, cauda lamella intermedia margine spinulosa, apice acute emarginata; lamellis exterioribus *subtruncatis*: lamellis anterioribus oblique truncatis, intus ciliatis.

ing at times to black, having invariably the greater part of the anterior scales, inner branch of the superior antennæ and joints of the outer laminae of the tail, black, and the fringe of the scales tinged with pink; lower down, amongst the littoral Fuci, it takes various tints of brown, and those obtained from sites abounding in *Zostera* and *Ulvæ*, present us with green colours of greater or less intensity.

This species has been occasionally met with in the stomachs of Herrings, but has never been observed like the other species in any great numbers together, but scattered and solitary, often associated with *M. vulgaris*. They are extremely quick sighted and wary, darting away or descending tail foremost or retrograde, when any attempt is made to capture them, and more frequently swim with the body in a perpendicular direction, than in any other. In the Lee, they do not appear until towards the latter end of June, but remain until the approach of winter. Length $1\frac{1}{4}$ inch. That this is the species indicated by Montagu, under the title of *Cancer Astacus multipes*, can hardly be doubted from the sketches given of it in Linn. Trans. Vol. IX. t. 4, fig. 3, and the accompanying description, derived from specimens occasionally found dead amongst Shrimps taken at Salcomb, and in the Kingsbridge estuary: it appears also from the same authority, to have been noticed on the coast of Kent, by Mr. Henry Boys of Sandwich. The figure given by Herbst in his Work on Crabs, &c. for *Cancer flexuosus* Plate XXXIV. fig. 8, natural size, and I, magnified, described Vol. II. p. 114, appears also referable to the present species, although like many of the figures in that valuable work, faulty in the colouring; as with us, he describes it — as existing *thinly scattered* in the Baltic.

The remaining species have the middle lamina of the tail entire.

Mysis vulgaris.* Plate I. This species which with us is probably the most common of any of the Opossum Shrimps, does not appear to have attracted the notice of any Naturalist, a circumstance, either owing to their having been taken for young fry of Shrimps, or to the little attention hitherto given to this tribe of animals. When full grown, they are about one inch in length, translucent, and of a greyish colour. The Clypeus ends in an acuminate point in front; the anterior scales are of a taper form, and ciliated *all round*; the outer laminae of the tail taper to a point, the middle lamina ends in an obtuse point, surmounted by two short spines. They swim with the body in a horizontal position, and abound in the Lee even up to Cork, from the early part of Spring to the approach of Winter; during the still period of the tide at low water, they repose upon the mud and stones at the bottom of the river, and as the tide rises, may be observed forming a wide belt just within its margin, the youngest swimming nearest to the shore, the oldest farther out and in deeper water; they appear to be mostly females, the males being few in proportion. This species contributes towards the food of various young fish, from which they frequently escape by springing up out of the water.

Mysis scoticus, the *integer* of Dr. Leach, who discovered this species on the coast of the Isle of Arran, in the estuary of the Clyde, but has not furnished sufficient characters to distinguish it from the former; like it, the middle lamina of the tail is without any notch at its extremity, but it is a much smaller animal, being but *one-third of an inch* in length, and different in colour and habitudes; colour, pellucid cinereous, *spotted with black and reddish brown*. Females more abundant. He observes, that at low tides near Loch Ranza in the Isle of Arran, the pools

* *Mysis cauda lamella intermedia integra, subulata, margine spinulosa: lamellis anterioribus acuminatis utrinque ciliatis.*

were full of this species in the month of August, swimming with its head uppermost, and its eyes spread, making a most grotesque appearance.

Mysis pelagicus, This is the species described by Otho Fabricius under the title of *Cancer pedatus*,* its characters would require to be more clearly pointed out, so as to distinguish it from *M. vulgaris*, to which it appears to approximate. It is described as of a pale colour, one inch in length, and of a *very compressed* form; the anterior scales oblong, pointed, and ciliated; the middle lamina of the tail with two short spines at its extremity united at their base; occupies the surface of the sea at Greenland in great numbers, rarely found either at the bottom or near to the shore; swims *on its back*, and forms together with the *M. Fabricii*, the chief food of the great Northern Whale.

Naturalists who may have opportunities of observing the ill-defined species of *Mysis*, or such as appear new, will do well to attend minutely to the form of the *anterior* scales, the form and armature of the scales which compose the tail, and the shape of the anterior part of the corselet, adding such information in regard to colour and habitudes, particularly their mode of swimming, as may assist in discriminating them.

* Fauna Groenl. p. 221. *Cancer macrourus*; thorace lævi, compresso, fronte prærupta, pedibus pectoris duplici serie; manibus adactylis; cauda recta apice aculeato, tetraphyllo.

MYSIS.

PLATE III. Fig. 1. Side view of *Mysis vulgaris* magnified; the straight line near it expressing its real length when fully grown. 1 *a*, innermost seta of the right superior antenna. 2 *a*, its outermost seta. 3 *a*, setæ of the inferior antennæ. *s*, anterior scales. *e*, eye. *p*, palpi. 1 *f*, prehensile, or innermost rows of feet. 2 *f*, natatory or exterior feet. 3 *f*, sub-abdominal fins. *u*, valvular sub-pectoral pouch, or receptacle of the young in the female. *c*, the cephalo-thoracic-clypeus. The five-jointed posterior part of the trunk, and the tail require no figures to make them obvious.

Fig. 2. The anterior part of the animal from above, more highly magnified, shewing the taper pointed form of the anterior Scales, the form and position of the superior antennæ, with regard to the inferior and exterior pair, the pointed termination of the Clypeus in front, and the Eyes.

Fig. 3. The Tail from above, magnified in the same degree with fig. 2, for the purpose of shewing the form of the laminæ, and particularly the middle one, with its spinulose margin.

Fig. 4. One of the Palpi from within, very highly magnified. *a*, basil joint, by which it is articulated to the mandible, *b* middle joint, *c* last joint, ending in a strong spine and a row of mucronated clavæ, and having a row of hooks along one margin, and a double decussating row of bristles along the other; to do justice to the curious and complicated structure of this one joint it would require the entire plate to itself.

Fig. 5. The basis of one of the superior antennæ in the *male*, to show its brush-like appendage; the setæ have been cut off short; *x* indicates the point of attachment to the animal.

Fig. 6. One of the first pair of feet, (the left) highly magnified, *x* point of attachment. *a* its inner division. *b* its outer division abbreviated, as being similar to those of all the other feet. *g* its branchia.

Fig. 7. One of the second pair of feet, (the left) highly magnified, *x* point of attachment. The same letters indicate the analogous parts in fig. 6, 7, and 8. In this figure, the outer or natatory division of the limb is fully represented.

Fig. 8. One of the last (or of the eighth) pair of feet, (the left) highly magnified; shewing the pluri-articulate tarsus of the inner division, consisting of about ten joints, and ending in a short claw. The 3d, 4th, 5th, 6th, and 7th pair of feet are exactly similar. Fig. 12, shews the tarsus and claw, as they appear when the young animal first emerges from the maternal pouch.

Fig. 9. One of the sub-abdominal natatory fins, very highly magnified, consisting of a single joint, and very beautifully feathered on its edge.

Fig. 10. Figures of the natural size and magnified, shewing the progress of development in the Ova. *a*, ova when first received into the valvular pouch. *b*, side and front views of the elongated ova, with its two pair of lateral projections. *c*, side view of the embryo, the tail considerably elongated, forked, and bent backwards, and together with the lateral members, slightly ciliated. Fig. 11. The Embryo of the natural size, and magnified,

approaching to maturity; its pedunculate eyes, two pair of antennæ, clypeus, feet and posterior extremity almost fully developed.

Fig. 13. The last or eighth pair of feet in the *male*, magnified. \times indicates the situation of those organs in the male which occupy the place of the female receptacle. *fig.* 14. One of these organs (the left) more highly magnified, \times its point of attachment.

Fig. 15. Magnified sketch of the Heart and great blood vessels, the arrows indicating the course of the circulating fluid. *a*, the stomach, lying over the anterior aorta, and obscuring its further course towards the head. *b*, heart. *c*, posterior aorta. *f*, indicates the line of the posterior part of the clypeus. *d, d*, presumed venæ cavæ. *e, e*, what seems to be a receptacle placed beneath the heart. The two *lateral* vessels which are seen entering the heart, are probably the trunks of the pulmonary veins, coming from the branchiæ. The great transparency of this species, (*M. vulgaris*), particularly when young, permits all this to be seen without dissection.

N. B. In order to avoid the unnecessary multiplication of plates, and as the *remaining members of the mouth, and the valvular pouch*, are similar in *M. Chamæleon*, these parts have been copied after *that* species, and will be found in the following Plate.

PLATE III. Fig. 1. Anterior extremity of the female *Mysis Chamæleon*, highly magnified. 1 *a*, superior antennæ. 2 *a*, inferior antennæ. *c*, corselet. *e*, eye. *s* anterior scales.

Fig. 2. Posterior extremity of the same somewhat more magnified, to shew the peculiar form and armature of the middle scale, as well as the shape and admirable plumose fringe of the outer ones.

Fig. 3. The last joint of the inner division of the second pair of feet, very highly magnified; a small circle on the left indicates its natural size, and the line on the right the length of the full grown animal. This very beautiful member, may be observed to end in a strong spine above, to have its front armed with a gradation of hooks, its back bristly, and its margin surrounded by a graduated row of bi-articulate flattish spines, most elegantly toothed on their opposite edges. It is hardly possible to do justice in such a sketch, to the complication, and extreme elegance of this wonderful little hand.

Fig. 4. One of the first pair of maxillæ, highly magnified, from the right side, (as seen from within,) foliaceous, complicate, and variously ciliated: *f* the analogue of the flagrum, placed at its outer edge.

Fig. 5. One of the second pair of maxillæ, from the same side, (also from within,) its middle division with a double row of teeth, its inner division, ending in three denticulate spines. *f*, analogue of the flagrum.

Fig. 6. Mandible and Palp of the left side, highly magnified, as seen from without. *a*, fulcrum for muscular attachments: *m*, actiog part of the mandible and its toothed extremity. *p*, Palp, (as in Plate I. fig. 4) attached to the angle of the mandible.

Fig. 7. Labrum, highly magnified.

Fig. 8. Labium, highly magnified.

Fig. 9. The outer or *posterior* valve of the maternal pouch, from the left side, magnified, \times point of attachment; front edge strongly ciliate or pectinate.

Fig. 10. The inner or *anterior* valve of the maternal pouch, from the same side as the former, magnified, \times point of attachment.

Fig. 11. *Mysis Fabricii* from the Fauna Groenlandica. Fig. 12, tail of the same.

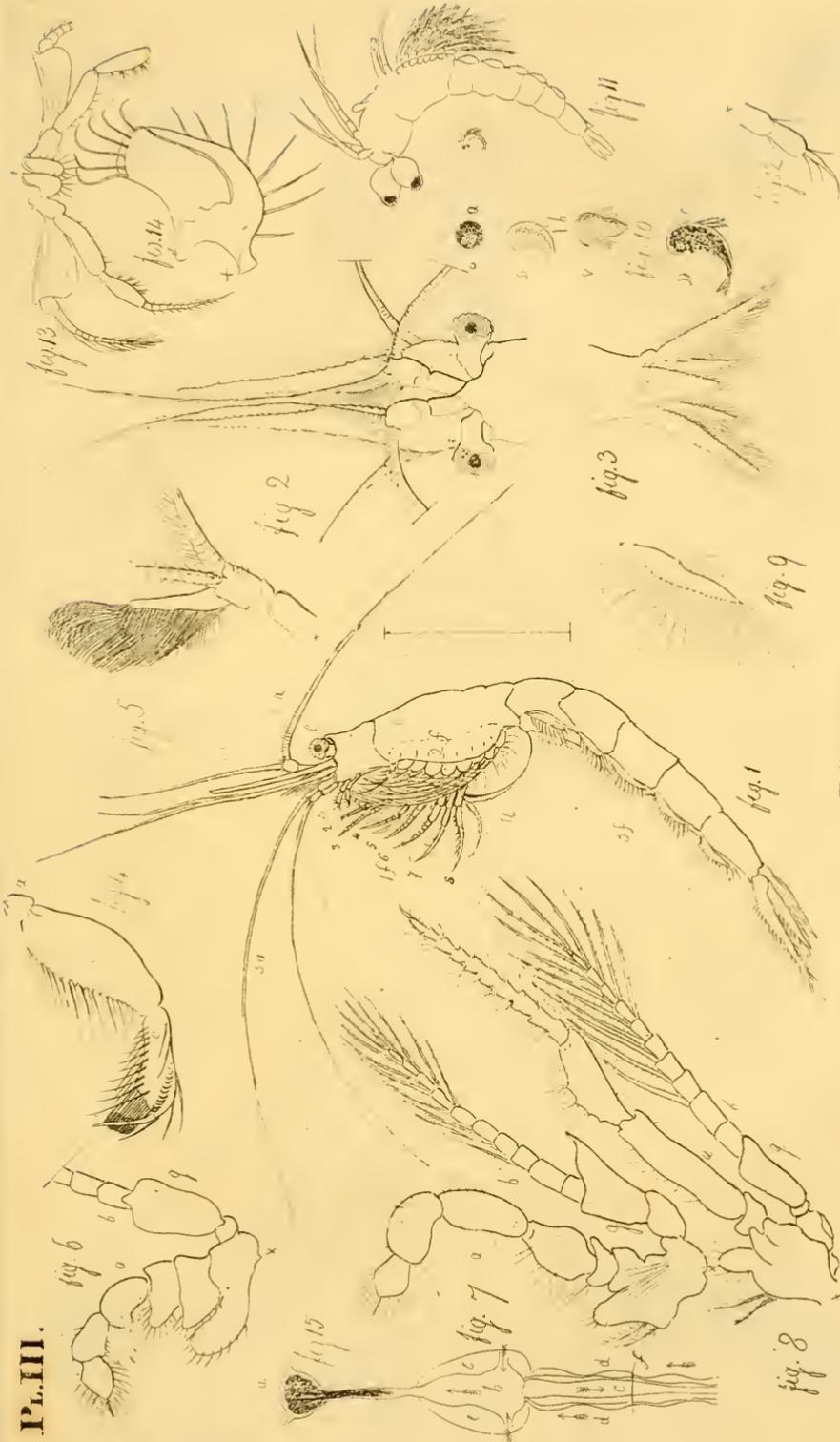
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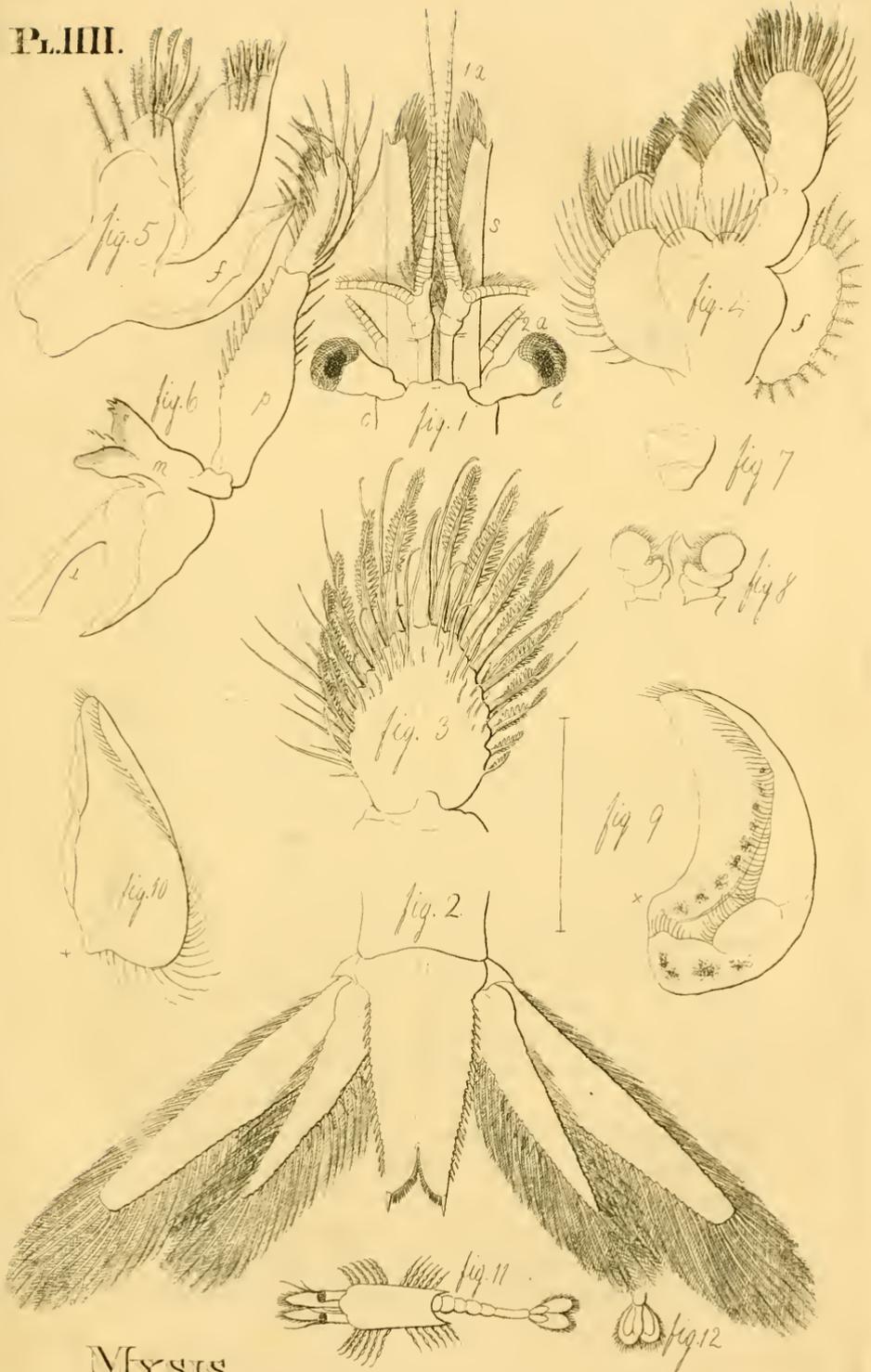
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