

of the head. Peduncle of antennulæ three-jointed, of antennæ five-jointed. Mouth-parts, biting or gnawing, never really suctorial; second joint of maxillipeds at least in males and immature specimens without external expansion; mouth-parts in females with brood rather frequently strongly metamorphosed and useless for nutrition. Thoracic segments seven, all free; marsupial lamellæ only on second, third, and fourth "epimera," rarely wanting (section Cassidinidi). All pleopods lamellar; all endopods, and at least the exopods of first and second pairs unjointed; at least both rami of plp.<sup>1</sup> and plp.<sup>2</sup> fringed with long plumose setæ, and at least in all two rami of the posterior pairs (both rami of plp.<sup>5</sup> or the endp. of plp.<sup>4</sup> and plp.<sup>5</sup>) without such setæ, and specially adapted for breathing. Sixth segment large. Uropods with the rami unjointed, these, at least in the females, generally depressed, sometimes one of them wanting; in *Vireia* the uropods are wanting. The body can be rolled more or less completely into a ball or can be folded.

The family is divided into three sub-families:

1. *Limnoriinæ*.—Mandibles stout; lacinia mobilis at most rudimentary, without plate on the left mandible; molar process wanting; palp three-jointed. Maxillulæ with the inner lobe well developed; maxillæ with the three distal lobes very short, but yet well developed. Maxillipeds with a single hook on the lobe from second joint; epipod large, longer than broad. Epimera not marked off from first thoracic segment; second to seventh epimera a little movable. Abdomen consists of six movable segments. Plp.<sup>3</sup> and plp.<sup>4</sup> have both rami furnished with long plumose marginal setæ, as have also plp.<sup>1</sup> and plp.<sup>2</sup>; rami of plp.<sup>5</sup> without marginal setæ, respiratory; exp. of plp.<sup>5</sup> without squamiferous areas or tubercles. Endopod of urp. movable. (The brood in the marsupium itself; no sexual difference in the mouth-parts.)

2. *Sphærominæ*.—Mandibles, at least their basal half, stout; lacinia mobilis well developed, with plate on left mandible; molar process generally well developed (wanting in the section *Ancinini*); palp three-jointed. Maxillulæ with

the inner lobe moderately or, generally, very well developed; maxillæ with the three distal lobes moderately long. Maxillipeds with a single hook on the lobe from second joint; epipod very small, broader than long, or not discernible. Epimera not marked off from first thoracic segment; second to seventh epimera immovably fused with their segments, but generally some of them marked off by very fine, or nearly inconspicuous, furrows or lines. Five anterior abdominal segments completely fused with each other, but, on the upper surface, transverse furrows—at most three and the two posterior broadly interrupted at the middle—are generally seen as traces of divisions into segments. Last segment generally movable (immovably fused with the preceding part in *Vireia burgunda* and *Cœcosphæroma Virei*). Rami of plp.<sup>5</sup> without plumose marginal setæ; endp. of plp.<sup>4</sup> generally without setæ, in rare cases with a few short plumose setæ, at least endp. of plp.<sup>4</sup> and plp.<sup>5</sup> respiratory; exp. of plp.<sup>5</sup>, generally with some—at least three—thickened areas or protuberances densely clothed with minute scale-like spines (in *Ancinella* without spines, in *Tecticeps* wanting). Endp. of urp. fused with the sympod, or wanting. (The brood most frequently develops in pouches; mouth-parts in ovigerous females often strongly metamorphosed.)

3. *Plakarthriinæ*.—Mandibles very slender; lacinia mobilis well developed, with plate on left mandible; molar process wanting; palp rudimentary, one-jointed. Maxillulæ with the inner lobe rudimentary; maxillæ reduced, showing only a narrow oblong plate terminating in three spines and some setæ. Maxillipeds without any hook on the lobe from second joint; epipod not discernible. All seven pairs of thoracic epimera movable, large. Abdomen has all segments fused together, on the surface two interrupted furrows as rudiments of division. Exp. of plp.<sup>3</sup>, plp.<sup>4</sup>, and plp.<sup>5</sup> pellucid, scarcely respiratory, with numerous plumose setæ along their distal margin; endp. of the same three pairs opaque, respiratory, without marginal setæ; exp. of plp.<sup>5</sup> without squamiferous areas or protuberances. Both rami of urp. movable.

(The brood in the marsupium itself; no sexual difference in the mouth-parts.)

It may be preferred first to deal with the genera of the two very small sub-families before proceeding to the rich sub-family, the Sphærominæ.

#### Sub-family Limnoriinæ.

Only one genus is known, the diagnosis of which may be as follows: Antennulæ and antennæ very short, freely protruding, their proximal joints not fitting in excavations on the head. Endp. of plp.<sup>1</sup> more than three times longer than broad; exopods of all pleopods unjointed. Last abdominal segment with the posterior margin equally rounded, without terminal notch. Urp. with exp. much shorter than endp.

Limnoria (Leach).

#### Sub-family Plakarthriinæ.

This sub-family is established on a single genus, the diagnosis of which is given here. Two proximal joints of each antennula, and third and fourth joints of the antennæ exceedingly expanded in front, with their anterior margin cut off. All thoracic legs simple. Endp. of plp.<sup>1</sup> nearly four times longer than broad; exopods of all pleopods unjointed. Abdomen terminates in a nearly semicircular notch. Head and abdomen quite excluded from partaking in forming the outline of the animal; this outline is continuous, regularly oval, formed exclusively by the front margin of first and second joint of the antennulæ, third and fourth joints of the antennæ, the outer margin of the thoracic epimera, and the distal margin of the uropods. Animals very depressed, the lower surface concave.

Plakarthrium (Chilton) (Chelonidium (Pfeffer)).

#### Sub-family Sphærominæ.

This rich sub-family is divided into three sharply defined groups.

(A) Sph. hemibranchiatæ: Plp.<sup>4</sup> and plp.<sup>5</sup> have the

endopods thick, of fleshy aspect, with deep, essentially transverse folds, the exopods submembranaceous and rather pellucid, two-jointed; both rami of both pairs without plumose marginal setæ; exp. of plp.<sup>5</sup> has the subapical squamiferous protuberance on the lower surface very high. Plp.<sup>3</sup> have both rami closely set with long plumose setæ, at least on the distal margin. Endp. of plp.<sup>1</sup> at least rather broad, scarcely ever half again as long as broad.

(B) Sph. eubranchiatæ: Plp.<sup>4</sup> and plp.<sup>5</sup> have both rami subsimilar, with deep, essentially transverse folds, often of fleshy aspect, without plumose marginal setæ; exp. of plp.<sup>5</sup> generally distinctly two-jointed, with the subapical squamiferous protuberance on the lower surface very high. Plp.<sup>3</sup> have both rami closely set with long plumose setæ at least on their distal margin. Endp. of plp.<sup>1</sup> at least rather broad, scarcely ever half as long again as broad. (End of abdomen at least emarginate, generally with a notch or with a slit terminating in a foramen.)

(C) Sph. platybranchiatæ: Plp.<sup>4</sup> and plp.<sup>5</sup> have both rami completely without transverse folds, and their exopods are unjointed; endp. of plp.<sup>4</sup> at most with a few short terminal plumose setæ, exp. of same pair rarely with numerous long marginal plumose setæ (Tecticeps), in most genera both rami without plumose setæ; both rami of plp.<sup>5</sup> without plumose marginal setæ, and the exp. has the squamiferous protuberances slightly in relief, and in rare cases without spines or even wanting. Plp.<sup>3</sup> have sometimes plumose marginal setæ on both rami as plp.<sup>2</sup>, sometimes with endp. nearly naked or with both ~~both~~ rami naked. Endp. of plp.<sup>1</sup> rarely broad, most frequently narrow. (End of abdomen sometimes with a rounded notch, often truncate, rounded, or acute.)

#### Group A. Sphærominæ hemibranchiatæ.

This group comprises a very large number of forms, but in spite of much difference in aspect great uniformity is met with in the large majority of more important features. The

proximal joints of the antennæ never protrude with free expansions in front of the head; they are fitted in oblique excavations. In the mouth-parts only the development of the incisive process of the mandibles and the "palp" of the maxillipeds show noteworthy generic differences, excepting the metamorphosis in the females in half of the forms. The thoracic legs are all simple, without sexual difference. The pleopods in the different genera are so uniform that scarcely more than the exopods of plp.<sup>3</sup> and plp.<sup>5</sup> present generic differences. The exopod of the uropods is always present, but sometimes exceedingly small. The brood is developed in internal pouches. The body is never strongly depressed, the faculty of rolling excellently developed, the lateral margin of thorax not continuous.

The group is divided into two sections about equal in number of genera.

(*a*) Sphæromini.—End of abdomen in the female without notch, rounded or somewhat produced and more or less acute; in the male generally as in the female, in some forms the end much produced with a pair of lateral notches, so that the mesial part is shaped as a process narrowed at the base.<sup>1</sup> Mouth-parts similar in both sexes.

(*α*) Maxillipeds with the lobes from fourth, fifth, and sixth joints low or rudimentary. Three anterior pairs of thoracic legs closely set with exceedingly long stiff plumose setæ on the outer margin of third and fourth joints. Exp. of plp.<sup>3</sup> unjointed. Marsupial lamellæ overlap each other at the mesial line (they are unknown in *Hemisphæroma*, which probably does not differ from *Sphæroma* in this respect).

† Mandibles normal, the cutting process not elongate, its

<sup>1</sup> In a species from Simon's Bay, at Cape, closely allied to or identical with *Sphæroma scabriculum* (Hell.), the end of abdomen in the female is as in *Exosphæroma*, while in the male a notch, as in the male *Dynamenella* (compare the diagnosis below) is observed; the specimen described by Heller is evidently a male. The female of the species seen by me cannot be separated from *Exosphæroma*, while the structure in the male alluded to is very curious. For various reasons I omit this form from the conspectus, hoping to obtain more material of allied species.

end obtuse or with some small teeth. Side of abdomen not expanded below the lateral margin of thorax. Tip of abdomen rounded.

(1) *Sphæroma* (Bosc).

(††) Mandibles aberrant, having the cutting process very elongate (fig. 5 *a*), its distal part widened and divided by a deep triangular incision into two oblong, plate-shaped, distally acute processes. Lateral wall of abdomen considerably expanded, directed downwards, and extending a good deal below the lateral margin of thorax. Tip of abdomen triangular, acute.

(2) *Hemisphæroma* (n. gen.).

(β) Maxillipeds with the lobes from fourth, fifth, and sixth joints at least rather long. Three anterior parts of thoracic legs without stiff natatory setæ. Exp. of plp.<sup>3</sup> two-jointed. Marsupial lamellæ small, far from reaching each other at the mesial line.

(†) <sup>1</sup>Last thoracic segment unarmed in both sexes. End of abdomen at most somewhat produced, but not acute.

(3) *Exosphæroma* (Stebb.).

(††) Last thoracic segment in the male with a slender mesial process. End of abdomen somewhat or very considerably produced, subacute. (In the male both rami of the uropods are exceedingly large plates.)

211 (§) End of abdomen subsimilar in both sexes, very considerably produced, with a real groove on the lower side of the produced part.

(4) *Isocladus* (Miers).

(§§) End of abdomen in the female somewhat produced, in the male strongly produced with a pair of lateral notches, so

<sup>1</sup> The genera *Exosphæroma*, *Isocladus*, and *Zuzara* (with *Cycloidura* as a synonym) are so closely allied that the females can scarcely be separated, while it is easy to refer the adult males to their respective genera. When more species are known it will probably be necessary to unite them, preserving the name *Zuzara* for the genus. If that be not done it will be necessary to establish a new genus for *Sphæroma scabriculum* (Hell.), and perhaps some other species.

that the mesial part is shaped as a process narrowed at the base; an oblong groove is scarcely developed.

5. *Zuzara* (Leach) (incl. *Cycloidura* (Stebb.)).

(b) *Cymodocini*.—End of abomen in both sexes with a notch, which sometimes is semicircular, most frequently bilobed, being divided by a mesial process; in rare cases (especially in *Bregmocerella*) this process is so large that it overlaps the lateral teeth limiting the notch, so that these teeth are only visible from the side. Mouth-parts strongly metamorphosed in the females. Maxillipeds with long lobes on fourth, fifth, and sixth joint. Exp. of plp.<sup>3</sup> always two-jointed. Marsupial lamellæ always overlap each other at the mesial line.

(a) Epistome without any free process in front (exp. of urp. generally well developed).

(†) <sup>1</sup>Abdominal notch at least with a vestige of mesial lobe; generally this lobe is well-developed, frequently large or even very large.

(§) In the male the anterior part of abdomen is without mesial process, and the endp. of urp. is generally moderately developed.

(6) *Cymodoce* (Leach).

(§§) In the male the anterior part of abdomen has a large mesial process, and the endp. of urp. is very short or quite rudimentary.

(7) *Cilicæa* (Leach).

(††) Abdominal notch semicircular, without any vestige of mesial lobe. Endp. of urp. rudimentary in the male.

(8) *Cilicæopsis* (n. gen.).

(β) Epistome produced into a process which, in the female, reaches somewhat beyond the front margin of the antennulæ while it is exceedingly long in the male (Exp. of urp. rudimentary in

<sup>1</sup> In Chapter VII the slight value of *Cilicæa* (Leach) and *Cilicæopsis* (n. gen.) as separated from *Cymodoce* (Leach) is discussed in the treatment of the last-named genus.