

it is present on the second pair also ; and these are never present without being attached to a mastigobranchial appendage. This is true of each separate division, both normal and aberrant, with the following exceptions :—viz., *Cheramus* in the Trichobranchiata, *Latreutes* and *Atya* in the Phyllobranchiata. Of these the two former are small specimens, and the mastigobranchia may have been overlooked, and it is present on the second gnathopod in *Atya*.

In the genus *Stereomastis* there is only one mastigobranchia, and that is attached to the second pair of gnathopoda and is in a rudimentary condition (p. 158, fig. 37) ; there are, however, four podobranchiæ attached to the anterior four pairs of pereopoda, but in this genus they are projected on a stalk and the mastigobranchia has become obsolete and the podobranchia reduced to a degree, which appears to be further advanced than is seen in *Pentacheles euthrix*, where the mastigobranchiæ exist as plates of exquisite delicacy.

In the family Astacidæ the majority of the genera are tabulated as having six pairs of podobranchiæ and only one mastigobranchia, *Cambarus* and *Astacus* having none ; but the fact is that the mastigobranchia in this family is connected with the podobranchial plume throughout the whole of its length in the manner shown in Pl. XXVII. fig. 1, *pb*, and in fig. 1*m*". This I think may be understood from a knowledge of the fact that in their development the mastigobranchial plate and the podobranchial plume commence in one sac, which afterwards divides by forming a branch that is without branchial filaments, as may be seen in Pl. XIIb. fig. 4, *g*. But whether they be united or distinct from the branchial plume they fulfil the same office, that of separating one set of branchial appendages from another, and sending long serrate hairs between the filamentose rods, and thus keeping them free from undue lateral pressure, as may be seen in Pl. VII. figs. 1 and 1 *bis*, and Pl. XXVIII. *pd.br*.

In many instances, especially where the podobranchiæ are not developed, the mastigobranchiæ are small ; but though small they can scarcely be considered as rudimentary, seeing that they are developed upon a general plan, and that one of usefulness. In Pl. CVII. fig. *mb*., and Pl. CVIII. fig. *i*", where they are figured as developed with a hook at the extremity, varying in form, they reach only to the extremity of the next succeeding branchia, and sometimes, as in *Atya* (Pl. CXIX. fig. 1), they terminate in a brush of long hairs that penetrate between the plates of the different plumes.

The arthrobranchiæ, or those branchiæ attached to the membranous articulation that connects the legs with the body of the animal, are the most abundant and very constant throughout the Macrura. They appear to be present in all the genera alluded to in this Report, with the exception of *Pontophilus*, *Sabinea*, *Pontocaris*, *Nika*, *Paralpheus*, *Synalpheus*, *Latreutes*, *Hippolyte*, *Spirontocaris*, *Hetairus*, and *Pontonia*. There is only one arthrobranchia in *Alpheus*, and that is attached to the second pair of gnathopoda.

The pleurobranchiæ, if not the most numerous, are perhaps the most constantly