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On the Importance of an Examination of the Structure of the Integument of Crustacea in the determination of doubtful Species.—Application to the genus *Galathea*, with the Description of a New Species of that Genus. By SPENCE BATE, Esq., F.L.S.

[Read January 21, 1858.]

OF the various genera of Decapod Crustacea none are more interesting, or more difficult of description, than those which constitute the family Galatheadæ.

The interest attaching to these forms arises from the intermediate position which they occupy in the natural arrangement of the class, their structure placing them between the Macrura and Brachyura; in accordance with which we find that, whilst Professor M.-Edwards classes them among the Macrura, Professor Bell, in his work on the British Crustacea, places them (more correctly, as we think) in the intermediate group of Anomura.

This opinion is fully borne out both in the development of the animals and in their structure in the adult state.

The early form of the larva bears, anteriorly, a resemblance to the Brachyural type, whilst the caudal appendages assimilate to those of the Macrura. The same conditions obtain in the young of Anomura. At the time of birth, the larva, like that of the Brachyura, has only the two gnathopoda developed, whilst the

termination of the tail is like that of a fish, as in the *Macrura*. In the adult, the internal antennæ possess short flagella and complementary appendages, such as exist in the order *Brachyura*, whilst the external antennæ have the long and slender flagella proper to the *Macrura*. The *scale*, however, commonly appended to the external antennæ in the latter order is wanting, a circumstance which exhibits a relation to the *Brachyura*.

An examination of the legs shows that the coxæ are fused with the thorax, as in the *Brachyura*, and not articulated with it as in the *Macrura*, whilst, on the other hand, the posterior division and caudal termination approach the *Macrural* type more nearly than that of the *Brachyura*, the animal thus assuming a character intermediate between the two orders.

But in the description of the several species of the genus *Galathea*, a peculiar difficulty appears to arise, originating in the affinity which they bear to each other. So close, in fact, is the approximation, that the descriptions of the best writers will scarcely avail for the distinction of the individual species without the assistance of figures. This arises from the fact that the general characters, upon which the descriptions are based, vary, in this genus, only in their comparative degrees of development.

In the three species recognized in Professor Bell's work on the British Crustacea, it will be found that each species retains the same characters in greater or less degree.

Galathea strigosa is peculiar for the spinous character of the carapace and cheliform legs. Every spine, however, is repeated in both the other species, only less developed. We find the rostrum furnished with four lateral teeth on each side, a character which also exists in each of the other species; and although close observation may detect a slightly different arrangement in the relative position of these teeth, the differences are not of sufficient importance to enable a naturalist thence to derive a specific distinction, unless the peculiarity is seconded by some more unqualified character less liable to be affected by any peculiarity of condition.

In order to arrive at more certain results in the identification of species, we think that the microscopic examination of the surface of the integument will be found peculiarly useful.

This mode of examination of species may also be applied to a considerable extent throughout the Crustacea generally with great advantage; and if found valuable in recent, there can be no doubt that it will prove of far greater importance in extinct forms, where

parts on which the identification of species usually rests are lost, and fragments only of the animal obtainable.

It should be borne in mind that, as the structure in question undergoes modifications more or less considerable in different parts of the animal, it will always be advisable to compare the corresponding parts with each other.

Applying this test to the known species of *Galathea*, we perceive that the structure of the integument upon the arms, independent of the marginal spines, exhibits a squamiform appearance, but that the scales, which characterize the structure, possess features peculiar to each species.

In *Galathea strigosa* the scales are convex, distant from each other, smooth at the edge, and fringed with long hairs. In *G. squamifera* they are convex, closely placed, scalloped at the edge, and without hairs. In *G. nexa* the scales are obsolete, tufts of hair representing the supposed edges. In *G. depressa*, n. sp., the scales are broad, less convex than in *G. strigosa* and *G. squamifera*, smooth, closely set, and fringed with short hairs. In *G. Andrewsii* they are small, distant, very convex, tipped with red, and slightly furnished with hair.

As another instance of the practical application of the microscopical examination of the surface, I would refer to two species of Amphipoda, classed by Leach under the name of *Gammarus Locusta*, from his inability to assign them any separate specific characters. In the structure of their integuments, however, these two forms will be found to exhibit widely different microscopical appearances.

Again, there exists in the same group three or four species, the description of any one of which would apply to either of the others; and it is probable they would never have been ranked as separate species had not their habitats been geographically distant. Thus *Gammarus Olivii*, M.-Ed., *G. affinis*, M.-E., *G. Kröyii*, Rathke, and *G. gracilis*, R., can only be specifically determined by a microscopic examination of the integument.

The same may be said of other Amphipoda, such as *Urothoe inostratus*, Dana, from South America, which so nearly resembles in form the *U. elegans* of the British shores.

GALATHEA DISPERSA, mihi.

G. rostro brevi, dentibus 4 utrinque ornato, 2 anterioribus minoribus; pedibus anterioribus elongatis, sparse spinosis; chelarum digitis parallelis.

Galathea with short rostrum, armed on each side with 4 teeth, the two posterior being less important than the two anterior. The fingers of the chelæ impinge through their whole length; outer margin of the hand furnished with 3 or 4 small spines.

Hab. Trawling-ground, Plymouth, common; Moray Frith, Scotland.

This species unites *G. Andrewsii* with *G. nexa*, and, I think, has often been mistaken for the young of the latter; but *G. nexa*, so far as my experience goes, is a species peculiar to the north of England, whereas *G. dispersa*, I anticipate, will be found to be the most universally dispersed, in deep water, of any of the species known. It can always be detected from *G. nexa* by the form of the hand and the manner in which the fingers impinge: in *G. nexa* the hand is broad towards the extremity, and the fingers meet only at the apex; in *G. dispersa* the hand gradually narrows to the apex, and the fingers meet each other through their whole length, the inner margin of the finger being finely serrated, the thumb not.

It also may be distinguished from *G. Andrewsii* by the breadth of the hands, which are narrow and round in *G. Andrewsii*, and moderately broad and flat in *G. dispersa*.

By an examination of the texture of the integument under a magnifying power of low degree, the surface of *G. dispersa* will be seen distinctly to differ from that of any of the others; it is covered with flat scales, fringed with short cilia. The length of the animal, including the arms, is about $2\frac{1}{4}$ inches.

Catalogue of Hymenopterous Insects collected at Celebes by Mr. A. R. WALLACE. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., F.L.S.

[Read April 15th, 1858.]

THIS collection of the Hymenoptera of Celebes is specially interesting, as adding greatly to our knowledge of the geographical range of many well-known species, while the additions made to the Fossorial group contain many of great beauty and rarity. A new species belonging to the tribe of Solitary Wasps, *Odynerus clavicornis*, is perhaps the most interesting insect in the collection; this Wasp has clavate antennæ, the flagellum being broadly dilated towards the apex, convex above and concave beneath. I am not acquainted with any other insect belonging to the Vespidious group which exhibits such an anomaly.