

## 20. Palaeontologie.

Palaeontographica. Suppl. III. Lief. 8 u. 9. Cassel, Th. Fischer, 1880. 4<sup>o</sup>.  
M 40, —.

(Enthält: Verbeek, Boettger, u. v. Fritsch, Die Tertiärformation von Sumatra.)

Geinitz, Hs. Br., Nachträge zur Dyas. I. Mit Beiträgen von Drude, Vetter und Weiss. Mit 8 Taf. Cassel, Th. Fischer, 1880. 4<sup>o</sup>. (Mittheil aus dem Kgl. Min.-Geol. und Præhist. Mus. Dresden. 3. Heft.) M 20, —.

(p. 33—39: Beitrag zur fossilen Fauna des Geraer Kupferschiefers und des oberen Perm in Russland.)

Verbeek, R. D. M., O. Boettger und K. von Fritsch, Die Tertiärformation von Sumatra. I. Theil. Cassel. Fischer, 1880. 4<sup>o</sup>. (120 p., 12 Taf. u. Karte.)  
M 40, —.

(Auch in den Palaeontographica Suppl. III.)

## II. Wissenschaftliche Mittheilungen.

### 1. The Embryology and Metamorphosis of the Sergestidae.

By W. K. Brooks, Director of the Chesapeake Zoological Laboratory of the Johns Hopkins University.

The points of especial interest in the development of *Leucifer* are the following

- 1) The egg undergoes total regular segmentation, and the lines of division extend to the centre of the egg, where a central segmentation cavity is formed.
- 2) There is an invaginate gastrula stage.
- 3) The larva leaves the egg as a Nauplius.
- 4) There is a Proto-Zoea stage, but no *Elaphocaris* stage, and no *Acanthosoma* stage; the Proto-Zoea changing into a Schizopod which has the same general form as the adult *Lucifer*.
- 5) The fifth thoracic segment is entirely wanting at all stages of development. There is at no time any trace of it or of its appendages.

In another *Sergestid* which was studied, probably *Acetes*, the Proto-Zoea changes into a larva very much like Dohrn's *Elaphocaris*, but with much shorter eye-stalks, and with the rostrum and spines of the carapace simple. This changes into an *Acanthosoma*, and this is gradually transformed into the adult by a series of moults.

The schizopod stage of development is of very short duration, and the exopodites of the walking limbs are soon reduced to very small rudimentary structures which persist for one moult after they have become functionally useless.

The fifth thoracic segment is entirely wanting, as well as its appendages, and the appendages of the fourth thoracic segment, the 4. pereopods, are represented, for one moult only, by rudimentary exopodites, without endopodites.

The outline of the life history of *Leucifer* is as follows.

The eggs are laid about nine o'clock in the evening, and they develop very rapidly, hatching in about thirty six hours. They are attached to the last pair of thoracic limbs, in a loose bunch of about twenty eggs.

Segmentation is regular and total. The fissures reach to the centre of the egg, and there is no central food-yolk, but a segmentation cavity soon appears in the centre of the egg. During segmentation periods of activity alternate with periods of rest.

When the egg is divided into about seventy two spherules one side becomes flattened, and the two spherules which occupy the centre of the flattened area are pushed into the segmentation cavity, where they probably give rise to the mesoderm.

The primitive digestive cavity is formed, in the same place, by the invagination of the flattened side of the egg, but the early stages were not found in sufficient abundance to allow its later history to be traced.

In about thirty hours the appendages and eye spot of the Nauplius can be seen inside the egg, and when the embryo is removed from the egg it swims vigorously for a short time, but soon dies.

It has a pear-shaped body, a very large labrum, a median ocellus, a frontal sense organ, and three pairs of setose appendages. The first antennae are uniramous, about as long as the body.

The second antennae are of nearly the same length, and are biramous, as are the much shorter mandibles. Four more pairs of appendages are faintly indicated upon the ventral surface of the body, behind the mandibles.

The body and the appendages and setae are covered by a delicate cuticle, which is soon cast off.

Although these embryos soon died those which hatched naturally, thirty six hours after the eggs were laid, could be reared without difficulty.

The Nauplius,  $\frac{8}{1000}$  inch long, presents some differences from the one just described.

The body is ellipsoidal instead of pear-shaped. The uniramous first antennae are faintly divided into five joints, and the terminal joint carries two long sensory hairs.

The second antenna is the chief organ of locomotion. The endopodite is obscurely divided into three joints, and the exopodite is

divided into eight joints, of which the two nearest the base are much shorter than the others. The biramous mandible is less than one third as long as the antennae. The endopodite is divided into three joints, and terminates in two long hairs. The exopodite is unjointed and ends with three hairs. There is no cutting blade. The labrum is very large, and the telson is indicated by a fold on the ventral surface of the posterior end of the body. The four appendages behind the mandibles are no more developed than they were at the earlier stage.

At the end of twelve hours more the embryo,  $\frac{9}{1000}$  inch long, has undergone considerable change, although it is still a Nauplius. The joints of the first antennae have disappeared, and those of the second antennae are barely indicated. The setae of the second antennae and of the mandibles are plumose, and the basal joint of the mandible carries a single, strong, curved, cutting hair. The telson is well marked, and carries six short strong spines. The outline of the posterior and lateral edges of the carapace is now visible.

The four pairs of appendages behind the mandibles are still rudimentary. The general form of the Nauplius of *Leucifer* is much more like *Metschnikoff's* figure of the Nauplius of *Euphausia*, than it is like *Fritz Müller's* figure of the Nauplius of *Penaeus*.

At the end of the next twelve hours the larva,  $\frac{20}{1000}$  inch long, has undergone very great change, and resembles the youngest *Euphausia* larva which *Claus* figures, although the edge of the carapace is smooth and unserrated.

The carapace makes about one half the length of the body. It is horse-shoe shaped, with a rostrum, and a dorsal and two lateral posterior spines. The frontal sense organ and ocellus are still present. The heart gives rise to three anterior arteries, one on the median line, and one on each side. The first antennae are uniramous and two-jointed. The second antennae are biramous; the endopodite is unjointed, the exopodite jointed. The mandible is like that of the adult, but has only one denticle. Behind it are two pairs of maxillae, with scaphognathites, and two pairs of biramous maxillipeds, the second pair rudimentary.

The third pair of maxillipeds are wanting, but their body segment, and the first four thoracic segments are present, and are followed by an unsegmented abdomen, with five pairs of strong spines at its posterior end.

After the next moult the larva is  $\frac{27}{1000}$  inch long, and the outline of the body has undergone considerable change, although the appendages and segments are the same as before. The antennae are still the chief locomotor organs, as they were during the Nauplius stage. The ocellus is still present, and accumulations of pigment mark the position of the compound eyes.

After the next moult the body is still longer, but there are no new appendages, although the first four abdominal segments are present. The fifth and sixth abdominal segments and the telson are represented by an unsegmented region, with five pairs of spines.

The next stage seems to correspond to the *Elaphocaris* stage of *Sergestes*, although the spines of the carapace are not compound, the telson is not cleft, and the compound eyes are sessile. The third pair of maxillipeds and the 1., 2., 3. and 4. pairs of pereopods are present as framous buds. The sixth abdominal segment is not yet separated from the telson, and it carries a pair of long bilobed buds, the rudiments of the swimmerets. The other five abdominal segments have no appendages.

After the next moult the larva becomes an unmistakable *Sergestid*, with seven pairs of *Mysis*-like schizopod feet, which are now the organs of locomotion. These seven pairs are the first, second and third maxillipeds, and the first, second, third and fourth pereopods. The 1. maxilliped has an unjointed exopodite, while the exopodites of the six following appendages are six-jointed, with a pair of long hairs at each joint. The eyes are mounted upon short movable stalks, and the ocellus is still present.

The first antennae are long, three-jointed, with six plumose hairs upon the inner edge. The second antennae have undergone very great change. They are less than half as long as the first pair: the outer ramus is about as long as the inner; both are unjointed and without hairs.

The telson is separate from the sixth abdominal segment; and the swimmerets are longer than the telson, fringed with plumose hairs, and functionally perfect. The other abdominal appendages are not present. The carapace is shaped like that of *Sergestes*; there is a long rostrum, and a pair of antero-lateral spines, but no posterior spines.

At the next stage the exopodite of the second antenna has become a scale, fringed with plumose hairs, and the endopodite is jointed, hairy, and about as long as the first antenna. The abdominal feet are now present as buds.

After the next moult the antennae are a little longer; the outer ramus has disappeared from the second and third maxillipeds and from the pereopods, and these appendages have their adult form. A transverse fold near the anterior edge of the carapace marks the line where the elongation to form the neck will take place.

The second, third, fourth and fifth abdominal feet next become biramous, and hairy, the neck elongates, and when the larva is about one fourth of an inch long it is substantially like the adult, the only



important changes being the elongation of the antennae, and the acquisition of the sexual characteristics.

The sexes are alike until the size of the adult is reached. The adult male is more different than the adult female from the young.

Every change from copulation and oviposition to the acquisition of the adult form was observed in isolated captive specimens, and all the appendages were figured at nearly every stage of development. There is therefore the most complete certainty, that a Nauplius stage occurs in the development of at least one stalk-eyed Crustacean.

Branfort N. C., Sept. 30, 1880.

## 2. Diagnoses Batrachiorum novorum insulae Madagascar.

Auctore Dr. O. Boettger.

### *Dyscophus sanguineus* n. sp.

Secundum caput latum, obtusum plica cutanea transversa ad membrum anterius decurrens. In palato inter tubas plica transversa cutanea fimbriata. Pedes semipalmati. Cutis omnino laevis.

Supra laete sanguineus, infra antice fuscescens vel nigrescens, postice albidus.

Long. corp. ♂ 60, ♀ 95, membr. anter. ♂ 39, ♀ 58, poster. ♂ 85, ♀ 128 mm.

A *Dysc.* insulari Grandidier (Ann. des Scienc. natur., 5. Sér. T. 15. 1872. p. 10), typo generis huius Bombinatorinarum, notis supra positis facile distinguitur.

Spec. 2 e Tohizona insulae Madagascar teste Gust. Schneider Basiliensi mihi allata sunt.

### *Rhombophryne* nov. gen. *Engystomatidarum*.

Corpus rhombicum, breve crassumque; membra valde compacta. Caput latissimum, brevissimum, sicut membra non distincte a corpore separatum, rostro obtusissimo. Oculi minimi; aperturae nasales laterales, spatio lato inter se separatae. Fissura oris parva, bulbum vix transgrediens. Dentes maxillares nulli; palatales parum validi, lineam transversam, media parte retro angulatam neque interruptam adornantes. Choanae mediocres; tubae fere obsoletae. Inter tubas in medio palato plica transversa cutanea, arcui similis, simplex, non fimbriata. Lingua magna, lata longissimaque, parte postica non ejicienda ibique sulco longitudinali instructa, sed nullo modo emarginata, lateribus liberis, lineae longitudinali mediana in basi oris affixa. Tympanum cute obtectum. Parotides nullae. Cutis verruculosa, verruculae ad rostrum et in mento spinulosae, in tergo series longitudinales exhibentes. Plica cu-

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