

Im vollkommen ausgestreckten Zustande hat es die in vorstehender Figur dargestellte Form.

Ich entdeckte diese neue Art vor drei Wochen in einem Tümpel in der Umgebung von Krakau. Sie scheint hier sehr selten zu sein, wenigstens ist mir bisher nicht gelungen zahlreichere Exemplare zu erbeuten.

Näheres über den Bau und die Entwicklung dieser Art werde ich in Kurzem an anderer Stelle berichten.

Krakau, den 6. Juni 1893.

### 3. The »Head« of *Galeodes*, and the Procephalic Lobes of Arachnidan Embryos.

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Considerable mystery surrounds the very striking »procephalic lobes« of Arachnidan embryos, and attempts have been made to see in them a number of vanished segments. A simpler explanation, however, lies near at hand.

As is well known, a distinct head has been claimed for *Galeodes*, a character which is supposed to distinguish it from all other Arachnids. No true head really exists; the appearance of a head is due to the peculiar shifting backward of parts of the last (cheliceral) segment dorsally over those immediately following it.

On opening up this so-called head of *Galeodes*, it is found to consist of two hollow lobes of chitin fused together in the middle line, and posteriorly to the terga of the following segments. These lobes are entirely filled up with muscle for moving the chelicerae. Further, the cheliceral muscles are confined to these lobes, and none but cheliceral muscles run into them.

The origin of these cephalic lobes in *Galeodes* is not difficult to see. The development of the first pair of limbs as powerful seizing organs which were at first thrown forward on each side of the mouth, and eventually met in the middle line above the prostomium, necessitated an upward and backward development of the lateral parts of the segment for the attachment of the muscles of these appendages. The first segment is thus greatly distorted; its lateral parts have developed as two great shoulders for the carrying of the mandibles, and these shoulders have fused in the dorsal middle line to form a new dorsal surface across the anterior region of the cephalothorax. A comparison of the diagrams will make my meaning clear.

All adult Arachnids show clear traces of these cephalic lobes. In the Araneidae, Chernetidae, and Schizonotidae, they still retain the importance which they have in *Galeodes*, and though somewhat more disguised, occupy the whole anterior dorsal surface except when median eyes are developed on an ocular tubercle. In *Phrynus* and *Scorpio*, the cephalic lobes are very much obscured by the shoulders of the pedipalps, which have also moved up laterally to take part in the formation of the dorsal surface.

According to this interpretation of the »head« region of Arachnids, the ocular tubercle, wherever developed, is a remnant of the old dorsal surface protruding between the cephalic lobes. This protrusion is very marked in the Scorpionidae, in which the ocular tubercle

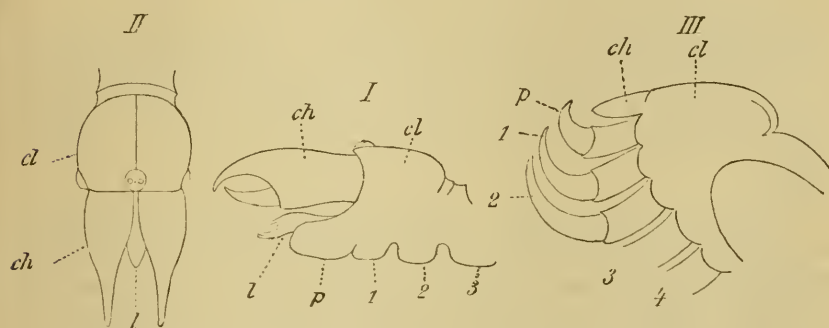


Fig. 1. Diagram of the head of *Galeodes* from the side. *cl* cephalic lobes; *ch* chelicerae; *l* labrum; *p* pedipalps; 1, 2, 3, 4 the four legs.

Fig. 2. The same from above.

Fig. 3. Embryo of *Pholcus opilionides* (after Claparède) showing the cephalic lobes thrown back over the dorsal surface as in *Galeodes*.

seems to be forced up through the suture between the cephalic lobes. In the Silurian Scorpion *Palaeophonus nuncius*<sup>1</sup>, the remains of the original dorsal surface is seen as a kind of island being gradually invaded by the approximating cephalic lobes. In *Galeodes* again, the ocular tubercle shows a marked discontinuity with the surrounding cuticle, often (*Rhax*) differing in colour from the rest of the head region. It stands up as an abrupt prominence at the anterior end of the median suture. This is probably the primitive position of the eyes<sup>2</sup>, whereas that realized in *Scorpio* is secondarily acquired. The shifting backwards of the ocular tubercle along the median suture has gone furthest in the genus *Opisthophthalmus*.

<sup>1</sup> On a Silurian *Scorpion* from Gottland. Thorell and Lindström, Stockholm 1885.

<sup>2</sup> cf. Embryology of a *Scorpion*. Laurie, Q. J. M. S. Vol. XXXI. Fig. 38.

The original number of eyes on the ocular tubercle was almost certainly only one pair. In *Mygale*, there are more than one pair on a tubercle, which may or may not be the primitive ocular tubercle. In the majority of Arachnids, the accessory eyes are arranged along the edge of the new dorsal surface formed by the cephalic lobes. It is necessary therefore to assume that they have been independently acquired, a fact borne out by the striking structural differences they present. Whereas according to Lankester and Bourne<sup>3</sup> the lateral eyes of *Scorpio* have the retinal cells arranged so that their distal ends are in contact with the lens, without the intervention of a vitreous body, I have recently shown<sup>4</sup> that in the Chernetidae the retinal cells are inverted, and their large nucleated ends are in contact with a very well developed hypodermal, or vitreous layer.

On turning to the embryos of the Arachnida, we have the remarkable procephalic lobes above alluded to. Unfortunately little is known of the embryology of *Galeodes*. In the embryo of the Araneids, the cephalic lobes are very conspicuous and pass through a stage in which they might almost represent a »head« like that in *Galeodes* (Fig. 3).

In the embryo of *Scorpio*, these lobes lie in front of the mouth, an arrangement simply due to their displacement by the yolk. They are early laid down, and develop on each side of the mouth and prostomium, eventually taking part in the formation of the dorsal surface. As nearly as can be expected, they repeat the phylogenetic development above described.

I think thus that the head of *Galeodes* throws a new light on these enigmatical procephalic lobes, and on the morphology of the anterior segmentation of the Arachnids. The interesting formations and markings found by Jaworowski<sup>5</sup> on the cephalic lobes of *Trochosa* require some other interpretation than that which he wishes to attach to them, as there could hardly have been any true antennae in front of the chelicerae.

If the interpretation of the »head« of *Galeodes* here put forward is correct, we have to look upon the retention of it as a primitive feature of equal importance with the segmented cephalothorax which characterizes the Galeodidae.

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<sup>3</sup> Q. J. M. S. Vol. XXIII.

<sup>4</sup> Journal of the Linnean Soc. (in the press).

<sup>5</sup> Jaworowski, Zool. Anz. T. XIV. 1891 and May 1892.

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