ON THE PHALANGEÆ OF THE UNITED STATES OF AMERICA

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II. *On the Phalangeæ of the United States of America.*

By Horatio C. Wood, Jr., M. D.

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Introduction.

The Phalangeæ, or Opilionina, as they are sometimes called, are a suborder of the Trachean Arachnids of the same rank as the Pedipalpi of the Pulmonary Arachnids.

The external skeleton, the *tegument*, contains chitine, as does indeed that of all the arachnids, remaining firm although becoming transparent, when the animal is soaked in a solution of caustic potash. It is variously ornamented with tubercles or spines, and more rarely punctated or excavated. Good specific characters can frequently be drawn from it.

The cephalothorax and abdomen are closely fused together, although in most cases the line of separation is more or less distinct. The cephalothorax is never, at least in any species the author has seen, at all segmented; it is generally smaller than the abdomen, but in the family Gonyleptidæ, it is expanded into a broad plate, entirely overshadowing the very small abdomen. The latter is in all the Phalangeæ more or less distinctly segmented.

Near the centre of the cephalothorax is a more or less prominent abrupt elevation or large tubercle, upon which the eyes are situated. This tubercle, or as I have called

it, *eye eminence*, in our species is mostly dark-colored, and more or less spinate or tuberculate. The eyes are two in number, rather large, simple. Near the anterior margin of the cephalothorax, on each side is an oblique stigmata. These have been mistaken for eyes, but are openings through the dermal skeleton.

The spiracles from which proceed the principal trachean trunks in the "Harvest-men" are placed between the posterior pair of coxæ and the abdomen.

All of the Arachnida have four pairs of feet, which in the Phalangidæ are chiefly remarkable for their length, and the number of their tarsal joints. The coxæ are large, conical, and converging towards the sternum. They are almost completely hid by the body of the animal. The next article, the trochanter, forms with the coxa a sort of ginglymoid joint. The trochanters are small, but often afford good specific characters. The femora are long and slender, and are distally connected with the shorter tibiæ, which in turn give attachment to the numerous series of short tarsal articles. In the Gonyleptidæ, the last pair of feet are the longest. In the Phalangidæ proper, the first and third pairs are about the same length and much shorter than the others; the fourth pair is not quite so long as the second.

The question here naturally presents itself, are the most anterior pair of feet true feet, *i. e.* sternal appendages, or in other words are the so called *octopodous* insects really eight-footed. The use of these organs as feet is of course no argument at all as to their homologies. Besides, in many Arachnids, such as the Phrynidæ and Thelyphonidæ, they are used almost exclusively as feelers, almost replacing the antennæ in function, and probably in very many other genera and families they answer the double purpose of limb and palpus. If a true spider be examined, the anterior pair of feet will be seen to be articulated to the sternum, and in all respects similar to the others. Nevertheless, I cannot think they are true sternal appendages, for the following reasons. If they be so, the thorax must consist of four segments instead of three, as in the true insects. In the Spiders, in Scorpions, Harvest-men, etc., the segments of the cephalo-

thorax are so fused together, that it is impossible to find any distinct sutures; but in the genus Galeodes, which in respect to the separateness of the head, thorax, and abdomen approaches somewhat the hexapods, the thorax is pretty distinctly divided into three segments. Again, although the attachment of the first pair of legs in many arachnids is apparently to the sternum, yet in others it is very distinctly not so. Thus in the Thelyphonidæ, it is placed on an entirely different plane from that of the truly sternal legs and the bases of the first pair of legs are indeed partially covered by the base of the maxillæ. In the Phrynidæ this is even more marked.

For these reasons, it would seem that the anterior legs of octopodous insects are really appendages of the cephalic segments.

In the mouth of a rapacious arachnid the most anterior organs are the so-called cheliceres, which project forwards or downwards from immediately under the labrum, or anterior edge of the cephalothorax. Latreille was, I believe, the first to regard these organs as modified antennæ. Siebold, who follows him in this, assigns as his reasons, the cerebral origin of their nerves, and the fact that they never act like the mandibles of the other Arthropoda in a horizontal direction.* The first of these reasons is not at all conclusive; for if the antennæ were absent, it would seem, *a priori*, most probable that the cerebral ganglion, not being called on to supply them with nerve power, would send a nerve to some of the mouth organs, and to which more naturally than to the most anterior? It is very doubtful whether such anatomical facts are of any aid whatever in tracing homologies; are the arms of man any the less appendages of the occipital vertebra, because they do not receive their nervous supplies from it? Again, the cheliceres of some arachnids do act in a horizontal direction, in the true Scorpions for example. The value of such a character is shown by the fact, that in one order, the Pedipalpi, the Scorpions have their cheliceres acting horizontally, whilst amongst the Phrynids they are vertical. Farther, the

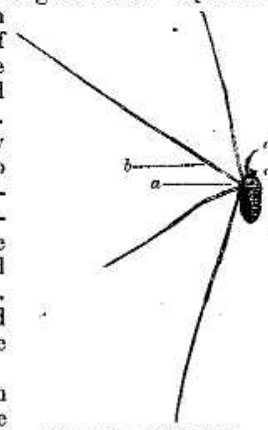
* Anatomy of the Invertebrates. American edition by Burnett, p. 378.

cheliceres occupy the same place and perform the same functions as the anterior maxillæ or mandibles of Coleoptera, so that the burden of proof certainly rests very strongly on those who assign them as the homologues of the antennæ. If, as stated by Professor Owen, some species of Galeodes have the rudiments of the antennæ attached to the cheliceres, it will strengthen the position that the latter are the homologues of the mandibles rather than weaken it. No such rudiments exist in the North American species, *Galeodes subulata* Say, which is the only one that I have seen specimens of; but in certain of the Harvest-men, there are two small processes placed superiorly and anteriorly to the mandibles, which must be regarded as the rudiments of the antennæ.

The mandibles or cheliceres in the Phalangidæ are two-jointed, the distal, larger article, being vertical and armed with a pair of forceps, one finger of which is fixed, the other movable.

The ligula is scarcely perceptible in the Phalangeæ.

The second prominent mouth-organs of the rapacious arachnids are those which form the large arm like weapons of the Scorpions. They are the homologues of the maxillæ and their palpi of the Coleoptera. Among the Harvest-men they have much more resemblance to the corresponding hexapod organs than is general. Their basal-joints, the representative of the maxillæ proper, are large, and so opposed as to act as jaws. The palpi are four-jointed, and strictly retain the form and use of palpi.



Phalangium ventricosum.
a, trochanter; b, femora; c, palpus; d, mandibles.

Such are the organs, which are most obviously parts of the mouth. Professor Owen suggests in his anatomy of the Invertebrates that the anterior pair of feet are modified labial palpi. This seems to be the most probable view

of the subject. They appear to be cephalic appendages, for the reasons before given, and, if so, can hardly be other except labial palpi or antennæ. The presence of the rudiments of the latter on the cheliceres of certain Galeodes, and the total absence of any proof, are sufficient reasons for not considering them as misplaced antennæ. Again in certain arachnids, they not only perform solely the tactile function of both of these organs, but occupy very closely the position of the former. Thus in the Phrynidæ, they are placed just posteriorly and superiorly to the maxillæ. No distinct labium is acknowledged as existing among the arachnids, but if these organs are the labial palpi, in the Scorpions the two processes, which project forward from their bases, may be looked upon as a split labium. Such appears to me the most probable view of the homologies of these parts, but embryological studies can alone settle these completely. Among the Phalangeæ the anterior pairs of legs are attached just in front and on the same plane as the others.

HABITS. The *Phalangidæ*, Harvest-men, "Daddy Long Legs," or "Grab for Gray Bears," as they are called in northern New York, appear to live equally well about the habitations of men and in the most lonely forests. I have seen hundreds of them running over the bushes and ground amongst the recesses of the Alleghanies, and every country lad has noticed them with wonder about out-buildings. I believe they are most active in the very early morning and evening, preferring twilight to the bright sun-glare. They are carnivorous, feeding on small insects, and are said to be especially addicted to aphis eating. The true spiders, and, indeed, nearly all of the rapacious arachnids, content themselves with sucking out the juices of their victims, but the Harvest-men appear to devour them, for which the opposing maxillæ seem to fit their mouths. I have seen one running with a half-devoured insect in its mouth; and Tulk, according to Siebold, has found fragments of insects in their alimentary canal.

The eyes of the Harvest-men, placed as they are on a prominence near the centre of cephalothorax, cannot enable them to see beneath them, or in fact to discern any near object much below their own level. The Phalan-

gium, however, when he walks, does not generally raise his body much above the ground, but so bends his long legs that their extremities are near the surface, whilst their central portion is high in the air. As a consequence of this the body of the animal is almost in the same plane as his prey, which he is thus enabled to watch during his approach. I have never seen a Harvest-man seize his victim, but, according to Herbert, "Sie springen und stürzen auf die Beute wie die Katze auf die Maus und halten sie mit den Palpen wie mit Händen selbst."*

Mr. A. Tulk,† speaking of the habits of *Phalangium Opilio*, says, "The harvest-spiders, at least the present species, are nocturnal in their habits and capture their prey, consisting of flies, mosquitoes, and small lepidoptera, by stealing cautiously towards it, and making a gliding spring upon the victim when within reach. I have repeatedly seen individuals of *P. cornutum*, when in confinement, pursue each other with the utmost pertinacity, the larger generally pouncing upon the former, and having brought them within reach of the cheliceræ and palpi by grappling them with their long legs, proceed to devour the body, leaving the extremities untouched. They use one of their legs occasionally to support the food to their mouth." In our northern climates, probably but few Phalangians survive the winter. Dr. Lincecum writes that large numbers winter in Texas, in the long moss (*Tillandsia usneoides*). In the spring, all of the specimens to be found in this neighborhood are evidently very young, just hatched. They are small, very soft and tender, and have not the coloration and other specific characters well pronounced. Towards the close of summer no more young specimens are to be met with. All of the females are then full of eggs. The eggs are said to be laid in the autumn in protected crevices, under dry stones, etc., hatching out in the spring.

CLASSIFICATION. In regard to the classification of this group, there is no doubt but that its value is that of a suborder, and that is naturally divided into two families,

* They spring and pounce upon their victim as the cat upon the mouse, and seize it with their palpi as if with hands.

† Annals and Mag. Nat. Hist. 1843, p. 246.