

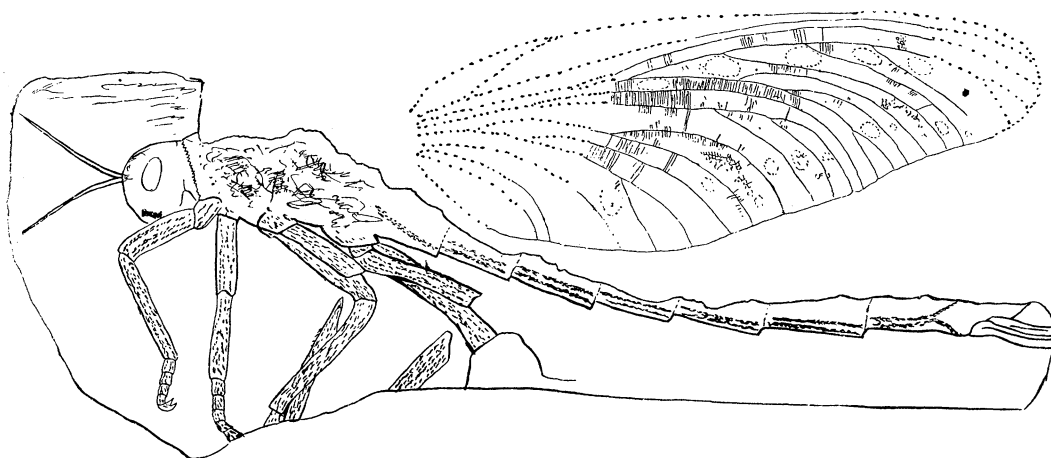
ing above the mountain summit on the morning of the 2d, but it had vanished completely within two hours; and on three or four occasions clouds were observed very near the horizon, but they never rose. Fitful gusts of wind prevailed night and day the 3d and 4th, and the morning of the 5th; but, about noon this latter day, a period of the utmost tranquillity set in, and lasted for fifty or sixty hours, the temperature ranging only between sixty and seventy degrees.

Dec. 6 the sun rose about seven o'clock, with Venus a good way on its disk. The first sensitive plate was exposed at eleven minutes after seven, the slit being three inches wide, and the exposure a second and a half long; but a very faint image was all that came out on the plate in developing. Six minutes later,

sixths of them will be available for exact micrometric measurement. Their number and quality are about as follow: A signifying a plate of the first order of definition, and any two successive grades being separated by only a slight variation in quality:—

Grade.	No. of Photographs.	Grade.	No. of Photographs.
A	71	B—	3
A—	23	C	4
B+	13		
B	9	Total,	123

The record of the times of exposure of these photographs was kept by two chronometers independently, one record being automatic. The original photographic record, and such parts of the photoheliograph as have yet to be investigated, together with the greater part of



TITANOPHASMA FAYOLI BRONGNIAT. — ONE-FOURTH NATURAL SIZE.

with an exposure of one second, a picture sufficiently intense for measurement was obtained; but the vertical diameter of the sun was about a quarter of an inch, or one-eighteenth part, shorter than the horizontal one. Something like a half-hour later, very satisfactory pictures began to be obtained, with the slit an inch wide, and an exposure less than half a second long. By twenty minutes past nine the slit had been reduced in width to 0.25 in., and was kept at this setting throughout the remainder of the transit, the exposures varying only slightly from 0.25 sec. in length. At twenty-two minutes before twelve the last exposure preceding interior contact at egress was made, and subsequently ten additional photographs were taken between the two contacts. The total number of plates exposed was a hundred and forty-seven, and about five-

the photographs themselves, are now stored for safe-keeping in the vault of the observatory on the mountain.

No other observations of importance were attempted, except those of the two contacts at egress: these being observed by Capt. Floyd, with the twelve-inch equatorial, aperture reduced to six inches; and by myself, with the four-inch transit instrument.

DAVID P. TODD.

A GIGANTIC WALKING-STICK FROM THE COAL.

WE owe to the favor of M. Charles Brongniart of Paris, sketches of an enormous insect from the carboniferous beds of Commeny, France, which we have reproduced upon this page; in short preliminary notices, given last December to the Paris academy and the geo-

logical society of France, he has named it *Titanophasma Fayoli*. The interest attaching to this remarkable creature, which has not before been figured, and to another somewhat smaller species published by him five years since under the name of *Protophasma Dumasii*, is twofold. First: scarcely any group of Orthoptera is so specialized as the Phasmida, or walking-sticks; and one would naturally look upon these bizarre creatures as the last term in a long series of forms in a special line of development. They had never been found fossil, excepting in one or two fragments in amber, when suddenly the upper coal-measures of Commentry revealed a considerable number of forms, of which M. Brongniart has only described two. He points out, that they differ from modern types in certain features, such as the relative length of the parts of the thorax and legs; but their connection with living Phasmida is unmistakable. Second: the hind wings are of a type very different from those of living Phasmida, and accord closely, as pointed out in my paper on *The early types of insects*, with those of a whole group of detached wings found in carboniferous beds in Europe and America (*Dictyoneura*, *Paolia*, *Haplophlebium*). These have always been looked upon as Neuroptera. It can hardly be doubted that these wings belong to this early type of walking-sticks,—a probability, we may add, strengthened by unpublished material in our possession: Here we have clear evidence of the presence, in early times, of synthetic types of marked character. As M. Brongniart informs me that he has now over five hundred and fifty specimens of arthropod remains from Commentry alone, and as our own Mazon-Creek beds have doubtless yielded as many, we may look for many new revelations concerning the early insect fauna of our globe. I am already acquainted with half a dozen or more species of *Dictyoneura* and allied genera from our American coal-fields, notably from Pennsylvania. The figures we give are from M. Brongniart's sketches, reduced lineally one-half. The body is that of the original specimen of *Titanophasma* described in the *Comptes rendus* of Dec. 11. The wing, his latest discovery, and not yet described, has merely been mentioned by M. Brongniart, in the bulletin of the entomological society of France: it was found detached in the same beds, and is conjectured by him, not without reason, to belong to the same or a closely allied species. Of *Protophasma*, specimens have been found with the wings attached to the body. SAMUEL H. SCUDDER.

ANATOMY AND HISTOLOGY OF *POLYOPHTHALMUS*.

THIS interesting genus, which was first discovered by Dujardin in 1839, and more fully described by Quatrefages in 1850, is the subject of a fine monograph by E. Meyer in the *Archiv für mikroskopische anatomie*, xxi. 769. The transparent worm is 15-18 mm. long; has twenty-eight bristle-bearing segments, followed by eight smooth, very small ones, none of which are marked externally. The bristles form two rows on each side. Most remarkable are the eyes; of which there are three on the head, and several pairs on the body. In *P. pictus*, the species investigated by Meyer, there are twelve such pairs, on as many segments. The external cuticula is of nearly uniform thickness, except over the sensory organs, where it is thinned out; but the hypodermis varies considerably, and is composed of narrow cylinder cells and relatively large unicellular glands, which last have granular contents, an oval nucleus, and a cross-shaped opening through the cuticula for the duct. The external coat of annular muscles is very imperfectly developed. The remaining muscles resemble those of other annelids. The bristles arise from the bottom of four pockets in each segment; the pockets (*bursae*) are invaginations of both the hypodermis and cuticula; but the hypodermis cells are cubical, and not cylindrical as over the rest of the body. The brain is kept in place by a set of threads of muscular and connective tissue, which run from various points of the body-wall to the cerebral envelopes. A detailed description of the nervous system is given. The ventral cord is nearly uniform, and has no distinct ganglionic swellings. It lies close against the skin, which directly underneath it is reduced to a thick cuticula with a matrix of flat cells, which pass suddenly on either side into the layer of hypodermal cylinder cells. There are two pairs of peripheral nerves in every segment. The sensory organs are numerous and interesting. The organs of touch are the cephalic and anal papillae. The former is a small elevation of the integument of the forehead, covered with a delicate cuticula and thin hypodermis, and receiving a number of nerve filaments. The nine anal papillae are similar in structure, but project more. There are also the so-called lateral organs, a pair in each bristle-bearing segment, which are probably homologous with the *seitenorgane* discovered by Eisig in the *Capitellidae*. They lie between the two bristle pockets of each segment, and have the form of hemispherical projections, probably covered in life with free sensory hairs arising from the modified hypodermal cells, which rest upon a peripheral ganglion, from which they are separated by a thin membrane; the membrane is pierced by the cells to establish their connection with the ganglion. There are beaker-shaped organs, having evident resemblance with those of fishes and the *Capitellidae*, but present only in a single cephalic pair. There is also a pair of ciliated pits of horse-shoe shape on the oral segment. These pits are in structure quite complicated; and their bottom has hair-bearing sensory cells, which are greatly elongated, have rod-like nuclei, and rest upon a ganglionic layer, to which runs a large special nerve. There is an evident histological similarity between the ciliated pits, the beaker-shaped organs, and the lateral organs. The lateral eyes are of two sizes, those upon the eighth to the fifteenth segments, both inclusive, being nearly twice as large as the four other pairs: they all lie close against the integument, the overlying cuticula and hypodermis being both very much thinned. The