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III. ANCIENT INSECTS AND SCORPIONS.

Fossil scorpions have been known for some time as far down in the geological series as the Carboniferous, in which formation about twenty-five species of scorpions and spiders have been discovered, but until last year no discovery of this kind had been announced in any older rocks. In November last, Dr. Lindström of Stockholm, announced the discovery of a well-preserved specimen of a true scorpion, which he named *Paleophoneus nuncius*, in the Upper Silurian of Sweden; and in December of the same year, a similar discovery in Scotland was announced by Dr. Hunter. In July of this year, Prof. Whitfield of New York described and figured a third species in the Lower Helderberg series of the State of New York. Thus this form of life has been at one bound, and in three different localities, carried back from the Carboniferous to the Silurian, a remarkable instance of the nearly simultaneous discovery of new facts, in different places and by different observers. It is also of interest that the crustaceans of the genus *Eurypterus*, which have been called aquatic scorpions, appear in the same formations in which the scorpions have now been found, so that it would appear that the aquatic and aerial animals of this type of structure originated together, or were at least contemporaneous in the Silurian period. The Eurypterids, however, early became extinct, while the scorpions survive.

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The insects had previously been traced back to the Devonian or Erian period, and the scorpions would now have antedated them, but for another discovery made in Spain by M. Donville, and communicated to the Academy of Sciences by M. Charles Brongniart in December, 1884. This is a wing of an insect in the sandstone of the Middle Silurian, probably equivalent to our Niagara series in Canada. This wing is shown by its venation to belong to the Blattidæ or cockroaches, a group already well-known in the Carboniferous, where they seem to have thriven on the abundant vegetable matter of that period. It differs, however, in some of the details of venation from any living or fossil species previously known. Brongniart proposes for it the name *Protoblattina donvillei*, and as the beds containing this insect are probably a little older than any of those containing the scorpions above referred to, this discovery makes the cockroaches, still so numerous and voracious a family of insects, the oldest known air-breathing animals. It is to be observed, also, that the group which thus has priority belongs to the insects which have an imperfect metamorphosis, and to the order *Orthoptera*. In connection with this, it seems that all the insects hitherto known in the Carboniferous period belong (with the exception of species uncertainly referred to the moths and the beetles) to the three closely allied groups of *Orthoptera*, *Neuroptera*, and *Hemiptera*, all having incomplete metamorphosis, so that in any case this group was the dominant one of insects in the Palæozoic period. With the exception of a few lycopodiaceous plants we know nothing as yet of Silurian land vegetation, but the Spanish *Protoblattina* suggests to us the existence of Silurian forests producing some kind of succulent and nutritious vegetable food, while it also furnishes an explanation of the possible means of sustenance of the carnivorous scorpions.

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