EARTHWORMS FROM ILLINOIS.

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The literature on Illinois earthworms has been very scanty. In 1888, Garman, of the State Laboratory of Natural History, described *Diplocardia communis* as a new genus and species from specimens of earthworms found at Urbana. He also listed three species of *Lumbricidae* from the vicinity, all well-known European forms.

In 1893, Ude, of Hanover, Germany, described a form collected at Danville, Illinois, as a new genus and species, *Geodrilus singularis,* but it is now considered merely as a variety of Garman's *Diplocardia communis.*

In 1895 I had the opportunity to describe another species of *Diplocardia* from Havana, Illinois, and also a species of aquatic earthworm from the same place, belonging to the genus *Spar-*

ganophilus. These are the only papers that have dealt with new species of earthworms based on Illinois material. A paper by me in 1900, dealing chiefly with other *Oligochaeta,* contained a list of eleven species of earthworms known in the State. At present my list includes three species and three varieties of *Diplocardia,* of which two varieties are undescribed; one species of *Sparganophilus,* and seven species and one variety of *Lumbricidae,* with three other forms not yet determined—a total of eighteen different forms.

It may be of interest to know something of the source and general relationships of the different types represented in the Illinois fauna. At the present time there are more than one thousand recognized species of earthworms in various parts of the world. The great majority of these have been made known within the last twenty years, chiefly through the efforts of five Europeans, and one Swede, Eisen, who for a number of years lived in San Francisco and worked on West and Central American species.

These worms are grouped into four great families, of which one is limited to Ceylon and southern India, and need not receive attention. The other three are represented in Illinois. The great family *Megascolecidae* includes more than half of the known species, and is found chiefly in the tropical regions and the Southern Hemisphere. The most primitive type is the genus *Eodrilus,* which is represented by species in India, South America, Africa and Australia, a distribution typical of the survivors of ancient groups of other types of animal life. They date back at least as far as the Triassic in the early Mesozoic.

According to Michaelsen, a prominent investigator in this field, *Diplocardia* was one of the first branches to develop from the *Eodrilus* trunk, and probably appeared in Mexico or Central America during the Jurassic in time for derivatives from it to invade Africa by way of the land connection formerly existing between Brazil and the African continent. *Diplocardia* itself seems to have spread to the north instead of southward, and species are known from Mexico, Lower California, Texas, Florida, Nebraska and Illinois. Its representatives are among the dominant forms of our endemic species.

The *Geoscolecidae* constitute another great family of the earthworm group, and seem to have developed at least as early as the Jurassic in the northern continental area. Some went southward through Europe into Africa, where many species now exist, while a still greater development took place on the American con-

tinent. One of the oldest genera was *Sparganophilus,* in the Jurassic, which seems to have remained behind in North America, while other American representatives went south, not much before the Eocene, to Central and South America, where they have differentiated widely and into numerous genera and species. *Sparganophilus* species are known from Mexico, California, Florida, Illinois and the Great Lake region, and form a second group of prominent endemic species. Probably the only reason why the list of States is not longer is simply that no one has collected and identified the worms from other States. It seems a little odd that the genus *Sparganophilus* should have been founded by an Englishman on specimens taken from the Thames, but there seems excellent reason for believing that his conjecture was correct, viz.: that their occurrence there was accidental, due to the introduction of a purely American form, perhaps with aquatic vegetation. He was not able to find the species in later years, and I think there is no record of any other occurrence of the genus in the Old World.

The third and last earthworm family to receive attention is the *Lumbricidae.* These are the most recent forms to appear, and seem to have been derived from the *Glossoscolecidae,* probably in Southwest Asia, where there is a great variety of endemic forms. They probably invaded Europe in the Eocene and North America in the Oligocene. There are numerous endemic forms in Europe and but few in the United States. These latter are found chiefly in the Southeastern Atlantic coast region. None are yet positively known to occur in Illinois. Notwithstanding the lack of endemic lumbricid species in Illinois, it is probable that 90 to 95 per cent of all the specimens that would be taken in random collections made in any of the settled districts of Illinois or of the United States would be included in a few species common also in Europe, and more than 50 per cent would belong to a single species, *Helodrilus caliginosa.* These species are found the world over where Europeans have settled and cultivated the soil. They abound about the towns of Africa, South America and Australia and crowd out the native species as they seem to do here.

The habits and mode of life of the earthworms are such that they must necessarily be destroyed in any region subject to general glacial action, and there can be no doubt that the earthworm fauna of the glacial territories of Eurasia and North America have been occupied by invaders from the territory further south

since the retreat of the glacial ice mass. The conditions found in the earthworm fauna of Europe are interesting in this connection. In the various parts of Southern Europe are found dozens of endemic species, while Northern Europe is occupied exclusively, with a single possible exception, by forms also found further south. The line separating the northern territory with peregrine forms from the southern region with endemic forms is found to correspond quite closely to the southern border of the ice sheet at its most southern extension during the glacial period. This would seem to indicate that the time since the glacial period has been too brief for the differentiation of endemic forms from the southern invaders. Our knowledge of the earthworm fauna of North America is altogether too imperfect to permit a statement as to corresponding conditions here.

It is my wish to gain a more extended knowledge of the distribution of earthworms in this State, and particularly of the endemic forms. We know nothing of the northern limits of the range of *Diplocardia,* and nothing of the earthworm fauna of the unglaciated area of Southern Illinois. If any of the members of the Academy will aid in the securing of material which will throw light on the two topics suggested, I shall be very glad to secure it and return named material in exchange.