

## PRELIMINARY SURVEY OF THE ACANTHOCEPHALA FROM FISHES OF THE ILLINOIS RIVER.\*

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Life of the Illinois River has received much attention on the part of Professor S. A. Forbes and his colleagues of the State Natural History Survey. In his convincing manner Professor Forbes has strongly emphasized the intimate relationship between all forms of life in an aquatic habitat. There are few aquatic organisms which do not have some sort of interrelationship with the fishes that live in the same water. Fish as food and food for fish have been two phases of this interrelationship of organisms which have received much attention in the past. Little attention has been given to the parasites which attack the fish, though they may directly or indirectly become of considerable economic importance for the fisheries industry.

The present paper is based upon intensive examination of the fishes of the Illinois River for Acanthocephala. The entire summer of 1910 was spent at Havana, Illinois, in the study of these parasites. Additional examinations were made at various times of the year and some observations were taken at Peoria and at Beardstown. The facts thus brought together constitute the first intensive study of this important group of parasites made for any freshwater habitat in North America.<sup>1</sup>

The Acanthocephala comprise a group of worms which represent the development of the parasitic habit to the fullest extent. Worms of this group have become so profoundly modified in structure that the body consists of a sac for containing the reproductive organs and a special organ of attachment called the proboscis. No special sense organs, no locomotor structures, and no special organs for

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<sup>1</sup>In the interval between the reading and the publishing of this preliminary survey the full results of the investigation have been published in the Bulletin of the Illinois Natural History Survey, Vol. XIII, Art. VIII, (1919). In the meantime the results of investigations in other localities have also been published.

metabolic processes are present at any stage in the development of the individuals. They are parasitic throughout their existence. They reach maturity in the digestive tract of various vertebrates. Eggs enclosing the developing young are discharged with the feces of the vertebrate host. These embryos never are freed from their shells until they are taken into the body of some suitable primary host (usually an arthropod) in whose body they can undergo their development up to a certain stage. They never reach sexual maturity and have no power of reproduction within the body of the primary host. Development to maturity is possible only under condition that the primary host is eaten by a suitable vertebrate in whose intestine the liberated larva finds shelter and an abundant food supply to bring it to the close of its life cycle. The absolute dependence of the Acanthocephala upon some other organism throughout their entire development renders a knowledge of them of prime importance in the study of hosts which harbor them.

The effect of these parasites upon the fishes may assume several different aspects. If present in large numbers in a single host these worms appropriate elaborated food material which should be utilized by the host, thereby reducing the available food supply for the host. Frequently they are present in such large numbers that they fill the entire cavity of the alimentary canal, thereby also interfering with the digestive process. Another type of injury is that due to the action of the proboscis in its normal functioning as a holdfast organ. The proboscis is covered with hooks or spines which penetrate the lining of the alimentary canal of the host, thereby allowing the parasite to maintain its position against the peristaltic movements of the intestine. These minute spines cause lacerations and in some cases perforations of the intestine through which disease producing organisms find access to the blood system and to the body cavity of the host. Infections which under normal conditions are resisted by the unbroken mucosa of the intestine are thereby facilitated. For the reasons cited above a study of these parasites is desirable because of their direct or indirect effect upon fishes which have commercial value.

In the present study it has seemed inadvisable to attempt an analysis of percentages of infestation since in many instances the number of individuals examined was too small to render such a statement of much value. Furthermore, age of the host and season of the year when examined are factors which influence the extent of the infestation, thereby rendering any statement of percentage of infestation misleading unless a complete analysis could be given for fishes of different ages and for all seasons of the year.

In the following table is given the tabulated result of the fishes examined, showing the *Acanthocephala* found in each.

TABLE I.  
Acanthocephala from fishes of the Illinois River at Havana

	examined	infested	species of Ac. found
<i>Lepisosteus platostomus</i> (Raf.) shortnosed gar .....	15	1	<i>E. thecatus</i>
<i>Lepisosteus osseus</i> (Linn.) longnosed gar .....	2	0	none
<i>Amia calva</i> Linn. freshwater dogfish .....	5	3	<i>E. thecatus</i>
<i>Hiodon tergisus</i> LeS toothed herring .....	7	1	<i>E. thecatus</i>
<i>Dorosoma cepedianum</i> (LeS) gizzard shad .....	212*	164	<i>T. longirostris</i> <i>G. gracilicentis</i>
<i>Anguilla chryssypa</i> Raf. American eel .....	8	0	none
<i>Ictiobus urus</i> (Agassiz) mongrel buffalo .....	1	1	<i>P. bulbocolli</i>
<i>Ictiobus bubalus</i> (Raf.) small mouth buffalo .....	20	5	<i>E. thecatus</i> <i>P. bulbocolli</i>
<i>Carpiodes carpio</i> (Raf.) river carp .....	16	4	<i>E. thecatus</i> <i>P. bulbocolli</i> <i>N. cylindricus</i>
<i>Carpiodes velifer</i> (Raf.) quillback .....	1	0	none
<i>Erimyzon succetta oblongus</i> (Mitch.) chubsucker .....	1	0	none
<i>Moxostoma aureolum</i> (LeS.) redhorse sucker .....	15	1	<i>O. macilentus</i>
<i>Cyprinus carpio</i> Linn. German carp .....	1	1	<i>E. thecatus</i> <i>P. bulbocolli</i>
<i>Ictalurus punctatus</i> (Raf.) channel cat .....	2	1	<i>E. thecatus</i>
<i>Ameiurus nebulosus</i> (LeS.) bullhead .....	3	2	<i>P. bulbocolli</i>
<i>Ameiurus melas</i> (Raf.) black bullhead .....	2	1	<i>P. bulbocolli</i>
<i>Pomoxis annularis</i> Raf. white crappie .....	6	4	<i>E. thecatus</i> <i>P. bulbocolli</i>
<i>Pomoxis sparoides</i> (Lacép.) black crappie .....	11	7	<i>E. thecatus</i> <i>P. bulbocolli</i>
<i>Ambloplites rupestris</i> (Raf.) rock bass .....	2	2	<i>E. thecatus</i>
<i>Lepomis pallidus</i> (Mitch.) bluegill .....	22	20	<i>E. thecatus</i>
<i>Eupomotis gibbosus</i> (Linn.) pumpkinseed .....	3	1	<i>E. thecatus</i>
<i>Micropterus dolomieu</i> Lacép. smallmouthed black bass...	6	4	<i>E. thecatus</i> <i>N. cylindricus</i>
<i>Micropterus salmoides</i> (Lacép.) largemouthed black bass....	1	1	<i>E. thecatus</i>
<i>Perca flavescens</i> (Mitch.) yellow perch .....	2	1	<i>E. thecatus</i>
<i>Aplodinotus grunniens</i> , Raf. sheepshead .....	1	0	none.

\*Specimens examined in all seasons of the year.

There are thus representatives of six genera of Acanthocephala infesting fish of the Illinois River at Havana: Echinorhynchus, Pomphorhynchus, Tanaorhamphus, Gracilisentis, Neoechinorhynchus, and Octospinifer. In the region under consideration each of these genera is represented by a single species. The last four of these genera belong to the family Neoechinorhynchidae, which is especially highly differentiated in the North American fauna.

Of the species of Acanthocephala infesting freshwater fishes of North America but two show strong evidence of restriction to a single host species. *Tanaorhamphus longirostris* and *Gracilisentis gracilisentis* have been recorded from the gizzard shad only. *N. cylindratus* and *O. macilentus*, though recorded for a single host species in the accompanying table, are known to occur in other species from other localities.

It is significant that no larval Acanthocephala were found in any of the vertebrates examined in the region under consideration.

In the present study four species of Acanthocephala are listed for the first time from the Illinois fauna; *Echinorhynchus thecatus* Linton, *Neoechinorhynchus cylindratus* (VanCleave), *Pomphorhynchus bulbocolli* Linkins *Octospinifer macilentus* VanCleave.

Twelve additional fish are added to the host list for *E. thecatus*, namely: *Lepisosteus platostomus*, *Hiodon tergisus*, *Ictiobus bubalus*, *Carpiodes carpio*, *Cyprinus carpio*, *Ictalurus punctatus*, *Pomoxis annularis*, *P. sparoides*, *Lepomis pallidus*, *Eupomotis gibbosus*, *Micropterus salmoides*, and *Perca flavescens*.

For *N. cylindratus* two new host species are reported: *Carpiodes carpio* and *Micropterus dolomieu*.

#### SUMMARY.

Over 350 fishes representing twenty-four species from the Illinois river were examined for Acanthocephala, chiefly in the summer of 1910. Of these nineteen species were found to harbor Acanthocephala.

Six genera of these parasites, each represented by a single species, were found in the fishes of the region under consideration.

But two species are restricted to a single species of host. Other species occur in widely separated Orders of fish.

*E. thecatus*, the most common species, was found in fourteen species of fish representing six Orders.

Two genera, *Tanaorhamphus* and *Gracilisentis*, known only from fishes of this stream, are restricted to a single species of host; namely, *Dorosoma cepedianum*.

A number of new host records are listed.

Four species are recorded for the first time from the State of Illinois.