Macracanthorhynchus hirudinaceus from Swine: An Eighteen-Year Record of Acanthocephala from Southern Illinois

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ABSTRACT: An 18-year record of collecting Macracanthorhynchus hirudinaceus from southern Illinois meat packing plants has revealed a major decline in infected pigs from a small local packer (DuQuoin Packing Company). This decline reached bottom in 1969 and has remained at that level since that time. However, regional packers (Swift Fresh Meats Company and Hunter Packing Company) have had a stable population of infected pigs and a higher infection rate than that previously observed in pigs processed by the local packer. A comparison of the number of infected pigs per month for the years 1965 and 1975 indicates the worm population, while different in different locations, was stable throughout the year in each site. The decline in infection rate at DuQuoin can be attributed to changes in animal husbandry practices in that area.

We have been routinely collecting Acanthocephala from pigs in southern Illinois for 18 years. During this time, it never occurred to us that parasitologists north and south of Carbondale, Illinois were gradually developing the idea that Macracanthorhynchus hirudinaceus was seldom observed north of the Mason-Dixon Line. However, in 1976 Dr. Arlie C. Todd (Department of Veterinary Science, University of Wisconsin) startled us by stating that he did not see this parasite in the swine passing through their clinic and mused that M. hirudinaceus ‘‘may be on its way out.’’ We thought little about this until Dr. George Cain (Department of Zoology, University of Iowa) remarked that they had difficulty collecting live M. hirudinaceus. Dr. S. Patton (Department of Veterinary Pathobiology, University of Tennessee) also discussed this issue with us and added that she seldom saw the parasite. Such widespread difficulty in collecting this helminth suggested to us that a literature search and an analysis of our own collection records would be worth pursuing.

Materials and Methods

Throughout the year we make regular trips to area packing houses to obtain living specimens of M. hirudinaceus in order to study their physiology. Intestines containing these worms are separated from the remaining viscera shortly after evisceration and placed in 35-gallon plastic containers. Intestines are normally collected until the employees have a rest period (90 minutes from our arrival) and then the parasites are removed. Collections have been made through the courtesy of plant managers at DuQuoin Packing Company, DuQuoin, Illinois as well as Hunter Packing Company and Swift Fresh Meats Company in East St. Louis, Illinois. DuQuoin Packing Company is a local meat packer, which during the time of these observations processed 200–300 pigs daily. The animals processed were obtained from local farmers in southern Illinois. In contrast, Hunter Packing Company and Swift Fresh Meats Company are regional meat packers that process 3,000–5,000 animals daily. These animals come from Illinois, Missouri, and Arkansas. We have collected worms at these packing companies throughout the
year, but more frequently during the summer when the weather is more suitable for travel. An "exact" determination of the infection rate of animals observed during these trips was not possible by our procedures. We were restricted to those infections which could be determined without interfering with the assembly line procedures of a modern meat packer. While we believe we missed very few, if any, acanthocephalan infections, we could be sure of this only by a much more extensive examination including opening each intestine. Clearly an animal infected with one or two worms is not as likely to be noticed using our collection techniques as one heavily infected. Nevertheless, we believe that the 6–7 seconds available to examine each intestine was adequate to detect 95% of the infections. During this time, the duodenum was visually scanned while being manually rotated and palpated. All initial determinations were based on the presence of "knots" formed as a result of the embedded proboscis. We believe these "knots" indicate all but the earliest infections since even the smallest worms seem to cause this host response.

Results

Figure 1 shows the average number of infections per thousand pigs for each year since 1960. The collections were made at the DuQuoin Packing Company through 1969. However, the decline in the number of infections during 1967–1969 forced us to begin collecting from a company that processed a larger number of animals. Figure 1-A shows the large abrupt increase in infected animals following our shift to Hunter Packing Company. Figure 1-B indicates when we began collecting from Swift Fresh Meats Company. This change was the result of a prolonged labor strike at Hunter Packing Company and, as is evident from the graph, not because of a decline in infections.

The gradual decline in infections at DuQuoin Packing Company in the 1967–1969 period has no obvious explanation. However, in contrast to the East St. Louis companies, DuQuoin Packing Company is a local packing company that processed animals which were and are obtained largely from southern Illinois.

Figure 1. Average number of infections of *M. hirudinaceus* per 1,000 pigs, plotted on a yearly basis beginning in 1961 (1) and ending in 1978 (8). The 1961–1969 collections were made at DuQuoin Packing Company, DuQuoin, Illinois; 1970–1976 were made at Hunter Packing Company, East St. Louis, Illinois; 1976–1978 were made at Swift Fresh Meats Company, East St. Louis, Illinois.
farmers. Since 1970, we have occasionally attempted to collect parasites from DuQuoin Packing Company but without success. We believe the worms still occur locally but in much smaller numbers than formerly. This may be the same trend Drs. Todd and Cain have observed and reflect conditions for the Midwest generally. If that is true, investigators may soon be required to go south of the Mason-Dixon Line to obtain adequate quantities of live worms.

Animal husbandry of pigs in this area has gradually changed during the last two decades. Pigs are presently seldom allowed on the ground and therefore are not exposed to intermediate stages of this parasite. We are unable to explain why results of this shift in farm management practices appear in our data between 1966 and 1970 (Fig. 1). The dramatic increase in the number of infections observed in 1970 can only be attributed to the change in location of collection and to the much larger number of animals obtained from Missouri and Arkansas, which are processed by East St. Louis plants. While the packer has records containing the origin of all animals processed, we have not routinely collected these data.

Figures 2 and 3 compare infection rates at DuQuoin Packing Company in 1965 with those at Hunter Packing Company in 1975. The data show a difference in infection rate between the two sites; however, the rate does not have a seasonal
fluctuation as we expected. We thought that it was more difficult to get worms in the spring of the year but this "feeling" was not substantiated by our data.

These data do not show the intensity of infections or weight of worms per host. We have found as few as one worm and just recently as many as 232 (125 males, 107 females) in a single host. According to Kates (1944), an infection may last for ten months or longer, and since these pigs are normally marketed between 5.5 and 6 months of age, any infection prior to marketing should still be in the pig.

The stability of the population of infected pigs seems to suggest the following. Most commercial hog raisers use practices that preclude infections, whereas the small farmer who markets less than 30 animals at a time is more likely to let his animals run in the field where they may become infected. These animals form a reservoir of infections, albeit in a small number of the total hogs marketed. These "sales" hogs, so called because they are sold to a buyer at a local auction who in turn will sell them to the meat packer, are much more likely to be infected. This lot or group of hogs will be processed together so that when one infection is detected, it is usually followed by several others.

We have also noted that the chances of finding *M. hirudinaceus* are much better when the pigs contain ascaris infections. This probably reflects health care practices of a given producer which, together with his confinement practices, determine the probability of infections. Drug therapy against acanthocephalans will also improve. As it does, it will become increasingly difficult to obtain living material to study.

**Literature Cited**


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**Obituary Notice**

**THOMAS WRIGHT MOIR CAMERON**

29 April 1894–1 January 1980

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