2005

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Research Note

Metazoan Parasites of Young-of-the-Year Paddlefish from Lewis and Clark Lake, Nebraska, U.S.A.

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ABSTRACT: Young-of-the-year paddlefish, Polyodon spathula (Polyodontidae), from Lewis and Clark Lake, an impoundment of the Missouri River in Nebraska, U.S.A., were surveyed for parasites. In 2001 and 2002, 28 and 48 fish were examined for parasites, respectively. Only the nematode Rhabdochona decaturensis infected fish collected in 2001, but 8 parasite taxa (R. decaturensis, Spinitectus sp., Camallanus sp., Contracaecum sp., Marsipometra sp., Diclybothrium hamulatum, Ergasilus elongatus, and 1 unidentified leech) infected fish collected in 2002. Rhabdochona decaturensis was the most common parasite, occurring in 21.4% of fish in 2001 and 79.2% of fish in 2002. Prevalence of other parasite species infecting fish from 2002 was 33% or less. The helminth community of young-of-the-year paddlefish in both years was dominated by nematodes. This study is the first report on parasites of young-of-the-year paddlefish and documents a new host record for R. decaturensis.

KEY WORDS: Polyodon spathula, paddlefish, parasites, Camallanus, Contracaecum, Diclybothrium hamulatum, Ergasilus elongatus, Hirudinea, Marsipometra, Piscicolidae, Rhabdochona decaturensis, Spinitectus, Lewis and Clark Lake, Missouri River, Nebraska, United States.

The paddlefish, Polyodon spathula (Walbaum, 1792), is among the most ancient species of freshwater bony fishes in the United States, and occurs in large rivers of the Mississippi River drainage (Bemis et al., 1997). Although adult paddlefish have been the subject of considerable parasite surveys (Linton, 1898; Cooper, 1918; Pearse, 1924; Simer, 1929, 1930; Meyer, 1940; Bangham and Venard, 1942; Wilson, 1956; Causey, 1957; Meyer, 1960: unpublished thesis, Iowa State University, Ames, Iowa; Hugghins, 1972; Schmidt et al., 1974; Lockard and Parsons, 1975; Suppes and Meyer, 1975; Raikova et al., 1979; Robinson and Jahn, 1980; Miyazaki et al., 1988; Holloway et al., 1991), there is no published survey of parasites of young-of-the-year paddlefish. This study reports the parasites of young-of-the-year paddlefish from Lewis and Clark Lake, Nebraska, U.S.A., and briefly characterizes their helminth community.

Lewis and Clark Lake is an impoundment of the Missouri River on the border of Nebraska and South Dakota, U.S.A., measuring ca. 40 by 4 km with a maximum depth of ca. 17 m. Young-of-the-year paddlefish were collected from this lake, using a 7.9-m (headrope) semiballoon otter trawl fished on the bottom of the old river channel (42°50'5"N; 97°34'2"W). Collections were made weekly 5–19 July 2001 and 26 June–24 July 2002. (In 2002, only 5 fish were collected in June: 48 were collected in July.) Fish were fixed in 10% formalin for 2 mo and stored in 70% alcohol.

On necropsy, the entire fish was examined for parasites. Monogenean and copepod prevalences reported in this study may differ from those found on fish examined at fresh necropsy but still represent minimum prevalence values for monogenean and copepod infections on young-of-the-year paddlefish in Lewis and Clark Lake. Parasites were processed using conventional parasitological techniques. Voucher specimens have been deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland as follows: Rhabdochona decaturensis Gustafson, 1949 (USNPC 096440); Diclybothrium hamulatum Simer, 1929 (Price, 1942) (USNPC 096441); and Ergasilus elongatus Wilson, 1916 (USNPC 096439). Specimens of the remaining species are retained by the senior author (B.M.P.).

Use of prevalence, mean intensity, and mean abundance is consistent with that recommended by Bush et al. (1997). Species richness is the number of parasite species in an examined fish. Values for Brillouin’s index for use in diversity and evenness (Pielou, 1975; Magurran, 1988) and Simpson’s dominance were calculated using common logarithms for all parasites irrespective of their sites of infection. Only prevalence was recorded for monogeneans and copepods, and they are not included in diversity, evenness, and dominance values. Values are reported as mean ± SD

3 Corresponding author.
Piscicolidae gen. sp.
Ergasilus elongatus
sp.
Rhabdochona
Rhabdochona
sp.
Contracaecum
sp.
Camallanus
sp.

E. elongatus
leech; and 1 copepod,
recorded in 2001. Gonads were not well developed,
infected with a parasite to the maximum fish length
from the minimum length of fish from either year
years in fish of similar length (75–108 mm) ranging
length of 48 fish sampled was 93.5 mm
In 2001, the mean length of 28 fish sampled was 67.9
mean eye-to-fork length (Ruelle and Hudson, 1977).
appropriate.
followed parenthetically by range values where
appropriate.

Paddlefish length measurements are reported as
mean eye-to-fork length (Ruelle and Hudson, 1977).
In 2001, the mean length of 28 fish sampled was 67.9
mm ± 24.5 (35–108 mm), and in 2002, the mean
length of 48 fish sampled was 93.5 mm ± 27.7 (28–
135 mm). Paddlefish in the 2002 sample were signifi-
cantly longer than those in the 2001 sample (Student’s
t-test, t = −4.3, P < 0.001, 74 df). Because fish length
between years was significantly different, species
richness, prevalence, mean intensity, and mean abun-
dance of R. decaturensis were compared between
years in fish of similar length (75–108 mm) ranging
from the minimum length of fish from either year
infected with a parasite to the maximum fish length
recorded in 2001. Gonads were not well developed,
and sex could not be determined for most fish.
Paddlefish examined in 2001 were infected only
with R. decaturensis, whereas fish from 2002 were
infected with 8 parasite taxa including 1 monogenean,
D. hamulatum; 1 cestode, Marsipometra sp.; 4 nema-
todes, R. decaturensis, Camallanus sp., Contra-
taceum sp., and Spinitectus sp.; 1 species of piscicolid
leech; and 1 copepod, E. elongatus (Table 1). No
gravid parasites were found in the paddlefish collected
in 2001, but gravid individuals of D. hamulatum,
Marsipometra sp., R. decaturensis, and E. elongatus
occurred in paddlefish collected in 2002.
Mean parasite species richness for 2001 and 2002
was 0.2 ± 0.4 and 1.7 ± 1.3, respectively. Mean

Table 1. Prevalence, mean abundance, and mean
intensity of parasites in young-of-the-year paddlefish,
Polyodon spathula, from Lewis and Clark Lake,
Nebraska, U.S.A.*

<table>
<thead>
<tr>
<th>Parasite</th>
<th>Prevalence (%)</th>
<th>Mean abundance ± SD</th>
<th>Mean intensity ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dicolybothrium hamulatum†</td>
<td>12.5</td>
<td>0.3 ± 0.7</td>
<td>2.0 ± 1.1</td>
</tr>
<tr>
<td>Marsipometra sp.†</td>
<td>6.3</td>
<td>0.1 ± 0.2</td>
<td>1.0 ± 0.0</td>
</tr>
<tr>
<td>Camallanus sp.‡</td>
<td>8.3</td>
<td>0.1 ± 0.3</td>
<td>1.0 ± 0.0</td>
</tr>
<tr>
<td>Contracaeum sp.‡</td>
<td>14.6</td>
<td>0.2 ± 0.4</td>
<td>1.1 ± 0.4</td>
</tr>
<tr>
<td>Rhabdochona decaturensis†</td>
<td>21.4</td>
<td>0.6 ± 1.6</td>
<td>2.7 ± 2.7</td>
</tr>
<tr>
<td>Rhabdochona decaturensis‡</td>
<td>79.2</td>
<td>10.0 ± 13.7</td>
<td>12.6 ± 14.2</td>
</tr>
<tr>
<td>Spinitectus sp.‡</td>
<td>33.3</td>
<td>0.5 ± 0.9</td>
<td>1.6 ± 0.9</td>
</tr>
<tr>
<td>Ergasilus elongatus‡</td>
<td>8.3</td>
<td>0.1 ± 9.9</td>
<td>18.0 ± 33.3</td>
</tr>
<tr>
<td>Piscicolidae gen. sp.†</td>
<td>2.1</td>
<td>&lt;0.1 ± 0.2</td>
<td>2.0 ± 0.0</td>
</tr>
</tbody>
</table>

* Values from fish collected in 2001. All other values from fish
collected in 2002.
† Gravid adults.
‡ Immatures.

species richness values were significantly different
between years overall (Student’s t-test on natural log-
transformed data, P < 0.001, 74 df) and between
years for fish of similar length (Student’s t-test on
square-root transformed data, P < 0.001, 49 df).
Prevalence (χ² = 22.3, P < 0.001, 1 df), natural log-
transformed mean abundance (Student’s t-test, P <
0.001, 74 df), and natural log-transformed intensity
(Student’s t-test, P = 0.012, 42 df) of R. decaturensis
were significantly higher in 2002 than in 2001 over-
all, but in fish of similar size, there was no significant
difference in prevalence (χ², P = 0.05, 1 df), natural
log-transformed mean abundance (Student’s t-test,
P > 0.05, 25 df), or natural log-transformed mean
intensity (Student’s t-test, P > 0.05, 32 df) between
years. Intensity of R. decaturensis and fish length
were significantly correlated in 2002 (Spearman’s
rank correlation, r = 0.53, P < 0.05) but not in 2001
(Spearman’s rank correlation, P > 0.05).

With the exception of Rhabdochona, all parasite
genera reported in this study are previously known
from adult paddlefish. The paddlefish is a new host
record for R. decaturensis. Spinitectus sp. infecting
paddlefish in the literature. Individuals of Spinitectus sp. found in this study were
immature females.

Several factors including diet and fish age and size
may be contributing to the between year differences in
prevalence, intensity, and abundance of R. decatu-
rensis and also to the between-year difference in
parasite species richness values. For the first months
of life, young-of-the-year paddlefish prey on a variety
of macroinvertebrates such as Daphnia and Hexage-
nia spp. (Michaletz et al., 1982). As fish become
older, they eat a wider variety of food items and filter
feed on planktonic crustaceans such as copepods
(Meyer, 1960: unpublished thesis, Iowa State Univer-
sity, Ames, Iowa; Ruelle and Hudson, 1977). Al-
though the precise age of each fish was not determined
in this study, it follows that the overall larger fish
collected in 2002 were older, had a more diverse diet,
and ate greater quantities of food than the overall
smaller fish collected in 2001. Thus, the fish sam-
ples in 2002 were probably exposed to both a greater
diversity and absolute number of potential interme-
diate hosts.

Overall prevalence of young-of-the-year paddlefish
from Lewis and Clark Lake in 2001 and 2002 was
21.4% and 85.4%, respectively. The internal helminth
community in both years was dominated by nema-
todes. Among fish collected in 2002, there was a significant correlation between parasite species richness and fish length (Spearman’s rank correlation, $r_s = 0.66, P < 0.05$). The mean diversity, evenness, dominance, and species richness values for the internal parasites of infected paddlefish collected in 2002 were $0.075 \pm 0.129, 0.202 \pm 0.260, 0.846 \pm 0.253$, and $1.7 \pm 1.3$, respectively. High relative intensities of *R. decaturensis* produced these high dominance, low diversity, and low evenness values.

We thank Kirk Steffensen, Jason Skold, David Tsoodle, Steve Freeling, Ken Hatten, Clint Williams, Austin Budden, and Jake Charvat, Nebraska Game and Parks Commission, for their assistance in the field.

**LITERATURE CITED**


