

1983

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GEOGRAPHICAL DISTRIBUTION OF ACANTHOCEPHALA IN NEBRASKA FISHES

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Examination of more than 2,700 fishes from 71 sites throughout Nebraska revealed the presence of nine species of Acanthocephala: *Leptorhynchoides thecatus*, *Neoechinorhynchus cristatus*, *N. cylindricus*, *N. prolixus*, *N. rutili*, *Octospinifer macilentus*, *Paulisentis missouriensis*, *Pomphorhynchus bulbocolli*, and *Tanaorhamphus longirostris*. Fishes from the reservoir at the state recreation area at Atkinson were more frequently parasitized by Acanthocephala than those from any other site. At that reservoir fishes harbored four of the nine species known from the state. In general, fishes in lakes of the Sand Hills were more frequently and densely parasitized by Acanthocephala than those in other regions.

† † †

Between April 1971 and August 1974, 2,425 fishes from 71 sites in Nebraska were surveyed for Acanthocephala. The report of that survey (Samuel et al., 1976) did not record the fishes examined or the prevalence of infection at each site. In subsequent years further information regarding parasitism at these sites has accumulated from examination of another 279 fishes, but no additional acanthocephalan species has been found. Because it is often desirable to know the distribution of parasites within a single community, the original data of Samuel et al. (1976), supplemented with results of recent studies, are presented here for each of 71 sample sites across Nebraska.

MATERIALS AND METHODS

Fishes were collected at 71 sites (Fig. 1) representing the reservoirs, lakes, rivers, and streams of Nebraska. The sites, numbered according to their designation in Figure 1, are

(1) Missouri River at Brownville, (2) Little Nemaha River 1 km E of Auburn, (3) Easley Creek, (4) Burchard Lake, (5) Big Blue River at Holmesville, (6) Cub Creek 8 km S of Plymouth, (7) Turkey Creek 5 km SW of Dorchester, (8) Turkey Creek at Pleasant Dale, (9) Big Blue River at Beaver Crossing, (10) Dry Creek 3 km SE of Hebron, (11) Republican River at Guide Rock, (12) Elm Creek, (13) Republican River at Red Cloud, (14) Little Blue River, (15) Plum Creek at Seward, (16) Bluestem Lake, (17) Stagecoach Lake, (18) Wagon Train Lake, (19) Yankee Hill Lake, (20) Conestoga Lake, (21) Pawnee Lake, (22) Branched Oak Lake, (23) Missouri River at Nebraska City, (24) Salt Creek at Ashland, (25) Platte River at Louisville, (26) Missouri River at Blair, (27) Platte River at Fremont, (28) Platte River at Columbus, (29) Loup River at Genoa, (30) Elkhorn River at Scribner, (31) Elkhorn River at Norfolk, (32) Logan Creek at Wakefield, (33) Pearl Creek 8 km S of Hartington, (34) Missouri River at U.S. Highway 81, (35) Niobrara River at Spencer Dam, (36) Elkhorn River at O'Neill, (37) Cedar River, (38) Sherman Reservoir, (39) Atkinson Lake, (40) Bone Creek 3 km S of Ainsworth, (41) Holt Creek 8 km NW of Springview, (42) Niobrara River at Valentine, (43) Big Alkali Lake, (44) Clear Lake, (45) Dewey Lake, (46) West Long Lake, (47) Merritt Reservoir, (48) Minnechaduzza Creek at Crookston, (49) Bear Creek at Merriman, (50) Middle Loup River 16 km N of Whitman, (51) Middle Loup River 16 km NW of Mullen, (52) Unnamed stream at Callaway, (53) Maloney Reservoir, (54) Interstate-80 sand pits at Cozad, (55) Johnson Reservoir, (56) Harlan County Reservoir, (57) Beaver Creek 1 km E of Beaver City, (58) Red Willow Reservoir, (59) Swanson Reservoir, (60) Enders Reservoir, (61) Lake McConaughy, (62) Crane Lake, (63) Island Lake, (64) Nine Mile Creek, (65) Alliance drainage creek, (66) Winter Creek, (67) Lake Minatare, (68) Box Butte Reservoir, (69) Soldiers Creek at Fort Robinson, (70) White River at Whitney, and (71) Bordeaux Creek 16 km W of Chadron.

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Sampling methods and treatment of parasites were as described by Samuel et al. (1976). Description and comments regarding the acanthocephalan species are also found in that report. Representative specimens are deposited in the Manter Laboratory of Parasitology of the University of Nebraska State Museum. Accession numbers are as follow: *Leptorhynchoides thecatus* 20054–20055, *Neoechinorhynchus cristatus* 20062, *N. cylindricus* 20041–20051, *N. prolixus* 20052–20053, *N. rutili* 20061, *Octospinifer macilentus* 20060, *Paulisentis missouriensis* 20059, *Pomphorhynchus bulbocolli* 20057–20058, and *Tanaorhamphus longirostris* 20056.

RESULTS

Nine species of Acanthocephala are known to occur in fishes of Nebraska: *Leptorhynchoides thecatus* (Linton, 1891) Kostylew, 1924 (Figs. 15 and 16); *Neoechinorhynchus cristatus* Lynch, 1936 (Figs. 2 and 3); *N. cylindricus* (Van Cleave, 1913) Van Cleave, 1919 (Figs. 13 and 14); *N. prolixus* Van Cleave and Timmons, 1952 (Figs. 17 and 18); *N. rutili* Müller, 1780) Hamann, 1892 (Figs. 4 and 5); *Octospinifer macilentus* Van Cleave, 1919 (Figs. 6 and 7); *Paulisentis missouriensis* Keppner, 1974 (Figs. 19 and 20); *Pomphorhynchus bulbocolli* Linkins in Van Cleave, 1919 (Figs. 8 and 9); and *Tanaorhamphus longirostris* (Van Cleave, 1913) Ward, 1917 (Figs. 10–12). Table I details their distribution among fishes at each of the sites (Fig. 1). Because fishes were examined at different times and for different purposes, comparable data are not always available at each site.

DISCUSSION

The prevalence of acanthocephalans in fishes was higher at Atkinson Lake (site 39) than at any other sampling site. The reservoir at Atkinson is ideal for acanthocephalans because it is a small (ca 8 ha), shallow, alkaline, eutrophic lake where zooplankton abounds. Abundance of zooplankton promotes acanthocephaliasis because microcrustaceans are the principal intermediate hosts for the species that occur in aquatic vertebrates. Most of the lakes in the Sand Hills are nearly as suitable as Atkinson Lake, and infection rates at these sites were also high. Compared to these localities, fishes at other Nebraska sites were infrequently parasitized by acanthocephalans.

In general very few acanthocephalans have been reported from Nebraska's contiguous states. No species has been reported from fishes of Colorado. Four species have been recorded from fishes in Iowa: *Leptorhynchoides thecatus* by Van Cleave (1920), Lincicome and Van Cleave (1949), Meyer (1958) and Barnhart et al. (1976); *Neoechinorhynchus cylindricus* by Barnhart et al. (1976); *N. prolixus* by Barnhart et al. (1976) and *Pomphorhynchus bulbocolli* by Barnhart et al. (1976). Each of these species occurs also in Nebraska. Five species are known from fishes of Kansas: *Acanthocephalus dirus* was recorded there by Gash et al. (1973); *L. thecatus* by Gash et al. (1973), and Gash and Gash (1973); *N. strigosus* by Gash et al. (1973); and *P. bulbocolli* by Harms (1959 and 1960). Of these species only *A. dirus* and *N. strigosus* were not discovered also in Nebraska. Only *Paulisentis missouriensis* has

(Cont. p. 48)

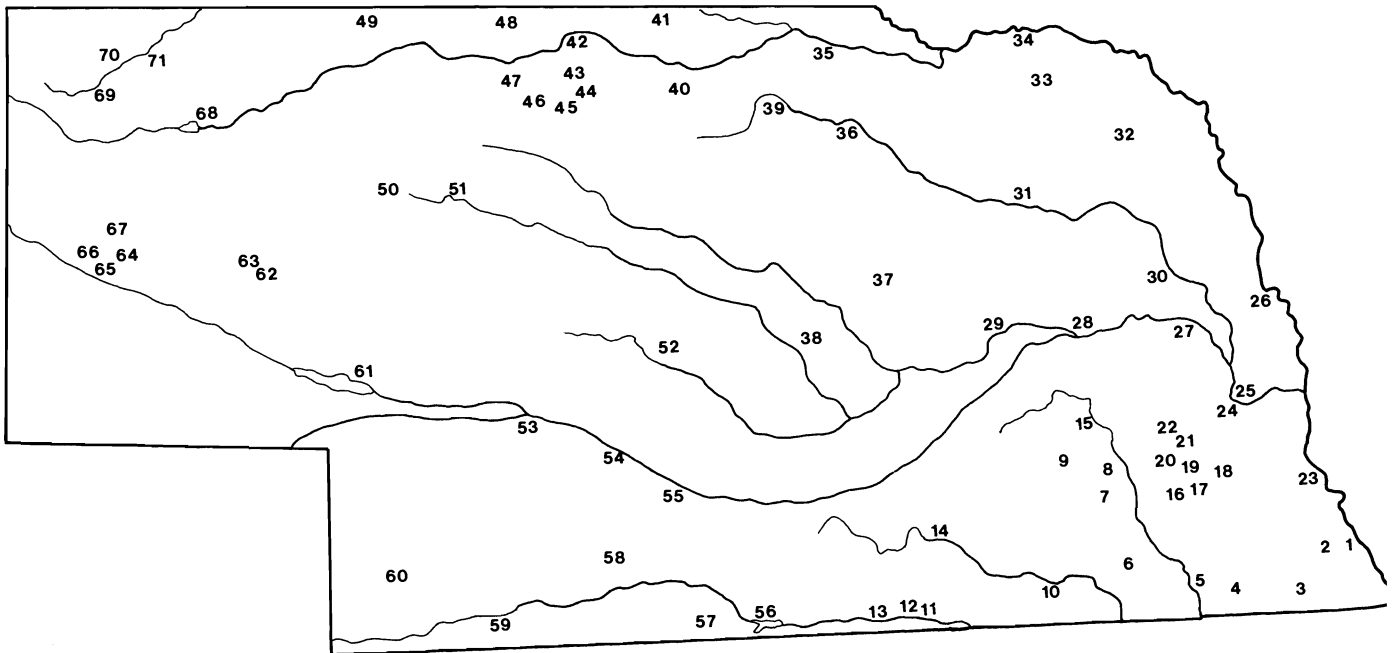


FIGURE 1. Collection sites for fishes.

TABLE I. Geographical distribution of Acanthocephala in fishes of Nebraska.

Fish Acanthocephalan	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
ALLIANCE DRAINAGE CREEK (65)						
<i>Salmo gairdneri</i>		8	0			May
ATKINSON LAKE (39)						
<i>Carpiodes carpio</i>		13	2			Sept.
<i>Pomphorhynchus bulbocolli</i>			2	1	1	Sept.
<i>Catostomus commersoni</i>		18	8			Aug., Sept., Oct.
<i>Neoechinorhynchus cristatus</i>			7	2-40	1	Aug., Sept.
<i>P. bulbocolli</i>			6	1-2	1	Aug., Sept., Oct.
<i>Cyprinus carpio</i>		18	15			Aug., Sept., Oct.
<i>P. bulbocolli</i>			12	1-90	1	Aug., Sept.
<i>P. bulbocolli</i>			2	1-2	2	Aug.
<i>P. bulbocolli</i>			1	8	3	Aug.
<i>Esox lucius</i>		12	7			July, Aug., Sept., Oct.
<i>Leptorhynchoides thecatus</i>			6	1-3	1	July, Aug., Sept., Oct.
<i>Neoechinorhynchus cylindratus</i>			6	1-4	1	Aug., Sept., Oct.
<i>E. vermiculatus</i>		4	2			Sept., Oct.
<i>L. thecatus</i>			1	1	1	Sept.
<i>N. cylindratus</i>			1	3	1	Sept.
<i>Ictalurus melas</i>		7	5			July, Sept.
<i>L. thecatus</i>			3	1-7	3	July
<i>N. cylindratus</i>			2	1-15	2	Sept.
<i>P. bulbocolli</i>			3	1-5	3	July
<i>I. natalis</i>		1	1			July
<i>L. thecatus</i>			1	6	1	July
<i>P. bulbocolli</i>			1	1	2	July
<i>I. punctatus</i>		2	2			Aug.
<i>P. bulbocolli</i>			2	3-6	1	Aug.
<i>Lepomis cyanellus</i>		25	23			July, Sept., Oct.
<i>L. thecatus</i>			19	3-15	1	July, Sept., Oct.
<i>L. thecatus</i>			1	4	2	Sept.
<i>L. thecatus</i>			3	4-8	3	Sept.
<i>N. cylindratus</i>			3	2-3	1	Sept.
<i>N. cylindratus</i>			2	2-4	3	Sept.
<i>P. bulbocolli</i>			1	2	2	July
<i>P. bulbocolli</i>			1	2	3	Sept.
<i>L. gibbosus</i>		60	56			July, Aug., Sept., Oct.
<i>L. thecatus</i>			34	1-6	1	July, Aug., Sept., Oct.
<i>L. thecatus</i>			22	3-21	3	Aug., Sept., Oct.
<i>N. cylindratus</i>			8	1-3	1	Aug., Sept.
<i>N. cylindratus</i>			2	2-3	2	Aug., Sept.
<i>N. cylindratus</i>			7	2-5	3	Aug., Sept., Oct.
<i>P. bulbocolli</i>			1	3	1	Sept.
<i>P. bulbocolli</i>			10	1-5	2	Sept.
<i>L. macrochirus</i>		18	8			July, Aug., Sept.
<i>L. thecatus</i>			8	1-3	1	July, Aug., Sept.
<i>N. cylindratus</i>			1	1	2	July

TABLE I. Continued.

Fish	Locality*		No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month‡
Acanthocephalan							
<i>P. bulbocolli</i>				1	1	2	July
<i>Micropterus salmoides</i>			37	37			Aug., Sept.
<i>L. thecatus</i>				19	1-6	1	Aug., Sept.
<i>L. thecatus</i>				1	1	2	Aug.
<i>L. thecatus</i>				3	2-5	3	Aug., Sept.
<i>N. cylindratu</i> s				20	1-17	1	Aug., Sept.
<i>Perca flavescens</i>			2	1			Aug.
<i>L. thecatus</i>				1	1	1	Aug.
<i>Pomoxis nigromaculatus</i>			4	2			Aug., Sept.
<i>L. thecatus</i>				2	1	1	Sept.
BEAR CREEK at Merriman (49)							
<i>Esox vermiculatus</i>			1	1			Aug.
<i>P. bulbocolli</i>				1	1	1	Aug.
<i>Rhinichthys cataractae</i>			12	5			May, Aug.
<i>P. bulbocolli</i>				5	2	1	May, Aug.
<i>Semotilus atromaculatus</i>			6	3			Aug.
<i>P. bulbocolli</i>				3	2-5	1	Aug.
BEAVER CREEK 1 km E of Beaver City (57)							
⊕							
BIG ALKALI LAKE (43)							
<i>Cyprinus carpio</i>			4	0			June
<i>Esox lucius</i>			3	0			June
<i>Ictalurus melas</i>			3	0			June
<i>Micropterus salmoides</i>			‡	‡			June
<i>N. cylindratu</i> s				1	‡	1	June
<i>Morone chrysops</i>			3	2			June
<i>L. thecatus</i>				1	2	1	June
<i>N. cylindratu</i> s				2	2-4	1	June
<i>Perca flavescens</i>			1	0			June
BIG BLUE RIVER at Beaver Crossing (9)							
<i>Carpion</i> es <i>carpio</i>			1	0			June
<i>Cyprinus carpio</i>			4	0			June, July
<i>Ictalurus punctatus</i>			5	0			June, July
<i>Pylodictis olivaris</i>			2	0			June, July
BIG BLUE RIVER at Holmesville (5)							
<i>Carpion</i> es <i>carpio</i>			2	0			June
<i>Ictalurus melas</i>			1	0			June
BLUESTEM LAKE (16)							
<i>Esox lucius</i>			1	0			Aug.
<i>Ictalurus punctatus</i>			4	0			Aug.
<i>Lepomis cyanellus</i>			1	1			June

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>N. cylindratus</i>			1	1	1	June
<i>L. macrochirus</i>		124	0			June, July, Aug., Sept.
<i>Micropterus salmoides</i>		20	17			June, Aug., Sept.
<i>N. cylindratus</i>			17	10-99	1	June, Aug.
<i>Notemigonus crysoleucas</i>		1	0			Aug.
<i>Perca flavescens</i>		3	0			Aug.
<i>Pomoxis nigromaculatus</i>		8	0			June, Aug.
BONE CREEK 3 km S of Ainsworth (40)						
<i>Etheostoma exile</i>		‡	0			‡
<i>Fundulus sciadicus</i>		‡	0			‡
<i>Ictalurus melas</i>		‡	0			‡
<i>Notemigonus crysoleucas</i>		‡	0			‡
<i>Phoxinus eos</i>		‡	0			‡
<i>Semotilus margarita</i>		‡	0			‡
BORDEAUX CREEK 16 km W of Chadron (71)						
<i>Salmo trutta</i>		‡	0			‡
BOX BUTTE RESERVOIR (68)						
<i>Esox lucius</i>		13	0			May
<i>Micropterus dolomieu</i>		2	0			May
<i>M. salmoides</i>		1	0			May
<i>Perca flavescens</i>		14	0			May
<i>Salmo trutta</i>		1	0			May
<i>Stizostedion vitreum</i>		15	0			May
BRANCHED OAK LAKE (22)						
<i>Esox lucius</i>		2	2			June, Aug.
<i>N. cylindratus</i>			2	4-8	1	June, Aug.
<i>Ictalurus melas</i>		16	5			Jan., April, Aug.
<i>N. cylindratus</i>			5	1-10	1	Jan., April, Aug.
<i>I. punctatus</i>		6	0			Aug.
<i>Lepomis cyanellus</i>		1	1			April
<i>N. cylindratus</i>			1	6	1	April
<i>L. gibbosus</i>		2	1			April
<i>N. cylindratus</i>			1	5	2	April
<i>L. macrochirus</i>		22	0			Jan., April, June
<i>Micropterus salmoides</i>		20	19			Jan., April, June, Sept.
<i>N. cylindratus</i>			19	8-90	1	‡ Jan., April, June, Sept.
<i>Notemigonus crysoleucas</i>		2	0			June
<i>Perca flavescens</i>		1	0			Aug.
<i>Pomoxis annularis</i>		2	1			April, Sept.
<i>N. cylindratus</i>			1	16	1	April
<i>P. nigromaculatus</i>		5	0			June, Aug.
<i>Stizostedion vitreum</i>		11	1			April, Aug.
<i>N. cylindratus</i>			1	2	1	Aug.

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
BURCHARD LAKE (4)						
<i>Cyprinus carpio</i>		1	0			June
<i>Ictalurus punctatus</i>		5	0			June, July
<i>Lepomis cyanellus</i>		1	0			June
<i>L. macrochirus</i>		14	0			June
<i>Micropterus salmoides</i>		7	0			June, July
<i>Notemigonus crysoleucas</i>		1	0			June
<i>Notropis blennioides</i>		3	0			Nov.
<i>Perca flavescens</i>		10	0			June
<i>Pomoxis nigromaculatus</i>		8	0			June
CEDAR RIVER (37)						
<i>Carpionoxys carpio</i>		±	0			±
<i>C. cyprinus</i>		±	0			±
<i>Fundulus sciadicus</i>		±	0			±
<i>Lepomis macrochirus</i>		±	0			±
<i>Micropterus salmoides</i>		±	0			±
CLEAR LAKE (44)						
<i>Archoplites interruptus</i>		2	0			June
CONESTOGA LAKE (20)						
<i>Pomoxis annularis</i>		4	0			May
<i>P. nigromaculatus</i>		11	0			May
CRANE LAKE (62)						
<i>Esox lucius</i>		9	0			June
<i>Lepomis macrochirus</i>		10	0			June
<i>Micropterus salmoides</i>		1	0			June
<i>Perca flavescens</i>		7	0			June
<i>Pomoxis nigromaculatus</i>		1	0			June
CUB CREEK 8 km S of Plymouth (6)						
<i>Notropis lutrensis</i>		±	0			±
<i>Noturus gyrinus</i>		±	0			±
<i>Pimephales promelas</i>		±	0			±
DEWEY LAKE (45)						
<i>Ambloplites rupestris</i>		1	1			June
<i>N. cylindricus</i>			1	2	1	June
<i>Cyprinus carpio</i>		3	0			June
<i>Esox lucius</i>		15	5			June
<i>N. cylindricus</i>			5	1-2	1	June
<i>Lepomis macrochirus</i>		1	0			June
<i>Micropterus salmoides</i>		1	1			June
<i>L. thecatus</i>			1	1	1	June
<i>N. cylindricus</i>			1	10	1	June

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>Stizostedion vitreum</i>		1	0			June
	DRY CREEK 3 km SE of Hebron (10)					
<i>Notropis dorsalis</i>		‡	0			‡
<i>Semotilus atromaculatus</i>		‡	0			‡
	EASLEY CREEK (3)					
<i>Semotilus atromaculatus</i>		5	5			April, Nov.
<i>Paulisentis missouriensis</i>			5	4-36	1	April, Nov.
	ELKHORN RIVER at Norfolk (31)					
<i>Carpiodes carpio</i>		‡	0			‡
<i>Hybognathus nuchalis</i>		11	0			‡
	ELKHORN RIVER at O'Neill (36)					
<i>Carpiodes carpio</i>		2	0			Aug.
<i>Esox lucius</i>		2	0			Aug.
<i>E. vermiculatus</i>		3	0			Aug.
<i>Ictalurus melas</i>		1	1			Aug.
<i>P. bulbocollis</i>			1	1	1	Aug.
<i>I. natalis</i>		3	0			Aug.
<i>I. punctatus</i>		1	0			Aug.
<i>Lepomis cyanellus</i>		1	0			Aug.
<i>L. gibbosus</i>		1	1			Aug.
<i>L. thecatus</i>			1	2	1	Aug.
<i>L. macrochirus</i>		2	0			Aug.
<i>Noturus flavus</i>		1	0			Aug.
	ELKHORN RIVER at Scribner (30)					
<i>Cyprinus carpio</i>		1	0			July
<i>Ictalurus punctatus</i>		10	0			July
<i>Pylodictis olivaris</i>		1	0			July
	ELM CREEK (12)					
<i>Campostoma anomalum</i>		‡	5			June
<i>Octospinifer macilentus</i>			5	‡	1	June
<i>Catostomus commersoni</i>		‡	2			June
<i>O. macilentus</i>			2	‡	1	June
<i>Semotilus atromaculatus</i>		‡	0			June
	ENDERS RESERVOIR (60)					
<i>Carpiodes carpio</i>		2	0			July
<i>Cyprinus carpio</i>		2	0			July
<i>Dorosoma cepedianum</i>		7	0			June, July
<i>Ictalurus punctatus</i>		7	0			July
<i>Lepomis macrochirus</i>		2	0			June, July
<i>Morone chrysops</i>		13	0			July

TABLE I. Continued.

Fish	Locality*		No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
	Acanthocephalan						
<i>Perca flavescens</i>			3	0			July
<i>Pomoxis annularis</i>			4	0			July
<i>P. nigromaculatus</i>			9	0			July
<i>Stizostedion vitreum</i>			12	0			July
HARLAN COUNTY RESERVOIR (56)							
<i>Aplodinotus grunniens</i>			14	0			June, July
<i>Carpiondes carpio</i>			6	0			June, Aug.
<i>C. cyprinus</i>			2	0			June, Aug.
<i>Cyprinus carpio</i>			10	0			June, July, Aug.
<i>Ictalurus punctatus</i>			19	0			June, July, Aug.
<i>Lepomis cyanellus</i>			1	0			June
<i>L. macrochirus</i>			3	0			June, July
<i>Morone chrysops</i>			5	0			June, July
<i>Notemigonus crysoleucas</i>			2	0			June
<i>Pomoxis annularis</i>			4	0			June, July
<i>Pylodictis olivaris</i>			1	0			June
<i>Stizostedion vitreum</i>			11	0			June, July, Aug.
HOLT CREEK 8 km NW of Springview (41)							
<i>Campostoma anomalum</i>		‡		12			March, May
<i>Paulisentis</i> sp.				12	4-17	1	March, May
<i>Catostomus commersoni</i>		‡		10			May, June
<i>O. macilentus</i>				2	1-7	1	June
<i>P. bulbocolli</i>				9	‡	1	May, June
<i>Etheostoma exile</i>		‡		0			June
<i>Fundulus sciadicus</i>		‡		0			June
<i>Hybognathus hankinsoni</i>		‡		5			May
<i>Neoechinorhynchus rutili</i>				5	2-6	1	May
<i>Ictalurus melas</i>		‡		0			‡
<i>Notropis cornutus</i>		‡		0			‡
<i>N. dorsalis</i>		‡		2			May
<i>N. rutili</i>				2	1	1	May
<i>N. heterolepis</i>		‡		0			‡
<i>Phoxinus eos</i>		‡		0			‡
<i>Pimephales promelas</i>		‡		5			Feb., May
<i>N. cristatus</i>				1	1	1	Feb.
<i>N. rutili</i>				4	2-4	1	May
<i>Rhinichthys cataractae</i>		‡		2			May
<i>N. rutili</i>				2	2-4	1	May
<i>Semotilus atromaculatus</i>		‡		2			May
<i>N. rutili</i>				2	1	1	May
<i>S. margarita</i>		‡		0			‡
INTERSTATE-80 SAND PITS at Cozad (54)							
<i>Ambloplites rupestris</i>			2	0			July
<i>Carpiondes carpio</i>			5	2			July

TABLE I. Continued.

Fish	Locality*		No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
Acanthocephalan							
<i>Tanaorhamphus longirostris</i>				2	1-2	1	July
<i>Catostomus commersoni</i>			2	0			July
<i>Dorosoma cepedianum</i>			2	2			July
<i>T. longirostris</i>				2	1-5	1	July
<i>Ictalurus punctatus</i>			18	3			July
<i>T. longirostris</i>				3	1-3	1	July
<i>Lepomis cyanellus</i>			4	0			July
<i>L. macrochirus</i>			13	0			July
<i>Micropterus dolomieu</i>			4	0			July
<i>M. salmoides</i>			3	1			July
<i>N. cylindratus</i>				1	2	1	July
<i>Morone chrysops</i>			1	0			July
<i>Moxostoma macrolepidotum</i>			1	0			July
<i>Pomoxis annularis</i>			3	0			July
ISLAND LAKE (63)							
<i>Cyprinus carpio</i>			4	0			June
<i>Esox lucius</i>			31	0			June
<i>Lepomis macrochirus</i>			6	0			June
JOHNSON RESERVOIR (55)							
<i>Aplodinotus grunniens</i>			11	0			July
<i>Carpodes carpio</i>			1	0			July
<i>Cyprinus carpio</i>			11	0			July
<i>Ictalurus punctatus</i>			1	0			July
<i>Lepomis cyanellus</i>			1	0			July
<i>L. macrochirus</i>			4	0			July
<i>Morone chrysops</i>			6	4			July
<i>T. longirostris</i>				4	1-3	1	July
<i>Moxostoma macrolepidotum</i>			2	0			July
<i>Perca flavescens</i>			2	0			July
<i>Pomoxis annularis</i>			2	0			July
<i>P. nigromaculatus</i>			2	0			July
<i>Stizostedion vitreum</i>			5	0			July
LAKE MCCONAUGHY (61)							
<i>Carpodes carpio</i>			10	6			March, June, July, Oct.
<i>Neoechinorhynchus prolixus</i>				5	1-9	1	March, June, July
<i>P. bulbocolli</i>				1	1	1	July
<i>C. cyprinus</i>			26	24			March, June
<i>N. prolixus</i>				24	1-39	1	March, June
<i>Catostomus catostomus</i>			5	0			March, June, July
<i>C. commersoni</i>			29	0			March, June, July
<i>Cyprinus carpio</i>			31	0			June, July, Oct.
<i>Dorosoma cepedianum</i>			5	0			March, June
<i>Esox lucius</i>			2	0			March, June
<i>Ictalurus melas</i>			7	0			June
<i>I. punctatus</i>			17	0			June, July

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
	Acanthocephalan					
<i>Micropterus dolomieu</i>		20	0			June
<i>Morone chrysops</i>		18	0			June, July, Oct.
<i>M. saxatilis</i>		2	0			March
<i>Moxostoma macrolepidotum</i>		11	0			March, June, Oct.
<i>Perca flavescens</i>		54	0			June
<i>Salmo gairdneri</i>		21	0			March, July, Oct.
<i>Stizostedion vitreum</i>		15	0			June
LAKE MINATARE (67)						
<i>Carpiodes cyprinus</i>		4	0			May
<i>Catostomus commersoni</i>		2	0			May
<i>C. catostomus</i>		1	0			May
<i>Cyprinus carpio</i>		7	0			May
<i>Dorosoma cepedianum</i>		3	0			May
<i>Ictalurus melas</i>		2	0			May
<i>Micropterus salmoides</i>		1	0			May
<i>Morone chrysops</i>		3	0			May
<i>Perca flavescens</i>		8	0			May
<i>Pomoxis nigromaculatus</i>		18	0			May
<i>Stizostedion vitreum</i>		15	0			May
LITTLE BLUE RIVER (14)						
<i>Cyprinus carpio</i>		2	0			July
<i>Ictalurus punctatus</i>		8	0			July
<i>Pylodictis olivaris</i>		4	0			July
LITTLE NEMAHA RIVER 1 km E of Auburn (2)						
⊕						
LOGAN CREEK at Wakefield (32)						
<i>Hybopsis gracilis</i>		5	0			‡
LOUP RIVER at Genoa (29)						
<i>Cyprinus carpio</i>		1	0			June
<i>Ictalurus punctatus</i>		9	0			June
MALONEY RESERVOIR (53)						
<i>Aplodinotus grunniens</i>		6	0			July
<i>Carpiodes carpio</i>		2	0			July
<i>Catostomus catostomus</i>		2	0			July
<i>Cyprinus carpio</i>		1	0			July
<i>Ictalurus melas</i>		1	0			July
<i>I. punctatus</i>		14	0			July
<i>Lepomis macrochirus</i>		3	0			July
<i>Micropterus dolomieu</i>		2	0			July
<i>M. salmoides</i>		3	0			July
<i>Morone chrysops</i>		11	0			June, July

TABLE I. Continued.

Fish Acanthocephalan	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>Moxostoma macrolepidotum</i>		3	0			July
<i>Perca flavescens</i>		7	0			June, July
<i>Pomoxis annularis</i>		6	0			July
<i>P. nigromaculatus</i>		8	0			July
<i>Stizostedion vitreum</i>		4	0			June, July
MERRITT RESERVOIR (47)						
<i>Ictalurus melas</i>		11	3			June
<i>N. cylindricus</i>			3	2-4	2	June
<i>Lepomis cyanellus</i>		3	1			June
<i>N. cylindricus</i>			1	1	1	June
<i>L. gibbosus</i>		5	0			June
<i>L. macrochirus</i>		4	0			June
<i>Micropterus dolomieu</i>		2	2			June
<i>N. cylindricus</i>			2	1-897	1	June
<i>M. salmoides</i>		2	2			June
<i>N. cylindricus</i>			2	927-975	1	June
<i>Morone chrysops</i>		4	0			June
<i>Perca flavescens</i>		1	0			June
<i>Pomoxis nigromaculatus</i>		10	0			June
<i>Salmo gairdneri</i>		4	0			June
<i>Stizostedion vitreum</i>		12	0			June
MIDDLE LOUP RIVER 16 km NW of Mullen (51)						
<i>Rhinichthys cataractae</i>		±	0			±
MIDDLE LOUP RIVER 16 km N of Whitman (50)						
<i>Hybognathus hankinsoni</i>		±	0			±
<i>Fundulus sciadicus</i>		±	0			±
MINNECHADUZA CREEK at Crookston (48)						
<i>Catostomus commersoni</i>		4	2			May, Aug.
<i>P. bulbocolli</i>			2	1-3	1	May, Aug.
<i>Notropis dorsalis</i>		3	0			Aug.
<i>Rhinichthys cataractae</i>		7	0			Aug.
<i>Semotilus atromaculatus</i>		4	0			Aug.
MISSOURI RIVER at Blair (26)						
<i>Aplodinotus grunniens</i>		3	0			June, Nov.
<i>Carpoides carpio</i>		8	4			June, Oct.
<i>N. prolixus</i>			4	1-7	1	June, Oct.
<i>Cycleptus elongatus</i>		1	0			June
<i>Cyprinus carpio</i>		13	2			June, Nov.
<i>P. bulbocolli</i>			2	1-21	1	June
<i>Dorosoma cepedianum</i>		6	0			June, Oct.
<i>Hiodon alosoides</i>		11	0			June, Nov.
<i>Ictiobus bubalus</i>		1	0			June

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
	Acanthocephalan					
<i>I. cyprinellus</i>		2	0			Oct.
<i>Lepisosteus platostomus</i>		1	0			Oct.
<i>Pomoxis nigromaculatus</i>		1	0			June
<i>Pylodictis olivaris</i>		2	0			June
<i>Stizostedion canadense</i>		3	0			June
MISSOURI RIVER at Brownville (1)						
<i>Aplodinotus grunniens</i>		6	0			Oct.
<i>Carpiodes carpio</i>		10	0			Sept., Oct.
<i>Dorosoma cepedianum</i>		13	0			Sept., Oct.
<i>Ictalurus punctatus</i>		1	0			Oct.
<i>Ictiobus cyprinellus</i>		5	0			Sept., Oct.
<i>Lepisosteus osseus</i>		1	0			Oct.
<i>Moxostoma macrolepidotum</i>		4	0			Oct.
<i>Stizostedion canadense</i>		3	0			Oct.
MISSOURI RIVER at Nebraska City (23)						
<i>Aplodinotus grunniens</i>		2	0			July
<i>Cyprinus carpio</i>		6	0			July
<i>Esox lucius</i>		1	0			July
<i>Ictiobus bubalus</i>		1	0			July
<i>Pomoxis annularis</i>		3	0			July
<i>Pylodictis olivaris</i>		9	0			July
MISSOURI RIVER at U.S. Highway 81 (34)						
<i>Anguilla rostrata</i>		1	0			July
<i>Aplodinotus grunniens</i>		3	0			July
<i>Carpiodes carpio</i>		2	2			July
<i>N. prolixus</i>			2	1-4	1	July
<i>C. cyprinus</i>		2	1			July
<i>N. prolixus</i>			1	27	1	July
<i>Cycleptus elongatus</i>		1	0			July
<i>Cyprinus carpio</i>		5	0			July
<i>Dorosoma cepedianum</i>		1	0			July
<i>Esox lucius</i>		1	0			July
<i>Ictalurus punctatus</i>		3	0			July
<i>Ictiobus bubalus</i>		1	0			July
<i>I. cyprinellus</i>		5	0			July
<i>Lepisosteus platostomus</i>		2	0			July
<i>Lota lota</i>		3	0			July
<i>Morone chrysops</i>		10	1			July
Unidentified acanthocephalan			1	1	1	July
<i>Moxostoma macrolepidotum</i>		1	0			July
<i>Polyodon spathula</i>		4	0			July
<i>Stizostedion canadense</i>		1	0			July
<i>S. vitreum</i>		3	0			July

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
NINE MILE CREEK (64)						
<i>Salmo gairdneri</i>		5	0			May
<i>S. trutta</i>		1	0			May
NIOBRARA RIVER at Spencer Dam (35)						
<i>Carpiodes carpio</i>		1	0			Aug.
<i>C. cyprinus</i>		1	0			Aug.
<i>Cyprinus carpio</i>		8	3			Aug.
<i>P. bulbocolli</i>			3	1	1	Aug.
<i>Hybopsis gracilis</i>		5	0			Aug.
<i>Ictalurus punctatus</i>		5	0			Aug.
<i>Lepomis cyanellus</i>		1	0			Aug.
<i>L. macrochirus</i>		1	0			Aug.
<i>Micropterus salmoides</i>		‡	‡			Aug.
<i>L. thecatus</i>			‡	‡	1	Aug.
<i>N. cylindratus</i>			‡	‡	1	Aug.
<i>Pomoxis annularis</i>		1	0			Aug.
<i>P. nigromaculatus</i>		1	0			Aug.
<i>Stizostedion canadense</i>		2	0			Aug.
<i>S. vitreum</i>		1	0			Aug.
NIOBRARA RIVER at Valentine (42)						
<i>Ambloplites rupestris</i>		1	0			Aug.
<i>Carpiodes carpio</i>		2	0			Aug.
<i>Catostomus commersoni</i>		3	1			Aug.
<i>P. bulbocolli</i>			1	3	1	Aug.
<i>Cyprinus carpio</i>		1	1			Aug.
<i>P. bulbocolli</i>			1	3	1	Aug.
<i>Esox vermiculatus</i>		2	0			Aug.
<i>Hybopsis gracilis</i>		6	2			Aug.
<i>P. bulbocolli</i>			2	1-3	1	Aug.
<i>Ictalurus punctatus</i>		2	1			Aug.
<i>N. cylindratus</i>			1	1	1	Aug.
<i>Micropterus salmoides</i>		3	1			Aug.
<i>N. cylindratus</i>			1	‡	1	Aug.
<i>Moxostoma macrolepidotum</i>		2	0			Aug.
<i>Pomoxis nigromaculatus</i>		1	0			Aug.
<i>Semotilus atromaculatus</i>		2	0			Aug.
PAWNEE LAKE (21)						
<i>Carpiodes carpio</i>		7	1			‡ Jan.
<i>N. prolixus</i>			1	1	1	Jan.
<i>Cyprinus carpio</i>		2	0			March
<i>Dorosoma cepedianum</i>		40	23			Jan., March, April, May, Oct.
<i>T. longirostris</i>			23	1-14	1	Jan., March, April, May, Oct.

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>Esox lucius</i>		2	0			April, May
<i>Ictalurus melas</i>		7	0			April, June
<i>I. punctatus</i>		10	0			May, Aug.
<i>Lepomis cyanellus</i>		23	0			March, April, May, Oc
<i>L. gibbosus</i>		1	0			March
<i>L. macrochirus</i>		36	0			March, April, June, Aug., Sept.
<i>Micropterus salmoides</i>		15	0			June, Aug.
<i>Notemigonus crysoleucas</i>		2	0			May
<i>Notropis blennioides</i>		4	0			April
<i>Noturus flavus</i>		4	0			June
<i>Pomoxis annularis</i>		1	0			May
<i>P. nigromaculatus</i>		49	0			March, April, June Aug., Sept., Oct.
<i>Stizostedion vitreum</i>		7	0			Aug., Sept.
PEARL CREEK 8 km S of Hartington (33)						
⊕						
PLATTE RIVER at Columbus (28)						
<i>Carpionotus cyprinus</i>		3	0			Sept.
<i>Cyprinus carpio</i>		16	0			June, Sept.
<i>Dorosoma cepedianum</i>		3	0			Sept.
<i>Ictalurus punctatus</i>		7	0			June, Sept.
<i>Micropterus salmoides</i>		2	0			Sept.
<i>Moxostoma macrolepidotum</i>		1	0			June
<i>Pomoxis annularis</i>		3	0			June
PLATTE RIVER at Fremont (27)						
<i>Cyprinus carpio</i>		‡	0			‡
<i>Ictalurus punctatus</i>		‡	0			‡
<i>Moxostoma macrolepidotum</i>		‡	0			‡
PLATTE RIVER at Louisville (25)						
<i>Hybopsis gracilis</i>		2	0			July
<i>Lepisosteus platostomus</i>		2	0			July
<i>Lepomis cyanellus</i>		3	0			April
<i>L. macrochirus</i>		18	0			April, Sept.
<i>Notemigonus crysoleucas</i>		2	0			April
<i>Pimephales promelas</i>		1	0			April
PLUM CREEK at Seward (15)						
<i>Lepomis cyanellus</i>		‡	0			‡
RED WILLOW RESERVOIR (58)						
<i>Dorosoma cepedianum</i>		1	0			July
<i>Esox lucius</i>		1	0			July

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>Ictalurus melas</i>		2	0			July
<i>I. punctatus</i>		12	0			June, July
<i>Lepomis cyanellus</i>		1	0			June
<i>L. gibbosus</i>		1	0			June
<i>L. macrochirus</i>		4	0			July
<i>Micropterus dolomieu</i>		11	1			June, July
<i>N. cylindratu</i> s			1	1	1	July
<i>M. salmoides</i>		11	5			July
<i>N. cylindratu</i> s			5	1-24	1	July
<i>Notemigonus crysoleucas</i>		1	0			June
<i>Perca flavescens</i>		7	0			June, July
<i>Pomoxis annularis</i>		1	0			June
<i>P. nigromaculatus</i>		13	0			June, July
<i>Stizostedion vitreum</i>		14	0			June, July
REPUBLICAN RIVER at Guide Rock (11)						
<i>Carpion</i> es <i>carpio</i>		3	0			Aug.
<i>Cyprinus carpio</i>		1	0			Aug.
<i>Fundulus kansae</i>		2	0			July, Aug.
<i>Hybognathus nuchalis</i>		5	0			July, Aug.
<i>H. placitus</i>		5	0			Aug.
<i>Ictalurus punctatus</i>		4	0			July
<i>Lepomis cyanellus</i>		2	0			July
<i>L. humilis</i>		2	0			July
<i>Notropis lutrensis</i>		4	0			July, Aug.
<i>N. stramineus</i>		14	0			July, Aug.
<i>Pomoxis annularis</i>		4	0			Aug.
<i>Scaphirhynchus platyrhynchus</i>		1	0			Aug.
REPUBLICAN RIVER at Red Cloud (13)						
<i>Catostomus commersoni</i>		2	0			July
<i>Dorosoma cepedianum</i>		1	0			July
<i>Etheostoma spectabile</i>		1	0			July
<i>Hybognathus nuchalis</i>		1	0			July
<i>Ictalurus punctatus</i>		5	0			July
<i>Notropis stramineus</i>		3	0			July
<i>Semotilus atromaculatus</i>		2	0			July
SALT CREEK at Ashland (24)						
<i>Carpion</i> es <i>carpio</i>		8	0			May
<i>Cyprinus carpio</i>		1	0			May
<i>Dorosoma cepedianum</i>		1	0			May
<i>Ictalurus melas</i>		5	0			May
<i>Lepomis cyanellus</i>		2	0			May
<i>L. macrochirus</i>		1	0			May
<i>Morone americana</i>		1	0			May
<i>Pomoxis annularis</i>		5	0			May

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>P. nigromaculatus</i>		3	0			May
SHERMAN RESERVOIR (38)						
<i>Aplodinotus grunniens</i>		2	0			Aug.
<i>Cyprinus carpio</i>		9	0			Aug.
<i>Esox lucius</i>		1	0			Aug.
<i>Ictalurus punctatus</i>		3	0			Aug.
<i>Morone chrysops</i>		4	0			Aug.
<i>Moxostoma macrolepidotum</i>		4	0			Aug.
<i>Pomoxis annularis</i>		2	0			Aug.
<i>P. nigromaculatus</i>		1	0			Aug.
<i>Stizostedion vitreum</i>		3	0			Aug.
SOLDIERS CREEK at Fort Robinson (69)						
<i>Catostomus commersoni</i>		‡	2			‡
<i>N. cristatus</i>			2	3-6	1	May
<i>Rhinichthys cataractae</i>		‡	0			‡
STAGECOACH LAKE (17)						
<i>Esox lucius</i>		3	1			Aug.
<i>N. cylindricus</i>			1	1	1	Aug.
<i>Ictalurus punctatus</i>		1	0			Aug.
<i>Lepomis macrochirus</i>		8	0			April, June, Aug.
<i>Micropterus salmoides</i>		4	4			June
<i>N. cylindricus</i>			4	9-31	1	June
<i>Morone americana</i>		17	2			April, Aug.
<i>N. cylindricus</i>			2	1-2	1	April, Aug.
<i>Perca flavescens</i>		1	0			April
<i>Pomoxis nigromaculatus</i>		7	0			April, Aug.
<i>Stizostedion vitreum</i>		2	0			Aug.
SWANSON RESERVOIR (59)						
<i>Aplodinotus grunniens</i>		11	0			July
<i>Carpionodes carpio</i>		3	0			July
<i>Cyprinus carpio</i>		9	0			July
<i>Dorosoma cepedianum</i>		4	0			July
<i>Esox lucius</i>		1	0			July
<i>Ictalurus punctatus</i>		2	0			July
<i>Lepomis cyanellus</i>		2	0			July
<i>L. macrochirus</i>		3	0			July
<i>Morone chrysops</i>		11	0			July
<i>Pomoxis annularis</i>		6	0			July
<i>P. nigromaculatus</i>		8	0			July
<i>Stizostedion vitreum</i>		4	0			July
TURKEY CREEK 5 km SW of Dorchester (7)						
<i>Ictalurus melas</i>		‡	0			‡

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
<i>Noturus flavus</i>		‡	0			‡
<i>Semotilus atromaculatus</i>		‡	0			‡
TURKEY CREEK at Pleasant Dale (8)						
<i>Noturus flavus</i>		8	0			Aug.
UNNAMED STREAM at Callaway (52)						
<i>Catostomus commersoni</i>		‡	0			‡
<i>Fundulus sciadicus</i>		‡	0			‡
<i>Hybognathus hankinsoni</i>		‡	0			‡
<i>Ictalurus melas</i>		‡	0			‡
<i>Notropis lutrensis</i>		‡	0			‡
<i>Phoxinus neogaeus</i>		‡	0			‡
<i>Pimephales promelas</i>		‡	0			‡
WAGON TRAIN LAKE (18)						
<i>Dorosoma cepedianum</i>		10	1			May, June
<i>T. longirostris</i>			1	1	1	May
<i>Ictalurus melas</i>		3	0			May
<i>Lepomis cyanellus</i>		13	2			March, June
<i>N. cylindricus</i>			2	1-2	1	June
<i>Micropterus salmoides</i>		2	0			April, May
<i>Morone americana</i>		14	0			April, May
<i>Notemigonus crysoleucas</i>		2	0			May
<i>Notropis blennioides</i>		3	0			May
<i>N. lutrensis</i>		2	0			March
<i>Pimephales promelas</i>		42	0			Feb., March, Sept.
<i>Pomoxis nigromaculatus</i>		2	0			May
<i>Stizostedion vitreum</i>		2	0			June
WEST LONG LAKE (46)						
<i>Lepomis gibbosus</i>		3	3			June
<i>L. thecatus</i>			3	1-3	2	June
<i>L. macrochirus</i>		1	0			June
<i>Micropterus salmoides</i>		1	1			June
<i>N. cylindricus</i>			1	8	1	June
<i>Perca flavescens</i>		11	8			June
<i>L. thecatus</i>			7	1-6	1	June
<i>N. cylindricus</i>			3	1-5	1	June
WHITE RIVER at Whitney (70)						
<i>Rhinichthys cataractae</i>		‡	0			‡
WINTER CREEK (66)						
<i>Catostomus commersoni</i>		1	0			May
<i>C. catostomus</i>		5	0			May
<i>Salmo gairdneri</i>		7	0			May

TABLE I. Continued.

Fish	Locality*	No. Exam.	No. Inf.	No./Inf. Fish	Site†	Month
Acanthocephalan						
<i>S. trutta</i>		6	0			May
YANKEE HILL LAKE (19)						
<i>Ictalurus melas</i>		3	0			May
<i>Lepomis macrochirus</i>		6	0			May
<i>Micropterus salmoides</i>		2	0			May

* Numerals in parentheses following localities refer to map-sites in Figure 1.

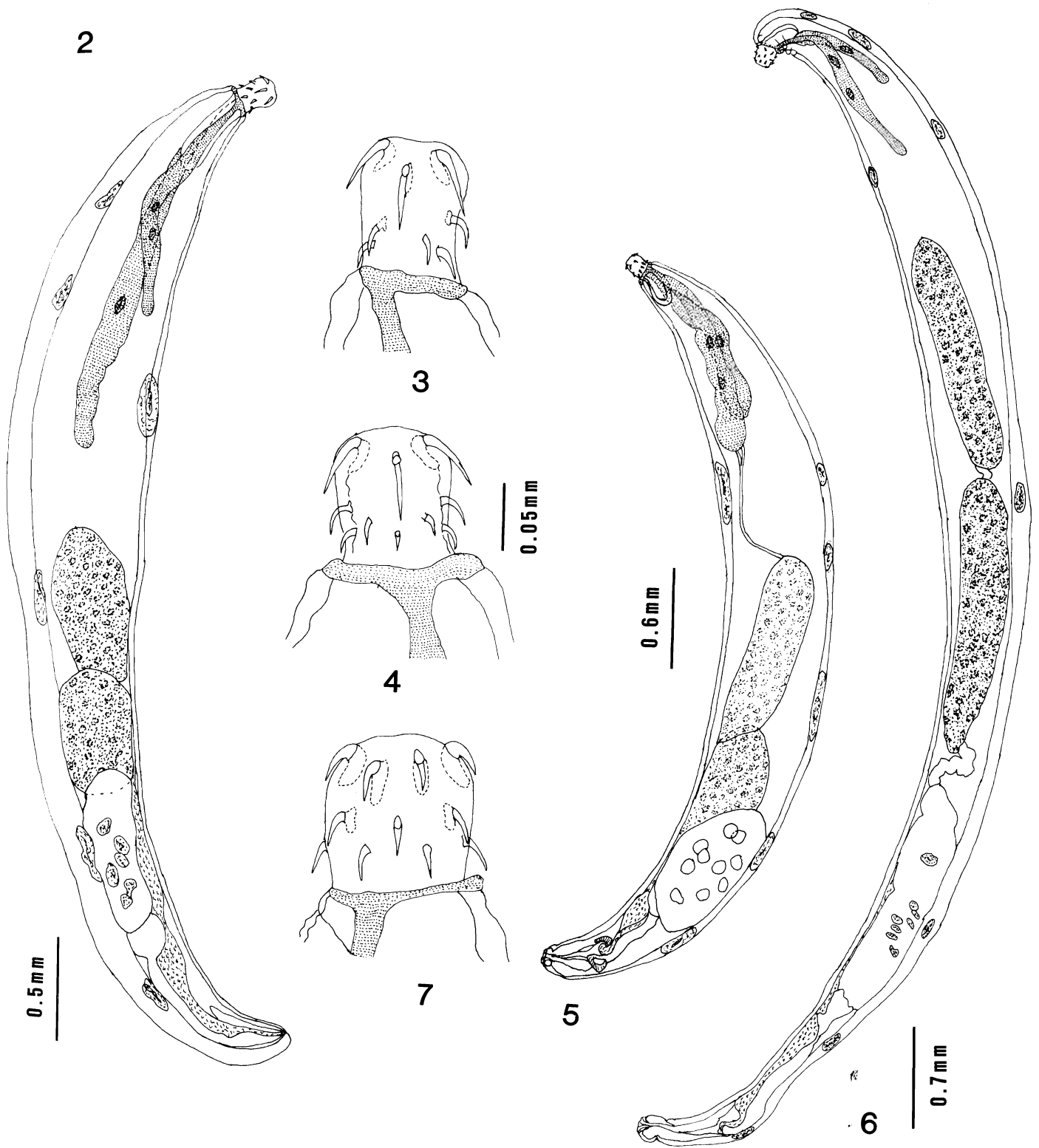
† Sites are designated 1 = intestine, 2 = mesentery or liver, and 3 = intestine and mesentery or liver.

‡ Data not available.

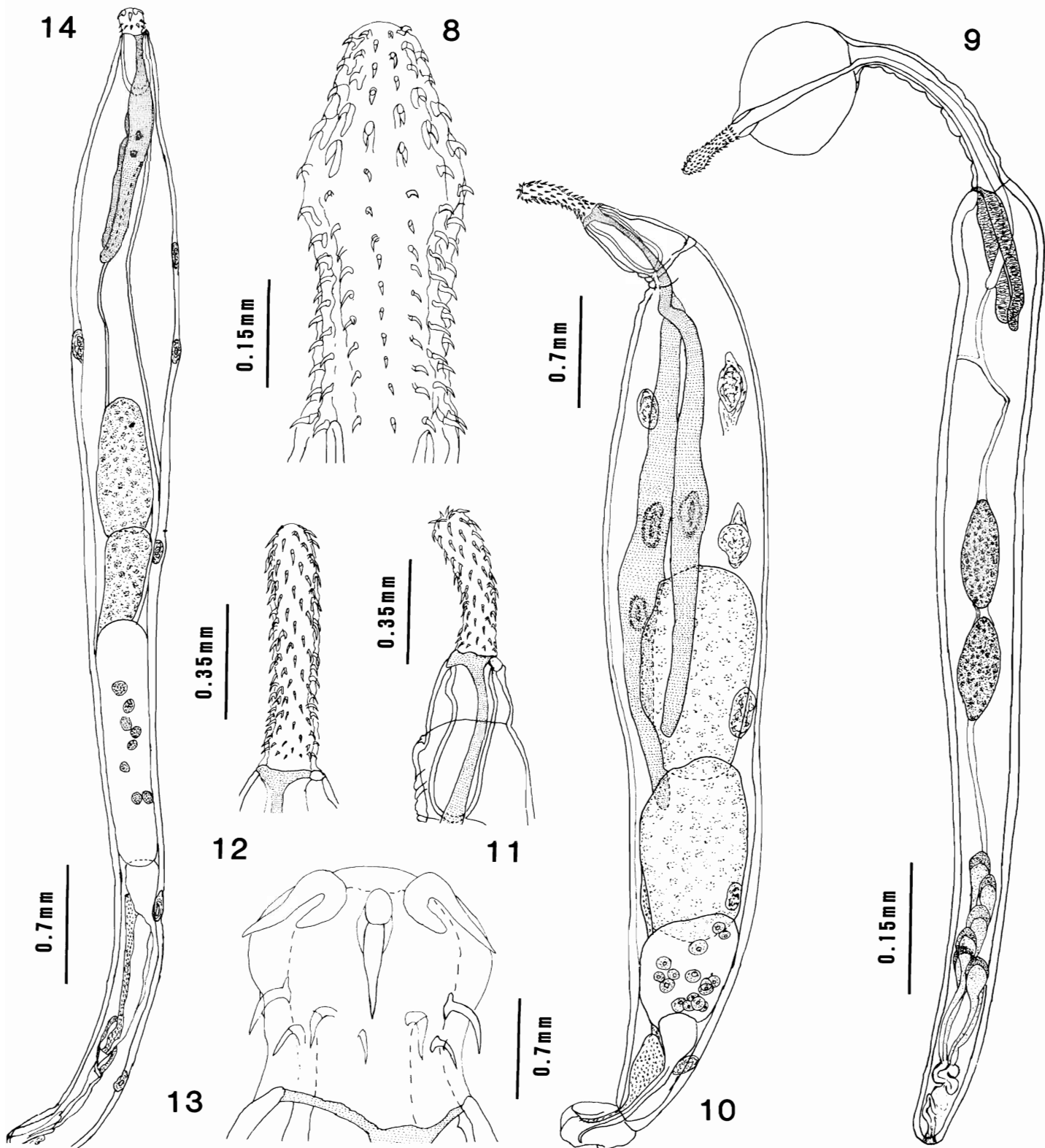
⊕ Numbers and species of fishes examined unknown, but no acanthocephalan found.

been reported from fishes of Missouri (see Keppner, 1974) and it occurs in Nebraska as well. Each of the three species reported from fishes in South Dakota, *N. cylindratus* reported by Zischke and Vaughn (1962), *N. prolixus* by Kritsky et al. (1972), and *P. bulbocolli* by Huggins (1959), was discovered also in fishes of Nebraska. Two species of Acanthocephala, *N. rutili* and *P. bulbocolli*, have been recorded from fishes of Wyoming, and both occur also in Nebraska. Linton (1893) reported *Echinorhynchus tuberosus* and *E. globulosus* from Wyoming fishes. *Echinorhynchus tuberosus* is a well recognized synonym of *N. rutili*. Bangham (1951) and Heckmann

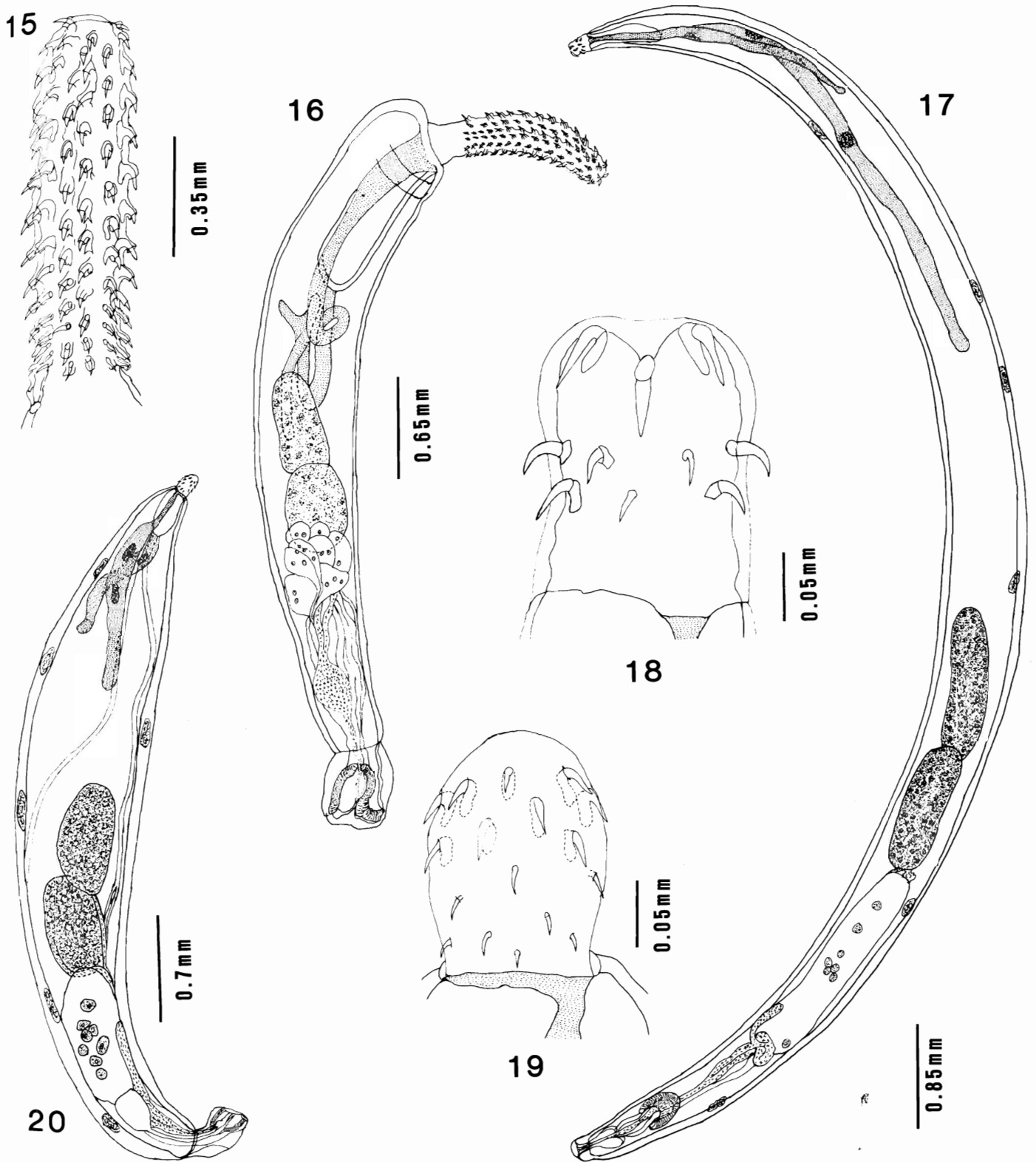
(1971) confirmed that *N. rutili* occurs in Wyoming. *Echinorhynchus globulosus* was regarded by Meyer (1932) as a synonym of *Tanaorhamphus ambiguus*. Bullock and Samuel (1975) designated *T. ambiguus* as the type species of a new genus, *Paratenuisentis*. Occurrence of this species in Wyoming would be surprising because all other reports of it are from coastal regions, and Bullock (1970) identified two species of brackish-water amphipods as its intermediate hosts. *Tanaorhamphus longirostris*, however, does occur in Nebraska. It appears best to regard Linton's *E. globulosus* as a species *inquirendum*.



FIGURES 2-7. Camera lucida drawings of acanthocephalans from Nebraska fishes. 2. *Neoechinorhynchus cristatus*, entire male. 3. *N. cristatus*, proboscis. 4. *N. rutili*, proboscis. 5. *N. rutili*, entire male. 6. *Octospinifer macilentus*, entire male. 7. *O. macilentus*, proboscis. Projection beside Figure 4 applies equally to Figures 3, 4, and 7.



FIGURES 8-14. Camera lucida drawings of acanthocephalans from Nebraska fishes. 8. *Pomphorhynchus bulbocolli*, proboscis. 9. *P. bulbocolli*, entire male. 10. *Tanaorhamphus longirostris*, entire male. 11. *T. longirostris*, proboscis with tip partially invaginated. 12. *T. longirostris*, proboscis fully extended. 13. *Noechinorhynchus cylindratus*, proboscis. 14. *N. cylindratus*, entire male.



FIGURES 15-20. Camera lucida drawings of acanthocephalans from Nebraska fishes. 15. *Leptorhynchoides thecatus*, proboscis. 16. *L. thecatus*, entire male. 17. *Neoechinorhynchus prolixus*, entire male. 18. *N. prolixus*, proboscis. 19. *Paulisentis missouriensis*, proboscis. 20. *P. missouriensis*, entire male.

ACKNOWLEDGMENTS

The authors are indebted to many individuals, but primarily to Monte A. Mayes for sharing records of parasites from fishes. Assistance was also provided by Mary Hanson Pritchard, Curator, Manter Laboratory of Parasitology, University of Nebraska State Museum.

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