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First Record of *Leptodora kindti* in Dardanelle Reservoir and Status of Other Recent Additions to Dardanelle Fauna

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One of the first reports on the zooplankton in Dardanelle Reservoir, Arkansas, was that of Palko (1970). His list of taxa included the usual rotifers, cladocerans, and copepods. Since 1968 personnel in the Biology Department, University of Arkansas at Little Rock have collected zooplankton samples from the reservoir in association with the construction and operation of Arkansas Power and Light's nuclear generating station (now being operated by Energy Corporation). Rickett and Watson (1983, 1993) reported several genera of rotifers, copepods, and the cladocerans, *Daphnia* sp., *Ceriodaphnia lacustris*, *C. quadrangula*, *Bosmina longirostris*, and *Diaphanosoma* sp. We believe this is the first documentation of *Leptodora kindti* in Dardanelle Reservoir and in the main stem of the Arkansas River. Although zooplankton in the Arkansas River have not been exhaustively studied, we feel this record represents a fairly recent range extension from northeast Oklahoma from the Neosho-Grand Rivers drainage basin into the Arkansas River. Researchers at Arkansas Tech University have not documented any large, unusual planktonic organisms in their mid-water trawls for larval fish (C. Gagen, pers. comm.).

Zooplankton samples were taken and handled according to methods described by Rickett and Watson (1992). After a single *L. kindti* was found in a subsample from Station 16 (intake) on 10 June 1993, the remainder of the sample was visually examined in the vial, but no additional specimens were apparent. This specimen was 3.2 mm long and was stained with a 1.0% rose bengal solution and permanently mounted on a standard microscopic slide. None of the samples taken at four other stations on the reservoir contained *Leptodora*.

Leptodora kindti is a large (up to 12 mm long) predatory cladoceran and can usually be seen in a sample without the aid of a microscope. Most reference books (Edmondson 1959; Pennak 1989) state *Leptodora* exhibits only a distribution across northern states, but a search of the available literature (summarized in Table 1) revealed several fairly recent reportings of *Leptodora* in this geographic region. Three hypotheses emerged from these references.

Conner and Bryan (1983) reported that Bryan and colleagues collected *Leptodora* from the lower Mississippi River first in 1973 while conducting an environmental

survey for Gulf States Utilities Company, Baton Rouge, LA. They also noted that *Leptodora* was collected from the Atchafalaya River by Binford in 1975 while collecting samples for masters thesis research. Collections began including *Leptodora* shortly after they began sampling for fish larvae and other macroplankton with a large-mouth, 0.505 mm mesh net. Between 1973 and the early 1980s, it was taken at least once a year usually in June and July, but as early as March and as late as November. Specimens from 3-10 mm have been taken, indicating local reproduction; smaller ones were usually taken in late summer and autumn. Population densities ranged from 3-25 per 100 m³ of water. Citing a paper by Shindler (1969, Jour. Fish. Res. Bd. Can., 26: 1948-1955), they hypothesized that small-mouthed, fine-meshed nets, used almost exclusively for limnological work prior to 1970, were selective against the larger, strong-swimming zooplankters. Still, aside from its ephemeral presence and low densities, it seems probable that a few should have been collected prior to 1970 if it has been present in this geographic region all the while.

Table 1. Recent records of *Leptodora kindti* in the Midwest and South.

Applegate and Mullan (1969)	-north Arkansas, 1967 Bull Shoals Reservoir
Conners and Bryan (1983) Sw. Nat. 28:118	-southeastern Louisiana, 1973 Mississippi River -southcentral Louisiana, 1975 Atchafalaya River
Kring et al., (1976)	-southeast Kansas, 1974, 75 Toronto and Fall River Reservoirs -southwest Missouri, data unknown Tablerock Reservoir
Holt et al., (1978)	-northeastern Oklahoma, 1975 Grand Lake -southeastern Oklahoma, 1975 Lake Texoma
Prophet (1978)	-northcentral Kansas, data unknown Lovewell Reservoir -central Kansas, date unknown Lyon County State Lake
Roseberg and Moen (1981)	-southwest Arkansas, 1979 Lake DeGray
Rickett and Watson (1994) Proc. Ark. Acad. Sci.	-westcentral Arkansas, 1993 Dardanelle Reservoir

Kring et al. (1976) reported *Leptodora* from Toronto and Fall River Reservoirs in the Verdigris River basin in southeastern Kansas. Both bodies of water were small with moderately high turbidity, and *Leptodora* was in samples from July 1974 and June, July, and October 1975. It composed less than 1% and less than 0.1% of the zooplankton community in Toronto and Fall River Reservoirs, respectively. Its route of introduction was not known, and they suggested it has been in this area longer than collecting records indicate. Kring et al. (1976) also cited personal communication with R. Anderson indicating *Leptodora* has been collected from Tablerock Reservoir in southwestern Missouri.

Prophet (1978) followed up on the Kring et al. (1976) study and reported *Leptodora* also from Lovewell Reservoir and Lyon County State Lake. In 1976 it was present in some samples between 11 May and 10 October and in all samples between 11 June and 1 October. Prophet (1978) hypothesized the plankton was brought into Kansas with fish stocking activities and was spread locally the same way.

Holt et al. (1978) reported *Leptodora* from the Neosho River, of the Grand River system in southeastern Kansas and northeastern Oklahoma, from Grand Lake itself, and from Lake Texoma on the main stem of the Red River as early as 1975. Samples from several stations in Grand Lake contained *Leptodora*, where it made up 4-5% of the total samples prior to 10 July when it started to decline. It was taken in May in Lake Texoma, in the early afternoon at 5 m depth and near midnight near the surface. *Leptodora* comprised 0.4% of the sample, and size ranged between 1.7 and 8.1 mm, indicating reproduction.

Two previous Arkansas locations for *Leptodora* have been noted. Applegate and Mullan (1969) reported taking a small number (up to 0.16/1) during June, July, and August, 1967 from Bull Shoals Reservoir. Roseberg and Moen (1981) collected *Leptodora* from DeGray Reservoir in 1979 although it was not present during four previous years of intensive collecting of larval fish. Roseberg and Moen (1981) suggested that reservoir construction had increased available habitat for *Leptodora* and, because of its predatory nature, expressed concern for its impact on the overall structure of the zooplankton community in this region. Although hypotheses of its reasons and routes of dispersal did not agree, it is our belief that this reporting represents a natural range extension from the Grand River system in northeast Oklahoma.

Since 1985 we have collected steadily increasing numbers of the estuarine amphipod, *Corophium lacustrae*. In the early 1980s numerous individuals of *Corophium* were collected with artificial substrate samplers (rock baskets and Dendy-type multiplate) in the Arkansas River adjacent to AP&L's White Bluff generating station near Redfield (Bob West, pers. comm.). This genus of euryha-

line amphipods is common in sandy shorelines and mud flats along the Texas Gulf Coast where it lives in a tube built of sand grains or small pieces of detritus (Heard, 1982). Collections of *Corophium* in this area indicate a probable natural range extension, not completely unexpected given the historically high salinity of the Arkansas River. However, salinity, as measured by chloride concentration, has declined significantly since the mid-1980s. The fact that *Corophium* is still being collected and in gradually increasing numbers suggests it may be adapting to freshwater.

Since the mid-1980s we have also collected increasing numbers of the attached colonial Entoproct, *Urnatella*. *Urnatella* is easily recognized by its branches or arms that resemble chains of beads. We found most *Urnatella* colonies attached to snail shells and larger pieces of woody detritus. Until our December 1993 samples were taken, it was collected only at Station 16, which was characterized by a virtual absence of soft, finely divided silt. The substrate was composed mostly of hard, gray clay overlain with large pieces of woody debris. There were also localized patches of a non-silty granular material. Pleurocerid snails were also particularly abundant at Station 16, and many entoprocts were attached to snail shells.

We have collected low numbers of the introduced Asiatic clam, *Corbicula fluminea* since 1983, and its numbers have declined slightly in recent years. None of the substrates at our regular sampling stations in Dardanelle (organic muck, silty, sandy, and clay-dominated) were ideal for *Corbicula* colonization. By comparison, Rickett (1989) found *Corbicula* in densities of hundreds per square meter in the upper Saline and Ouachita Rivers in substrate dominated by small rocks and pea gravel and rinsed constantly by flowing water.

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