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## Preliminary Report on the Zygoptera (Damselflies) of Arkansas

George L. Harp  
*Arkansas State University*

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## General Notes

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CRAIG ENDRES, SUSAN KULP, and GASTON GRIGGS, John Brown University, Siloam Springs, AR 72761.

### A PRELIMINARY REPORT ON THE ZYGOPTERA (DAMSELFLIES) OF ARKANSAS

Adams (1900) published the first list of Arkansas Odonata, reporting seven damselfly species. Subsequent papers (Needham and Heywood, 1929; Bick, 1959; and Houston, 1970) increased the species list to 18. Bick (1978) was apparently unaware of Houston's (1970) paper and relisted three species as new records. This study provides a list for Arkansas damselfly species, their known flight seasons, and their distributions by county. Adults of most species occurring or possibly occurring in Arkansas can be identified using the keys of Johnson (1972). The exceptions, several *Lestes* species and *Enallagma aspersum*, are included in Walker's (1953) keys.

The data presented are a compilation of the contributions of all sources listed in the Acknowledgements, pertinent published records, and materials collected by myself. The museum collections at the University of Arkansas-Fayetteville and -Little Rock were visited.

Treatment of captured specimens was as follows. While still alive, specimens were placed in paper triangles with wings in the normal resting position and heads rotated 90° to the left. The triangles were placed in science-grade acetone for a period of 18-24 hours. These may remain in acetone for up to five days with no detrimental effects. Next, each specimen was removed from the acetone, dried, identified, and transferred to a clear cellophane envelope with a 3 X 5 inch data card. These curatorial methods are advantageous in that they better preserve many colors than does air drying, storage space is minimized, and, since each envelope contains but one specimen, association of parts after breakage is facilitated.

Thirty-three damselfly species are currently recorded for Arkansas. The flight season for most of these extends from spring through summer months, and for many species persists into mid-autumn (Table 1). Temperature appears to be a major factor controlling their emergence. Some species vary from this generalization, however. *Enallagma divagans* seems to be a spring to early summer species, as was noted by Johnson (1972). *Hetaerina titia* in Arkansas appears in midsummer and flies through early autumn. Johnson (1972) stated that it is characteristically a spring form in central Texas. Species of *Lestidae* are highly adapted for life in temporary waters, and many have a diapause in the egg (Corbet, 1962). This imposes a characteristic massed, synchronized emergence on the species, followed by a relatively short flight period. *Lestes disjunctus australis* has an extended flight season in Arkansas, but *L. inaequalis* and *L. rectangularis* are spring fliers, while *Archilestes grandis* adults are present during the late summer and autumn (Table 1).

Twenty-four Arkansas damselfly species (73%) are of the Eastern United States or Eastern U.S.-Tropics fauna, and seven species (21%) are Transcontinental or Transcontinental-Tropic in distribution. They are therefore likely to be found in any Arkansas county, provided suitable habitat is present. *Ischnura posita* and *Anomalagrion hastatum* are the most common forms, having been recorded in 69 and 54 counties, respectively (Table 2). These two species can be found in association with a variety of aquatic ecosystems, and they apparently have a wide range of tolerance for several environmental parameters.

*Ischnura ramburii* and *I. verticalis* are two species of the Eastern U.S. which reach a geographic limit in Arkansas. *I. ramburii* has been reported from Louisiana, Mississippi, Texas and Oklahoma, but not from Kansas, Missouri or Kentucky (Bick, 1957; Bick and Bick, 1957; Montgomery, 1967; Johnson, 1972; Huggins et al., 1976; Lago and Stanford, 1979). Its Arkansas distribution reflects that situation in that 19 of the 21 counties from which it is recorded are in the southern half of the state. Seemingly disjunct populations in Craighead and Washington Counties are the exceptions. *I. verticalis* has been reported from north of a line connecting Lake Texoma (Oklahoma-Texas state line) with extreme northeast Tennessee (Bick, 1957; Bick and Bick, 1957; Montgomery, 1967; Johnson, 1972; Huggins et al., 1976; Lago and Stanford, 1979; Johnson and Coney, 1980). Its Arkansas distribution concurs with those data, as the 10 counties listed are northcentral and northwestern.

*Argia plana* apparently has a limited Central U.S. distribution, as it has only been reported from Texas, Oklahoma, Kansas and Missouri (Bick, 1957; Montgomery, 1967; Johnson, 1972; Huggins et al., 1976). Ten of the 11 Arkansas county records for this species are in the northern quarter of the state. Four of the six county collections made by me were from springs or spring-fed streams. I have not been able to determine the specific habitat for the remaining five county collections. Huggins et al. (1976) listed four of their seven county collections for this species in Kansas as being from springs.

*Argia immunda* has been reported from only Mexico, Texas and Oklahoma (Bick and Bick, 1957; Johnson, 1972). Bick and Bick (1957) reported this species to be frequent and locally abundant in southern Oklahoma, but absent in the northern part of the state. The Washington County, Arkansas, record is the most northern and eastern location for *A. immunda*.

Johnson and Westfall (1970) have remarked that *Ischnura kellecotti* is one of the few temperate latitude odonates to have developed an apparently obligatory relationship with specific plants. The plant in this case is a water lily, *Nuphar* (spatter dock). My first collection of this species was on 27 July 1982 from Berg Lake at the western city limit of Camden, Ouachita County, Arkansas. This population was associated with *Nymphaea odorata* Ait., the sweet-scented water lily, and is the first record of this particular association. A subsequent collection of *I. kellecotti* was made on 6 September 1982 from a pond on the S side of U.S. Hwy. 270, 1 mi E of Poyen and immediately W of Frances Creek, in Grant County, Arkansas. This pond contained *Nuphar*.

A perusal of the damselfly species lists for neighboring states (Bick, 1957; Bick and Bick, 1957; Macklin and Cook, 1967; Montgomery, 1967; Johnson, 1972; Huggins et al., 1976; Lago and Stanford, 1979) reveals that at least eight additional species may be found in Arkansas. Those species include *Calopteryx dimidiata* (Burmeister), *Lestes congener* Hagen, *L. dryas* Kirby, *L. forcipatus* Rambur, *Amphiagrion saucium* (Burmeister), *Chromagrion conditum* (Hagen), *Enallagma dubium* Root, and *Nehalennia integricollis* Calvert.



## General Notes

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GEORGE L. HARP, Department of Biological Sciences, Arkansas State University, State University, AR 72467.

### STATUS OF THE BAT *Myotis keenii* IN THE ARKANSAS OZARKS

Keen's bat, *Myotis keenii*, occurs in two disjunct ranges in North America. The western subspecies, *M. k. keenii*, is found from Alaska south to Puget Sound in Washington. The eastern race, *M. k. septentrionalis*, ranges from Saskatchewan to Newfoundland and south to northern Florida (Fitch and Shump, 1979).

It has been suggested by van Zyll de Jong (1979), based on a study of Canadian specimens, that *M. k. keenii* and *M. k. septentrionalis* are distinct species. In that case, the Arkansas form would take the name *M. septentrionalis*. At this time it is not clear whether or not this separation will be accepted. Therefore, we utilize the name *M. k. septentrionalis* for the Arkansas form.

*Myotis keenii* is a medium-sized *Myotis* with long ears (17-19 mm) and a narrow pointed tragus. The forearm measures 32-39 mm and the wingspan is 228-258 mm; the calcar is not keeled (Barbour and Davis, 1969). Color varies somewhat but the body is usually brownish to reddish-brown above and gray below. The fur is not glossy.

*Myotis keenii* hibernates in caves or mines during the winter where they usually select relatively cool sites, often near cave entrances. They often hang singly and seem to prefer tight crevices and holes. They are never abundant; concentrations of 100 or more in a single cave or mine are unusual (Barbour and Davis, 1969). During summer they roost in a variety of shelters including under the bark of trees, behind shutters, and in buildings. They appear to be relatively solitary in their habits, except for small maternity colonies formed during summer.

In Arkansas, *M. keenii* is widely distributed throughout the Interior Highlands. Sealander (1979) considered it to be "relatively uncommon" in Arkansas and reported it from Benton, Washington, Newton, Baxter, Stone, and Independence counties in the Ozarks and from Pike and Garland counties in the Ouachitas. During a recent study in eastern Missouri, Caire et al. (1979) reported that 141 trips to 77 caves between October 1975 and April 1976 resulted in locating only 39 *M. keenii*. However, as many as 460 individuals were captured at a single Missouri cave entrance during one night in June.

Since 1968, we have recorded *M. keenii* from 15 caves in seven Arkansas Ozark counties, the same six counties reported by Sealander (1979), and also from Marion County. Usually 1-3 and not more than 6 *M. keenii* were seen in any one cave. They were found in relatively large numbers in only one cave, Cave Mountain Cave in Newton County. During the winter of 1973-74 we estimated 200 to be present there and during the winter of 1977-78 we found ca. 100 (we did not visit the cave during the intervening years). Since the winter of 1977-78, Cave Mountain Cave has been checked yearly and less than 10 *M. keenii* have been observed there each winter. However, it is important to point out that because of their preference for cracks and holes in the cave ceiling, they could easily be overlooked.

Netting at cave entrances during the summer-autumn swarming period indicates that this species is more abundant in the Arkansas Ozarks than indicated by observations of hibernating bats in caves and mines. As many as 40 *M. keenii* have been netted at the entrance of Cave Mountain Cave. However, that number is greater than at most caves netted, where the number captured during any one night is usually less than 10.

Cave Mountain Cave, located on Buffalo National River lands, from which the largest numbers of *M. keenii* have been reported in Arkansas, was recently (1982) fenced by the National Park Service to protect the endangered Indiana bats (*M. sodalis*) and gray bats (*M. grisescens*) that hibernate there from human disturbance. Hopefully, the protection of this cave from disturbance during the hibernation period will result in an increase in the numbers of *M. sodalis*, *M. grisescens*, and *M. keenii* that hibernate there.

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MICHAEL J. HARVEY, Ecological Research Center, Department of Biology, Memphis State University, Memphis, TN 38152, and V. RICK MCDANIEL, Department of Biological Science, Arkansas State University, State University, AR 72467.

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