Journal of the Arkansas Academy of Science

Volume 30 Article 27

1976

Update of Arkansas Odonata (Anisoptera)

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ABSTRACT

Seventy-five species of dragonflies have been reported in Arkansas. The present study provides 43 species; records of the other 32 are drawn from the literature and personal communication with individuals. A new species, *Gomphus ozarkensis*, described from western Arkansas in 1975 on the basis of minimal data emphasizes the need for extensive work in this area. Opportunities to collect and identify additional species are discussed.

INTRODUCTION

When Needham and Westfall's *Manual of Dragonflies of North America* was published in 1955, only 12 species were included from Arkansas, but Bick (1959) mentions 16 species from the literature that were known at that time. Little work has been done since toward compiling and reporting a complete list of odonates. George Harp studied the group in northeast Arkansas, Jim Houston published a brief report in 1970 of those found in Franklin County, and Minter J. Westfall, Jr., has several records of dragonflies from Arkansas. He recently published a description of a new species, *Gomphus ozarkensis*, from western Arkansas on the basis of a minimal amount of material (1975). There is real need for more complete and updated keys for all aquatic insects, especially immature forms, and little is known about the natural history of many species.

An aquatic organism, in the context of this report, is any one whose life cycle is spent partly or entirely in or on water. Some make small contributions to the ecosystem, others large. Dragonfly nymphs are predators of a variety of aquatic insects and even small fish. They in turn are eaten by larger fish and perhaps by larger predatory insects such as diving beetles and giant water bugs. Therefore their contributions should not be minimized and cannot be ignored.

Several organisms have been studied in relation to their tolerance or intolerance of changing conditions. Although dragonfly nymphs are found in many different habitats, they have limited tolerance to pollution and therefore might be studied as an indicator of water quality.

METHODS

Aerial adults of many species were collected with a standard entomology net. Much patience and care are required to obtain a representative sample of adults because they have an uncanny ability to dodge the net regardless of how hard it is swung. Therefore, it is necessary to record as auxiliary data the species of adults seen but perhaps not actually captured.

Nymphs were captured with a three-sixteenths-inch mesh dip net or fish seine. Some were found in aquatic vegetation, others in mud, sand, or detritus on the bottom. Riffle-kicking (disturbing the substrate and letting the current carry specimens into a waiting net) yielded a surprising variety. A Surber sampler was used sparingly.

Aerial adults were killed in a jar containing ethyl acetate and dried, whereas specimens taken directly from water were preserved in 70% ethyl alcohol. All were returned to the laboratory where positive identifications were made to the extent possible with present keys. Needham and Westfall's (1955) is the most complete key, containing characters for all adults and most nymphs. Usinger (1956) provides a key to widespread genera and California species. Edmondson's (1959) and Pennak's (1953) keys also were used, but neither goes beyond genus. Some of these keys apparently are built upon Wright and Peterson's (1944), which is still one of the best.

Dragonflies were collected at 27 sites in 16 counties, mostly in central Arkansas (Table I). All collections were made in the months April through October because adult specimens become rather scarce during the colder months and water temperatures tend to dampen ardor. Habitat types included all gradations from swift streams with clean, rocky bottoms to lakes with silty bottoms to swamps.

RESULTS AND DISCUSSION

Several taxa are represented by nymphs only, others by adults only. Rarely were both nymphs and adults of the same species collected at the same locality and time. The explanation of this phenomenon is that many species of insects (aquatic and terrestrial) undergo large periodic emergences, for example, cicadas (White and Lloyd 1975) and mayflies (Ross 1965). Moreover, it is known that within a family or genus, each species has a characteristic time of emergence (Usinger 1956). At a certain time, dependent on water temperature, directness of sunlight, and perhaps other factors, all or nearly all of the immature forms become adults. The staggered emergence of species, especially those closely related, apparently enhances reproductive isolation.

Thirty-four species were collected in this study, six additional species are catalogued in the UALR entomology collection, and three more (*Anax junius*, *Libellula luctuosa*, and *L. pulchella*) were observed in Saline, Conway, and Conway Counties, respectively. These three are distinctive and easily recognized by sight. Therefore, a total of 43 species of dragonflies are listed herein (Table II).

Needham and Westfall (1955) listed six species not in this report. Bick (1959) listed 38 species, 22 of which had not been reported from Arkansas at the time. Eight species he listed were neither collected in this study nor listed by Needham and Westfall (1955). George Harp (pers. comm.) has records of 40 species representing five families (six families if Macromiidae is valid) collected mostly in northeastern Arkansas. Eleven of his species were neither collected in this study nor listed previously. Jim Houston (1970) listed 27 species representing four families from Franklin County, six of which are not listed in previous works. Because many nymphs are poorly characterized and others are unknown, identifications are commonly subject to error. If all taxonomic efforts are assumed to be correct, at least 75 species of dragonflies are known to be present recently in Arkansas. Minter J. Westfall, Jr. (pers. comm.) perhaps has records of additional species from Arkansas besides the new *Gomphus ozarkensis*.

Higher taxonomy of Anisoptera is basically agreed upon, although some entomologists (Borror et al. 1976) have given family status to two subfamilies of Libellulidae, Macromiinae and Cordulinae. Of the families represented, Libellulidae is by far the most diverse, but Gomphidae presents the most difficult taxonomic problems. These problems are intensified by inadequate nymph records and descriptions.

Bick's (1959) report is based on specimens taken from eight counties in the western part of the state, and Houston's (1970) work was done nearby (Franklin County). Harp's (pers. comm.) work was mainly in the northeast corner. With the exception of those in Columbia County, the Anisoptera of the southeastern third of the state are virtually unknown. There are other scattered counties where few or no collections have been made. Within recent months two additional species have been identified, but data on them were not ready for this report. It is entirely possible at least a third of the more than 330 North American species of dragonflies are present in Arkansas.

ACKNOWLEDGEMENT

Financial aid for this project was provided by a UALR Faculty Research Grant.

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Table I. Collecting Localities for Dragonflies, 1974-75

	County	Name	Location
1.	Arkansas	Cox Cypress Lake	T 5S R 6W S 2
2.	Arkansas	Bayou LaGrue	T 4S R 3W S25
3.	Clark	Caddo River	T 5S R23W S22
4.	Conway	E. Fk. Point Remove Creek	T 7N R16W S 8
5.	Conway	Lake Overcup	T 7N R16W S30
6.	Faulkner	Buffalo Fork Lake	T 6N R14W S26
7.	Faulkner	Lake Conway	T 4N R13W S19
10.	Grant	Hurricane Creek	T 3S R13W S25
13.	Madison	Kings River	T16N R24W S28
14.	Marion	Crooked Creek	T18N R16W S 9
15.	Montgomery	Ouachita River	T 1S R25W S32
16.	Newton	Buffalo River	T16N R20W S 7
18.	Perry	Farm pond	T 5N R19W S28
19.	Pope	Big Piney Creek	T10N R20W S 6
20.	Pulaski	Boyle Park Pond	T 1N R13W S12
22.	Pulaski	Little Maumelle River	T 2N R15W S30
23.	Pulaski	Coleman Creek	T 1N R12W S18
24.	Pulaski	Broadmoor Lake	T 1N R13W S13
25.	Pulaski	Hindman Park Pond	T 1N R13W S26
27.	Pulaski	Lakewood Lake No. 1	T 2N R12W S24
28.	Saline	North Fork Saline River	T 1S R15W S28
29.	Saline	Alum Fork Saline River	T 1S R16W S29
30.	Saline	Lake Winona	T 2N R17W S20
31.	Saline	Saline River	T 3S R15W S27
32.	Washington	White River	T15N R28W S20
33.	Woodruff	Black Swamp	T 6N R 3W S15
34.	Yell	Petit Jean River	T 5N R21W S23

Table II. Taxonomic List of Species of Dragonfly Nymphs (N) and Adults (A) Collected in Arkansas, 1974-75 (numbers refer to exact locality, Table I)

Odonata

Anisoptera

Aeschnidae
- *Aeschna constricta* (UALR collection)
- *Anax junius* A-28 (sight record)
- *Basiaeschna janata* N-15,32
- *Boyeria vinosa* N-22
- *Epiaeschna heros* N-28,33; A-31
- *Nasiaeschna pentacantha* N-25

Gomphidae
- *Dromogomphus armatus* N-19
- *Dromogomphus spinosus* A-4,34
- *Dromogomphus spoliatus* N-30; A-18
- *Gomphus brevis* N-15
- *Gomphus descriptus* A-34
- *Gomphus submedianus* N-27
- *Gomphus villosipes* N-2
- *Hagenius brevistylus* N-14,15,16,22; A-28
- *Lanthus albistylus* N-3,13,29
- *Ophiogomphus rupensilensis* N-14

Libellulidae
- *Cannacria gravida* (UALR collection)
- *Celithemis elisa* A-31
- *Epicordulia princeps* N-1,30
- *Erythemis simplicicollis* N-25; A-5,6,7,10,18
- *Libellula cyanea* (UALR collection)
- *Libellula flavida* A-29
- *Libellula incesta* A-1,5,6,30
- *Libellula luctuosa* A-5 (sight record)
- *Libellula pulchella* A-5 (sight record)
- *Libellula vibrans* A-18,28
- *Libellula* sp. N-20,24,25
- *Miathyra marcella* N-6
- *Pachydiplax longipennis* N-1,30; A-5,6,7
- *Pantala flavescens* N-23; A-1,2,10,18
- *Pantala hymenea* A-23
- *Perithemis tenera* N-22,24; A-6,18
- *Plathemis lydia* N-20; A-18
- *Sympetrum ambiguum* (UALR collection)
- *Sympetrum vicinum* A-23
- *Tarnetrum corruptum* (UALR collection)
- *Tetragoneuria cynosura* N-1; A-13
- *Tramea lacerata* A-23
- *Tramea onusta* (UALR collection)

Macromiidae
- *Didymops transversa* A-13
- *Macromia illinoiensis* N-4,14,29,32
- *Macromia taeniolata* A-2
- *Macromia* sp. N-34