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THE EPHEMEROPTERA OF MOUNTAINOUS ARKANSAS

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Abstract.—A study of the mayfly fauna of the Ozark-Ouachita area of northwestern Arkansas was based on extensive field sampling and the examination of all available collections for the area. A total of 70 nominal species were found in the area, 35 of which are reported as new state records from Arkansas. Many of the newly reported species represent considerable range extensions from their previously known distributions. The mountainous Arkansas fauna is primarily related to that of the Appalachians, however, other faunal elements are also present. Complete distributional data for within the region of study are given for each species along with brief biogeographic annotations.

The geographic region covered by this study (Fig. 1) includes the Ozark and Ouachita Mountains of Arkansas including the intermediate Arkansas River valley, and is representative of the Ozark Plateau in general. Local uplift occurred in this region during the Pliocene creating a considerable number of gradient stream environments, which were contributed to greatly by subsequent groundwater outflow in springs (Ross, 1971). This region has long been one of interest for its unique, often isolated flora and fauna. Aquatic insects are no exception (Ross, 1956; Ross and Ricker, 1971).

The Ephemeroptera fauna has been documented for the relatively nearby areas of Illinois (Burks, 1953) and the southeastern U.S. (Berner, 1977), however, very little has been known concerning the Arkansas area.

Warren et al. (1964) conducted a pre-impoundment study of the Beaver Reservoir Basin of northwestern Arkansas which included Benton, Washington, Carroll, and Madison counties (Fig. 1). Only 18 species of mayflies were listed in this unpublished report. Peters and Warren (1966) published a list of 27 nominal species of Arkansas mayflies based on a year of light trap samples of adults taken in Washington Co. (Site 24, Fig. 1). Another 8 records from this region were scattered throughout the literature making a total of 35 nominal species known from the region previous to this work.

We have verified all previously recorded species and add another 35 species herein to the list, making a total of 70 nominal species known from mountainous Arkansas. Our faunal analysis is based on extensive sampling of the region in 1974 and examinations of the collections of the University of Arkansas, Florida A & M University, Illinois Natural History Survey, and the United States National Museum.

The study has indicated that the mayfly fauna of this region represents

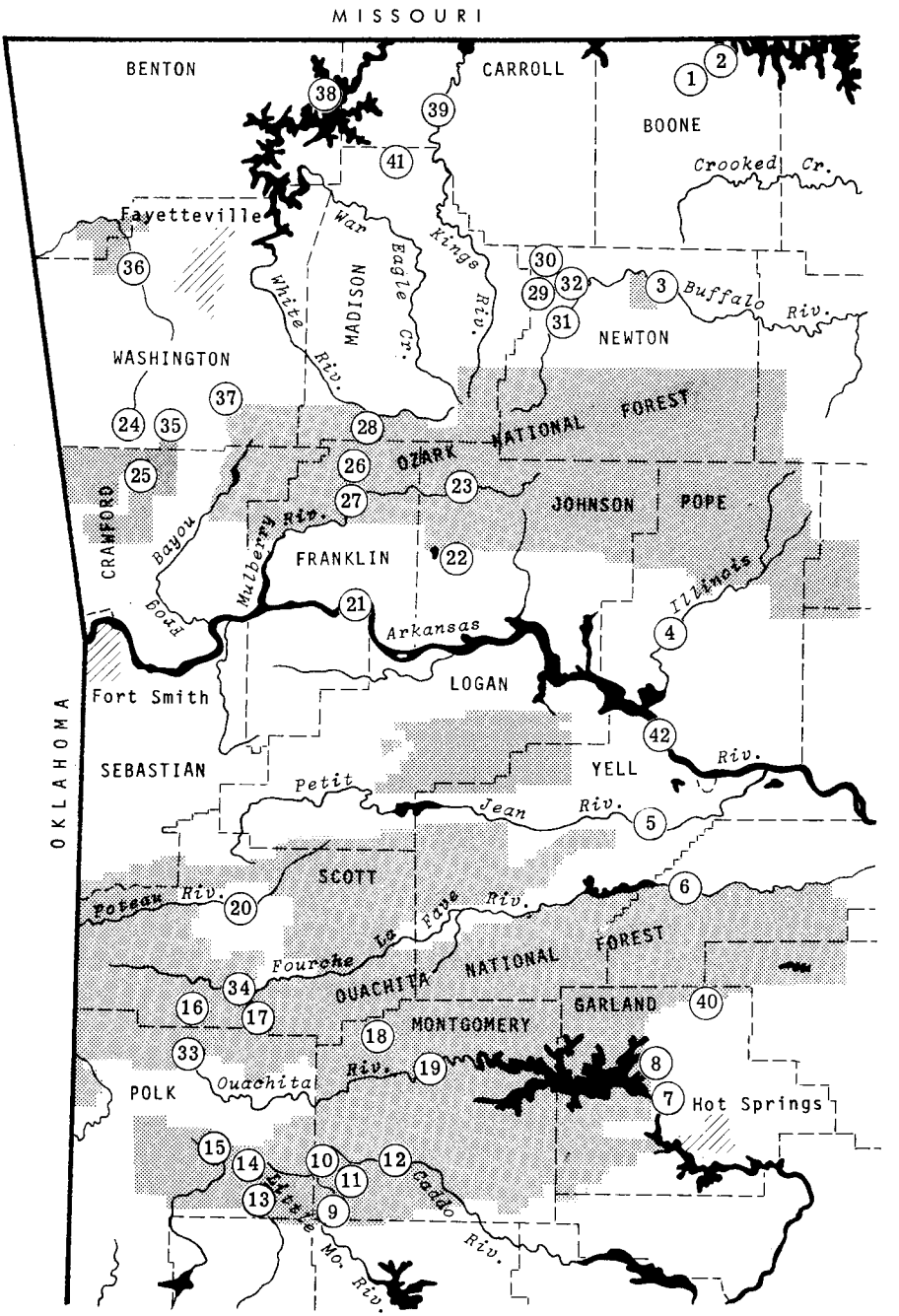

Fig. 1. Geographic area of coverage with site numbers plotted.

primarily a western extension of the Appalachian fauna (particularly as concerns mountain and riffle adapted species). This fauna more than likely dispersed westward via the unglaciated Illinois Ozarks corridor connecting the Cumberland Plateau–Appalachian area with the Ozark–Ouachita area, and is now somewhat isolated. Many of these Arkansas populations are somewhat atypical for the species represented, which would tend to substantiate their relative isolation or fringe status.

A second common element found in this region of Arkansas consists of those species which range generally into the midwest. Some of these species are apparently widely adapted, being common in the east and in states such as Illinois and Indiana. Some, however, are more restricted to the Appalachians, but range into colder flatlands of east-central Canada and the northern tier of midwestern states. A few species have previously been known only from these northern regions.

There is little continuity between the mayfly fauna of the Coastal Plain and Mississippi Abayment and that of the Ozark–Ouachita area except for those species which are very generally widespread. Only possibly 2 species, *Baetis spiethi* and *Stenonema smithae*, range in these areas at the exclusion of all others.

There are apparently no otherwise strictly western mountain faunal elements to be found in mountainous Arkansas, although a few species whose ranges include central, eastern, and northwestern North America are also found in the region of study. Delta areas of eastern Arkansas generally correspond to the Mississippi Abayment and/or the Great Plains in faunal components.

Only 1 mayfly species, *Ephemerella provonshai*, is currently considered to be endemic to the Ozark–Ouachita area (McCafferty, 1977b). However, *Habrophlebiodes annulata*, could be considered such if its type locality of "Oklahoma" could be confirmed for the Ozark area of that state. It should be reiterated that many of the populations are atypical, and with further study may possibly be interpreted as distinct species. We have attempted to be conservative in our verification and identification of materials. Several larval populations were found that may represent new species, but since they could not be reared (in groups where taxonomy has been based primarily on adults), no action was taken.

The mayflies are listed systematically by family and subfamily and alphabetically by genus and species within each subfamily. Newly reported species, representing new state records, are asterisked. All site collection data are given for each species along with pertinent notes concerning variation and biogeography.

In order to economize on space, most collection records are abbreviated and given a number corresponding to those listed below and plotted in Fig. 1. Only locality data which were too general to be pinpointed are

given in full under the species and are not plotted on the map. The deposition of material is indicated thusly: (FAMU) = Florida A & M University, (INHS) = Illinois Natural History Survey, (PU) = Purdue University, (UA) = University of Arkansas, and (USNM) = U.S. National Museum. The abbreviation "L" represents larvae. Deposition, sex, and stage are indicated only for materials being studied for the first time; otherwise, the appropriate literature citations are indicated.

Collection Records

Site No.

1. Boone Co.: Bear Cr. at St. Rd. 14, 3 mi. W. Junct. 281 and 14. V-28-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
2. Boone Co.: Tucker Hollow Rec. Area. V-28-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
3. Newton Co.: Mill Cr. at St. Rd. 7, 1 mi. S. Dogpatch. V-29-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
4. Pope Co.: Illinois R. 7 mi. N. Russellville, at St. Rd. 7. V-29-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
5. Yell Co.: Petit Jean R. at St. Rd. 7, 3 mi. S. Centerville. V-29-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.

6a. Perry Co.: South Fourche R. at St. Rd. 7, N. of Hollis. V-29-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.

6b. Perry Co.: South Fourche R. 16 mi. N. Jessieville. VIII-9-57. W. L. Peters, C. Eberhart.

7. Garland Co.: Stephens Park below Blakely Mnt. Dam and powerhouse. V-29-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
8. Garland Co.: Bear Cr. at Ouachita St. Park. V-30-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
9. Montgomery Co.: Little Missouri R. at Albert Pike Rec. Area. V-30, 31-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
10. Montgomery Co.: Crooked Cr. S. of Little Missouri Falls, Ouachita Nat'l Forest. V-31-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
11. Montgomery Co.: Crooked Cr. 1.5 mi. E. Little Missouri Falls, Ouachita Nat'l Forest. V-31-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
12. Montgomery Co.: Caddo R., .5 mi. E. Cox Springs, at St. Rd. 8. V-31-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
13. Polk Co.: Blaylock Cr. W. of Bard Springs, Ouachita Nat'l Forest. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
14. Polk Co.: Sugar Cr. at Forest Rd. 38, Ouachita Nat'l Forest. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
15. Polk Co.: Mine Cr. at Forest Rd. 25, 8 mi. SE Dallas, Ouachita Nat'l Forest. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.

16. Scott Co.: Johnson Cr. at Johnson Cr. Rd. nr. U.S. Hwy. 71. 8 mi. N. Mena. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
17. Scott Co.: Mill Cr. at Mill Cr. Picnic Area, Ouachita Nat'l Forest. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
18. Montgomery Co.: Big Brushy Cr. at Big Brushy Rec. Area at U.S. Hwy. 270, Ouachita Nat'l Forest. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
19. Montgomery Co.: Ouachita R. at Rocky Shoals Boat Camp at U.S. Hwy. 270. VI-1-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
20. Scott Co.: Poteau R. at U.S. Hwy. 71, 1 mi. N. Waldron. VI-2-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
21. Franklin Co.: Arkansas R. at Webb City nr. dam. VI-2-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
22. Johnson Co.: Trib. of Horsehead Lake, Horsehead Lake Rec. Area, Ozark Nat'l Forest. VI-2-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
23. Johnson Co.: Mulberry R. 1 mi. W. Ozark, Ozark Nat'l Forest. VI-2-74. W. P. McCafferty, A. V. Provonsha, L. Dersch.
24. Washington Co.: Low Hollow and Cove Creeks, 15 mi. S. Prairie Grove. (Peters and Warren, 1966).

25a. Crawford Co.: Lee Cr., Lee Cr. Camp. IV-30-72, R. W. Baumann.

25b. Crawford Co.: Lee Cr., 12 mi. NE. Cedarville. VIII-15-57. W. L. Peters, C. Eberhart.

26. Franklin Co.: Fane Cr., Hwy. 23 nr. Cass. IV-29-72. R. W. Baumann.
27. Franklin Co.: Mulberry R., Hwy. 43, at Turners Bend. IV-29-72. R. W. Baumann.
28. Madison Co.: Mill Cr. at Hwy. 16, nr. Combs. IV-29-72. R. W. Baumann.
29. Newton Co.: Add Cr., Hwy. 43, Ponca. III-25-72. R. W. Baumann and S. W. Szczytko.
30. Newton Co.: Lost Valley St. Pk. III-25-72. R. L. Furgason.
31. Newton Co.: Buffalo R. Hwy. 74, nr. Ponca. III-25-72. R. W. Baumann.
32. Newton Co.: Whitely Cr. Hwy. 43, nr. Lost Valley St. Pk. III-25-72. R. W. Baumann and S. W. Szczytko.
33. Polk Co.: Ouachita R., Hwy. 71, nr. Acorn. IV-30-72. R. W. Baumann.
34. Scott Co.: Mill Cr., Hwy. 71 nr. "Y" City. IV-30-72. R. W. Baumann.
35. Washington Co.: Lee Cr., Devil's Den St. Pk. IV-29-72. R. W. Baumann.
36. Washington Co.: Muddy Fork Illinois R. nr. Lake Wedington. IV-28-72. R. W. Baumann.
37. Washington Co.: W. Fk. White R., Hwy. 71, Brentwood. IV-29-72. R. W. Baumann.

38. Benton Co.: White R. 9.5 mi. S. Gateway. VIII-8-57. W. L. Peters and C. Eberhart.
39. Carrol Co.: Kings R. 9.5 mi. SE. of Eureka Springs. VIII-8-57. W. L. Peters, C. Eberhart.
40. Garland Co.: Iron Springs, Iron Sp. Camp, 5 mi. N. Jessieville. VIII-9-57. W. L. Peters, C. Eberhart.
41. Madison Co.: Stream, 13 mi. S. Eureka Springs. VIII-8-57. W. L. Peters, C. Eberhart.
42. Yell Co.: Arkansas R., Dardanelle. VIII-8-57. W. L. Peters, C. Eberhart.

Family Siphlonuridae
Subfamily Siphlonurinae
Genus *Ameletus* Eaton

Ameletus lineatus Traver

WASHINGTON CO.: 3L, White R., III-16-69, E. P. Mason and R. Thompson, (UA).

This widespread eastern species is probably the only representative of the genus occurring in Arkansas. Its color pattern is somewhat atypical in the region.

Genus *Siphlonurus* Eaton

Siphlonurus marshalli Traver

FRANKLIN CO.: 7L, Mulberry R., III-22-69, S. Webb, (UA). WASHINGTON CO.: Site 24, Peters and Warren (1966); 1L, II-27-69, R. Thompson, (UA); 1 ♂, IV-4-69, M. Guterriez, (UA).

This species was originally described from Randolph Co. in northeastern Arkansas, and is generally known from the central U.S.

Subfamily Isonychiinae
Genus *Isonychia* Eaton

Isonychia bicolor (Walker)

BENTON CO.: 1L, War Eagle Cr., II-15-65, Iovino, (UA); 1L, IV-18-63, Wingfield, (UA). WASHINGTON CO.: Site 24, Peters and Warren (1966); 3L, X-1-66, T. H. Wilson, (UA). Also Warren et al. (1964).

This is a widespread and common eastern and central mayfly species. Larvae should be identified with caution (preferably by rearing) since species limits, and larval characters are not well understood at this time.

Isonychia rufa McDunnough

BENTON CO.: 1♂, VI-15-66, B. F. Jordan, (FAMU). BOONE CO.: 12L, Site 1, (PU). JOHNSON CO.: 2L, Site 23, (PU). MONTGOMERY CO.: 2 ♂♂, 6L, Site 9, (PU); 6 ♂♂, 6 ♀♀, 20L, Site 19, (PU). NEWTON CO.: 15L, Site 3, (PU). POPE CO.: 4L, Site 4, (PU). WASHINGTON CO.: 8♂♂, 3♀♀, VII-23-64, B. F. Jones, (UA). Also Warren et al. (1964).

As for much of eastern and central North America, this is the most common species of *Isonychia* to be found in the region.

Family Baetidae
Subfamily Baetinae
Genus *Baetis* Leach

**Baetis frondalis* McDunnough

GARLAND CO.: 6L, Site 7, (PU). MONTGOMERY CO.: 15L, Site 11, (PU); 32L, Site 12, (PU); 16L, Site 19, (PU).

This species was found commonly in the Ouachita Mountains. It is known from the southern Appalachians and Canada with some possible records in Illinois.

**Baetis hageni* Eaton

NEWTON CO.: 1♂, 3 ♀♀, 30L, Site 3, (PU).

This new record represents a westward range extension for this species.

**Baetis intercalaris* McDunnough

CRAWFORD CO.: 1 ♂, 1 ♀, Site 25a, (USNM). MONTGOMERY CO.: 15L, Site 9, (PU); 3L, Site 10, (PU); 1 ♂, 3 ♀♀, Site 11, (PU); 1 ♂, 3 ♀♀, 16L, Site 12, (PU). POLK CO.: 1L, Site 13, (PU); 7L, Site 14, (PU); 5L, Site 15, (PU). SCOTT CO.: 4L, Site 17, (PU). WASHINGTON CO.: 1 ♂, Illinois R., IV-13-71, J. Bee, (UA).

This is a common and distinctive species in mountainous Arkansas as it is throughout eastern and central North America.

Baetis levitans McDunnough

WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This species was not taken by us, and evidently has a short emergence in late May and early June within the region (Peters and Warren, 1966).

Baetis ochris Burks

GARLAND CO.: 3♂♂, Mt. Pine, VI-5-37, H. H. Ross, (INHS). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This species is known only from adults taken in Arkansas and Illinois.

Baetis pygmaeus (Hagen)

GARLAND CO.: 1 ♂, Mt. Pine, VI-5-37, H. H. Ross, (INHS). MONTGOMERY CO.: 5L, Site 19, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This species is primarily Appalachian in its distribution.

**Baetis spiethi* Berner

PERRY CO.: 2L, Site 6a, (PU).

A comparison with Berner's Florida material of this species confirmed its identification, since the color pattern is very unique (Berner, 1950). This is a rare example of a mayfly being known from the Ozark–Ouachita area and the extreme southeastern U.S. only.

Genus *Centroptilum* Eaton

Centroptilum rufostrigatum McDunnough

BOONE Co.: 1 ♂, Site 1, (PU). MONTGOMERY CO.: 1 ♂, 1 ♀, Site 9, (PU); 5L, Site 19, (PU). POLK CO.: 6L, Site 15, (PU). SCOTT CO.: 3L, Site 16, (PU); 5L, Site 17, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This species is also known from the northern midwest and Canada.

Genus *Cloeon* Leach

Cloeon rubropictum McDunnough

BOONE CO.: 1♂, Site 1, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This species, which is widespread in central and eastern North America, has been taken only in the northern part of the region of study.

Genus *Pseudocloeon* Klapalek

**Pseudocloeon anoka* Daggy

MONTGOMERY CO.: 1 ♂, 1 ♀, 11L, Site 9, (PU).

This new record represents a considerable range extension for the species, which has been known only from the northern midwest.

**Pseudocloeon carolina* Banks

BOONE CO.: 45 ♀♀, 3L, Site 1, (PU). JOHNSON CO.: 2L, Site 22, (PU); 6L, Site 23, (PU). MONTGOMERY CO.: 2L, Site 9, (PU); 7L, Site 10, (PU); 7L, Site 11, (PU); 16L, Site 12, (PU). POLK CO.: 5L, Site 13, (PU); 2L, Site 14, (PU).

This species represents a good example of a primarily Appalachian species ranging into mountainous Arkansas.

**Pseudocloeon cingulatum* McDunnough

JOHNSON CO.: 2L, Site 23, (PU). MONTGOMERY CO.: 1L, Site 9, (PU); 1L, Site 12, (PU). SCOTT CO.: 1L, Site 16, (PU); 1L, Site 17, (PU).

This species has been known previously only from eastern Canada and the southern Appalachians.

**Pseudocloeon dubium* (Walsh)

MONTGOMERY CO.: 1 ♂, Site 9, (PU); 1L, Site 12, (PU). SCOTT CO.: 1 ♂, Mill Cr. Rec. Area, W. of "Y" City, IV-1-73, J. Westbrook, (UA); 1L, Site 17, (PU).

This is a rather widespread species in eastern and central North America and is easily distinguishable as larvae.

**Pseudocloeon parvulum* McDunnough

BOONE CO.: 2L, Site 1, (PU). JOHNSON CO.: 1L, Site 23, (PU).

This is another widespread central and eastern North American species extending westward into western Arkansas.

Family Heptageniidae
Subfamily Heptageniinae
Genus *Heptagenia* Walsh

**Heptagenia aphrodite* McDunnough

GARLAND CO.: 7L, Site 7, (PU). MONTGOMERY CO.: 13 ♂♂, 20 ♀♀, 17L, Site 9, (PU); 4L, Site 10, (PU); 33L, Site 12, (PU); 1 ♂, 12 ♀♀, 9L, Site 19, (PU). POLK CO.: 13L, Site 14, (PU). WASHINGTON CO.: Site 24. Peters and Warren (1966).

This is a primarily Appalachian species. It had been previously identified in part as *H. umbratica* by Peters and Warren (1966).

Heptagenia flavescens (Walsh)

NEWTON CO.: 2 ♂♂, V-3-69, L. Otwell, (UA). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This is more typically a warm water species being common in the the Coastal Plain, Mississippi Abayment, and throughout the central plains area south to Texas.

**Heptagenia hebe* McDunnough

JOHNSON CO.: 5L, Site 22, (PU); 15L, Site 23, (PU). MONTGOMERY CO.: 9 ♀♀, Site 19, (PU).

This is a widespread species with distinctive larvae.

Heptagenia inconspicua McDunnough

BOONE CO.: 5L, Site 1, (PU). MONTGOMERY CO.: 13 ♂♂, 5 ♀♀, 30L, Site 9, (PU); 6L, Site 10, (PU); 1 ♂, 20L, Site 19, (PU), WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

The larvae of this fairly common species of *Heptagenia* were recently described by McCafferty (1977a).

Heptagenia maculipennis Walsh

GARLAND CO.: 1 ♂, Mt. Pine, VI-5-1937, H. H. Ross (INHS). NEWTON CO.: 7L, Site 3, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This may be the most common species of *Heptagenia* encountered in the midwest, and is found in a wide range of stream and river habitats.

**Heptagenia minerva* McDunnough

MONTGOMERY CO.: 8 ♂♂, 10 ♀♀, 8L, Site 12, (PU); 4L, Site 19, (PU). POLK CO.: 2L, Site 15, (PU).

The larvae of this species were recently described by McCafferty (1977a). The species is not very common, but is evidently scattered throughout central and eastern North America.

**Heptagenia perfida* McDunnough

MONTGOMERY CO.: 1L, Site 9, (PU).

This species is very distinctive as both adults and larvae. Its previous recorded distribution included only eastern Canada, however, we have taken it in scattered localities in the midwest.

Heptagenia umbratica McDunnough

GARLAND CO.: 5L, Site 7, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This species is known only from mountainous Arkansas and Quebec; however, it should be pointed out that adults may be very easily confused with *H. aphrodite* and sometimes *H. hebe*, and this may account for a disparity of records.

Genus *Rhithrogena* Eaton

**Rhithrogena pellucida* Daggy

BENTON CO.: 1 ♂, War Eagle Cr., IV-17-63, D. F. Gibson and L. Aggus, (FAMU). BOONE CO.: 1L, Site 1, (PU). CRAWFORD CO.:

3 ♂♂, 9 ♀♀, Site 25a, (USNM). FRANKLIN CO.: 1 ♂, Site 27, (USNM). WASHINGTON CO.: 1L, Site 35, (USNM).

This is primarily a cold water, riffle species from the upper midwest. One record exists for Alabama. Many other species of *Rhithrogena* are known from mountainous regions of the east and west.

Genus *Stenacron* Jensen

Stenacron interpunctatum (Say)

BENTON CO.: 1 ♂, IV-29-69, B. Gresham, (UA). BOONE CO.: 2 ♀♀, Site 1, (PU). GARLAND CO.: 3 ♂♂, 3 ♀♀, 9L, Site 7, (PU). JOHNSON CO.: 4L, Site 23, (PU). MONTGOMERY CO.: 3 ♂♂, 5 ♀♀, 10L, Site 9, (PU); 9♂♂, 1♀, 2L, Site 10, (PU); 7♂♂, 1♀, 2L, Site 12, (PU); 2♂♂, 15 ♀♀, 15L, Site 19, (PU). NEWTON CO.: 3L, Site 3, (PU). POLK CO.: 1L, Site 14, (PU); 1♂, Site 15, (PU). SCOTT CO.: 6L, Site 16, (PU); 9L, Site 20, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966); 1L, Clear Cr., X-9-65, I. Brown, (UA); 1 ♀, IV-20-69, J. Kimbrow, (UA); 3L, Clear Cr., V-2-69, (UA). Also Warren et al. (1964).

This is a highly variable and relatively ubiquitous mayfly of running waters throughout the eastern half of North America.

Genus *Stenonema* Traver

**Stenonema bipunctatum* (McDunnough)

BOONE CO.: 1 ♂, Site 2, (PU). MONTGOMERY CO.: 1 ♂, Site 9, (PU).

This record extends the known range of this species westward. It may be most common in the southeast (Berner, 1977).

**Stenonema exiguum* Traver

MONTGOMERY CO.: 15L, Site 19, (PU). YELL CO.: 12L, Site 5, (PU); 3 ♂♂, Site 42, (FAMU).

This species was previously known only from the midwest and southeast.

Stenonema integrum (McDunnough)

BENTON CO.: 2L, V-23-66, (UA). WASHINGTON CO.: Lewis (1974). YELL CO.: 29 ♂♂, 4 ♀♀, Site 42, (FAMU).

This species is known throughout eastern and central North America. Mountainous Arkansas represents its southwestern limits.

**Stenonema luteum* (Clemens)

MONTGOMERY CO.: 1 ♂, 1 ♀, Site 9, (PU).

This species is absent from the Appalachian area and is apparently of more northern affinity in Canada and the midwest.

**Stenonema nepotellum* (McDunnough)

BOONE CO.: 15 ♂♂, 30 ♀♀, 18L, Site 1, (PU). CARROLL CO.: 15L, Site 39, (FAMU). MONTGOMERY CO.: 11L, Site 9, (PU); 1L, Site 10, (PU); 5L, Site 11, (PU); 1L, Site 12, (PU); 2 ♂♂, 15 ♀♀, 6L, Site 19, (PU). NEWTON CO.: 1L, Lost Valley St. Prk., III-25-72, R. L. Furgason, (USNM). POLK CO.: 2L, Site 14, (PU); 2L, Site 15, (PU).

This is primarily an Appalachian species which does range somewhat into the midwest.

**Stenonema pulchellum* (Walsh)

BOONE CO.: 5L, Site 1, (PU). CARROLL CO.: 4L, Site 39, (FAMU). MONTGOMERY CO.: 18L, Site 9, (PU). NEWTON CO.: 35L, Site 3, (PU). POPE CO.: 2L, Site 4, (PU).

This species is widespread throughout eastern and central North America, although this new record may represent its southwestern limits. It is known from moderate sized rivers in mountainous Arkansas.

Stenonema rubromaculatum (Clemens)

MONTGOMERY CO.: 17♂♂, 1♀, Site 9, (PU); 1♂, Site 12, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

Arkansas populations of this species are widely disjunct from the northeastern and north-central populations which typify the species.

**Stenonema smithae* Traver

WASHINGTON CO.: 42 ♂♂, Site 24, Peters and Warren (1966).

This is an unusual case where the species is known from the flatlands of the southeast and from northwestern Arkansas. The type of aquatic habitat it occupies is not known since it is known only from adult collections.

**Stenonema terminatum* (Walsh)

JOHNSON CO.: 1L, Site 23, (PU). PERRY CO.: 6L, Site 6a, (PU). SCOTT CO.: 2L, Site 17, (PU).

This is the only case we know of where a mountainous Arkansas species also occurs in western mountainous areas. This species is obviously of a more eastern origin, however.

Stenonema tripunctatum scitulum (Traver)

CRAWFORD CO.: 5 ♂♂, 4 ♀♀, Site 25b, (FAMU). JOHNSON CO.: 6 ♂♂, Site 23, (PU). MONTGOMERY CO.: 24 ♂♂, 7 ♀♀, Site 9, (PU); 31 ♂♂, 15 ♀♀, Site 19, (PU). POPE CO.: 3 ♂♂, Site 4, (PU). WASHINGTON CO.: Lewis (1974); 3 ♂♂, 1 ♀, V-10-67, J. Kimbrough, (UA); 1 ♂, IV-5-69, J. Kimbrough, (UA); 1 ♂, Site 24, (*Stenonema* sp. B. in part of Peters and Warren, 1966).

Mayflies which will key to this subspecific designation (Lewis, 1974) are known primarily from the Ozark Plateau, and lower Appalachians. Part of what Peters and Warren (1966) had called *Stenonema* sp. B. agree with the description of this group.

Stenonema tripunctatum tripunctatum (Banks)

BOONE CO.: 1 ♀, Site 2, (PU). FRANKLIN CO.: 3 ♂♂, 2 ♀♀, Site 26, (USNM); 1 ♂, 1 ♀, Site 27, (USNM). MADISON CO.: 1 ♂, War Eagle Cr., IV-17-63, L. Aggus, (FAMU). NEWTON CO.: 1 ♂, V-3-69, L. Otwell, (UA). 1 ♀, Whitely Cr., Hwy. 43 nr. Lost Valley St. Pk., III-25-72, R. W. Baumann and S. W. Szczytko, (USNM) (see Site 31, Fig. 1). POLK CO.: 1 ♂, 1 ♀, Site 15, (PU); 1 ♂, 1 ♀, Site 33, (USNM). SCOTT CO.: 1 ♂, 1 ♀, Site 34, (USNM). WASHINGTON CO.: Site 24, Peters and Warren (1966); 35 ♂♂, 7 ♀♀, Site 36, (USNM); 5 ♂♂, Site 37, (USNM); 1 ♂, 2 ♀♀, V-11-69, J. Johnson, (UA). Also Warren et al. (1964).

This is a generally widespread form throughout eastern and central North America. There may be some doubt as to its systematic status since it obviously overlaps with *S. t. scitulum* and may intergrade in character states with some other currently recognized species of *Stenonema* (Lewis, 1974).

Family Caenidae
Subfamily Caeninae
Genus *Caenis* Stephens

**Caenis amica* Hagen

MONTGOMERY CO.: 20 ♂♂, 10 ♀♀, Site 9, (PU).

This is primarily an Appalachian species. Larvae were not associated with this species.

**Caenis anceps* Traver

MONTGOMERY CO.: 1 ♂, Site 19, (PU). YELL CO.: 12 ♂♂, 93 ♀♀, Site 42, (FAMU).

This species has previously been known from widely scattered localities in New York, Missouri, Alabama, and Tennessee.

**Caenis hilaris* (Say)

BOONE CO.: 25 ♂♂, 55 ♀♀, Site 1, (PU). MONTGOMERY CO.: 10 ♂♂, 5 ♀♀, Site 9, (PU); 20 ♂♂, 15 ♀♀, Site 19, (PU).

This is a distinctive species found throughout eastern and central North America, developing in good size rivers and streams.

Caenis simulans McDunnough

BOONE CO.: 4 ♂♂, 20 ♀♀, Site 1, (PU). WASHINGTON CO.: Site

24, Peters and Warren (1966); 28 ♂♂, 10 ♀♀, Site 36, (USNM). Also Warren et al. (1964).

This is a very widespread mayfly species, being found throughout North America north of Mexico. This may be the most common pond and lake dwelling *Caenis*.

Family Ephemerellidae
Subfamily Ephemerellinae
Genus *Ephemerella* Walsh
Subgenus *Attenella* Edmunds

**Ephemerella attenuata* McDunnough

JOHNSON CO.: 2L, Site 23, (PU). MONTGOMERY CO.: 2L, Site 9, (PU).

This is primarily an eastern Appalachian species, although it does range into the southern Coastal Plain. The Ozark–Ouachita record is a disjunct western range extension.

Subgenus *Dannella* Edmunds

Ephemerella provonshai McCafferty

JOHNSON CO.: Site 23, McCafferty (1977b).

This species is known only from the region of coverage, and is the only member of the subgenus known from the Ozark–Ouachita area.

Subgenus *Ephemerella* s.s.

**Ephemerella catawba* Traver

FRANKLIN CO.: 1 ♂, Site 26, (USNM).

This is a southern Appalachian species primarily.

**Ephemerella invaria* (Walker)

MONTGOMERY CO.: 3L, Site 9, (PU). NEWTON CO.: 18L, Site 30, (USNM); 4L, Site 31, (USNM).

This species is widespread throughout most of central and eastern North America. Young larvae of this species may be very difficult to identify.

Subgenus *Eurylophella* Tiensuu

**Ephemerella bicolor* Clemens

MONTGOMERY CO.: 1L, Site 11, (PU); 11L, Site 12, (PU). POLK CO.: 1L, Site 15, (PU).

This species is primarily a northern and Appalachian species. It has been previously known from the Missouri Ozarks, and thus may have been expected to occur in northwestern Arkansas.

**Ephemerella funeralis* McDunnough

SCOTT CO.: 1L, Site 16, (PU).

This is primarily an Appalachian species that is also known from scattered localities in the midwest.

**Ephemerella lutulena* Clemens

WASHINGTON CO.: 3L, Clear Cr., X-9-65, I. Brown, (UA).

This is primarily a northeastern and north-central species ranging south of the Ozark–Ouachita area and the southern Appalachians.

**Ephemerella versimilis* McDunnough

CARROLL CO.: 2L, III-1-63, Wingfield, (UA).

This is primarily an Appalachian species with is previous most western known range in eastern Kentucky.

Subgenus *Serratella* Edmunds

**Ephemerella serratoides* McDunnough

BOONE CO.: 3 ♂♂, 4 ♀♀, Site 1, (PU). JOHNSON CO.: 1L, Site 22, (PU); 5L, Site 23, (PU). MONTGOMERY CO.: 5 ♂♂, 9 ♀♀, 15L, Site 9, (PU); 9 ♀♀, Site 19, (PU). PERRY CO.: 5L, Site 6a, (PU). POPE CO.: 6L, Site 4, (PU). SCOTT CO.: 1L, Site 17, (PU).

This species is found commonly throughout the Ozark–Ouachita area and is also generally known from throughout much of eastern North America including the Appalachians. Its Arkansas records represent a considerable range extension.

Ephemerella sordida McDunnough

WASHINGTON CO.: Site 24, Peters and Warren (1966).

This is apparently a cold water species being found in mountainous regions of eastern North America, central Canada, and the northern midwest (1 record exists for a trout stream in extreme northern Indiana).

Family Trichorythidae
Subfamily Leptohyphinae
Genus *Trichorythodes* Ulmer

Trichorythodes atratus (McDunnough)

NEWTON CO.: 18L, Site 3, (PU). SCOTT CO.: 9L, Site 17, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This species is generally widespread in central North America with

southern disjunct populations in the southern Appalachians and the Ozark–Ouachita area. Other distinctive larvae of Trichorythodes were also taken in the region but could not be assigned a specific name.

Family Leptophlebiidae
Subfamily Leptophlebiinae
Genus *Choroterpes* Eaton

**Choroterpes basalis* (Banks)

MONTGOMERY CO.: 2 ♂♂, Site 9, (PU); 3 ♂♂, 5L, Site 19, (PU). SCOTT CO.: 3L, Site 17, (PU).

This record represents the southwestern limits of this primarily northeastern species. The larvae apparently prefer slow moving yet well oxygenated water.

Genus *Habrophlebioides* Ulmer

**Habrophlebioides americana* (Banks)

JOHNSON CO.: 27 ♂♂, 4L, Site 23, (PU). MONTGOMERY CO.: 32 ♂♂, Site 18, (PU).

This genus has not been known from Arkansas previously. *H. americana* has been widely known from throughout central and eastern North America.

**Habrophlebioides annulata* Traver

JOHNSON CO.: 5 ♂♂, 7L, Site 22, (PU); 5 ♂♂, Site 23, (PU). SCOTT CO.: 16 ♂♂, 9L, Site 16, (PU).

This species may be endemic to the Ozark–Ouachita area. It has been previously known only from the type material taken in Oklahoma (Traver, 1934). Unfortunately, specific type locality data is not known but may possibly be in the Ozark area of far eastern Oklahoma. The species is distinct from *H. americana*.

Genus *Leptophlebia* Westwood

Leptophlebia cupida (Say)

NEWTON CO.: 1 ♂, Buffalo R. at Hwy. 21, III-8-63, D. A. White and M. Wall, (INHS) (see Site 31, Fig. 1); 1 ♂, 4 ♀♀, Site 31, (USNM). WASHINGTON CO.: Site 24, Peters and Warren (1966); 2 ♂♂, VI-22-67, Berman, (UA); 1 ♀, IV-1-69, L. Otwell, (UA); 5 ♂♂, III-20-69, S. Webb, (UA); 3 ♂♂, 3 ♀♀, III-16-48, L. O. Warren, (INHS).

This species is primarily a cold water form, requiring ice formation in the winter. It ranges across Canada, into the midwest, and into the southern

Appalachians. It is most likely northern in orgin, dispersing southward where temperatures or high altitudes permit.

Genus *Paraleptophlebia* Lestage

Paraleptophlebia guttata (McDunnough)

BENTON CO.: 2L, II-25-63, D. A. Hite, (UA). GARLAND CO.: 6 ♂♂, 13 ♀♀, 9L, Site 7, (PU). JOHNSON CO.: 16 ♂♂, 1 ♀, 1L, Site 23, (PU). MONTGOMERY CO.: 1L, Site 10, (PU); 5L, Site 12, (PU). POLK CO.: 1 ♂, Site 15, (PU). SCOTT CO.: 8 ♂♂, 2 ♀♀, Site 16, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966); 5L, Site 35, (USNM).

This distinctive species is widely distributed throughout eastern and central North America.

**Paraleptophlebia mollis* (Eaton)

MONTGOMERY CO.: 1 ♂, 1 ♀, 1L, Site 12, (PU). POLK CO.: 1L, Site 15, (PU).

This is primarily an Appalachian species, most common in the northeast.

Family Potamanthidae
Subfamily Potamanthinae
Genus *Potamanthus* Pictet

Potamanthus distinctus Traver

BENTON CO.: 2 ♂♂, 2 ♀♀, VI-3-63, L. Aggus, (FAMU); 30 ♂♂, 10 ♀♀, VI-24-63, L. Aggus, (FAMU); 1 ♂, VI-15-64, B. F. Jones, (FAMU); 3 ♂♂, 2♀♀, VII-16-63, B. F. Jones, (FAMU). WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This is primarily an Appalachian species with some records from the Ohio Valley area. It may be the most common *Potamanthus* in eastern North America.

Potamanthus myops (Walsh)

BENTON CO.: 10 ♂♂, VI-24-63, L. Aggus, (FAMU); 12 ♂♂, 3 ♀♀, VI-15-64, B. F. Jones, (FAMU). WASHINGTON CO.: Site 24, Peters and Warren (1966); 1L, Beaver Lake, XI-16-63, T. H. Wilson, (UA). Also Warren et al. (1964).

This species is widespread through central and eastern North America from Kansas to Virginia.

Potamanthus neglectus Traver

BENTON CO.: 4L, VI-13-63, Wingfield, (UA); 15 ♂♂, 5 ♀♀, VI-24-63, L. Aggus, (FAMU).

This species is currently known from the south-central region and the

northeast. The larvae reported here are only tentatively identified since they were not reared (see McCafferty, 1975).

Potamanthus rufous Argo

BOONE CO.: 2 ♂♂, Site 1, (PU). MONTGOMERY CO.: Site 19, McCafferty (1975). WASHINGTON CO.: McCafferty (1975).

This species has been taken in scattered localities from eastern and central North America, from New York to Minnesota to Arkansas.

Family Polymitarcyidae
Subfamily Polymitarcyinae
Genus *Ephoron* Williamson

Ephoron album (Say)

MONTGOMERY CO.: 5L, Site 19, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This is a widespread western and midwestern species; it is probably of midwestern origin.

Subfamily Campsurinae
Genus *Tortopus* Needham and Murphy

Tortopus primus (McDunnough)

WASHINGTON CO.: 12 ♀♀, summer, 1958, L. O. Warren, (FAMU).

This is a central North American species. The exact location where the larvae occur in the Ozark–Ouachita areas is not known at this time.

Family Ephemeridae
Subfamily Ephemerinae
Genus *Ephemera* Linnaeus

Ephemera simulans Walker

WASHINGTON CO.: 2L, Waddington, V-13-70, A. Underwood, (UA); 1L, X-17-65, Gladden, (UA); 6L, Beaver, V-13-66, T. H. Wilson, (UA); 1 ♀, V-11-69, R. Thompson, (UA); Site 24, Peters and Warren (1966). Also Warren et al. (1964).

This is the most widespread species of *Ephemera* in North America occurring in most regions excluding the southwest and extreme southeast.

Genus *Hexagenia* Walsh

Hexagenia bilineata (Say)

FRANKLIN CO.: 15 ♂♂, Site 21, (PU). WASHINGTON CO.: Site 24, Peters and Warren (1966).

This is a wide ranging species being found throughout much of eastern and central North America. It is not regarded to be a mountainous form, but rather a big river burrower. Adults were taken along the Arkansas River.

Hexagenia limbata (Serville)

BENTON CO.: 1 ♀, VI-24-63, L. Aggus, (FAMU). WASHINGTON CO.: Site 24, Peters and Warren (1966). YELL CO.: 2♀♀, Site 42, (FAMU). Also Warren et al. (1964).

This may be the most wide ranging mayfly species in North America. Its affinities are not necessarily with mountainous environments.

Hexagenia munda Eaton

BOONE CO.: Site 1, McCafferty (1975). MONTGOMERY CO.: Site 19, McCafferty (1975).

This burrowing mayfly is found in habitats throughout eastern and central North America. Its affinities are not necessarily with mountainous environments.

Family Palingeniidae
Subfamily Pentageniinae
Genus *Pentagenia* Walsh

Pentagenia vittigera (Walsh)

WASHINGTON CO.: Site 24, Peters and Warren (1966); 4 ♀♀, IX-1-68, B. Schiefer and J. Kimbrough, (UA); 1 ♀, IV-20-69, B. Schiefer, (UA). Also Warren et al. (1964).

This is a big river burrowing mayfly that is known from throughout central and southeastern North America. Interestingly, it is conspicuously absent from the Appalachians.

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