

Observations of the Mayfly Fauna of a Stream in Central Virginia¹

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Interest of the author in the mayfly fauna of the Piney River in central Virginia was stimulated in the spring of 1953 when several trips were made to this area to study aquatic insects. On one of these occasions a large number of adult mayflies were seen swarming, and the question arose as to how many species of mayflies might occur in the area. The opportunity to answer this question was made possible when several members of the University of Virginia faculty initiated an ecological survey on the river. The writer's cooperation with this project began in June, 1953.

The chief contribution of the present study of the mayflies of Piney River is similar to others which result from explorations into a poorly known faunistic area. Of necessity, considerable effort was expended in ascertaining what species are present in the area; however, the attempt to determine the spatial and ecological distribution of the several species was considered to be primary throughout the course of the study. Anticipated difficulty arose in that a study of the spatial and ecological distribution of the nymphs alone is hardly possible if one wishes to know with what species he is dealing; thus, it was necessary to obtain imagoes from the area. Some of the latter were collected in the conventional manner with the aid of a net; a few were attracted to a light-trap which was used in the late evening hours; and a number of specimens were reared from nymphs brought into the laboratory.

At the present time thirty-six species have been found in the area. Only twenty-five have been assigned specific names, and those without specific names have been designated as "species" and must await the correlations of the nymphal stages with the adult insects.

Previous Work on Virginia Mayflies

Little work has been done on the mayflies (of the state) of Virginia. Available published records indicate that only seventeen species have been reported prior to this work. The earliest record appeared in 1910 when Banks described *Heptagenia marginalis* from Glencarlyn and Great Falls, Fairfax County, Virginia. In 1914 he also described *Callibaetis pretiosus* from the latter locality.

Speith (1941) reported *Hexagenia munda marilandica* Traver from Fairfax County, and Surber (1951) listed ten additional species from the St. Mary's River in Augusta County. Those species which Surber lists are *Stenonema varium* Traver, *Stenonema fuscum* (Clemens), *Stenonema pul-*

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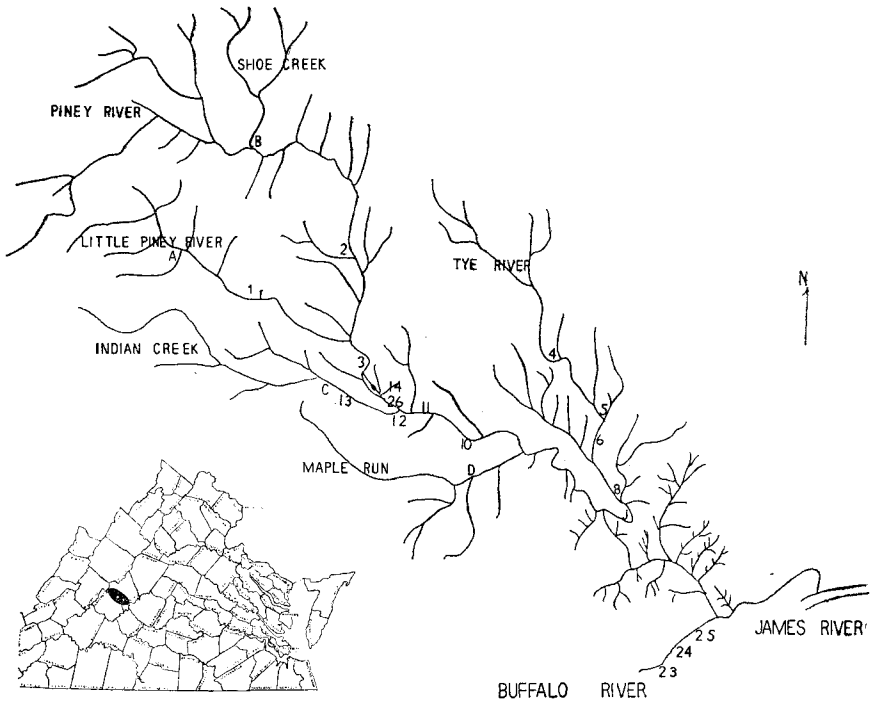


FIGURE 1.—Stations on the Piney, Tye, and Buffalo rivers from which mayflies were collected.

chellum (Walsh), *Stenonema heterotarsale* (McDunnough), *Isonychia sadleri* Traver, *Paraleptophlebia mollis* Eaton, *Ephemerella subvaria* McDunnough, *Baetis cingulatus* McDunnough, and *Pseudocloeon carolina* Banks.

The most recent work in which Virginia mayflies are treated is that of Burks (1953) in which he cites no specific localities but records the following species from the State: *Hexagenia atrocaudata* McDunnough, *Hexagenia bilineata* (Say), *Ephemerella dorothea* Needham, *Ephemerella funeralis* McDunnough, *Stenonema pudicum* (Hagen), and *Heptagenia marginalis* Banks.

Piney River

Piney River rises on the eastern slope of the Blue Ridge Mountains from spring and seepage areas, and flows eastward through portions of Nelson and Amherst counties. Much of the river is accessible by primary and secondary roads, but its upper reaches lie in rugged terrain which cannot be reached except on foot. It is a typical mountain stream in the Blue Ridge Province, and may be classified as a trout stream. Its headwaters lie at an elevation of approximately 3,100 feet, where small tributaries converge to form the river proper.

Along its course, the river, flowing over Precambrian strata, is fed by several large tributaries of which the largest is the Little Piney River, the headwaters of which lie at an elevation of 3,250 feet.

Piney River drains some 70 square miles, traveling approximately seventeen miles before converging with the Tye River, and the latter subsequently with the Buffalo River. The confluence of these three streams a large tributary of the James River. The Piney, Tye, and Buffalo rivers drain a total of about 416 square miles. At Station 10 (see Figure 1) the rate of flow varied from approximately four to 64 cubic feet per second. The water level, in general, is highest in the spring, and is lowest in late summer and fall.

ANNOTATED LIST AND DISTRIBUTION OF MAYFLIES³

Family Ephemeridae. Nymphs of this family are burrowers and are found in mud and silt-bottomed pools along the shore of the stream. *Ephemera guttulata* Pictet was collected only at Station 1. No last instar nymphs were recorded, but adults were taken here in May. A single adult specimen of *Ephemera varia* Eaton was taken at Station 1 in May.

Another representative of this group, *Hexagenia* sp., was collected from two stations, 1 and 6, in July and August. Only five specimens were recorded, and none was in the last instar.

The subfamily Neoephemerinae was represented by one imago, *Neoephemera purpurea* (Traver), which emerged from a nymph brought into the laboratory in May.

³ The author is aware of the recent familiar revision of the Ephemeroptera (George F. Edmunds, Jr. and Jay R. Traver—1954. An Outline of a Reclassification for the Ephemeroptera. *Ent. Soc. Wash.*, 56(5): 236-240.) but feels that the classification employed by Needham, Traver, and Hsu is adequate in this report.

Family Heptageniidae. Certain members of this family are among the most widely distributed mayflies in the area. Wherever there is flowing water and a flat surface to which they may cling, certain of these nymphs seem to abound.

Stenonema pudicum (Hagen) was collected at every station visited except 11, 14, and 24. Last instar nymphs were taken from stations 1 and 4 in April and May.

Stenonema heterotarsale (McDunnough) was not so widely distributed in the stream, being found at stations 1, 2, 3, 4, 6, A, B, C, D, and J. At all stations it was found in relatively small numbers. There are no records of nymphs in the last instar, but imagoes were taken at stations 1 and 4 in May.

Heptagenia juno McDunnough was collected in relatively large numbers from stations 1, 2, 3, 6, 8, 13, and B. It seems to be restricted to the riffle areas where large rocks are present. Last instar nymphs were collected in July, and adult specimens were taken at Station 1 in September.

Rhithrogena amica Traver was represented by ten imagoes taken at Station 1 in May.

Rhithrogena anomala McDunnough was found only at Station 1. Nymphs and adults were recorded from this station in late April.

Rhithrogena exilis Traver was collected in small numbers from stations 1, 2, 3, A, and B, all of which lie above the 600-foot contour level. Last instar nymphs were found in July, and no adults were encountered.

Epeorus humeralis Morgan seems to be one of the most abundant species in Piney River having been collected at every station except 10, 11, 12, 14, 23, 26, B, and D. Nymphs in the last instar were collected in August and September, and adults were taken from Station 1 in September.

Epeorus pleuralis (Banks) was taken in very small numbers from stations 1, 2, 3, 4, 6, A, B, C, D, and J. Several adult specimens were reared from nymphs brought into the laboratory in April. It occurs in a habitat similar to that of *Epeorus humeralis*.

Family Baetidae. This family is represented by the largest number of species, and certain members are distributed along the entire course of the river except in contaminated areas.

Ameletus sp. was taken only from stations 1 and 4. Fifteen specimens were gathered during the survey and no record can be given for last instar nymphs or adults.

Isonychia sadleri Traver was collected from every station except 11 and 14, and appears to be the most ubiquitous species encountered during the period of this survey. Last instar nymphs were taken in May, July, August, and October. Adults were recorded from Station 1 in May.

Leptophlebia sp. occurred only at stations C and D, both located on small tributaries of Piney River. This species seems to prefer the more sluggish reaches of the stream where grasses of the shore-line hang into the water.

Paraleptophlebia adoptiva McDunnough is represented by several adult specimens taken from Station 1 in April.

Paraleptophlebia guttata McDunnough was collected in rather large numbers from stations 2, 3, 13, A, B, and C. It was abundant in the broad shallow riffle areas at these stations. Nymphs in the last instar were taken in March, and adults of this species were recorded from Station 1 in May and September.

A number of adults of an undescribed species of *Paraleptophlebia* were collected from Station A in March.

Habrophlebiodes americana (Banks) was collected at stations 3 and J in May. None of the nymphs were in the last instar.

Habrophlebia vibrans Needham is represented by several nymphs taken from Station 1 in May; last instar nymphs were not encountered.

Baetisca carolina Traver was collected in very small numbers from three stations 2, 3, and B. Nymphs in the last instar were found in May.

The genus *Ephemerella* is represented in the area by a larger number of species than any other genus. As a group these nymphs show a large range of tolerance, but they seem to prefer gravel-bottomed portions of the stream.

Ephemerella cornutella McDunnough was collected at all stations except 11, 13, 14, 26, A, C, and D. A relatively large number of specimens were taken and last instar nymphs were found in July.

Ephemerella deficiens Morgan shows a slightly broader tolerance to stream conditions than the other species of the genus and was collected from all but stations 14, 26, C, and D. No imagoes were taken although last instar nymphs were collected in August.

Ephemerella dorothea Needham is represented by several imagoes which were reared in the laboratory from nymphs collected from Station 4 in April.

Ephemerella minimella McDunnough is not so widely distributed in Piney River as are *E. cornutella* or *E. deficiens*. It occurs in varying numbers in the shallow riffles where there is an accumulation of gravel. Nymphs were taken from stations 1, 2, 3, 4, 5, 6, 8, 25, A, B, and J. No adults of this species have been observed, although last instar nymphs were collected in May.

Ephemerella serratoides McDunnough was taken in small numbers at all stations except 10, 13, 14, 25, 26, C, and D. Nymphs in the last instar were recorded in August. No adults were observed.

Ephemerella tuberculata Morgan was collected at stations 4, 24, and J. At Station 4, where they were most abundant, a luxuriant growth of *Podostemum* occurs on the rocks. Neither last instar nymphs nor adults were observed.

Ephemerella wayah Traver was collected in relatively small numbers and appears to be somewhat uncommon in Piney River. In the lower portions of the Tye and Buffalo rivers, however, it appears to be more abundant. It was collected from stations 3, 4, 5, 6, 8, 12, 13, 25, and J. Neither last instar nymphs nor adults were recorded.

Ephemerella sp. was taken from stations 2 and 4 where there is a large accumulation of gravel in the river bed. While nymphs in the more advanced instars were found in April, neither last instar nymphs nor adults are known.

The following three species also inhabit gravel-bottomed areas.

Tricorythodes sp. was taken in very small numbers from stations 1 and 6 in July. Neither last instar nymphs nor adults have been collected.

Caenis sp. shows a slightly wider distribution than *Tricorythodes* sp., having been taken in small numbers from stations 1, 2, 3, 6, and B. There are no records of last instar nymphs or adults.

Baetis vagans McDunnough is generally distributed in the area investigated, occurring in small numbers at stations 1, 2, 3, 4, 5, 6, 8, 10, 12, 13, 25, A, and B. Nymphs in the last instar were taken in July and October, and several adults were reared in the laboratory in April from nymphs collected at Station 4.

The remaining members of the family Baetidae show a broad tolerance in relation to habitats. Members of the genus *Pseudocloeon* inhabit the rapid waters of cascading areas and also the slow currents of silt and gravel-bottomed pools.

Pseudocloeon carolina Banks was collected from stations 1, 2, 3, 4, 5, 6, 8, 10, 12, 13, 25, A, B, and J. Nymphs in the last instar were taken in August. No adults of this species were observed.

Pseudocloeon dubium (Walsh) was collected in small numbers from stations 1, 2, 3, 4, 5, 6, 8, 10, 12, 13, 24, A, and B. It seems to prefer riffle areas where the water is not flowing too rapidly. Last instar nymphs were taken in October.

Pseudocloeon sp. was not so widely distributed in the area and even at the stations where it was encountered, it was not common. Specimens were taken from stations 1, 2, 3, 4, 5, 6, 10, 12, 13, 23, and A. Nymphs in the last instar were taken in July and August.

Centroptilum simile McDunnough was represented by six specimens collected at Station 1 in May. No nymphs of this genus were observed during the course of this survey.

The work which has been done in this survey indicated that there is a wide range of tolerance exhibited by the mayflies, as a group, to the varying ecological conditions in the Piney, Tye, and Buffalo rivers. Certain species such as *Epeorus humeralis*, *Isonychia sadleri*, and *Stenonema pudicum* occur along the entire course of the streams. Other species, such as *Stenonema heterotarsale* and *Leptophlebia* sp. are much more restricted in their distribution. There is considerable evidence that some of the species are able to survive in areas of the stream where there is a continuous deposition of finely divided particulate matter.

SUMMARY

1. Previous records of Virginia mayflies are few, and the records of only 17 species occurring in the State have been reported. Twenty-three specific names may now be added to the Virginia list.

2. A general description of the Piney River area is presented.

3. Among the 6,600 specimens collected during the course of this survey, thirty-six species have been recognized, and their distribution in the area indicated.

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