Aquatic Macroinvertebrates of the Hiatt Prairie Region, Franklin County, Arkansas

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in eliminating tedious least-square manipulations, and ease of making judgments about reliability of data. Student reaction has been enthusiastic, but some effort must be expended by instructional personnel to prevent rote manipulation of "black boxes" and permit understanding of the logic involved.

The spectrophotometer used is the B & L Spectronic 70, although the ubiquitous Spectronic 20 is interchangeable. Any of a number of similar digital or non-digital instruments could be adapted with the proper interfacing arrangement. The interface used is one of several built during an annual workshop on microcomputer interfacing (Wiseman, Chemistry Department, University of Arkansas, Fayetteville, AR 72701. Circuit used with permission.) The program requires 6K on the 4032-N PET microcomputer. The program runs on both mains (4.0) and under (2.0) RAM in PET BASIC. The 301 lines (58 comments) in the program are capable of being greatly reduced, but are presented so as to permit modification and ease of understanding. Transfer to other brands of microcomputer would require modification of the graphics portion of the program, as well as some changes in the interface adapter. The program is written for the small-screen PET, but minimal changes would accommodate the new 12" (80 column) screen. The modified Day/Underwood experiment, a schematic of the interface, a program listing, and a sample execution are available from the author.

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AQUATIC MACROINVERTEBRATES OF THE HIATT PRAIRIE REGION, FRANKLIN COUNTY, ARKANSAS

At one time significant disjunct expanses of natural grassland or prairie occurred in all quarters of Arkansas. These were predominantly tall grass prairies with scattered areas of wetlands or marsh. Most have been destroyed by agricultural practices (Ark. Dept. Planning, 1974). Only two prairie tracts remain in Arkansas that are associated with permanent water. One of these is Hiatt Prairie. Little work has been done on the aquatic macroinvertebrates of prairie-associated streams in Arkansas. It was the primary intent of this study to establish a species list of aquatic macroinvertebrates for the Hiatt Prairie region.

Hiatt Prairie is located 2 km N of Charleston in the SW 1/4 S25, R29W, T8N, Franklin County, Arkansas. Hiatt Creek, formerly called Prairie Creek, is a first order stream that meanders to the west across the Prairie, approximately 1 km. Recently beaver have invaded the area and caused a drastic change in stream flow. Six large beaver dams cross the stream channel at approximately 140 m intervals, and smaller dams are occasionally interspersed between them. As a result, the typically narrow, shallow stream has become deeper and more sluggish at the beaver pools established behind each dam.

The main channel width varies from 0.9 to 2.4 m and the depth varies from 20 to 91 cm, dependent on the beaver dams. The substrate of the channel is typified by silt several cm deep in areas of little current, whereas broken slate and rock predominate where the current is more rapid. Compacted clay is typically found at each bend in the stream. Substrate in the beaver pools is characterized by a thick silt, augmented by detrital material from the surrounding watershed.

An oval-shaped stock pond is located approximately 0.1 km NE of the St. Hwy 217 bridge over Hiatt Creek. The pond was constructed in the early 1900's and has maintained a supply of water since that time (Hiatt, pers. comm.). During periods of excessive rainfall, the pond overflows its east bank creating excellent habitat for aquatic macroinvertebrates in the surrounding grasses and low shrubs. Several kinds of aquatic vascular plants abound in this low flooded area where the effect of silation is minimal. The substrate within the normal boundaries of the pond consists of a very deep layer of silt, with the complete absence of vegetation.

Thirty-four collections were made during 15 trips from 24 May 1980 to 21 February 1982. Seventeen collections were made from the stream channel, 10 from the beaver pools and seven from the stock pond. Collections were made monthly from spring through fall and bi-monthly during the winter. Temperature, pH and turbidity were measured on each sampling date. Dissolved oxygen, carbon dioxide and alkalinity were measured only on the final trip. Chemical determinations were made by standard limnological methods. Aquatic macroinvertebrates were collected with an aquatic dip net. The stream channel was sampled at approximately 20 pace intervals. Each microhabitat was sampled proportionately in the beaver pools. The circumference and overflow area of the stock pond was sampled randomly, although dense silt accumulations were avoided. On each trip an ultraviolet light was used after dark to collect emerging adults. Dip net and ultraviolet light specimens were preserved in 70% ethanol. Adult Odonata were collected by aerial net, placed in paper triangles, and immersed in acetone for 18-24 hours. All specimens are housed in the Arkansas State University Museum of Zoology (ASUMZ) Aquatic Macroinvertebrate Collection.

Physicochemical parameters of both the stream and stock pond were within the known limits of tolerance for freshwater organisms and caused no visible detrimental effects. The aquatic macroinvertebrate fauna of the Hiatt Prairie region was quite diverse, with 138 taxa representing 18 orders, 55 families and 115 genera (Table). Of these, 126 taxa were collected in Hiatt Creek; 104 and 95 taxa in the beaver pools and channel, respectively. Seventy-one taxa were collected from the stock pond. The three major zones had 42 taxa in common, while 31 taxa were shared by the channel and beaver pools only, 15 taxa by the beaver pools and stock pond only, and five taxa by the channel and stock pond only. Seventeen taxa were found in the channel only, 16 in the beaver pools only, and nine in the stock pond only. Coleoptera was the most diverse order with representatives from eight families and 51 species. The most frequently collected orders were Isopoda, Coleoptera, Decapoda, Hemiptera, Amphipoda, and Ephemeroptera, respectively. Most of the taxa are adapted to a variety of habitats and environmental conditions (Pennak, 1978).

The beaver activity has increased the diversity of aquatic macroinvertebrates in Hiatt Creek by increasing the diversity of microhabitats, introducing instability, or a combination of the two. The beaver pools provide a greater range of water depth, current speed (absent to moderate), and substrate types (particulate organic matter to decomposing leaf litter). The beaver pools also have gradually sloping bottoms which are conducive to the establishment of a greater variety and density of aquatic vegetation and associated fauna. During the study period the beaver pools were in the process of being established, and thus were areas of transition. Such transitions are marked by temporary instability. Increased species diversity can result, as some new species will be developing, others will be at population peaks, and yet others will be declining (Reed, 1978).

The aquatic macroinvertebrate fauna of the channel was qualitatively similar to that of the beaver pools, with 95 and 104 taxa, respectively. Of these, 73 taxa were collected from both zones. Fewer taxa were collected from the channel than the beaver pools despite more intensive collection in this zone (17 samples vs 10 from the beaver pools). In many areas of the channel the substrate was compacted clay, and the stream banks were of vertical, eroded clay, providing little suitable habitat. Most of the taxa found in the channel only (e.g. Hagenius, Pycnopsyche, Stenelmis crenata) are shrub intolerant, inshore inhabitants, and are associated with the small-screen interface, where they are more adapted to the transitional environment.

Aquatic macroinvertebrate diversity was least in the stock pond. This primarily resulted from the homogeneity of its silt substrate (Harrell, 1969). The fewest samples were taken from this zone, and this also reduced the number of taxa collected. Most taxa were collected in the overflow.
area, where the substrate was a fine particulate organic material, with a dense accumulation of aquatic vegetation and interspersed algae. The faunal composition was more similar to that of the beaver pools than that of the channel, having 57 and 47 taxa in common, respectively.

It is noted that the streams of Iowa, Missouri, Kansas, and Nebraska, are not prairie streams, because their valleys are wooded. Such streams are shaded in the summer and receive much organic allochthonous material from the watershed. In contrast, prairie streams receive little organic allochthonous material and have a substrate composition of gravel, sand and clay. The streams of eastern Kansas are transitional in that their banks are wooded, but swift currents and periodic flooding remove organic deposits (Jewell, 1927). Basically, Hiatt Creek is such a transitional stream, particularly in the channel zone.
Arkansas Academy of Science

This research was supported in part by a grant from the Arkansas Water Resources Research Center. We thank Thomas Bowman, Mark Gordon and Horton Hobbs, Jr., for identification of Isopoda, Mollusca and Decapoda, respectively. Bill Hiatt kindly granted permission to collect on his property, and John Huggins was of great assistance in collecting field data.

LITERATURE CITED


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Neviusia alabamensis: A PHYTOGEOGRAPHIC ANALYSIS

Neviusia alabamensis is an extremely rare plant endemic to only a few southeastern states. Arkansas has representative populations in three counties: Conway, Pope, and Newton (Fig.). Other identified populations are located in Alabama, where the species was first recognized, and in Missouri. In the two remaining states it has just recently been discovered. The purpose of this paper is to describe the distribution of Neviusia alabamensis in Arkansas and to examine the physical environments in which the Arkansas species are found.

To develop a plant description of Neviusia alabamensis, 16 herbarium specimens were measured and published information was examined (Chapman, 1987; Dean et al., 1973; Dean, 1961; Greene and Blomquist, 1953; Small, 1903; Lownberry, 1901; Mendenel, 1949; Small, 1933; Steyermark, 1975). The physical environment was described in terms of soil, slope direction, slope percentage, solar exposure, and dominant vegetation. Soil samples were taken from each of the ecosystems in Arkansas in which Neviusia alabamensis is found and soil nutrient, soil texture, and pH tests were conducted. The soil was gathered from depths of 4 to 10 cm at three different areas within each population and mixed before testing.

Neviusia alabamensis is a perennial shrub with numerous slender primary stems and short lateral branches. The bright green leaves (approximately 3 cm X 4 cm) are simple and alternating. The flowers are odorless and lack petals, however, the stamens are numerous (usually over 100) and showy. Flowering may occur between March and May.

Neviusia alabamensis seems to be able to exist on relatively dry sites. Two of the populations, Conway and Newton Counties, are located on southeast facing slopes, whereas the population in Pope County is located on a northwest facing slope (Table). The percentage of the slope varied a great deal among the populations. The slope in Conway County was the greatest, 80%, and the slope in Newton County was the least, 35%. It would seem that the Conway County population would be much drier as a result of the steeper slope. However, the soil at Newton County was very sandy. These two populations may be approximately equal in what seems to be the most critical factor, soil moisture.

Table. Comparison of the physical environments in which Neviusia alabamensis exists. The soil nutrients are given in kilograms per hectare.

<table>
<thead>
<tr>
<th>Slope Direction</th>
<th>Conway County</th>
<th>Pope County</th>
<th>Newton County</th>
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<tbody>
<tr>
<td>Site of Population</td>
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<td>65° E</td>
<td>33° E</td>
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<tr>
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<td>Sandy</td>
<td>Loamy sand</td>
<td>Loamy sand</td>
</tr>
</tbody>
</table>

Figure. The three Arkansas counties in which Neviusia alabamensis is found.