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ROLE OF ALLOCHTHONOUS DETRITUS IN THE TROPHIC STRUCTURE OF A WOODLAND SPRINGBROOK COMMUNITY¹

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Abstract. The community trophic structure of Morgan's Creek, Meade County, Kentucky was analyzed through regular measurement of standing crops of the chief potential sources of plant materials available to the animals (suspended particulate, attached particulate, and allochthonous leaf materials) and an examination of their gut contents. The most important food was allochthonous leaf materials, which occurred as suspended material in the water, as a component of materials attached to the streambed, and as whole leaves and fragments. Diatoms were the only other important source of plant materials and constituted the greatest proportion of the attached organic fraction.

Mean standing crop measurements of potential foods for five sampling stations ranged from 0.6 to 1.0 kcal/m³ for suspended particulate organic matter; 12 to 19 kcal/m² for attached particulate organic matter; and 4.7 to 13 kcal/m² for allochthonous leaf materials. Comparison of standing crop data with previous findings indicates that the values generally are within the known ranges for flowing waters. Analysis of gut contents and determination of the principal pathways of energy flow in the stream indicate that imported organic matter in the form of allochthonous leaf materials provides the main source of energy for the primary consumers and, indirectly, for the entire benthic community of Morgan's Creek. Of the 37 taxa of animals studied, 24 were herbivores, 5 omnivores, and 8 carnivores. In general, detritus made up from 50 to 100% of all the materials ingested by both the herbivores and omnivores. The total number of benthic animals was comprised of 14% herbivores, 83% omnivores, and 3% carnivores. *Gammarus minus* was the single most important member of the fauna. It contributed 81% of the total number of invertebrates, and well over 90% of its diet consisted of allochthonous leaf detritus.

INTRODUCTION

It has been known for a number of years that dead organic matter may be ingested by aquatic invertebrates. However, only comparatively recently was it realized that allochthonous detritus can play an important role in the economy of aquatic ecosystems (Jones 1949, 1950; Dunn 1954; Elton 1956; Teal 1957; Odum and Smalley 1959; Brown 1961; Darnell 1961, 1964;

Hynes 1961, 1963; Nelson and Scott 1962; Chapman and Demory 1963; Minckley 1963; Egglisshaw 1964). The present study provides further evidence of the importance of allochthonous detritus to the benthic communities of flowing waters, and explores the role of this food in the trophic economy of a relatively simple system, a woodland springbrook.

At present the only other study relating specifically to the role of detritus in stream productivity is that of Nelson and Scott (1962) on the Middle Oconee River, Georgia. Nelson and Scott measured standing crops of the major sources of primary food and of the bottom fauna over an entire

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