CC/NUMBER 33
AUGUST 16, 1982

This Week's Citation Classic

Kaushik N K & Hynes H B N. The fate of the dead leaves that fall into streams. *Arch. Hydrobiol.* **68:465-515, 1971.**
[Department of Biology, University of Waterloo, Waterloo, Ontario, Canada]

Temperature, leaf composition, and nutrients in water control leaf decomposition. During leaf breakdown, fungi seem more important than bacteria, and the absolute quantity of nitrogen in leaves increases, mostly as microbial protein. Detritivores preferentially feed on leaves that support microorganisms. [The *SCI*® indicates that this paper has been cited in over 145 publications since 1971, making it one of the most cited published in this journal, 1961-80.]

N.K. Kaushik
Department of Environmental Biology
University of Guelph
Guelph, Ontario N1G 2W1
Canada

May 14, 1982

"In an elegant discussion paper[1] presented at the International Congress of Zoology, held in Washington in 1963, H.B.N. Hynes put forward a number of convincing arguments to elucidate that the bulk of the organic matter consumed as food by stream invertebrates is not produced within the stream but rather enters from the outside. He posited that most of this organic matter is derived from autumn-shed leaves of riparian vegetation. This paper very clearly highlighted the possible significance of autumn-shed leaves in stream ecology. Being at the base of the food chain, the input of leaves controlled production of stream invertebrates and through these eventually the production of fish. However, neither the stream biologists nor fisheries biologists had carried out any research on this topic. My involvement with it, in a way, is just a coincidence. As a graduate student at the University of Waterloo, Ontario, I had chosen studies on fish respiration as a research project. After about six months of preliminary research on fish, my major professor had a shortage of research funds and it was at this stage that I started working under Hynes's supervision on autumn-shed leaves, a topic suggested by him. Needless to say, a number of ideas incorporated in the paper came from him.

"We had presumed that fall leaves are very low in protein content and as such possibly not a good food for stream invertebrates. However, we conjectured that the microbes associated with leaf degradation enhance protein content of decomposing leaves, thus making them a suitable food source. So our first assignment was to determine if the protein content of the leaves increases as they decompose and this entailed developing a technique for determining protein content in leaves. Here again I was fortunate. A chance meeting in a supermarket with a newly arrived postdoctoral fellow in biochemistry looking for suitable accommodations resulted in my sharing an apartment with him. He soon became not only a good friend but my 'supervisor' for the development of a technique for protein determination. Once this technique was perfected, performing experiments was just a routine task. Most of our experiments were simple in design, entailed tremendous effort, but yielded thrilling results, and I simply enjoyed my research work.

"Reasons for the frequent citation of the paper could be not only that it dealt with a comparatively new aspect of stream ecology which turned out to be quite important, but it provided a comprehensive review of the literature signifying the role of leaves as an energy source in woodland streams. Our studies have been followed by a number of researchers and more up-to-date ideas appear in two recent reviews."[2,3]

1. **Hynes H B N.** Imported organic matter and secondary productivity in streams. *Int. Congress Zool.* **16**:324-9, 1963.
2. **Anderson N H & Sedell J R.** Detritus processing by macroinvertebrates in stream ecosystems. *Annu. Rev. Entomol.* **24**:351-77, 1979.
3. **Bird G A & Kaushik N K.** Coarse particulate organic matter in streams. (Lock M A & Williams D D, eds.) *Perspectives in running water ecology.* New York: Plenum Press, 1981. p. 41-68.