Relative influence of shredders and fungi on leaf litter decomposition along a river altitudinal gradient.

Barry R. Taylor and Eric. E. Chauvet

We compared autumn decomposition rates of European alder leaves at four sites along the Lasset-Hers river system, southern France, to test whether changes in litter decomposition rates from upstream (1300 m elevation) to downstream (690 m) could be attributed to temperature-driven differences in microbial growth, shredder activity, or composition of the shredder community. Alder leaves lost 75-87% of original mass in 57 days, of which 46-67% could be attributed to microbial metabolism and 8-29% to shredder activity, with no trend along the river. Mass loss rates in both fine-mesh (excluding shredders) and coarse-mesh (including shredders) bags were faster at warm, downstream sites (mean daily temperature: 7-8°C) than upstream (mean: 1-2°C), but the difference disappeared when rates were expressed in heat units to remove the temperature effect. Mycelial biomass did not correlate with mass loss rates. Faster mass loss rates upstream, after temperature correction, evidently arise from more efficient shredding by Nemourid stoneflies than by the Leuctra-dominated assemblage downstream. The influence of water temperature on decomposition rate is therefore expressed both directly, through microbial metabolism, and indirectly, through the structure of shredder communities. These influences are evident even in cold water where temperature variation is small.