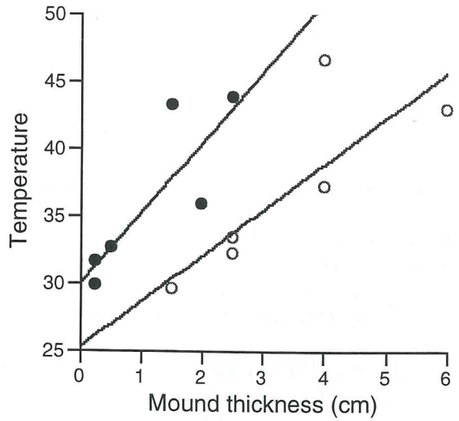

FIG. 1. Temperature increased significantly with thickness in both surface (closed circles) and subsurface (circles) layers in leaf-cutter ant refuse mounds at Corcovado National Park, Costa Rica.

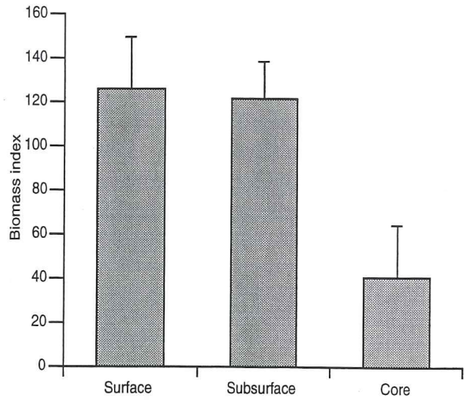

FIG. 2. Invertebrate biomass index (based on abundance and size) of the surface and subsurface layers of leaf-cutter ant refuse mounds in Corcovado National Park, Costa Rica. Biomass index was significantly lower in the core than in the surface or subsurface layers.

ranged from 1.5 mm to 21.0 mm.

The biomass index of invertebrates per unit volume in surface and subsurface layers was greater than in the core (Fig. 2; $F = 4.87$, $df = 17$, $P = 0.02$). Invertebrate abundance per unit volume in the surface layer increased with thickness of the layer ($r^2 = 0.62$, $df = 5$, $P = 0.06$). Abundance per unit volume in surface and subsurface layers also increased with temperature of these layers, but this pattern was not statistically significant ($r^2 = 0.25$, $df = 11$, $P = 0.08$).

Discussion

Leaf-cutter ant refuse mounds were made up of three strata that differed in texture, appearance, and often temperature. The size of refuse mounds was highly variable. Most were in shaded areas beneath branches from which ants dropped their refuse. The elevated temperatures that I observed in the surface and subsurface layers may be due to bacterial decomposition of the leaf/fungus refuse. Although the surface and subsurface layers were not as thick as the core, my data suggest that this bioactivity could be highest in those layers. Because more active ant colonies probably deposit more refuse, bioactivity may increase with colony size or activity.

Refuse mounds, particularly the surface and subsurface layers, supported a surprisingly high diversity and abundance of invertebrates. Although most were detritivorous beetles, other trophic relationships were observed. For instance, I observed two ant species preying upon coleopteran larvae within the surface layer. The feeding activities of the invertebrates and the microorganisms present in the mound may facilitate nutrient cycling initiated by the ants. These findings indicate that refuse mounds may be an important resource for invertebrate fauna.

Within each refuse mound, invertebrates were not distributed uniformly. The majority were in the surface and subsurface layers, possibly because the refuse material there was most recently deposited and, therefore, in the early, most active stages of decomposition.

Literature Cited

Stevens, G. C. 1983. *Atta cephalotes* (Zompopas, Leaf-cutting ants). *in* D. H. Janzen, ed. *Costa Rican Natural History*. University of Chicago Press: Chicago, IL. Pp. 688-691.