ABSTRACT

A survey was made of the fauna of a system of limestone caves in tropical rain forest in Trinidad. The caves contained large bat roosts with associated parasites, and animals involved in food chains based on the decomposition of the bats' guano. The macro-invertebrates present were forest-dwelling species pre-adapted to cave life because of their usual forest niches.

The fauna of a large part of one cave was dominated by a cockroach, Eublaberus posticus. To quantify the ecological role of this species, methods were devised for measuring rates of reproduction, moulting, defaecation, assimilation and respiration of cockroaches in the cave population. Growth rates measured in the laboratory had to be adjusted for an observed difference in moult rates to make them applicable to cave cockroaches. All these rates were used to construct energy budgets, which showed that small nymphs had high production efficiencies whereas large nymphs had very low production efficiencies, metabolising a large proportion of the energy they assimilate.

The cockroach population of one chamber, surveyed using a combination of sampling techniques, was very large. A scheme of the chemical changes involved in guano decomposition was devised. Small cockroach nymphs lived almost exclusively on the guano beds and were concentrated in areas of low water content. Large nymphs and adults were distributed over the three available substrate types, i.e. guano, gallery and wall. As this change in distribution occurred at about the same developmental stage as the drop in production efficiency, it is suggested that these observations reflect a change in the ecological niche occupied by cockroach nymphs. The total energy assimilated by the cockroach population was about a quarter of the energy input in bat guano, a very high proportion compared with other ecosystems. Thus a specialised habitat type based on decomposition processes is being very efficiently exploited by the cockroaches.