History and significance of tropical cave biology

Francis G. Howarth ‡

‡ Distinguished Research Associate B. P. Bishop Museum, Honolulu, Hawaii, United States of America

Corresponding author: Francis G. Howarth (fghcavebug@gmail.com)

Abstract

“Nothing could possibly live there!” They said. Indeed, until recently, few specialized cave-adapted animals were known from volcanic, tropical, or oceanic island caves, and plausible theories had been put forward to explain their absence. But assume nothing in science! One must illuminate, explore, and survey habitats before declaring them barren. Our understanding of cave biology changed dramatically about 50 years ago following the serendipitous discovery of cave-adapted insects and other terrestrial arthropods in lava caves on the young oceanic islands of the Galapagos and Hawai‘i. The discovery and subsequent studies on the evolutionary ecology of cave animals have revealed a remarkable hidden fauna and created new sub-disciplines within biospeleology. Biological surveys of caves in other regions have confirmed the results developed in Hawai‘i. We now predict that, rather than being relicts trapped in caves by changing climate, animals actively colonized caves and adapted to exploit food resources wherever there were suitable subterranean voids. The physical environment in caves can be determined with great precision because the habitat is buffered by rock. Furthermore, the bizarre adaptations displayed by obligate cave animals are similar across many taxonomic groups. These two characteristics make caves nearly ideal natural laboratories for studying evolution and ecology. However, to the untrained researcher, caves can appear hostile and dangerous, and in fact, fieldwork in caves requires a unique marriage of athletic ability and science. In other words, it is exciting! Join me on a virtual tour of exploration, discovery, and research in caves during the past half-century.

Keywords

troglobiont; cave environment; ecology; evolution

Presenting author

Francis G. Howarth

Presented at

The 25th International Conference on Subterranean Biology (Cluj-Napoca, 18-22 July 2022)

Hosting institution

B. P. Bishop Museum, Honolulu, Hawaii, USA

Conflicts of interest

None