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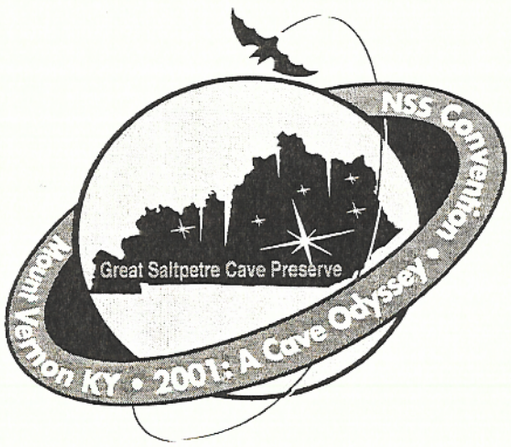

Editor
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Biology (cont.)

Unparalleled Evolution: Blindness, Depigmentation, and Scalelessness Do Not Run Hand in Hand among Troglomorphic Fishes

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Anecdotal evidence have suggested in the past that blindness, depigmentation, and simplification or loss of scales may be an example of parallel evolution among troglomorphic hypogean fishes. We investigated the level of blindness, depigmentation, and scalelessness among 423 families of fishes. Among those with troglomorphic features, blindness was categorized as eyes present, eyes sunken, microphthalmic, and eyes not visible; pigmentation level was categorized as fully pigmented, mostly pigmented, mostly depigmented, and totally depigmented/albino. For all families of fishes scalelessness was categorized as "have scales," "do not have scales," or "mixed" (some species have scales, some do not). We could not find reliable information on the scales for 22 of them, usually small, little known families, none of them with hypogean representatives. Of the rest, 257 have scales (64.0%), 117 do not have scales (29.2%), and 27 were mixed (6.7%). There are 18 families of fish with troglomorphic representatives. Of those, seven (38.8%) families have scales, seven(38.8%) do not, and four (22.2%) contain both scaled and scaleless species. Our results suggest that levels of blindness, depigmentation, and scalelessness is different even among species of the same family and that simplification and/or loss of scales is a common feature among troglomorphic fishes but that the lack of scales in the family as a whole cannot be considered a preadaptive feature. Different phylogenetic histories, selective pressures, and genetic independence governing these features account for the explanation of these results.

Differences in Behaviors, Physiological Responses and Neural Structure of Cave Crayfish to those of Epigean Species

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Cave crayfish serve as a good model organism to investigate cave adaptations since much is known about epigean species in their social behaviors, physiological responses and neural anatomical features for comparisons. We investigated the repertoire of social behaviors of cave crayfish to those previously reported with interacting sighted crayfish. The blind crayfish did not exhibit behaviors usually associated with visual displays and posturing. Additional investigations were conducted to determine how cave-adapted blind crayfish responded to novel territories of various sizes. We also used the cave crayfish and examined their responsiveness to stimuli while monitoring their heart rate as a measure of an internal state. Heart rate is a reasonable measure of the responsiveness of blind cave crayfish to given stimuli even in the absence of observable behavioral changes. This enables the observer to determine if an individual is responsive to and making an assessment of particular cues. Alterations in the crayfish internal physical state, such as when the animal autotomizes its chelipeds, will cause the larger sized animals to tail flip when before they would not. Comparing adult crayfish in an epigean species to a cave species revealed that the cave crayfish are more likely to tail flip to a given stimulus. Neural modifications in the cave crayfish visual and chemosensory structures were also examined. Troglobitic crayfish have a disorganized neuronal ganglia within the eye stalk. In addition, neurons associated with olfaction that arise in the central brain are more numerous in cave crayfish, suggesting that they has more neural processing devoted to olfaction, as an adaptation to cave life.