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THE IMPACT OF MASS EXTINCTIONS; Karl W. Flessa, Department of Geosciences, University of Arizona, Tucson, Arizona 85721 and Earth Sciences, National Science Foundation, Washington, D.C. 20550.

The years since Snowbird I have seen an explosive growth of research on the patterns, causes, and consequences of extinction. The fossil record of extinction is better known, new stratigraphic sections have been scrutinized in great detail, and additional markers of environmental change have been discovered in the rock record.

However flawed, the fossil record is the only record that we have of natural extinction. Compilations from the primary literature contain a faint periodic signal: the extinctions of the past 250 my may be regularly spaced. The reality of the periodicity remains a subject for debate: a statistical artifact? an accident of taxonomic or stratigraphic mistreatment? The implications of periodicity are so profound that the debate is sure to continue.

The greater precision from stratigraphic sections spanning extinction events has yet to resolve controversies concerning the rates at which extinctions occurred. Some sections seem to record sudden terminations, while others suggest gradual or steplike environmental deterioration. Unfortunately, the manner in which the strata record extinctions and the manner in which paleontologists collect fossils and compile stratigraphic ranges makes a strictly literal reading of the fossil record inadvisable.

Why do some species suffer extinction while others persist? Conventional wisdom holds that there must be some reason. Indeed, some patterns emerge with respect to properties such as body size, geographic distribution and trophic group. But correlations are not strong, and the patterns of extinction have not provided many constraints on causal hypotheses.

Individuals die, species become extinct, clades vanish with their last species. Because most species are rare, even catastrophic extinctions may not require mass mortality. The distribution of species among clades may further affect the evolutionary significance of an extinction event.

Much progress has been made in the study of mass extinctions. The issues are more sharply defined but they are not fully resolved. Scenarios should look back to the phenomena they purport to explain - not just an iridium-rich layer, but the complex fabric of a mass extinction.