AT A GLANCE FILM GUIDE

DESCRIPTION

The disappearance of the dinosaurs at the end of the Cretaceous period posed one of the great mysteries of Earth's natural history. Scientists from multiple disciplines, including geology, physics, biology, chemistry, and paleontology, helped form the shocking hypothesis that the mass extinction was caused by an asteroid impact.

KEY CONCEPTS

- Earth's 4.6-billion-year geological and biological history is deduced from the analysis of fossils, rocks, and chemical signatures found in sediments worldwide. The layered evidence reveals a pattern of change varying in tempo.
- Geological sediments reveal that Earth's environment generally changes gradually and that conditions are relatively stable over many millions of years. However, some sediment layers show evidence of rapid, even catastrophic, change.
- Catastrophes have played an important role in evolutionary history. The mass extinctions that have occurred in the past 550 million years are examples of catastrophic change.
- During mass extinctions, a large proportion of species, living in different habitats and around the world, abruptly go extinct, opening up new opportunities for survivors.
- Careful observations lead scientists to ask questions that can be answered by gathering evidence. A good scientific question leads to additional observations and questions, and ultimately to a hypothesis that can be tested.
- Not all hypotheses can be tested in a controlled laboratory experiment. For example, the study of deep Earth history, aspects of ecology, and astronomy, require gathering multiple lines of evidence to understand events that occurred in the past.
- Although the totality of evidence is important, certain pieces of evidence are more critical than others to confirming a hypothesis.
- Some of the most interesting problems require the combined efforts of experts from many scientific disciplines to find a solution.
- Scientists share information with other scientists in their communities, striving to reach consensus. Overturning long-established models and ways of thinking to arrive at a new consensus is appropriately difficult.

CURRICULUM AND TEXTBOOK CONNECTIONS

Curriculum	Standards
NGSS (April 2013)	MS-PS3.C, MS-LS2.C, MS-LS4.A, MS-LS4.C, MS-ESS1.C, MS-ESS2.A, HS-LS2.B, HS-LS2.C, HS-LS4.C, HS-LS4.D,HS-ESS1.C, HS-ESS2.A, HS-ESS2.E, HS-PS1.C,
AP Biology (2012-13)	4.B.4, 1.C.1, SP5
IB Biology (2009)	5.1, 5.4.8, D.2.7, D.2.9, D.1.3, G.2.6, G.2.7
APES: Themes and Topics (2013)	**Themes**: 1, 3; **Topics**: I.A; VII.C

Textbook	Chapter Sections
Miller & Levine, *Biology* (2010)	1.1-1.3, 19.1, 19.2
Reese *et al. Campbell Biology* (9th Ed. 2011)	1.3-1.4, 25.4
Pearson Earth Science (2011 Ed.)	1.5, 13.3, 22.3
Cunningham, *Environmental Science* A Global Concern 11e	2.1 - 2.3, 4.1, 4.4, 14.1, 15.3, 15.5, 16.2
Friedland and Relyea, *Environmental Science* for AP 2012	Ch.1 (p. 15), Ch. 4 (pp99 – 108), Ch. 5, Ch. 8 (pp. 208 – 209) Ch. 15 (pp410 – 415),

SUGGESTED AUDIENCE

This film is intended to engage *all* students in *all* science classes. The story of this mass extinction is an unbeatable introduction to the process of science for novice students. For students with a more advanced understanding of science, including content knowledge in biology and geology, the film is a memorable example of the excitement of scientific discovery.

KEY REFERENCES

Alvarez, L.W., Alvarez, W., Asaro, F., Michel, H.V. 1980. Extraterrestrial cause for the Cretaceous-Tertiary extinction. *Science* 208: 1095-1108.

Smit, J., Hertogen, J. 1980. An extraterrestrial event at the Cretaceous-Tertiary boundary. *Nature* 285: 198-200.