

## Outline 15: The K/T Extinction Event

### Death of the Dinosaurs

#### What caused the extinction of the dinosaurs?

- When dinosaurs were first discovered, people were shocked by their size.
- The cause of their extinction was a mystery.
- A variety of old theories.

#### Old Theories

- Their large size somehow worked against them in natural selection.
- They were reptiles and cold blooded. Climatic cooling caused their extinction.
- Mammals preyed on their eggs.
- Disease (Dino AIDS?)

#### The Alvarez Hypothesis

- Father and son, Luis and Walter Alvarez proposed in 1980 that a 10 km asteroid killed off the dinosaurs.
- Evidence based solely on the abundance of the rare element Iridium in the thin, K/T boundary clay layer.
- Iridium is common in meteorites.

#### Evidence collected since 1980

- Shocked quartz found only in K/T boundary sediments.
- Abundant glass beads, called tektites, found in boundary sediments.
- Abundant soot in boundary sediments.
- Many craters studied before the "smoking gun" was found.

## The Yucatan Crater

- About 1990 geologists came to realize there was a buried crater 180 km in diameter on the Yucatan Peninsula.
- Named the Chicxulub Crater.
- Radiometric dates for volcanic rocks recovered from drill cores were exactly 65 MY old.

## Impact Effects

- Infrared heat wave killed most unprotected animals not in water or burrows.
- Worldwide dust cloud blocked sunlight for months.
- Food chain collapsed.
- Freezing temperatures at the equator.
- Global wildfires consumed about 30% of terrestrial biomass.
- Nitric acid rains acidified both the land and the ocean.

## Extinctions

- All land animals larger than about 20 kg (50 lbs) became extinct.
- More than 50% of all animal species became extinct, including most (but not all) mammals.
- Extinctions extensive even in the oceans.

## Recovery

- It took about 10-20 MY for terrestrial ecosystems to fully recover.
- Dinosaurs were gone, except for their descendants, the birds.
- Mammals experienced an evolutionary radiation in the absence of dinosaurs.