FROM THE

PRESIDENT

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Walter Alvarez started his professional career in the oil and gas industry working for American Overseas Petroleum Limited in Libya but left shortly after Colonel Gadaffi's revolution. Following a brief stint studying archeological geology in Italy, Alvarez moved to Lamont-Doherty Geological Observatory of Columbia University to get involved with another revolution – plate tectonics. Alvarez had earned a Ph.D. in Geology from Princeton University and was obviously not ready to give up academic research. He was particularly interested in the field of paleomagnetics and its role in understanding plate tectonics.

It wasn't too long before Alvarez was back in Italy pursuing this new line of research. The Scaglia limestone in the Umbria-Marche Apennines offered an unusual opportunity to study paleomagnetics. It is a deepwater limestone with a nearly continous historical record of the Late Cretaceous and Palaeogene, undisturbed by erosional gaps. The Scaglia is a pelagic limestone with abundant plankton (calcareous nannofossils and planktonic foraminifera), an excellent tool for age-dating the strata. Some portions of the stratigraphic section also contain layers of volcanic ash which allowed for the application of radiometric age-dating. These deepwater limestone layers recorded the pole of the earth's magnetic field at the time of deposition. It was originally the intent of Alvarez, working with his colleague William Lowerie, to study the tectonic aspects of paleomagnetism to work out the rotations of Corsica and Sardinia, but in a classic case of scientific serendipity, they uncovered a pattern of paleomagnetic reversals recorded in the layers of the Scaglia formation. Alvarez and Lowerie soon began collaborating with other geologists to correlate patterns of magnetic polarity stratigraphy between sedimentary basins.

Studies of these deepwater limestones showed that their pattern of magnetic pole reversals matched the polarity record based on marine magnetic anomalies from the oceanic basalts. It soon became clear that two high resolution magnetic tape recorders are operating in the Earth, one in the ocean crust and the other in pelagic limestones. Once the patterns of the reversals were matched, it was possible to use the ages of the limestone sequences to date each magnetic stripe in the ocean crust, and thereby to put dates on the corresponding positions of the continental plates. This was a significant scientific accomplishment, but Alvarez's work soon led him to what would become one of the most significant, and certainly the coolest, scientific discovery of the twentieth century.

The limestone strata of the Scaglia formation also revealed another striking pattern. There was a dramatic difference in the size and diversity of the foraminifera between the layers of the upper Cretaceous and those of the lower Tertiary. The older upper Cretaceous strata held larger forams representing many more species, while the forams of younger lower Tertiary were smaller and less diverse. The two bounding layers were separated by a thin layer of clay that appeared to extend across the area. This sequence was an exquisite record of the great K-T extinction event. Alvarez sought to further investigate the boundary layer that marked this event. He wanted to know how long it took to deposit the thin layer of clay – was it a short event or a long span of time? What he needed was something to measure the span of time represented by the clay layer.

This is where it helps to have a father with a Nobel Prize in Physics. Luis Alvarez had received the Nobel in 1968 and was working at the Lawrence Laboratory at the University of

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California at Berkeley. Luis suggested that Walter measure the concentration of iridium, a metal from the platinum group, which could be used as a kind of cosmic timekeeper. Iridium comes to earth from extraterrestrial sources, and it is a component of the constant rain of "space dust" that falls to earth. The concentration of iridium in a deepwater sedimentary layer, which his laboratory could measure in parts per billion, would indicate the time span of the deposition. What they found was stunning.

Luis was able to convince Frank Asaro and Helen Michel at the Lawrence Berkeley lab to examine samples of the bounding clay layer. They found concentrations of iridium thirty times higher than they had expected to find. The concentration was so high that it appeared to require some other explanation. The team also sought out samples of K-T boundary sediments from other areas of the world to corroborate the findings, which they did. They ultimately determined that this intense concentration of iridium in a single clay layer had to indicate a major impact on earth from an asteroid. Luis calculated that the asteroid would have to be about 6 miles in diameter.

In 1980 the team published the seminal paper "Extraterrestrial Cause for the Cretaceous-Tertiary Extinction: Experiment and Theory. "Their" findings have since been supported by a wide base of evidence for this event including the location and mapping of the Chicxulub impact crater in the Yucatan. The process which led Walter Alvarez to this amazing discovery was one of persistence, serendipity, collaboration and creative thinking. These tend to be the basic elements of all great scientific discoveries.

Chris McLindon