

The Vredefort Dome, at the centre of the original crater, as seen from space.

2.02 billion years ago a huge asteroid hit the ground near the site where Vredefort stands today. In the process it created a crater some 250 km in diameter. South Africa's major gold mines all lie within this area.

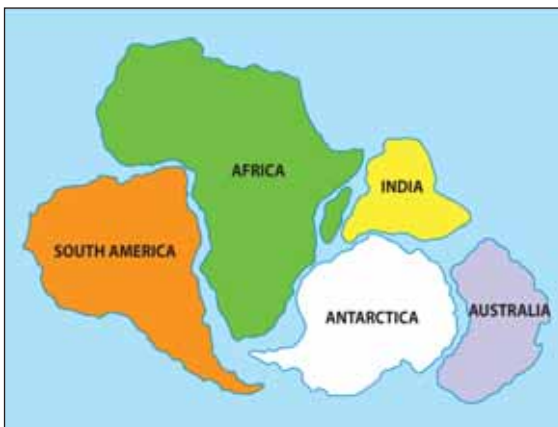


LET'S START AT THE SITE OF THE SMALL TOWN OF Vredefort, 120 km south-west of Johannesburg. Here, around 2.02 billion years ago, an enormous asteroid, somewhat larger than Cape Town's Table Mountain, came hurtling in from space at approximately 100 times the speed of sound and hit the ground with a force estimated to have been 7 or 8 billion times greater than that of the atomic bomb which destroyed Hiroshima in 1945. The asteroid turned the earth inside out as the pressure of its impact caused soil and rock to rebound from 20 km below the surface. The rock and soil formed a dome in the centre of the crater, which itself settled into a relatively shallow basin with a diameter of 250 to 300 km. Gold-rich layers of rock known as reefs sagged downward around the edges of the crater, tilting them towards the focal point of the impact, after which they were quickly covered by falling rock, debris and dust. These gold deposits were thus protected from erosion, which would otherwise have washed them away over time. The arc of gold mines which curves out from either side of Johannesburg, through the West Rand and Klerksdorp, to Welkom in the Free State traces the outer circle (known as the Witwatersrand) of the original crater. The Vredefort explosion was caused by the largest and first known asteroid to have hit the earth. Had it happened many million years later, it would have caused untold destruction to life; however, only bacteria existed at the time. Not until some 550 million years ago did life begin to evolve into more complex forms.

Since the Vredefort explosion, five major extinction

events have occurred; the worst of these, around 251 million years ago, destroyed about 96% of all then existing species and changed the course of the evolution of life dramatically. The best land-based record of this event is preserved in the dry Karoo, where the fossilised remains of the creatures that lived there before and after this global catastrophe are embedded in rock.

Two-thirds of the surface area of South Africa is covered by rocks of the Karoo Supergroup. These rocks contain an unsurpassed record of the development of life on land over the 100-million-year period between 280 and 180 million years ago, a period that witnessed the evolutionary origin and appearance of the first mammals, tortoises and dinosaurs. South Africa is renowned for having the most complete fossil set of therapsids, an extinct group of animals that record



About 180 million years ago Gondwana, the great southern supercontinent, began to split up. India drifted slowly north, crashing into Asia and creating the Himalaya Mountains in the process.