They are not visible because they are buried by sediment or covered by overthrust mountains.

These granitic continental cratons form the enduring core of the continents. Thus, while continents are added to or reduced on their margins by erosion and collisions, and while they move in relation to each other, they have remained essentially permanent features since their creation during the great vertical movements of the crust 2.5 to 3.5 billion years ago.

WHAT ALL THIS MEANS

Geologists feel they have found the answer to recent geologic and geographic events in the theory of plate tectonics. It should be borne in mind, however, that this process is apparently dependent on unique concentrations and densities of elements and materials in rather specific locations in the core, mantle, and crust of the Earth. The concentration of specific elements in the total Earth is unexplained, but it is apparently connected with the initial formation of the planet Earth from its nebular cloud of gas and dust. The vertical separation of material by density so that the heavier materials sink toward the core of the Earth and lighter materials rise toward the crust is in accordance with the law of gravity.

The crucial question is what caused the *lateral* separation of materials at the crust of the Earth into light granitic continents and heavy basaltic ocean basins in the first place. Gravity can account for the separation and sorting of materials in a *vertical* plane. But how did the *lateral* separation of the heavy oceanic material and the light continents occur at the Earth's crust? Until the massive granitic cratons appeared and formed platform-like continents, the process of plate tectonics could not begin.

What caused the first land to appear? We can speculate that, like the later operation of plate tectonics, the explanation has something to do with cooling the Earth's finely tuned heat engine. But the fact is we simply do not know why the first lands appeared. There is no observed, similar process operating today, and synthesizing granite in the laboratory remains unaccomplished. Perhaps scientific thinking is faced with a "gap" or unexplained cause that only God's creation command "Let the dry land appear" can answer.

What would the surface of the Earth look like without the lateral separation by density into the light high-riding lands and the heavy

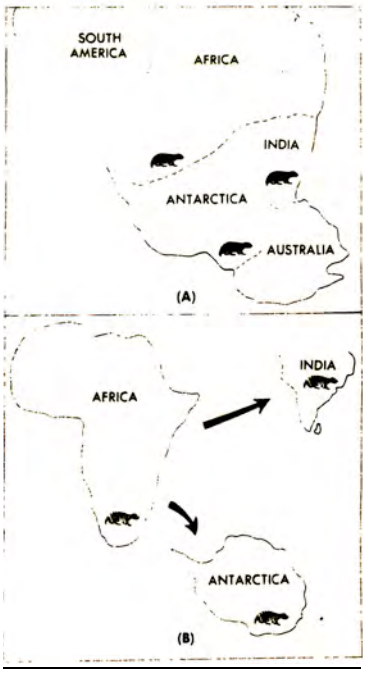

FIGURE 5.16.

Evidence that continents were once joined together is provided by the fossil remains of *Lystrosaurus*, a medium-sized reptile with distinctive skeletal characteristics that included large downward-pointing tusks. *Lystrosaurus* lived during the early Triassic period (about 200 million years ago) and neither it nor its close relatives could have crossed the oceans that now separate the continents of India, Africa, and Antarctica. Yet the fossilized remains of *Lystrosaurus* are found in Triassic formations on each of those continents.