

Earth's crust: Does it consist of massive drifting, colliding plates?

By MARTHA BLISS
Of the Emerald

In the 1600s Sir Francis Bacon developed a wild idea about continents drifting about the earth, splitting apart and colliding with each other.

"Bah humbug," jeered his colleagues. "You probably think men can fly to the moon, too."

Little did they know Bacon's idea would explode into the most popular theory in geology—plate tectonics.

The idea is wild, but it is

gathering the steam of acceptance throughout the scientific world. In fact, the federal government granted Gordon Gole, a University geology and chemistry professor, \$43,500 for an intense study of the subject.

According to the theory, the earth's crust is divided into plates, or sections, which literally drift around the globe.

About 200 million years ago, all the present continents were united as one giant land mass called Pangea. The plates underneath this super-continent began to drift, however, creating the seven individual continents. Great rifts, or trenchlike depressions, border the plates and are the key sites of plate tectonic activity.

Gole's study focuses on the eastern flanks of the Gregory Rift Vent in Kenya. This particular rift is not one of the great rifts bordering the continental plates, but it contains similar structural qualities.

Gole has collected rocks from three chains of volcanoes (Chyulu, Thiba and Nyambeni) near the rift and now hopes to formulate a hypothesis on the Gregory Rift's origins. In turn, this hypothesis will perhaps shed light on the entire plate tectonic theory.

The Gregory Rift is approximately 500 kilometers long and 60 kilometers wide. Like all rifts, it marks the scene of some underground activity in the asthenosphere, a layer of the earth's mantle usually about 100 kilometers below the surface. The asthenosphere is part liquid and part solid.

Occasionally, heated basaltic magma from the asthenosphere pushes up close to the earth's surface into large "reservoirs," where it undergoes a chemical metamorphosis known as "overprinting." In time the magma, now completely different from its former asthenospheric form, erupts onto the earth's surface in rift areas.



"The overprinting process in the reservoirs," explains Gole, "prohibits us from getting a clear picture of the asthenosphere. It is the main obstacle in studying the inner earth."

The inner earth, of course, provides the key to the plate tectonic theory.

To overcome the overprinting obstacle, Gole is studying the volcanoes near the Gregory Rift. Unlike rifts, volcanoes include basaltic magma that was "burped" straight up from the asthenosphere with no overprinting period in underground reservoirs.

With his 25 specimens, Gole now hopes to formulate a clear picture of the asthenosphere.

"I am using the volcanic rocks as a probe to find what causes the break-ups in the asthenosphere," Gole remarks. "Then, I want to compare these rocks with ones from the Gregory Rift to formulate

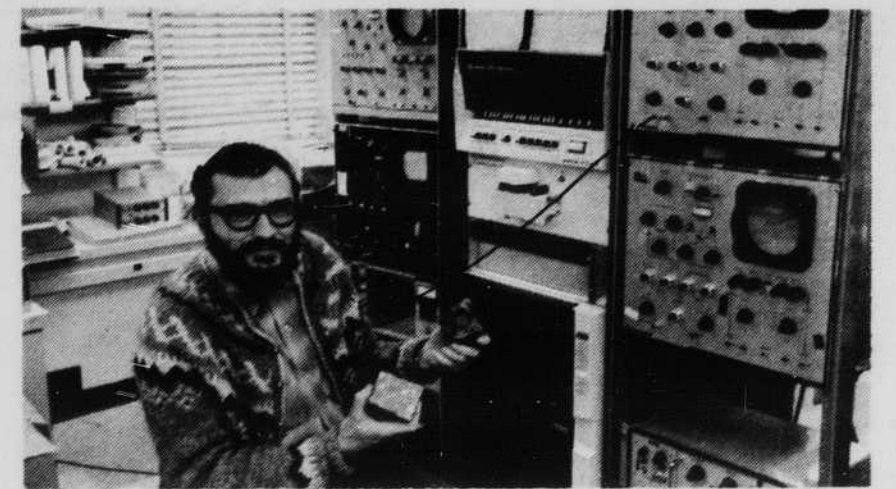
a hypothesis on the rift's origins."

Gole adds that the Gregory Rift's present stage is similar to the early stages of the larger rifts bordering the continental plates. He stresses, however, that the Gregory Rift is not the beginning of another plate; Africa is not splitting apart.

Instead, Gole sees evidence that the Gregory Rift eventually will "freeze in time and become a fossil rift" like a similar one in Norway did millions of years ago.

Most puzzling to Gole is the absence of surface evidence for any activity occurring deep within the earth.

"You would think that any movement inside would cause great upheavals and depressions on the surface, but this is not the case," he said. "All surface consequences are comparatively small. All hell is breaking loose underneath, and there is no evidence on top."



Gordon Gole

Photo by Paul Hribemick

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