

The Great Divorce

After 50 million years together, India and Australia have decided to go their separate ways. In perhaps the first confirmation of a tectonic divorce, American and French scientists have found direct evidence that the Indo-Australian Plate has broken in two, and the fragments are moving independently of each other.

Scientists had long suspected that something strange was going on in the middle of the Indo-Australian Plate. In the 1970s, seismologists plotted a line of earthquake epicenters just south of the equator in the Indian Ocean. Such quake zones often indicate the presence of a plate boundary, a seam in Earth's outer layer where tectonic plates meet. But this one lay in the middle of what was then presumed to be an intact Indo-Australian Plate.

Using studies of plate movements in the Indian Ocean, geologists at Northwestern University in Evanston, Illinois, theorized in the mid-1980s that the Indo-Australian Plate was indeed two separate plates. They calculated that the piece carrying Australia was spinning around India, and this rotation was occurring around a pivot point south of India.

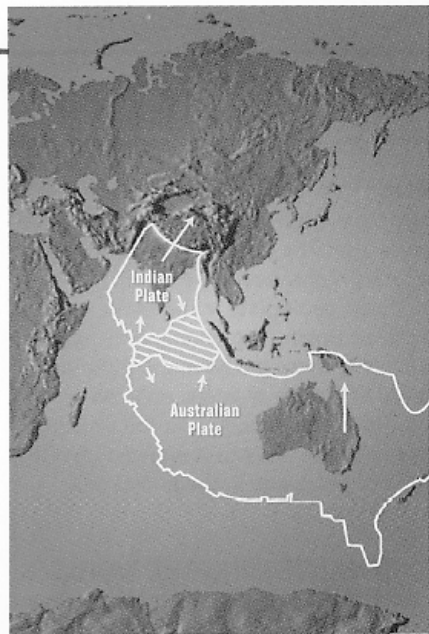
In 1986 and 1991, the American and French scientific team conducted

seismic surveys in the Indian Ocean to find any deformation of the seafloor that might be arising from the theoretical plate movements. They found that the earthquake zone is riddled with hundreds of faults running from east to west. Between the faults the seafloor is thrust upward and the rocks are squashed together.

The seafloor there is buckling "like a piece of tin," says geologist Jeffrey Weissel of the Lamont-Doherty Earth Observatory in Palisades, New York, a leader of the international team.

James Van Orman, then a Florida State University undergraduate, scrutinized the seismic pictures of the seafloor and found compression in the fault zone that increased east of the pivot point proposed by the Northwestern scientists. This is what one would expect if the Indo-Australian Plate were split, with Australia circling around India counterclockwise, according to Weissel's group. The team published its findings recently in *Earth and Planetary Science Letters*.

The breakup of the Indo-Australian Plate is an inevitable consequence of events that occurred long ago, the scientists say. Around 50 million years ago, India crashed into Asia, raising the Himalayan moun-



EARTH: Steven G. Davis

Scientists for the first time have direct evidence that one of Earth's tectonic plates has broken in two. The Indo-Australian Plate has fractured into two plates due to the same stress that is pushing up the Himalayan mountains.

tains. Australia followed closely behind, merging with the Indian Plate at a suture zone now located in the middle of the Indian Ocean. Thus was born the Indo-Australian Plate. About 7.5 million years ago, Weissel says, the part of the plate carrying India finally gave in to the stress of the collision, splitting right along that ancient suture zone. — Larry Krumenaker