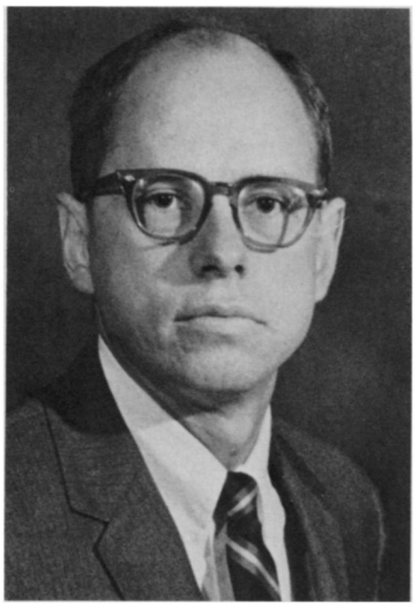
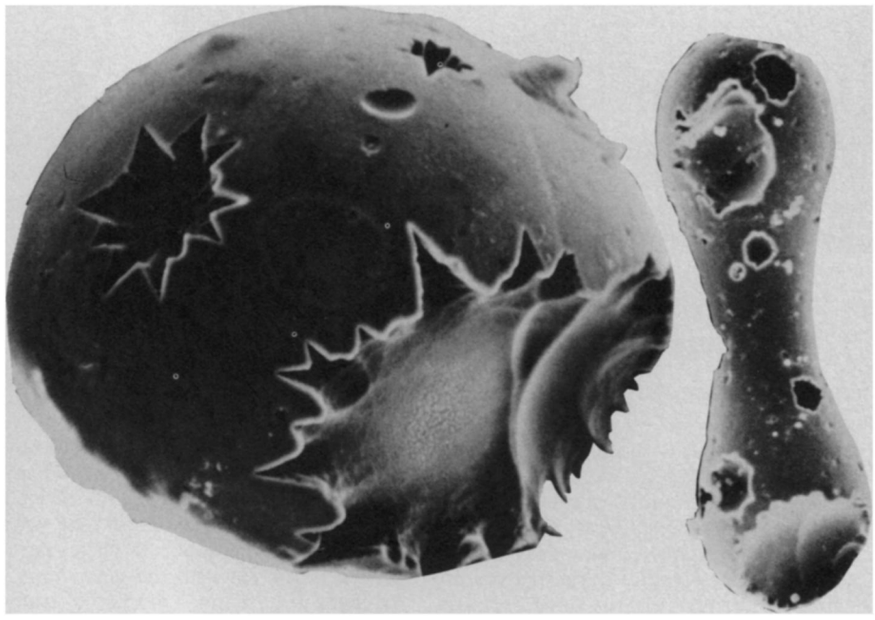
Microtektites found in Caribbean

In a single, mysterious event that occurred approximately 35 million years





Glass: Crystals may be clue to origin.

by Lisa J. Shawver

On several occasions in the distant past, the earth has been bombarded by walnut-sized glassy particles known as tektites. Though their origin remains a mystery to scientists, huge strewn fields of tektites have been found in widely separated areas of the world—on the Ivory Coast, in western Czechoslovakia, in southern Australia and in the United States. In addition, microtektites (between 125 microns and 1 millimeter in size) have been found in deep-sea sediments adjacent to the Australian and Ivory Coast fields.

The tektites discovered in the United States, with a single exception, have been either in Texas or Georgia. According to a report in the June issue of EARTH AND PLANETARY SCIENCE LETTERS, microtektites have now been found in the Caribbean, and the characteristics of these newly found specimens may ultimately shed some light on the question of tektite origin. The discovery was made by Billy P. Glass and Ralph N. Baker of the University of Delaware and Dietrick Storzer and Günther A. Wagner of the Max Planck Institute for Nuclear Physics at Heidelberg, Germany. Glass is responsible for redefining the boundaries around the Australian and Ivory Coast strewn fields. He discovered the Australian microtektites in 1966, and the Ivory Coast microtektites in 1968.

Encouraged by the discovery of microtektites in deep-sea sediments adjacent to the Australian and Ivory Coast strewn fields, Glass and fellow researchers initiated an investigation to see if microtektites related to the American field could be found in the Caribbean. They obtained over 130 samples of Eocene (35 million years ago) sediment from four Deep Sea Drilling Projects (DSDP) in the Gulf of Mexico, and in the Atlantic, north of the Bahamas. They also collected over 150 samples taken by the Lamont-Doherty Geological Observatory from the Caribbean and western Atlantic off the United States. No microtektites were found in the DSDP cores, but over 10,000 microtektites were found in one Lamont-Doherty core.

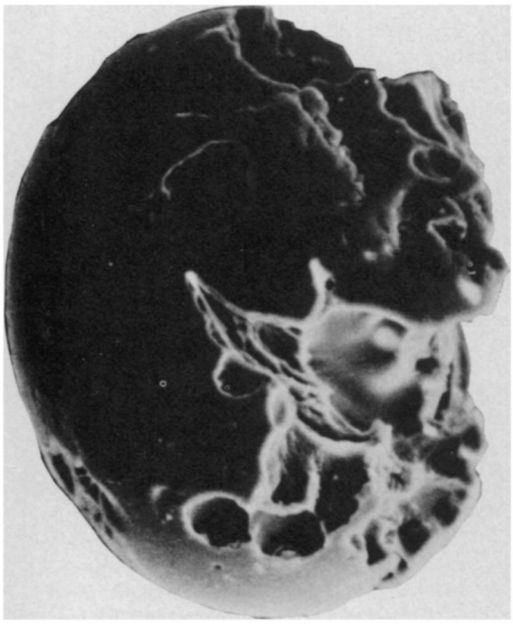
"The occurrence of North American microtektites in the Caribbean Sea," says Glass, "demonstrates that the strewn field is two to three times larger than previously believed." On the abundance of microtektites found, he estimates that as much as one hundred billion tons of glassy fragments fell over the entire region from Texas to Georgia and as far south as the Caribbean.

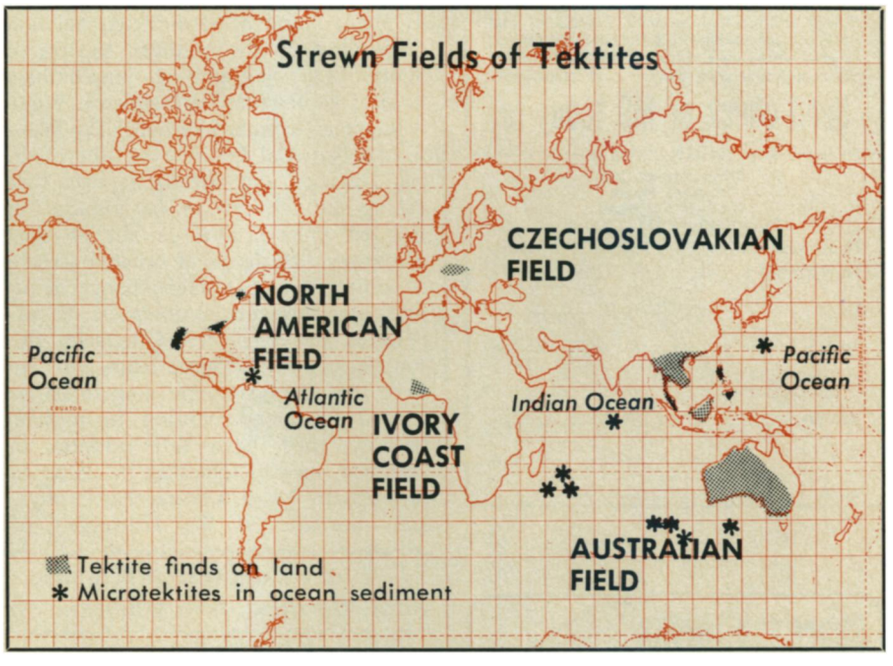
Tektites vary in color from jet black to olive-greenish or yellowish. They are made of silicate glass of nonvolcanic origin. Most tektites have a high silica (68 to 92 percent) and low water content. Their texture varies from glassy smooth to very irregular and badly pitted. They occur in a variety of shapes—teardrops, dumbbells, canoes and spheres—that suggest modeling by aerodynamic forces. Those in each strewn field have chemical characteristics in common and, it has been found, fell in the same event.

In physical properties and major

may shed light on tektite origin

ago, one hundred billion tons of glassy particles fell upon the earth





element composition, the American microtektites are similar to those found near Australia and the Ivory Coast. However, there are some important differences. They have a lower magnesium oxide and calcium oxide content than the other microtektites. One percent of the American samples have small, star-shaped pits on them, whereas none of the African or Australian fragments are so marked. But more important, a few American microtektites possess crystals in their interior; none have ever been found in other microtektites.

"The real importance of the North American microtektite find may yet come," says Glass. "Tektites are rock materials that have melted by impact and cooled so quickly that crystals have [usually] not been able to form. The discovery of crystal material is exciting because it may be able to tell us something about the parent material."

Glass has examined some 50 sediment cores from various parts of the oceans. He found that microtektites can be divided into two groups, normal and bottlegreen. The normal are the most abundant (80-100 percent) in a given core, and are similar to the larger tektites. However, the bottlegreen particles differ from most tektites in that they have a higher magnesium oxide content for a given sulfur dioxide content.

The age of tektites can be determined by comparing the potassium and argon content or by counting the tracks produced in fission or radioactive decay of uranium atoms. Because microtektites are so small they yield insufficient amounts of potassium and argon for the potassium-argon method, only the fission-track method is applicable. By this method, the North American microtektites have been shown to be 35 million years old.

The largest strewn field is the Australian field which covers not only southern Australia, but all of Southeast Asia, the Philippines, Tasmania and much of the Indian Ocean. The tektites of this area are believed to have fallen some 700,000 years ago, immediately after the last reversal of the earth's magnetic field. Whether the event which is responsible for the tektites caused the magnetic-field reversal is not known. The Ivory Coast tektites are believed to have fallen approximately a million years ago.

The debate on tektite origin is more than 100 years old. Some believe that the tektites come from the moon. They feel that tektites were formed when an asteroid hit the moon, splashing droplets of molten rocks so high that they escaped the moon's gravity and fell to earth. However, mass spectrographic analysis of lunar samples shows that elements in the lunar crust are far different from tektites. The tektites are more like the elements in the continental crust of the earth itself. Glass feels that if the parent material of microtektites can be determined from the new findings, the discovery of the origin of the glassy objects might quickly follow suit. □