large region, geologists have discovered a layer of tektites — distinctive rocks thrown into the air by an impact — dating to the late Eocene period. Poag and his colleagues propose that the crash at the southern end of the Chesapeake Bay created this vast field of tektites.

Poag's report has made a splash among other geologists, who would welcome the opportunity to study a large, relatively young crater. But the limited evidence has yet to bowl over most scientists. "It's not obvious that we're dealing with an impact deposit," comments Richard A.F. Grieve, who studies craters for the Geological Survey of Canada in Ottawa.

Grieve and his coworkers are currently studying rock samples from the Virginia breccias. They are looking for "shocked" mineral grains, which bear distinctive fracture patterns formed by the high-pressure shock waves generated during impacts. A preliminary search has not turned up clear examples of any shocked grains, but his group will continue this work for the next several weeks.

Lacking any shocked minerals, Poag may have a difficult time making his case. Grieve remains skeptical about the seismic reflection data because such images are equivocal. "Seismics are a matter of interpretation. People see what they want to see," he says. — *R. Monastersky*

Dante rescued from volcano

After all the high-tech, attention-grabbing wizardry, the saga of the robot Dante 2 ultimately ended with two humans climbing into a volcano on foot last week to retrieve the disabled machine.

Built by researchers at Carnegie Mellon University in Pittsburgh, Dante had crawled into the crater of Alaska's Mt. Spurr in late July. The eight-legged, spiderlike walker spent 8 days navigating 660 feet down the steep slopes and analyzing gases escaping from the floor of the crater. After completing its mission, Dante started its ascent. It had scaled 250 feet of the return route before rolling over on Aug. 5 (SN: 8/13/94, p.101).

The Dante crew first tried airlifting the robot using its tether, a power and communications umbilical cord designed to hold the 1,700-pound machine. But the tether inexplicably snapped during the attempted rescue. After waiting for the weather to clear, project manager John E. Bares and an Alaska National Guardsman hiked into the crater on Aug. 13. They rigged the robot to a line from a helicopter, which then flew Dante 2 to Anchorage. — *R. Monastersky*

Polymers grafted by interlocking strands

They run along the edges of outdoor gear, the tops of sneakers, the borders of bags. These fasteners — Velcro being the best-known brand — have two strips: one bristly and one fuzzy. Pressed together, they stick, as tiny hooks on the rough side grasp the soft side's looping threads.

Designed properly, polymers can join in the same way: Their surfaces can bear the molecular equivalents of hooks and threads.

Dilip Gersappe, a materials scientist at the University of Pittsburgh, and his colleagues describe a new method for grafting polymers with interlaced strands. A report on what they call "molecular Velcro" appears in the Aug. 19 SCIENCE.

"At the molecular level, it's like joining your hands together by interlocking your fingers," says coauthor Anna C. Balazs, also a Pittsburgh materials scientist. "Think of each hand as a different polymer, and think of your fingers as the strands that hook them together."

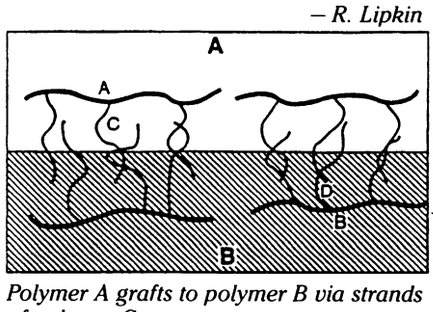
To create such a polymer concoction, the researchers used three compounds that otherwise do not mix: two "homopolymers," A and B, and a third "copolymer," C. When blended together, polymers A and B each form tiny globules surrounded by polymer C. The grafts occur when polymer C binds the surfaces of A and B.

The researchers first modeled the hook and loop interaction on a computer. Then they mixed up suitable polymers, Balazs says. For homopolymers A and B, they used deuterated poly(ethyl acrylate)(d-PEA) and poly(methyl methacrylate)(d-PMMA), respectively. For copolymer C they combined PEA-polystyrene(PS) and PMMA-PS. They subsequently blended, cooked, and cooled various combinations of the polymers and then tested them for their physical properties.

Interestingly, the scientists found that these bonds "significantly improved the structural integrity and mechanical properties" of the materials. The new polymer blend proved stronger, more pliant, and less likely to snap than either of the homopolymers.

"What's nice about this technique is that it's very general," Balazs says. "It will work for a whole class of materials."

— *R. Lipkin*



Balazs *et al.*/SCIENCE

Polymer A grafts to polymer B via strands of polymer C.

Chronic depression: Drugs show promise

A majority of people who struggle through recurring periods of major depression for years, often returning to a low-grade sadness between episodes, improve markedly during 12 weeks of antidepressant drug treatment, according to early results from the largest-ever clinical trial aimed at relieving this debilitating condition.

"To get such a high response to weekly antidepressant administration with no psychotherapy was absolutely striking," asserts Martin Keller, a psychiatrist at Brown University in Providence, R.I., and director of the ongoing multicenter study. "These people had been depressed for an average of 17 years."

Keller and his colleagues described their preliminary findings at the annual meeting of the American Psychological Association in Los Angeles last week.

About one in three cases of depression lasts more than 2 years and is classed as "chronic," Keller says. Some individuals suffer bouts of major depression that last for months or years at a time; some experience a persistent, moderate sadness known as dysthymia; and others encounter "double depression," in which at least 2 years of dysthymia lead to recurring major depression.

Chronic depression afflicts an estimated 3 percent to 5 percent of people in the United States at some time in their lives. However, scant research has examined either drug or psychotherapeutic treatments for this condition.

The new project, which began in April 1993, consists of 300 people with double depression and 240 with chronic major depression who sought help at one of 12 medical centers throughout the country. Two-thirds of each group took sertraline, a chemical cousin of Prozac (fluoxetine), for 12 weeks; the rest received imipramine, from another class of antidepressants, also for 12 weeks. Physicians adjusted the dose, if needed, on a weekly basis.

Another 16 weekly drug doses follow, after which clinicians administer antidepressants as needed for 76 weeks.

Volunteers who discontinue one antidepressant can switch to the other.

The data reported by Keller cover treatment for 89 individuals with chronic major depression and 123 with double depression. Most had attended college, yet about 30 percent had no job. A large majority were unmarried.

Approximately two-thirds of both depressed groups showed a significant lessening of their symptoms by the end of 12 weeks, Keller notes. The rest decided to stop receiving their assigned antidepressant, although most of these volunteers agreed to give the alternative drug a try.

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