

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

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.

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.

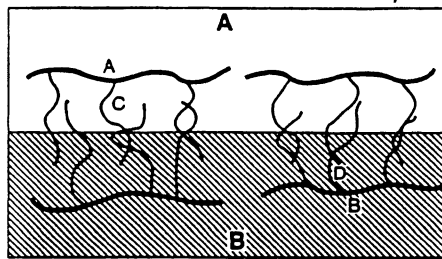
The researchers first modeled the

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



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

A substantial minority of the entire sample had a history of anxiety disorders, such as panic attacks, in addition to chronic depression. Yet those with anxiety disorders responded as well to antidepressants as those without, holds Lorin M. Koran, a psychiatrist at Stanford University Medical Center. In contrast, first-time major depression proves more difficult to treat with antidepressants when it is accompanied by anxiety problems, he says.

Participants with chronic major depression who expressed worries about physical health or cited physical symptoms, such as stomach problems and heart palpitations, were most likely to drop out of treatment, Koran notes.

Half the sample also received a diagnosis of personality disorder, adds Gabor Keitner of Brown University. Again, these individuals improved as much on antidepressants as those without personality disorders.

About 40 percent of volunteers had experienced the death of a parent or the divorce or separation of their parents during childhood, which may influence chronic depression, Keitner suggests.

Few participants had received adequate treatment with any antidepressant previously, says Michael Thase, a psychiatrist at the University of Pittsburgh. Past psychotherapy or drug treatment did not boost responses to antidepressants, he contends. — B. Bower

Protein missing in endometriosis cases

A woman diagnosed with endometriosis experiences the frustration of enduring an inexplicable disease. And a woman suffering infertility because of endometriosis experiences the double frustration of being told that pregnancy "cures" the disease — if only she could get pregnant.

It's the ultimate catch-22 situation, says Bruce A. Lessey of the University of North Carolina at Chapel Hill.

But if Lessey and his research team prove correct about the role of a protein known informally as beta-3 — the beta-3 subunit of the vitronectin receptor integrin — they may have taken one step closer to understanding the puzzling nature of endometriosis and its association with infertility.

Though the disease was named in the 1920s, the causes of endometriosis remain poorly understood. Recent research, however, has indicated a link between this disorder and exposure to dioxin (SN: 11/27/93, p.356).

Endometriosis occurs in 2 to 5 percent of all women. In the disorder, the endometrium, or uterine lining, grows where it shouldn't — on the ovaries, fallopian tubes, bladder, urethra, intestines; more rarely, on the kidneys, lungs, and thorax; and rarest of all, on the brain. The chief symptoms are pain, heavy bleeding, and infertility. About 40 percent of infertile women suffer from endometriosis.

In the August JOURNAL of CLINICAL ENDOCRINOLOGY and METABOLISM, Lessey and his coworkers report potentially excellent news for the future of endometriosis sufferers. They find that beta-3 analysis has a "positive predictive value as a nonsurgical diagnostic test for minimal and mild endometriosis." Currently, the only accurate diagnosis of the disease requires a laparoscopy, a procedure involving a "belly-button cut" and insertion of a lighted instrument into the navel.

Lessey and his team analyzed endometrial biopsies of 241 women with regular menstrual cycles. They compared 105 women diagnosed with endometriosis to 116 infertile women with no known endometriosis and 20 fertile women.

In normal, healthy women, Lessey says, beta-3 appears on the endometrial epithelium "like clockwork" on the 19th to the 20th day of the menstrual cycle, corresponding to the body's preparation for implantation and pregnancy.

The researchers collected biopsies from 89 of the infertile controls prior to laparoscopic examination. Of these, 22 displayed an absence of beta-3 on day 19 and day 20. Laparoscopy confirmed minimal endometriosis in 19 of the 22 women, making the beta-3 marker accurate in 86 percent of the cases.

Lyme disease may not harm kids' brains

Borrelia burgdorferi, the bacterium that causes Lyme disease, penetrates some people's brain tissue, where it can remain dormant for many years before causing cognitive disorders. That's one reason patients and physicians fear the illness.

In the first prospective study to look specifically for cognitive effects of Lyme disease in children, however, researchers came up empty-handed. None of the 41 youngsters examined suffered neuropsychological problems as a result of the infection, Wayne V.

too late.

In addition to the tests given to the participants, age 6 to 17, the researchers also compared the children's pre- and postdisease standardized achievement test scores.

Commenting on the study, pediatrician Ilona S. Szer of Children's Hospital and Health Center in San Diego cautions that "only in about 20 years can we be sure" that the bacteria left the children's brains unharmed. *B. burgdorferi* usually takes many years to cause noticeable damage, she argues.

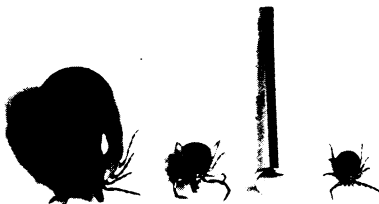
Szer does find some comfort in the new results, however. The researchers employed very sensitive tests that should have picked up subtle changes that could precede obvious cognitive disturbances, she says.

In 1991, Szer and her colleagues reported on 36 children diagnosed with Lyme disease between 1972 and 1981 who had not received treatment until at least 4 years after symptoms began. By the late 1980s, only the two participants diagnosed with bacteria in their spinal fluid had cognitive difficulties, she says.

Studies reporting that infection with the Lyme disease bacterium leads to mental ills in treated and untreated adults aren't conclusive, Adams and his colleagues say. The studies' methodologies were sometimes weak, and researchers often selected patients with neuropsychological complaints.

Scientists have fingered a new carrier of *B. burgdorferi*: dogs. A new study demonstrates that a deer tick feeding on an infected canine will pick up the bacterium, Thomas N. Mather of the University of Rhode Island in Kingston and his colleagues report in the July 15 JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. The ticks can then infect humans, although the dogs themselves cannot. Not all dogs develop symptoms, Mather adds.

— T. Adler



Unless full of blood, a deer tick, carrier of the Lyme disease bacterium, can almost dance on the head of a pin. Left to right: engorged female, female, male.

Adams and his colleagues at the Alfred I. duPont Institute in Wilmington, Del., report in the August PEDIATRICS. In 1993, the Centers for Disease Control and Prevention received almost 2,000 reports of Lyme disease in U.S. children.

In the study, the bacteria caused central nervous system disorders — such as Bell's palsy — in nine patients but no apparent cognitive ills.

However, the researchers administered neurological and cognitive tests only an average of 2 years after the patients became sick, and symptoms may take longer to develop, they acknowledge. As a result, the team continues to study the children. Also, these findings may not apply to anyone who did not receive treatment or received it

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