

## New twist for a sunspot

If there is nothing new under the sun, there is occasionally something new on the sun. Recently the Vacuum Solar Telescope at Kitt Peak National Observatory found a spiral-shaped sunspot. Such a finding is described by solar observers as unprecedented. William Livingston, a long-time observer of the sun at Kitt Peak, calls the finding a "real curiosity, a rare thing."

Sunspots were first discovered by Galileo, and their existence became ammunition in his controversy with the learned folk of his day, who regarded the solar system from a metaphysical perspective and had therefore decided by a priori reasoning that the sun had to be a perfect body and so immaculate. Galileo's observations showed otherwise. Sunspots are now believed to be cool regions characterized by intense concentrations of the sun's magnetic field. Their usual shape is irregularly round (not circles), and their diameters average 6,000 miles.

The spiral sunspot, which had an uncanny resemblance to the shape of a spiral galaxy, was first noticed on February 19. Its size as well as its shape was unusual: it was 50,000 miles across. Because sunspots are often the source of solar flares, it had been



Kitt Peak National Observatory

feared the spiral might spawn particularly severe ones, possibly interfering with radio communications on earth. But that did not happen. After about two days the spiral dispersed into smaller sunspots. The detailed mechanisms that form and shape sunspots are poorly known, so the question "why a spiral" is not likely to receive a precise answer. □

## Botulism toxin treats crossed eyes

The most poisonous biological substance known is the botulinus toxin. But now tiny amounts of it are being harnessed to help, not hurt, humans—specifically to correct strabismus, also known as crossed eyes. So reported Alan B. Scott of the Smith-Kettlewell Institute of Visual Sciences in San Francisco this week at the seventh national science writers seminar sponsored by Research to Prevent Blindness, Inc., in Arlington, Va. And according to Edward Schantz, a botulinus toxin authority at the University of Wisconsin in Madison, this is the first time that the toxin has been used medically.

Strabismus has traditionally been corrected by surgery. Around 60,000 strabismus operations are performed in the United States annually; they rank second only to cataract surgery as the most common eye operation. But this surgery is costly, and doesn't always work, so Scott and team sought a nonsurgical solution.

The botulinus toxin prevents nerves from releasing the chemical acetylcholine into muscles; as a result, muscles can't contract. Scott's team reasoned that if a minute amount of the toxin—a dose perhaps thousands or even millions of times smaller than that required to poison a person—were injected into the muscle that makes an eye cross, it might keep acetylcholine from signaling the muscle, thus

making the muscle relax and stretch. They hoped the muscle on the opposite side of the eye would pick up the slack and pull the eye back into line.

They tested the concept on monkeys first. It worked. They then undertook a clinical trial on 80 strabismus patients six to 80 years of age, half of whom had not profited from strabismus surgery. Each patient was given eye drops to alleviate any possible discomfort. Then one billionth of a gram of the botulinus toxin was injected into the offending eye muscle. As hoped, the injections relaxed the patients' eye muscles. In some cases one injection was enough to fully correct strabismus. The only visual side effect was temporary double vision. Most important, the patients experienced no botulism poisoning.

Scott cautions that "the treatment is not as permanent as surgical correction in many cases"—that is, sometimes patients' corrected eyes will start crossing a little again, and in such instances will need another toxin injection to bring them temporarily back to normal. He also points out that only further testing will show precisely how the toxin treatment compares with surgery in correcting strabismus. Connie Atwell, chief of the Strabismus, Amblyopia and Visual Processing Branch of the National Eye Institute, which funded the study, agrees.

—J. A. Treichel

## Science education in U.S. criticized

"A majority of our high school graduates are becoming members of the fastest growing minority group in the U.S.—the scientifically and technologically illiterate," warned Stanford University professor emeritus Paul DeHart Hurd last week. As the first speaker at a National Academy of Sciences convocation on precollege math and science education, Hurd outlined the recent decline in "quantity and quality" of that education.

Of the more than three million high school graduates today, he said, "only 34 percent have completed three years of math and only eight percent complete a course in calculus. Most seniors have had a biology course, a little over a third have had chemistry, but less than a fifth have had three years of science."

The drop in science study is paralleled by falling signs of achievement such as scores on standardized tests, he said. "The mean score in mathematics on the well-known Scholastic Aptitude Test dropped from 502 in 1963 to 466 in 1980." To make things worse, there is a "critical" shortage of qualified teachers, he noted.

Hurd's concern—echoed by nearly 40 other speakers—is not only that the U.S. could suffer a future shortage of research scientists, engineers and technicians, but also that declining science literacy is harmful to the general public. Asked NAS president Frank Press: "How can we expect our children to have successful lives in an intensely competitive and highly technological world if they don't have the education to understand it?"

Representatives of local, state and federal government, industry and the scientific community expressed similar worries. There was "a warm and solid consensus on the facts of this crisis," said SCIENTIFIC AMERICAN publisher Gerard Piel at the conclusion of the two-day convocation, as well as "significant initiatives from all quarters" that participated. For example, some states have raised high school graduation requirements to include several years of math and science. But the "consensus broke down" when it came to the question of federal involvement, said Piel.

Although local control of primary and secondary education is an almost sacred American tradition, many speakers said that the present crisis calls for greater federal initiative. Yet federal aid for science education has been declining for 20 years. In the Reagan administration alone, proposed funding for the National Science Foundation's education programs has been cut to \$15 million for FY '83 from \$70 million two years ago. Much of that money formerly went into precollege science programs, including teacher education, says NSF's Alphonse Buccino.—L. Tanglely