

## FY 2006 Research Highlights

The following are some results reported by NSF-supported researchers in FY 2006:

- Conducted extensive onsite research in and around New Orleans following Hurricane Katrina and published an analysis explaining how and why numerous levees failed, allowing engineers to improve plans for repairs
- Observed the astronomical results of a two-galaxy smashup and announced the first “direct detection” of the mysterious, invisible “dark matter” that is a major component of the universe but neither emits nor reflects light
- Provided novel telecommunications and computerized early-warning systems that gave critical information to separate teams fighting a dangerous outbreak of wildfires in California
- Issued advance warning of the increased risk of a potentially lethal microbe called Hantavirus that has plagued the Four Corners area of the southwest United States
- Launched a major, multiyear program to record and study dozens of dying languages—those spoken by only a few people and doomed to soon disappear completely—so that knowledge will not be lost to humanity
- Compiled a forecast indicating that the next 11-year sunspot cycle, with associated “solar storms” that can damage key communications satellites and cause widespread blackouts in power grids, will be at least 30 percent stronger than the last cycle
- Showed that there is a direct link between the number of species in an ecosystem and its ability to survive environmental and other threats
- Uncovered a new method of detecting and identifying cancer genes by mathematically analyzing the output of “gene chips” and tested the method successfully in lung cancer cases
- Undertook a wholesale reevaluation of high school advanced placement courses in math and science, which are now in drastic need of updating to give students the information and insight they will need in college
- Discovered and characterized a “super glue” produced by bacteria that is completely waterproof and three to five times stronger than any commercial adhesive available—capable of withstanding a pull of 5 tons per square inch
- Unearthed a remarkable fossil—unlike anything else ever discovered in the region—that is the oldest example of a creature that inhabited the evolutionary gap between fish and land animals
- Devised an ultra-tiny electrical valve (or diode) that is made of only a single molecule—a thousand times smaller than its current counterparts—thus raising the possibility of an entirely new era of miniaturization in electronic components
- Determined that infants less than one year of age have an innate sense of numbers that they are able to employ many months before they are even able to talk, much less do arithmetic
- Produced the first computer simulation of the workings of every atom in a virus, the first time any complete life form has been mapped in its entirety
- Sent a new high-altitude research plane, built to fly miles above commercial jets, on its first successful science mission to examine the contents and activity of atmosphere at previously unreachable heights
- Constructed a new generation of two-legged robots that can walk like human beings

For more information on the results of NSF-funded research, visit [www.nsf.gov/discoveries/](http://www.nsf.gov/discoveries/).

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