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Birth of brown dwarfs

U.S. ELECTIONS

Democrats Match GOP in Sending A Physicist to Washington

Democrats now have a physicist of their own in the U.S. Congress. In an upset victory last Tuesday, Rush Holt, a one-time student of solar winds, edged out first-term Republican Mike Pappas to capture New Jersey's 12th district congressional seat. Holt joins Michigan Republican Vernon Ehlers, who easily won a fourth term, as the first two Ph.D. physicists elected to the House of Representatives. "If we can find a room with a chalkboard, we'll form a bipartisan physics caucus," an ebullient but exhausted Holt joked following his 50% to 47% win.

Holt's win was just one unexpected result in a surprising election that shattered GOP hopes of strengthening their narrow majorities. The results—a net loss of five House seats and no change in the Senate—led to the resignation of House Speaker Newt Gingrich (R–GA) and prompted challenges to other party leaders. But although the probable new speaker, Representative Bob Livingston (R–LA), is unlikely to match Gingrich's vocal enthusiasm for science, most of Congress's other ardent R&D supporters retained their seats by comfortable margins. Among the returnees are the architects of the National Institutes of Health's recent $2 billion increase, Representative John Porter (R–IL) and Senator Arlen Specter (R–PA), along with Representatives James Sensenbrenner (R–WI) and George Brown (D–CA), chair and ranking member of the House Science Committee.

On the other side of the country, voters in Washington state passed a referendum that dismantles the state's affirmative action programs. The Washington initiative—which asked voters to ban discrimination but did not specifically mention affirmative action—will prohibit governments and universities from using race and gender as criteria for selecting employees, contractors, and students. It makes Washington the second state, after California, to roll back preference programs. But state officials say there will be years of litigation before the measure's full impact is known.

Meanwhile, researchers and science lobbyists hope that Holt's victory will provide a sorely needed boost to the scientific expertise of the nation's legislative branch, which contains only a handful of scientists and engineers. Holt, 50, has been assistant director of the Princeton Plasma Physics Laboratory in Plainsboro, New Jersey, since 1989 and spent 2 years in the late 1980s as a State Department arms control adviser. Scientists around the country contributed to his campaign, and Ehlers sees his election as a sign that scientists—often chided by politicians for their political naiveté and lack of activism—are becoming more interested in making a mark at the polls. "The science community has become much more politically energized in the last 2 years," believes Ehlers, who says he is "delighted to have another physicist aboard." He is disappointed, however, by the loss of conservative ally Pappas.

The rush of victory. Physicist-politician Rush Holt celebrates his upset win in New Jersey House district.

Although Pappas was considered among the House's most vulnerable incumbents after a narrow victory in 1996, many pundits had discounted Holt's chances. In particular, they doubted he could raise enough money to campaign effectively in the sprawling suburban district, which stretches across central New Jersey and includes the science-rich Princeton University campus. But Holt, who earned a doctorate at New York University in 1981 and later taught at Swarthmore College in Pennsylvania, raised nearly $1 million in cash and in-kind donations, more than any other Democratic challenger in New Jersey.

Most of Holt's nearly 4500 cash gifts—which totaled about $880,000—came from traditional Democratic constituencies, including teachers, union members, and abortion rights activists. But several hundred scientists coughed up significant time and money too, according to campaign officials and Federal Election Commission records. Among them were more than a dozen Nobel Prize winners, including biologist David Baltimore, president of the California Institute of Technology in Pasadena. Supporters also included scores of Holt's former colleagues from Princeton, the American Physical Society (APS, which awarded him a Congressional Science Fellowship in 1984), and the Department of Energy (DOE), which funds the plasma lab. DOE science chief Martha Krebs, for instance, gave the campaign $250 in June. "We made a major effort to reach out to the scientific committee," says physicist Sherrie Preische, a former Princeton graduate student who took time off from her job at the APS to serve as the campaign's treasurer.

One researcher who answered the call was Princeton physicist Norton Bretz, who donated a total of $2000, the maximum allowed for both the primary and general election. "Scientists usually focus on their own work, but [Holt's candidacy] jarred us a bit and got us interested," he said. Another $2000 donor was APS Editor-in-Chief Martin Blume, a physicist at Brookhaven National Laboratory in Upton, New York, who calls himself "a bipartisan supporter of electing more scientists to Congress." Blume, who in the past has given to candidates from both major parties, says that "the degree of scientific illiteracy in Congress is a serious problem, but few of us have any idea of how to get elected. Rush and Ehlers do."

Holt's political savviness is no surprise to those who know his family history. His father was, at 29, the youngest person ever elected to the U.S. Senate, representing West Virginia for one term in the 1930s. And his mother served as West Virginia's secretary of state. "I was raised to think that politics was an honorable calling," Holt told *The New*

CREDIT: DANIEL HULSHIZER/AP

York Times earlier this year.

Holt didn't dwell on his scientific credentials during the campaign, and as a freshman from the minority party he is unlikely to have a significant impact on national science policy. But he did claim "technical expertise that is so rare in Congress and political expertise that is so rare in science." He promises to be a "strong advocate for R&D" but declines to say whether he is seeking a seat with direct responsibility for science policies or spending. He also knows that his narrow win marks him as vulnerable in the 2000 campaign. "There are a dozen Republicans already thinking about running against me," he says. "I say, bring 'em on." **–DAVID MALAKOFF**

DEVELOPMENTAL BIOLOGY

Understanding of Ears, Bristles Jumps a Notch

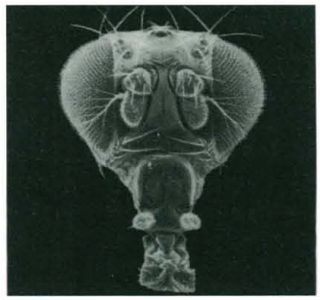
The arrangement of cells in the inner ear, which allows a music lover to sense harmonies, is itself as complex as a Bach fugue. It is orchestrated during development when precursor cells in the inner ear organize into a mosaic of sensory patches made of hair cells, which sense vibrations, neurons, which send messages to the brain, and supporting cells. In the December issue of *Development*, researchers describe part of the system of molecules that creates this intricate pattern. In an example of evolution's tendency to reuse basic mechanisms, it turns out to be the same system that guides the development of a much simpler sense organ in the fruit fly.

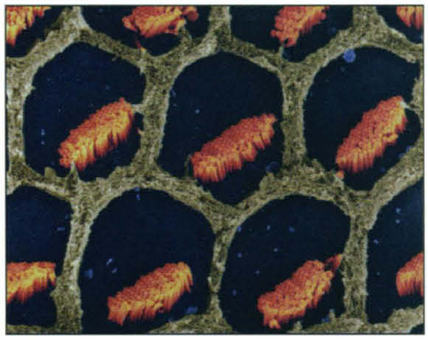
Developmental biologist Julian Lewis of the Imperial Cancer Research Fund in London and his colleagues demonstrate that proteins called Delta and Notch, already known to help pattern the vibration-sensing bristles on a fly, control the development of the hair cell mosaic in the inner ear of zebrafish and chicks. Other evidence from mice, which developmental biologist Matthew Kelley of Georgetown University has presented at several meetings, suggests that the same proteins are at work in mammalian ears as well.

Lewis's work "begins to give us an idea of the molecular pathways that govern the development of the mosaic," Kelley says. And it may eventually have clinical applications: In mammals, including humans, damaged hair cells are lost for good, but birds can regenerate them. Understanding how the cells develop in the first place "begins to give us insight into the pathways that prevent regeneration," Kelley says.

Delta and Notch are powerful determinants of cell fate in both the fly and in vertebrates. For example, as a group of vertebrate pre–neuronal cells matures, one cell gets slightly ahead of its cousins. Delta, which is lodged in the cell's membrane, interacts with the Notch receptor on neighboring cells, preventing them from becoming neurons. In the developing fly bristle—a miniature sense organ on the fly's head and body, which is made of a neuron and accessory cells—Delta-Notch signaling seems to work in a similar fashion to determine which precursor cells become neurons, bristle shafts, and supporting cells.

Because of the similarities between bristle and hair cell structure and function, scientists had suspected that the inner ear might also use Delta-Notch signaling in development. To find out, Lewis, Julie Adam, Anna Myat, and their colleagues looked for expression of the *Delta* gene in the ears of chick embryos. A few hours before the first neurons appear, the scientists found *Delta* expressed in scattered cells. Several days later, *Delta* was expressed again at just the site where the mature hair cells appeared a few hours later. By the time the hair cells were recognizable, Delta had nearly disappeared, but the two bouts of *Delta* expression are "strong evidence" that *Delta* guides neuron and hair cell development, says developmental neurobiologist Jeffrey Corwin at the University of Virginia, Charlottesville.





Hearing aid. During development, chick inner ears (*above*) and fly bristles (*top*) are both patterned by the Notch protein.

In a second paper in the same issue, Lewis, Catherine Haddon, and their colleagues suggest that a similar process also controls ear development in the zebrafish. They examined the embryonic ears of a mutant zebrafish called *mind bomb*, so named for its excess of neurons. No one has yet pinpointed the gene responsible for the fish's bumper crop of neurons but researchers think that the mutation somehow blocks Delta-Notch signaling. Sensory patches in the inner ears of *mind bomb* fish become "wall-to-wall hair cells," says Lewis, with no visible supporting cells—every cell becomes a hair cell.

Given that fly bristles and ear hair cells do basically the same thing and use the same developmental genes, Lewis and his colleagues propose that they may have evolved from a common ancestral sensory structure. But Corwin isn't so sure. Delta-Notch signaling is so common that "it may be like a subroutine in computer programming that evolution uses over and over," he says. So it's possible, says Corwin, that evolution reused the system in unrelated organs.

However the system evolved, understanding it may be useful. After chick inner ear cells are damaged, they express Delta as they regenerate, according to developmental neurobiologists Edwin Rubel and Jennifer Stone at the University of Washington, Seattle. These findings, under review at *Development*, may bring scientists a little closer to the day when "we will be able to restore hair cells in the human ear," says Rubel—an achievement that may allow today's headbangers to enjoy Bach in their old age.

–GRETCHEN VOGEL

COMPUTER SCIENCE

Microsoft Picks Beijing For New R&D Lab

BEIJING—Microsoft Corp. is making a major research investment to help it capture and retain a large chunk of China's fast-growing computer business. Last week, the software giant announced that it will open a research center in Beijing, and it pledged to spend $80 million over 6 years to make computers more user friendly for speakers

CREDITS: (LEFT) EDWIN RUBEL/UNIVERSITY OF WASHINGTON, SEATTLE; (RIGHT) R. TURNER/INDIANA UNIVERSITY