Ötzi Death Riddle Solved

Last week, almost 10 years after the discovery of the "Ice Man," scientists announced that they finally know what killed him: He was shot from behind by an arrow.

When the 5300-year-old mummy was found in the Tyrolean Alps, scientists figured he had died alone while hunting. But computed tomography (CT) scans have revealed a 2-centimeter-long flint arrowhead that ripped through his scapula and is buried about 6 cm deep under his shoulder.

The arrow missed vital organs, which means the man probably suffered a drawn-out and painful death, pathologist Eduard Egarter-Vigl and radiologist Paul Gostner of the Bolzano hospital in Italy related at a press conference. The missile also damaged nerves and possibly paralyzed his left arm. Its path indicates that the bow man was standing behind and slightly below the Ice Man.

Anthropologist Horst Seidler of the University of Vienna, head of the Ice Man research team, says that the mummy

Arrow hole under left shoulder. Inset, scan shows arrowhead (arrow).

—which is kept chilled at the archaeological museum in Bolzano—had been turned so that researchers could take new x-rays before extracting bone and tissue samples for research. The x-rays indicated that there was something in the shoulder; CT scans—which had never before been done on the mummy—then revealed it to be an arrowhead. The tissue around the wound is relatively dense, says Seidler, indicating "extended heavy bleeding."

Seidler notes that back in 1994 he was among a team of scientists who proposed that the Ice Man did not just collapse from cold or illness but suffered "personal disaster before death." That was based on "extremely weak arguments," he says; now it turns out they were right.

The Stammering Brain

For the first time, researchers have spotted differences in brain anatomy between stutterers and nonstutterers. The findings could help predict who is at risk for stuttering and perhaps lead to individually tailored treatments.

A team led by neurologist Anne Foundas at Tulane University Health Science Center in New Orleans, Louisiana, used magnetic resonance imaging to measure the volume of speech-related brain regions in 13 men and three women who had stuttered since childhood, as well as a control group of 16, matched for sex (male stutterers outnumber females 4 to 1) and handedess (stutterers are about twice as likely to be lefties), as well as age and education. The researchers then compared two brain areas associated with speech and language—Broca's area in the front of the brain, and parts of Wernicke's area in the back.

The stutterers tended to have a much larger and more symmetric planum temporale, a region in Wernicke's area associated with language and music processing, the team reports in the July issue of *Neurology*. Ordinarily, this feature juts out more on the left side in right-handers. Stutterers also had more folds, or gyri, on the brain surface in Broca's area, which Foundas suggests could disrupt connections between the auditory and motor areas of the brain. "There was not one distinct feature across all stutterers," Foundas says. Rather, each had an average of four unusual features, while nonstutterers averaged only one.

The study "very conclusively" shows anatomic differences between stutterers and nonstutterers, says speech pathologist Roger Ingham of the University of California, Santa Barbara. He says it provides "an important link" in a growing body of biological evidence on stuttering.

Recipe for Success

Last week we told you about U.S. Gold Medalist Reid Barton's success at the International Mathematics Olympiad (*Science*, 27 July, p. 597). Now we bring you his solution to one of the most daunting problems.

Here's the challenge: "Twenty-one girls and twenty-one boys took part in a mathematical contest. Each contestant solved at most six problems. For each girl and each boy [i.e., for any boy-girl pairing], at least one problem was solved by both of them. Prove that there was a problem that was solved by at least three girls and at least three boys." Reid's recipe:

1. Make a table, listing girls down the left side and boys along the top. In each cell, place a letter representing one problem that the girl in that row and the boy in that column both solved. (Every cell will be filled, because of the hypothesis about boy-girl pairs.) See example (A).

2. Now look in each row for letters that occur more than two times. (Remember, no row will contain more than six different letters.)

3. In that row, color every cell containing those letters red. You will observe that at least 11 cells in each girl's row are colored.

4. Thus more than half the cells in each row—and therefore in the entire table—are red, meaning they were solved by at least three boys.

5. Now repeat the procedure for each of the boys, coloring cells blue to represent problems solved by at least three girls.

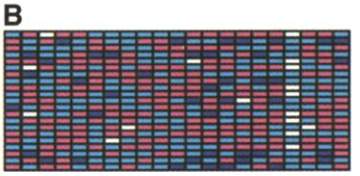
6. Because more than half the cells are red and more than half blue, at least one must be both red AND blue, as in (B).

7. The letter in this cell must then be a problem that was solved by at least three girls and at least three boys.

A

	Boy 1	Boy 2	Boy 3	Boy 4
Girl 1	B	C	D	C
Girl 2	A	E	A	A

B



Barton liked this problem because he didn't know until the very end that his formula was going to work. Of 473 contestants, only 20 got the answer; some were snagged trying to figure out the number of problems, which doesn't matter in this exercise.

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