



NATIONAL

Fields Medal Recognizes Mathematical Achievement

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TRANSCRIPT

Robert Siegel talks to Julie Rehmeyer, a math columnist for *Science News*, about the winners of the 2010 Fields Medal. Awarded every four years, the Fields Medal recognizes outstanding mathematical achievement.

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ROBERT SIEGEL, host:

The following are not household names: Elon Lindenstrauss, Ngo Bao Chau, Stanislav Smirnov and Cedric Villani. But those four men - one Israeli, a Vietnamese, a Russian who lives in Switzerland and a Frenchman - have just joined an elite group.

At the International Congress of the International Mathematical Union in Hyderabad, India, Lindenstrauss, Ngo, Smirnov and Villani received the 2010 Fields Medals for Mathematics. They're awarded every four years to as many as four mathematicians under the age of 40.

Julie Rehmeyer, who writes the Math Trek column for Science News, wrote the summaries of the medalists' work. And she joins us from Santa Fe, New Mexico.

Welcome to the program.

Ms. JULIE REHMEYER (Columnist, Science News): Thank you.

SIEGEL: And I'm going to dare you in a moment to explain what some of the medalists did to win this award. But first, just explain to us how significant the Fields Medals are to mathematicians.

Ms. REHMEYER: Oh, they're very significant. They're often called the mathematician's equivalent of the Nobel Prize. It's a little bit of an unfair comparison because you do have to be under 40 to win a Fields Medal. So there are plenty of people who've done fantastic things who just can't win because they're too old.

SIEGEL: Well, tell us about what won the medals.

Ms. REHMEYER: Well, let me start with Villani. Basically, what he figured out was just how fast the world is falling apart. In particular, he calculated the rate at which entropy increases. So entropy is disorder, and the second law of thermodynamics says that disorder will always increase, the world will fall apart. The really unexpected thing that came out of his work is that it falls apart at varying rates. So sometimes it's falling apart faster, and sometimes it's falling apart slower.

SIEGEL: Okay. That's Mr. Villani's medal-winning work.

Ms. REHMEYER: Uh-huh.

SIEGEL: What about the others?

Ms. REHMEYER: Well, let's see. There's Ngo who proved a result called the fundamental lemma, which was for many, many years a major roadblock to progress on this kind of mind-bogglingly grand program in mathematics that's finding these deep, hidden connections between different areas of math. The fundamental lemma is a really funny name because lemma ordinarily means a small, minor useful result. But this turned out to be an extraordinarily important lemma. But his proof is particularly important because there is a lot of theory that was built on top of it, assuming that it was true. And if it turned out to be false, then there are people whose lives' work would have just vanished.

(Soundbite of laughter)

SIEGEL: But it's not false, is what he's...

Ms. REHMEYER: But it's not false.

SIEGEL: ...found. Good. Good. Good.

Ms. REHMEYER: He proved it true.

SIEGEL: Smirnov or Lindenstrauss?

Ms. REHMEYER: So Smirnov, though his work is like everyone else's in this group, highly theoretical, it addresses a remarkably down-to-earth question, which is when can water percolate through soil and when does it get stuck? So what he did was that he showed that a very important mathematical model of this process works even at very tiny scales.

SIEGEL: And the fourth Fields Medal winner, Elon Lindenstrauss?

Ms. REHMEYER: So what he did is he applied an area of mathematics called Ergodic theory, which you can think of as basically the mathematics of billiards. And he developed a very powerful tool in Ergodic theory, and then he applied it to

areas that seemed completely unrelated to this, like number theory and quantum theory, and managed to solve some problems that had been quite difficult and had resisted proof for many, many years.

SIEGEL: I noticed, by the way, that this is a hugely prestigious award. It does not make a mathematician rich.

Ms. REHMEYER: Well, in general, mathematicians are motivated more by, I think, the joy of doing mathematics and the acclaim of the very few people who can actually understand what they do.

SIEGEL: Than the \$15,000 that might...

(Soundbite of laughter)

Ms. REHMEYER: Right.

SIEGEL: ...convey with the Fields Medals.

(Soundbite of laughter)

Ms. REHMEYER: Right.

SIEGEL: Well, Julie Rehmeyer, thanks a lot for talking with us about it.

Ms. REHMEYER: Thank you.

SIEGEL: Julie Rehmeyer, who writes columns on math for Science News and also for Wired magazine, spoke with us about the 2010 Fields Medals in Mathematics.

(Soundbite of music)

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