



# from string theory to TV star

**ROBERTO MARTINEZ ('02) is working on his Ph.D. at Harvard. He's also put his skills in math and physics to work for Animal Planet.**

**BY CORY DUGAN**

**“I want to be the person that makes science cool. Like a basketball star or a rapper or something—but a string theorist,” Roberto Martinez ('02) recently told *The Harvard Crimson* regarding his latest adventure in dispelling all those myths about the scientific community just being a nerd herd.**

That adventure took the Harvard Ph.D. candidate to Sydney, Australia, with four other young scientists and a television crew from the Animal Planet network.

“They’ve got the tools. They’ve got the brains,” says the voiceover on a teaser ad for the series, *Chasing Nature*. “And they’ve only got five days to replicate the wonders of the natural world.”

If it sounds like yet another in the endless stream of “reality-TV” fare, like *Survivor* or *Road Rules* or *The Amazing Race*, Martinez comes to its defense. “Most of reality-TV is crap,” he said. “No, *all* of reality TV is crap. *Chasing Nature* was more a documentary than a reality-TV show, and that’s why I was happy to be involved.”

More cerebral than other reality shows, *Chasing Nature* emphasizes creative thinking—participants must replicate a human-scale model of a specific physical characteristic of an animal, and then test it. And it doesn’t promise a big cash prize, just the experience of appearing on television and travel expenses to Australia for a week of filming.

In his episode, Martinez and his group were tasked with recreating the tail of a scorpion with man-made materials, only a much larger scale. Their giant, hinged metallic metasoma was then attached to the top of a dune buggy. Their arachnid dune buggy then stalked smaller dune buggies equipped with large balloons and attempted to “sting” and “kill” their prey by popping the balloons.

“Of course, the producers knew where to steer the show and what to expect, but the ‘fog of mystery’ was never cleared for us, the students,” Martinez said. “Well done on their part, I’d say.”

A sneak peek of the final edit shows that Martinez and a female engineer from California received a larger share of airtime than their other teammates; Martinez was also dubbed “the brains of the team” by a co-star from Stanford. He said he used his background in math and physics to help his team, the others being more well-versed in mechanical engineering.

That background has evolved and matured along a

somewhat circuitous route. Dr. John Varriano, CBU professor of physics, said that even Martinez’s path to his CBU degree was “perhaps the most winding road that a graduate has taken.”

Varriano recalled that Martinez received a U.S. Department of Energy Research Undergraduate Laboratory Fellowship and performed work at Ames Laboratory in Iowa during the summer of his freshman year. “He so impressed his supervisors in the first few weeks that he was also invited by a faculty member there to participate in a Research Experience for Undergraduate program sponsored by the National Science Foundation. He worked on two research projects that summer, after only one year of ‘formal’ undergraduate education.”

Martinez left CBU again during the summer of 2000 for a research fellowship with Dean Venkatesh Narayanamurti in the Division of Engineering and Applied Sciences at Harvard University, where he studied quantum transport in nanostructures, specifically, InP self-assembled quantum dots and AlInP superlattices, both theoretically and experimentally. He then spent the fall semester of 2001 at Argonne National Laboratory, where he synthesized charge-transfer salts and organic superconductors (“Tons of organic synthesis,” he said).

“Robbie certainly is a unique individual, a nontraditional learner if there ever was one,” Varriano said. “He was always studying and working on topics outside of the material that we covered in class. Sometimes I wished that he had spent more time on the class material! But that was Robbie’s learning style—he devoured as much material as possible in many different areas. He was always working on some math proof or reading about some theoretical physics problem.”

Martinez returned to Harvard in February 2001 and resumed working with Dean Narayanamurti. While there, he also began taking graduate classes in physics and mathematics to transfer back to CBU; he received a B.S. in physics in absentia in 2002. In 2003,



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he became a member of the mathematics faculty in Harvard’s Division of Continuing Education (Extension School) and has been teaching graduate mathematics courses there for three years. This semester he is teaching two courses in classical mathematics, involving geometry, algebra, number theory, and real analysis.

He received his master’s in applied physics from Harvard in 2005 and is working toward his doctorate in mathematical physics in the Division of Engineering and Applied Sciences (DEAS) in the Graduate School of Arts and Sciences.

For his thesis, Martinez is working on constructive quantum field theory and specifically intends to work on the Yang-Mills/Mass Gap Problem with Arthur Jaffe, the Landon T. Clay Professor of Mathematics

and Theoretical Science at Harvard University and founding president of the Clay Mathematics Institute (CMI) in Cambridge, MA. Yang-Mills/Mass Gap is one of the seven Millennium Prize Problems that were each issued with a \$1 million bounty attached by CMI in an attempt to promote and support mathematical research. The problems were selected by a committee of mathematicians with the symbolic purpose being to provide goals to 21st century mathematics.

According to the Clay Institute: “Quantum Yang-Mills theory is now the foundation of most of elementary particle theory, and its predictions have been tested at many experimental laboratories, but its mathematical foundation is still unclear. The successful use of Yang-Mills theory to describe the strong interactions of elementary particles depends on a subtle quantum mechanical property called the mass gap—the quantum particles have positive masses, even though the classical waves travel at the speed of light. This property has been discovered by physicists from experiment and confirmed by computer simulations, but it still has not been understood from a theoretical point of view. Progress in establishing the existence of the Yang-Mills theory and a mass gap and will require the introduction of fundamental new ideas both in physics and in mathematics.”

Martinez may feel right at home with mass gaps and quantum dots and string theory, and hey, so what if he discovered an infinite class of transcendental numbers and co-discovered the largest base 7 prime in the world (which has 67,727 digits)? Maybe he did synthesize a new liquid crystal and develop a graph theoretic understanding of the Somos-4 sequence. Does that make him a geek?

“Yes, I am a geek in the truest sense of the word,” Martinez told the *Crimson*. “But I have a little bit of style.” Photos and TV appearances would seem to bear out that claim.

The stylish scientist, when not busy developing a globally bounded, nonlinear approximation/perturbation technique, also plays his own mixes of house music as a DJ at Boston-area dance clubs. He said he’s always worked to reverse the stereotype of the scientist as being one-dimensional with no social skills or cultural interests. Which was one reason Martinez chose to participate in *Chasing Nature*—despite trepidations that the video editors could either make him look like theoretical physics icon Edward Witten (one of his heroes) or like a fool as they pared 60 hours of tape

down to one single hour.

“Actually, I was quite satisfied with the editing of my on-camera performance,” he said. “Those who got a sneak-peek of the episode said that I appeared cool, calm, articulate, and enthusiastic. Although my performance was far from laudable (or Wittenesque), I most certainly did not come across as a dolt.”

Martinez said the television producers were looking for drama as much as they were looking for science. Which led to the question of whether the obviously self-confident Martinez provided some of both.

“There was a bit of drama between myself and another student,” he admitted. “A clash of personalities, I guess. But it was mainly behind-the-scenes and quelled without much ado. We decided that composure and professionalism were more important to us than the satisfaction of beating each other senseless on camera. Needless to say, we accepted our ideological differences like gentlemen and found a peaceful resolution.”

But that was only the off-camera drama. Without giving away enough to risk a spoiler alert, Martinez said there was some tension on camera when the initial measurements of the base angle of the scorpion tail (with respect to the dune buggy rails) were not correct.

“It was the last day of filming,” he said. “We had to have a working device, or the show could not go on. Although I’m pretty sure that we checked our numbers so obsessively, there may have been some miscommunication along the way. Quite frankly, I had the suspicion that we may have been set up by the producers to test our talents in a do-or-die situation. You’ll have to watch the show to see how things unfolded.”

Martinez has also been contacted for other television appearances, including *Beauty and the Geek*, a WB reality series in which “nerdy” guys are paired up with beautiful women. After quick consideration, he turned it down.

“I decided that it was best to stay away from shows that would undermine my integrity as a scientist,” he said. He has however been recently contacted to interview for a host position on another science documentary/reality television show.

“Although I cannot say much more than this, I can say that my television career is far from over.”

Varriano said he was not surprised to hear that Martinez had participated in a reality television show in Australia. “This sounds like something that Robbie would do just for the fun of it—never mind that he is



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also working on a graduate degree in physics at Harvard. I don’t think that Robbie ever will be able to do just one thing at a time like most normal people.”

That observation seems to be born out by Martinez’s future plans. The New Orleans native, whose immediate family is currently relocated in Los Angeles due to Hurricane Katrina (“They are fine, just a little homesick,” he said), has a long list of career and educational goals.

“To a Ph.D. student there is no future but the present,” he said. “I will finish my thesis, then I will rest for one year. Thereafter, I would like to get a Ph.D. in mathematics and then attend medical school. But I’d also like to attend culinary arts school or perhaps even photography school, if time permits.”

Martinez’s ambition and his quest for experience and knowledge are reflected in the advice a professor once gave him, words he obviously still lives by: “Teach what you know, learn what you don’t, and document everything.” ■

*The Animal Planet network had originally scheduled Chasing Nature to be televised this past winter, but has put it on hiatus until June. Check local cable or satellite listings for actual airtimes.*