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ECU BIOLOGIST Jason E. Bond will appear on “The Colbert Report” at 11:30 p.m. today on Comedy Central.

Which spider will Colbert choose?

The countdown has begun to find out which spider comedian/talk-show host Stephen Colbert will choose to name after himself. Tonight, East Carolina University biologist Jason Bond will appear on “The Colbert Report” (11:30 p.m. on Comedy Central) with a handful of trapdoor spiders to help Colbert make his decision.

Bond agreed in a June 24 phone interview with Colbert to name one of his 27 recently discovered species after the comedian and talk-show host. Bond’s decision earlier this year to name a trapdoor spider after rock star Neil Young (Myrmekiaphila neilyoungi) caught Colbert’s attention.

Colbert’s spider will be named Aptastichus stephencolberti.

“I’ve particularly been a fan since the speech he gave at the White House Correspondence Dinner,” Bond told The Daily Reflector last month.

“Because names are important, it is quite an honor ... I wouldn’t name a species after him if I didn’t think it was appropriate.”

Other spiders have been named after Nelson Mandela, Angelina Jolie and Bond’s wife, Kristen.

Spiders in the trapdoor genus are distinguished on the basis of differences in genitalia, Bond said, from one species to the next. He confirmed through the spider’s DNA that each species of spider is distinct within the genus.

— The Daily Reflector
Shape is key in nanomedicine, UNC-CH researchers say

BY ZOE ELIZABETH BUCK, STAFF WRITER

The emerging science of nanomedicine has researchers rushing to make smaller and smaller particles in an effort to infiltrate the microscopic world of cells, strands and proteins that keep our body functioning.

But a team of researchers from the UNC-Chapel Hill Medical Center says that making the particles tiny is not all that's necessary. Instead, the key to interacting effectively with our bodies' microscopic systems is molding the drugs into the right shape, UNC-CH scientists reported this week in the online edition of the Proceedings of the National Academy of Science.

"Shape matters a lot in biology; we've known that for years," said Joseph DeSimone, a chemistry professor at UNC-CH who led the research team. Nature figured out how to infiltrate our bodies ages ago. Rod-shaped bacteria evolved to sneak past our defenses and invade the nuclei of cells. So by imitating the shape of these bacteria, DeSimone's team figured, scientists could launch cancer-fighting therapies into the nuclei of cells.

"It's a very exciting possibility," DeSimone

SEE NANO, PAGE 11B

Nanoparticles are, from left, designed to prevent clumping, given an aerodynamic shape for use in inhalers, and engineered to align. Nanoparticles can be as large as a few dozen nanometers, and a nanometer is about one-five-hundred-thousandth the length of the period at the end of this sentence.

![Nanoparticles](image1)

![Nanoparticles](image2)

![Nanoparticles](image3)

**SMALL WORLD**

Nanotechnology involves particles as large as a few dozen billionths of a meter.

The prefix "nano" means one-billionth of something.

That's so small that it is hard to imagine.

One thousand nanometers fit in a micron, one thousand microns fit in a millimeter, and one thousand millimeters fit in a meter.

Since the average American man is 1.75 meters tall, he could brag that he's 1,750,000,000 nanometers tall.

One nanometer is:

- One-half the width of a single strand of DNA.
- One-third the distance between a hard drive read head and the disk surface.
- One-tenth the thickness of the membrane of a human cell.
- One-ninety-first the size of a single human immunodeficiency virus.
- One-five-thousandth the size of a human sperm.
- One-five-hundred-thousandth the length of the period at the end of this sentence.
said, noting that the idea is intriguing big pharmaceutical companies as well. DeSimone’s company, Liquidia, which is based in Research Triangle Park, is working to bring the UNC-CH technology into manufacturing as soon as possible. He said Liquidia is already working with pharmaceutical companies to develop medical applications, and they hope to move into clinical trials within two years.

Vaccine development is at the top of DeSimone’s list of potential applications.

Vaccines — such as the new shot Gardasil, which protects against human papillomavirus — often need to be administered multiple times to be effective because the body will typically clear out the drug before the proper immune response has time to develop. But the right-shaped vaccine nanoparticles could fool the body into letting the vaccine circulate in the bloodstream for longer, reducing the number of required doses.

In the Third World, where getting a shot could mean miles of travel on foot, condensing immunization regimens into a single dose could save lives.

Another promising application for custom-shape nanoparticles is chemotherapy, which can be devastating to a patient’s body.

“There are a lot of chemother-apy drugs that are really toxic to the heart or the kidney,” DeSimone said. “By controlling the size and shape, we should be able to de-target these organs.”

To create the synthetic particles, DeSimone’s team developed what are essentially a series of microscopic muffin pans made of clear plastic. DeSimone held up a sheet and pointed a laser beam at it. The pattern of light refracted on the tabletop revealed the tiny rod-shape molds of various lengths imprinted in the plastic — synthetic versions of the rod-shape bacteria.

The UNC-CH team also manufactures molds that create worm shapes, red blood cell shapes, and doughnut shapes, among others.

DeSimone said additional applications of this technology are extensive.

Dangerous pollutants could be shaped in such a way that our bodies would be unable to absorb them. Patients could be transfused with synthetic red blood cells matching their specific blood type. Cargo particles could sneak RNA into cell nuclei to stop the production of proteins associated with cancer.

“This is important for environmental scientists, drug designers, oncologists, dermatologists, inhalation — any number of fields. Nobody else is doing this. It’s a huge unmet need.”

JOSEPH DeSIMONE
UNC-CH CHEMISTRY PROFESSOR WHO LED THE RESEARCH TEAM

Concerns

The ability to control how particles interact with our bodies comes at a critical point in the development of commercial nanotechnology. Critics fear that we don’t know enough about the nanoparticles now being used in consumer products, including cosmetics, sunscreens and textiles, and that they could have adverse biological effects.

Terry Davies, a senior adviser for the Projects for Emerging Nanotechnologies in Washington, said the very promise of the tiny particles is also a danger.

“Theyir small size means that they can get to places that other things can’t,” said Davies. “Particles taken in a dietary supplement could end up in the brain or the placenta. We just don’t know.”

The small size could also change the properties of familiar materials, he added.

“Aluminum in ordinary amounts is something we use every day, but nano-sized aluminum is highly explosive,” he said.

Davies’ worries are supported by a study published in the May edition of Nature Nanotechnology. The study found that carbon nanotubes could have the same devastating effects on the lungs as asbestos.

“We’ve never had a broad technology that did not have some adverse consequences,” Davies said. “Right now we just don’t know enough to say what the consequences could be.”

DeSimone said he recognizes the importance of understanding the consequences of letting nanoparticles loose in the human body, and has made it the focus of his research. By designing the nanoparticles carefully and precisely, he said, the UNC-CH team can understand and control what they interact with, and how.

“When you have the ability to precisely control both the size and shape of the particles, you can lay out the ground rules to understand exactly what roles they play,” DeSimone said.

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NCSU economist sees slump reaching into ’09

BY JONATHAN B. COX
STAFF WRITER

No matter what you call it — slow, sluggish, soft — the economy is in a slump right now.

And it seems everybody wants to know when the troubles will end. Mike Walden, an N.C. State University economist, has given his prediction. Walden is among the foremost experts on the North Carolina economy, and what he says gets the attention of government and business leaders.

He put out a 15-page report Tuesday with forecasts for North Carolina and its various regions. Here’s what he had to say:

THE STATE: Most economists expect the national economy to remain sluggish into 2009, and Walden’s expectations for North Carolina are similar.

He expects average unemployment to be about 6.2 percent for 2008 and rise to 6.8 percent next year. For comparison, the jobless rate in June was 6 percent.

Inflation-adjusted wages will fall 2 percent this year, he predicted, and rise half a percent in 2009. Housing will finally rebound in 2009, he forecasts. The number of housing permits will be down 35 percent this year compared with 2007 but rise 10 percent in 2009.

“This will signal the end of the housing bust,” Walden wrote.


He predicts the unemployment rate, averaged over the entire year, to be 5.2 percent in 2008 and rise to 5.7 percent in 2009. In June, the most recent data available, it was 4.8 percent.

Retail sales, adjusted for inflation, will fall 5 percent this year compared with 2007 and increase 3.5 percent in 2009, he forecasts. Wages will follow a similar trajectory, falling 1.7 percent this year and rising half a percent next year.
Teach For America gives no easy lessons

In 2005, journalist Donna Foote visited a friend's classroom at Locke High School in Los Angeles and was shocked to discover ninth-graders "sounding out words like C-A-T. They couldn't read." A former Newsweek writer, Foote had been following Teach For America (TFA), the elite teacher preparation program, since its founding in 1990, and soon learned that Locke was home to the largest cluster of TFA recruits in Los Angeles. The program recruits top college graduates for two-year teaching stints and has recently attracted more than one in 10 graduates at the nation's top colleges. So Foote decided to write about "how we teach our most impoverished students through the eyes and the experiences of our most privileged." Her new book, Relentless Pursuit (Knopf, $24.95), follows four "corps members" during their first year at Locke.

USA TODAY's Greg Toppo spoke with her recently:

Q: In one chapter, a corps member considers quitting, saying he (and his fiancée) are "tilting at windmills" trying to make a difference. How widespread was this thinking at Locke? What happened to this fellow?

A: At one point or another, each one of the corps members I came to know experienced moments of self-doubt and feelings of futility. TFA reports that 12% of corps members fail to complete their two-year assignment. The TFAers at Locke all understood their colleague's frustration, and not a single one was critical of his decision to leave — though other staff members regarded it as proof that TFA teachers were not committed to the community.

Today, he is happily married and living and working in L.A.

Q: One of the criticisms of TFA is that it requires just a two-year commitment from corps members. Many veteran teachers say that drains society's support for teaching as a career. How valid is this complaint?

A: Teachers, regardless of the path they take into the classroom, are leaving in droves. Some 14% of all new teachers quit after their first year: almost 50% are gone within five years. Teacher retention in low-performing schools is particularly difficult. At Locke, roughly 30% of the staff exit annually. Though the majority of TFAers leave soon after fulfilling their commitment, quite a few were still working at Locke the year I was there, and they were widely regarded as among the best on staff. Of the four teachers I followed, only one expected to remain in teaching after the two-year commitment was up. Things didn't turn out that way: They all got hooked. One just finished her third year at Locke. The other three left Locke but remain in education.