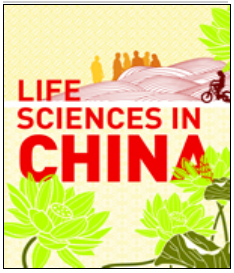

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By Ariel Bleicher

Technicolor doo-doo

An out-of-the-ordinary design project blends synthetic biology and human necessity to glimpse the future of self diagnosis

[Published 11th December 2009 03:26 PM GMT]

I'd been chatting with the sandy-haired biology major behind me in line for refreshments at the Massachusetts Institute for Technology for about three minutes when he asked me if I'd seen the suitcase of poo. I admitted I hadn't. "Oh man," he said, "you've totally gotta see it. That thing's the $h!t!"

I planned to attend about a half dozen presentations at MIT's annual undergrad student competition, the International Genetically Engineered Machine Jamboree, called iGEM by those in the know. The team from Imperial College in London, which tried to engineer bacteria to deliver drugs to hard-to-reach places inside the human body, was on my list. So was the Bangalore, India, team, who genetically engineered bacteria that smelled like rain.

But the one thing nearly everyone I met at iGEM told me I absolutely couldn't miss was the suitcase filled with rainbow-colored poo.

was the suitcase filled with rainbow-colored poo.

Finally, during an afternoon break, I ran into its owners. Daisy Ginsberg and James King, 27-year-old designers and graduates of London's Royal College of Art, told me about a two-week crash course in synthetic biology they took at the University of Cambridge with the Cambridge iGEM team last summer. They were so seduced by the science, they said, that they decided to stick around and help with their project.

King opened the suitcase -- an aluminum briefcase, really -- and inside lay six plump, slug-sized stool samples. Each was mottled with a different color: purple, blue, yellow, green, orange, pink.

"We call it the Scatalog," Ginsberg said. King pointed out that the samples were actually wax models. "Everyone wants to know how he got them through customs," Ginsberg said. "We like to joke that when they asked about it, James said he had made them."

Ginsberg and King explained that the Scatalog was a peek into the future when the Cambridge iGEM team's genetically engineered *E. coli* might become a useful diagnostic tool.

The seven members of the Cambridge team started with *E. coli* and transformed it into a living, color-coded chemical detector they dubbed *E. chromi*. They used a kit of more than 3,000 gene parts that iGEM's organizers have collected and stored since the competition began five years ago.

E. chromi can detect arsenic and turn orange or red or brown or purple or yellow depending on how much it finds.

Listening to Ginsberg and King, it's not hard to see how *E. chromi* might evolve into a product like the Scatalog. The idea is simple. Swallow a few gel capsules of *E. chromi*-like bacteria, and wait. The engineered bacteria travel through your system, searching for cancers and other diseases. If they find what they're looking for, they turn bold colors on their way through your digestive tract. Your diagnosis is delivered right to your toilet, and you don't even have to leave the comfort of your home.

Of course, synthetic biologists don't know nearly enough about engineering organisms to tackle a project as sophisticated as the Scatalog any time soon. "I can see the popular appeal of this kind of *E. chromi* technology," said Rick Henrikson, who helps run the Point-of-Care Diagnostics Idea Lab at the University of California, Berkeley. "But as far as actual diagnostics, conceptually it's a little far off." Developing such a product, he explained, would require huge feats: getting the Food and Drug Administration to approve it, for example, and keeping the body's immune system from attacking the bacteria.

Still, the Scatalog helped inspire the work of the Cambridge team, who, as it turned out, won iGEM this year. The students gave their first practice presentation a month or so before the Jamboree. They were so focused on the techniques of engineering life, Ginsberg said, that "they weren't quite sure why they were doing what they were doing."

"They made a bit of a hash of it, really," said James Brown, one of the team's advisers. But when Ginsberg and King showed the students a time line of possible applications, including the Scatalog, they began to think on a new scale.

"We'd get bogged down in our experiments," said Vivian Mullin, one of the team members, who studies biochemistry at Cambridge. "Then James and Daisy would come in and say, 'Let's play with color!' They'd be like 'Aah! In 20 years this could be happening," and we'd be like 'No way, science will never get that far.' They had this willingness to think anything's possible. It was really eye-opening."

King and Ginsberg gave about 20 "guerrilla-style" presentations of the Scatalog during the iGEM Jamboree. "Everyone laughs as soon as we open the case," King said. "But it starts a discussion. People take it quite seriously -- the question of

how synthetic biology might manifest as a real production."

Ginsberg said she thought the vials of colored bacteria were themselves an incredible achievement. "But after that," she added, "what's the future going to look like?"

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about time
by Roselyn Cerutis

[Comment posted 2009-12-11 12:54:38]
I agree with the first post; I work the importance of gut flora into my GI physiology lectures. As was already pointed out, they are critical to our well-being. Among their many functions,they metabolize hormones and xenobiotics, affecting responses to drugs.

Very interesting to note the reports out recently that flora differ between overweight and normal-weight individuals.....yes, we really don't know **** about this yet!! Keep up the good work.....

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comment:
Knowing Your Stuff
by john toeppen

[Comment posted 2009-12-11 12:37:30]
Knowing your, err, stuff had only been a metaphor except to game hunters and trackers up to this point. However it is clear that we don?t know sh*&%t yet. Intestinal flora is not a popular topic for some reason even though it is critical to our well being. Cultivating the right stuff internally has been a part of India?s diet for a long time ? start a meal with curry and end it with yogurt. There are many probiotic teas on the market now, but the creation of the perfect internal flora seems a long way off. It is time that we learn to deal with this?..