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The Harlem Science Renaissance

Molecular geneticist Sat Bhattacharya talks about his creation, the Harlem Children Society, which gets underprivileged kids involved in scientific research. And 13-year-olds Mitchell Haverty and Angus Fung talk about their research on algae as alternative fuel. Plus, we test your knowledge about some recent science in the news

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Molecular geneticist Sat Bhattacharya talks about his creation, the Harlem Children Society, which gets underprivileged kids involved in scientific research. And 13-year-olds Mitchell Haverty and Angus Fung talk about their research on algae as alternative fuel. Plus, we test your knowledge about some recent science in the news. Web sites related to this episode include www.harlemchildrensociety.org

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Podcast Transcription

Steve: Welcome to *Science Talk*, the weekly podcast of *Scientific American*, posted on October 15th, 2010. I'm Steve Mirsky. When you think of Harlem maybe the famed [Apollo] theater comes to mind or the music and literary movement known as the Harlem Renaissance. Well there's a new Harlem Renaissance in science. A couple of Saturdays ago I headed to the corner of 125th street [and] Adam Clayton Powell Boulevard for a science fair under the auspices of the Harlem Children's Society. The society is the brainchild of molecular geneticist Sat Bhattacharya. I spoke to him at the outdoor poster session.

Steve: Tell me about this event and give me the history of this entire project.

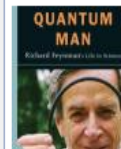
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Introduction I find physics is a wonderful subject.

about an hour ago

Scientific American magazine "The only silver lining I see in this dark cloud over Japan is to draw attention to the danger of on-site storage of spent fuel. I hope this revives discussion of Yucca Mountain," a USC engineer told Larry Greenemeier, SA online's editor for technology.

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Bhattacharya: Well, I started the program 10 years ago at Sloan-Kettering [Cancer](#) Center in my laboratory with three students, and what I saw was [a serious] under representation of various minorities in the field, principally black and Hispanic and native American—there are less native American students in New York City but elsewhere—but at least here so. And since I realized that there was a serious under representation and what I also noted that there is various other opportunities in college level and universities that the students are encouraged to take science but there was something missing. So obviously the students are not coming into science, so the problem I thought lay even earlier on. Now I am not trained as a high school teacher; so I thought with my skills and what I can do is probably what I believe also is a hands-on approach to anything. So my field is science and technology, so my work is circulating tumor cells where I isolate cancer cells from blood of patients and isolate their DNA and RNA and try to sequence them and try to devise treatments for cancer treatment and therapy. So it started off very small with taking, having a phonebook and calling up [two] schools in Harlem here and one in New Jersey and pick up and made an appointment with their principal[s] and science teachers and asked them to preselect some of the good students; and the only criteria that I left was that they have to be below U.S. poverty guidelines. At that time I didn't know what it was, so if they qualified for free lunch then it meant, you know, they are below \$30,500 for a family of four.

Steve: So there wasn't really an ethnic guideline. There was a...

Bhattacharya: ...economic...

Steve: An economic guideline.

Bhattacharya: Exactly. And that's very important for me because it's not just a black society, it's not a Hispanic society, it's not a Native American society, or not a white society or any other society. It's based on economic criteria, and what I firmly believe is if one is black or Hispanic or a female or a male or a Native American, you know, they might be compromised equally. So, if sometimes the males, for example, African-American males or certain Hispanic males are even endangered in science. So one of the things that I also realized was not to compromise the field of science. I cannot have someone come into my lab or some of my other colleague's lab and send students just because I wanted to do a public good; but I have to be responsible to my own profession which is science, but yet raise the level bar up and encourage more students in. So, the idea was to pick up the best and the brightest from the schools; so the school system picks up their bright students. But they have to be below U.S. poverty guidelines, they have to have a

perfect attendance, so that when they come to my lab or go to someone else's lab they're going there in certain hours and there's a certain professionalism; and then we teach other things to them that come along with it. And then put them through a rigorous summer program where they're working in the lab from morning 9 to evening 5 or whatever time, at least, and then move on from there. So, the first three students now are all medical graduates. One of the students, the first student has just got her MD last year, the second student got his MD, and he is doing his PhD, and the other student is here. She [just] graduated [from Swarthmore], and she just finished her, she is a registered nurse from Columbia, and over these years from three students, this year we [have] about 800 students from over 125 schools and ...

Steve: Did you ever expect that kind of growth?

Bhattacharya: Never. I was going to be happy with my own little students like my own little lab and try to feel good about it and share some good work with some of my colleagues and friends and family and feel good about the whole thing. And you know, sort of it catapulted, it took [a] life of its own. So some of my friends and colleagues got interested, they wanted to get, because they saw these kids are, you know, they're black or Hispanic or and they're still doing good and they have come to the lab regularly. They are not the regular preconceived notions of, you know, "Oh! They're coming from Harlem of South Bronx, and they don't know anything about science and they're poorly educated." As that sort of, it breaks up all those barriers, and it started off with my colleagues in Sloan-Kettering, and then I realized as more and more and as it became bigger and bigger from three students to 15 to 50 to 100 to 150 and then 300; and that the [field] is bigger and wider and not everyone is interested in cancer research. Not everyone, so then I started calling up my friends and colleagues in other hospitals in other areas, you know, at Columbia, Cornell and, you know, and I also belong to various other societies. So I have been tapping my

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own private contacts and resources through various societies that I belong to—you know, as scientists we all go to those conferences and all. And eventually as the program was beginning to grow, I realized that, you know, the thing also is I have friends elsewhere, I have a friend, for example, where [where I swim who] goes to the Hopi reservation, or used to go to the Hopi reservation in Arizona to build houses. And for years I used to, I wanted to go to [the] Hopi reservation myself that was the agenda. So but then I, he was helping the elderly build houses. I said "Okay, you're building houses for these senior citizens, what about the younger generation? We have a program for the last few years in Harlem. Let's start something here in the middle of nowhere in the Hopi reservation in Arizona." And so it started off six years ago, and now we have a substantial program for the last six years now.

Steve: That's great. And do you hear from the kids that when they interact with their peers they kind of spread the science seed around?

Bhattacharya: Exactly, that's the whole idea. So it's a top-down approach. So we take the best and the brightest, they come during the summer, and then in the fall they go back to the school systems. So when they go back to the classrooms they talk about their own research, their high-tech research of isolating cancer cells to space technology—we've sent students to NASA or they do [nanotechnology](#) or, you know physics or chemistry or, you know, you name it, agriculture—and when they go back to their classrooms and talk this over among their peers, more peers get interested. Because it is in a totally different area. Any of our kids, especially this year, the parents make less than \$15,000 a year. Many of them are unemployed. They are the only members in the household they make any money. The other thing that I realized was to give them a stipend. So every year, every student gets \$1,500 to \$2,000 as a stipend, and it has been very difficult this year and last year because of the economy, and therefore I make very strong pleas to whosoever is listening, [it] is very important that we need this to keep our future alive with our students. And just one instance, seven years ago, I went to a school. For the new schools I go to the schools because in my mind I would need to place where the students are coming from, and then so I don't go to 125 schools, but I go to the new, I make an attempt to go to the new schools and interview the students there. So about seven years ago I went to a school right here in Harlem in west Harlem, and I went there to interview students and the place was buzzing with reporters and TV and all that stuff, and after standing for some time the principal came out and said, "You know, can we have the interview at some other time, because we had an unfortunate incident in the morning; early morning today and one of our students was shot and killed. And that student was supposed to, you [were] supposed to interview that kid today, and he was top of

his class." And that exactly proves my point—it's the best and brightest. A creative mind will always find creative ways of engaging themselves, and if we cannot get the creative mind engaged they'll find creative ways to [destroy] themselves, either themselves or their surroundings. So it's not only just in New York City, but it's a global phenomenon with global terrorism and all that stuff. So we have to be more responsible towards the more creative mind and engage them to get their creative talent and put them in place. And we do that with science but it can be done in every other field. So that's why they succeed. They have to be put in a certain structure. So in the summer over these years, as it has been evolving—in the summer, we also have our summer lecture series; so four days a week, at least four days a week there, working with the individual mentors in the laboratories and the one day from 10 to four, we organize lectures and seminars where all students are required to make presentations, five to 10-minute presentations on their research. We invite other speakers and Nobel laureates, you name it, people come and talk, and all the students are required to submit their work online to us. So, this prepares them to develop writing skills, comprehension skills and submitting things on time, and that's absolutely critical because we know that there's a 40 to 60 percent drop-out rate in African-American, Hispanic and Native American students in the first two years of college. The reason why is, not only they're not

well prepared in the high schools, but they're not well prepared to make that next jump and take notes and submit everything on time, and if they don't know to go and seek out help. People are ashamed because they are told that they're top of the class in their respective schools, but when they go to Cornell or any other university or college, they hardly know anything.

Steve: This is the plot of *In the Heights* on Broadway.

Bhattacharya: Exactly. So, that is why I think this program has been succeeding is because we, sort of, enforce that and people [scream]. The new students who come into the program, they have a tough time; it's almost like a boot camp. And we ensure that they follow this. And then managing a crowd like that, we have groups, for example; we have say 12 groups and each group—say 20 to 25 students per group—and each group has a group leader and sub-group leaders. So our students keep on coming back. So over the years, what we have seen is students keep on coming back into their program. Some students even in the undergraduate years, they have come back. So they're either in Columbia, Cornell, Dartmouth, Swarthmore, M.I.T. [wherever] they are. They come back here and so we have about 20 to 25 percent of our students now have become undergraduates. The other important thing is this is sort of a pre-university level interaction happening even before they get to university only because the students even at the lecture sessions, for example, the students are coming from 125 schools. So an African-American student in South Bronx is interacting with a Caucasian student from, say Upper West Side, Manhattan to someone, say, a Chinese immigrant from, say, Queens. And this is one of the things we require in the students is to write about their experience. An overwhelming majority of the students talk about the social impact that they have. Science is okay. Anyone can do science, and we can put a rigor into it, but what is more important is that social impact, where the student—and that they get it in the university. Because at the university the students are coming from everywhere, all over the U.S., all over the state, all over the world, but then they've become adults. Here they're coming as young as 14 onwards, so they're very impressionable. So in a school where 90 or 100 percent are African-American or Hispanic or Caucasian or, say, Asian or whatever, now they're mixing with other people and that is the more important thing is to encourage that sort of ability to interact with one another with the common thing of science.

Steve: In talking to some of the kids, they seem very aware of the fact that science may lead them to a good job some day. And it's an underdeveloped area, and it's economically good in two ways because it's good for their personal economy, and it's also good for the country's economy to have more scientists.

Bhattacharya: Exactly. And the reason also with the hands-on approach is, many of the skills that they learn during our programs in the high school time, they can do summer jobs while in campus. So that could be like a side thing. So they can still earn their money on the side, and that prepares them. Anyone who does, say, research in my lab isolating cells and isolating DNA and sequencing them, they can continue that work in some other laboratory because the laboratories need technician[s], so someone can do a part-time job while still taking course[s]. It's like having a job while still in college, but at a higher level, not just standing in front of a podium or in the library. That's good too but this is on the level of, you know, making them prepare for their future. What I expect is not all our students [will] be scientists; of course secretly I wish that, but I know the reality is this will remain in the back of their heads.

Steve: And even if it doesn't directly come back, you want your business people to understand science, you want your politicians to understand. I mean, we've had plenty of good examples lately of politicians who clearly have no idea of what goes on in science.

Bhattacharya: Exactly, exactly, and that's absolutely right; you hit it right there. Now every year, we have, our students never graduate. What I also realize because of the background that many students, inner city students or even urban students, like the Hopi reservation or any other, they come from heavily compromised backgrounds, family backgrounds; either it's drugs in the neighborhood or family or single parent homes whatever. So this becomes very strong—this is the other family that they can be a part of. And the old boys [club] of, you know, in the universities,

this happens much earlier—old boys or girl's club—even earlier in life. So we have, instead of having a graduation ceremony, we do an induction ceremony. So anyone who is part of our program starts with being inducted, and so we have a celebration, we have song and dance and we have a few students, our top students making presentations. So we raise the bar for the incoming students to say, "Look, in our program, this is what we expect." So we have like two or three students making their Power Point presentations, so they know what is to be expected all throughout the summer. So, we don't do that, students they are the horse's mouth—they will talk themselves. And then we have these politicians come in as well. So this past summer on July 7th, we had 25 congressmen and senators and council members and candidates and one of the Nobel laureates, the president of Stony Brook University. I also advise Senator Gillibrand on science and education. So, it's very important for politicians to understand the importance of science and technology, not because it's a good thing to talk about, but especially in an age of today where we are in a globalized economy, where competition is—I tell my students, if you cannot work hard, by the time they will graduate, the jobs will be taken away—you have to constantly work hard and think creatively and engage yourselves in a way, in a globalized economy. You can be here and get your work done elsewhere, but you have to creatively engage yourself. If you take science in a scientific way, using science tools to do your work and creatively be productive, and that's what this, sort of, teaches.

Steve: And if anybody is interested in more information or getting involved financially, how can they get in touch with you or the organization in general?

Bhattacharya: Well, they can either go to our Web site, they can either google Harlem children Society or they can call 646 643-8543 or go to the Web site and register. We usually start with, I interview the students in the spring, so in February, March, April. So I reach out to the science teachers and principals. But if a student or the family is interested—and that's the other thing that the fair deals with, is for the parents, for the community that they have to go back to their schools and tell them that "My son and daughter is interested in science" and so then the teachers contact us. Just because we're in a globalized world, this all happens in real time. We organize the street fair simultaneously in New York City and Hopi reservation in Arizona, in Mexico, Kenya, Tanzania, Ethiopia, India and New Zealand at the same time; and this happens real time, so there's the time and the space has no boundaries. So, you know, Hopi reservation is three hours behind, Kenya is seven hours ahead and New Zealand is 12 hours ahead. But yet what is more beautiful is students participate in similar things and interact with one another across different time zones and that's....

Steve: Exactly what professional scientists do as well.

Bhattacharya: Right, but this is a community event that happens outside the realm of a university environment. And then over the years as the concept was evolving this is just an idea to get the science out, then you have to get the idea in motion and therefore the concept of the parade evolved, the science parade. Because the whole idea is to give a certain philosophy some traction. So when the parade starts from one location to the other, the people on the sidelines are interested in what's going on, and so then they are dragged on to the fair side, so that's the whole ...

Steve: Let's not say dragged on—They are encouraged to

Bhattacharya: Encouraged to (laughs)

Steve: By the way I ran into some of the bands on the subway coming down here.(laughs)

Bhattacharya: Oh, really. (laughs)

Steve: Some big bass drums in the subway station near the 125th street.(laughs)

Bhattacharya: I see(laughs)

Steve: Okay, thanks very much for your time. I appreciate it, good luck.

Bhattacharya: Pleasure, thank you, thank you very much.

Steve: I spoke to a few of the young people who have done research and created posters about it. Here are a couple of them who looked at the potential of algae as an alternative fuel source.

Steve: You're Mitchell.

Haverty: Mitchell Haverty.

Steve: And Angus....

Fung: Angus Fung.

Steve: Tell me about this project and how you got involved in it, Mitchell.

Haverty: Well it's a hot topic today, how there's so much pollution, and greenhouse gases are basically destroying our Earth and our environment as we know it. So we are trying to look at the main cause, and what we found is that it's mainly the fuel source, and we wanted to find [a] nice eco-friendly or green solution to all the pollution problems. So, we wanted to come up with an alternative fuel that's very abundant but it's also very efficient.

Steve: And what did you guys come up with, Angus?

Fung: [Well], we came up with algae, one because they thrive on carbon dioxide and another thing is that you can find algae anywhere in any moist place, and so in this experiment we found that algae can be used as fuel. So later on in the future or now even, we can use algae into cars or any type of vehicle or machinery that uses ethanol or any type of fuel so, yeah, that's what we found.

Steve: How old are you?

Fung: Thirteen.

Steve: And how old are you, Mitchell?

Haverty: Thirteen.

Steve: And how did you two hook up with each other.

Haverty: Well, we are friends and we started out with Science Olympiad. It's like a national competition for science, and we always had a passion for science, engineering and biology.

Fung: Yeah, we were in the same class. So it was science fair time in the school, so our teachers, they just put us together and we were just researching what we can do. So we thought of alternative energy because, as I said, it was a hot topic today.

Steve: And what school do you go to?

Haverty: We go to Bergen Arts and Science Charter School. It's located in Garfield, New Jersey.

Steve: You're not even in high school yet. What do you want to do? Do you want to continue with this particular project or do you have any specific kind of goals in mind for the future or just you know you're interested in science?

Fung: Well, we're interested in science, like I said, we have a passion for it.

Steve: You're pretty sure that you both want to become scientists eventually?

Haverty: Yeah, we're pretty sure. I mean we always want to expand our horizon, and as of now, we want to have even more equipment, just to pursue our passion [and to] find ways just to help everyone that we can, just help ourselves, the country; because alternative fuel is going to our big, important part of the world. We can't have greenhouse gases to continuously build up, and once they accumulate too much, it's going to cause severe damage to our whole planet. So we need to find a solution fast.

Steve: You know, you both have used the word passion, a couple of times about science, and when I was your age, baseball was the only thing I was particularly interested in. (laughs) How did you get so interested in science at this stage?

Fung: Well we thought science is everywhere, it's, you know, whether it's a tree growing outside or an airplane flying over us—everything is made up of science; like science is the building block of anything. So, yeah, we wanted to really get into it because our world, it's going to be all about science basically. Future jobs are going to be all about science, technology because that's what's, you know, going to make up our world, make it a better place.

Steve: For more information about the Harlem Science Fair and opportunities in labs go to www.harlemchildrensociety.org

(music)

Now it's time to play TOTALL..... Y BOGUS. Here are four science stories, and only three are true. See if you know which story is TOTALL..... Y BOGUS.

Story number 1: That newly discovered, possibly habitable exoplanet may not even exist.

Story number 2: Malaysian astrophysicist Mazlan Othman has been named by the U.N. as Earth's official ambassador to any aliens who land on our planet.

Story number 3: Monkeys help make up security forces for the recent Commonwealth Games in India.

Story number 4: Cats that are born deaf have better vision than hearing cats do. (cat meowing)

Time's up.

Story 4 is true. Cats born deaf wind up seeing better than hearing cats do, because parts of their brains ordinarily devoted to peripheral hearing and motion detection wind up being co-opted by the vision system. The work was published in the journal *Nature Neuroscience*. For more check out the October 11th episode of the daily SciAm podcast, *60-Second Science*.

Story 1 is true. The very existence of the exoplanet dubbed Gliese 581g has been called into question by astronomer Francesco Pepe who was unable to find the planet in the data. He spoke at an International Astronomical Union symposium on October 11th. More data and more data analysis should ultimately decide if Gliese is space oasis or just mirage.

And story 3 is true. [Security](#) at the New Delhi Commonwealth Games did include 38 trained langur monkeys. They were unarmed. And their function was to guard against incursions by smaller wild monkeys.

All of which means that story 2, about the astrophysicist Mazlan Othman being named Earth's official alien greeter is TOTALL..... Y BOGUS. What is true is that there were numerous news accounts to the effect that Dr. Othman had indeed been named to such a post but the United Nations Office for Outer Space Affairs denies that any such appointment exists. The purpose of that office is not to deal with aliens but promote international cooperation in the peaceful uses of outer space and space science and technology.

Well, that's it for this episode. Get your science news at www.ScientificAmerican.com or you can check out the multimedia look at artificial photosynthesis based on an article in the current issue of *Scientific American* called ["Reinventing the Leaf"]. And follow us on *Twitter* where you'll get a tweet every time a new article hits the Web site. Our *Twitter* name is @SciAm: S-C-I-A-M. For *Science Talk*, the podcast of *Scientific American*, I am Steve Mirsky. Thanks for clicking on us.

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