

ingredients



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48. REAPER

Tyler Labine and Missy Peregrym







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Futurama's Bender does some crazy crap we didn't know about at press time--but whatever it is, Futurama's TM and copyright 2007 20th Century Fox Film Corporation and all rights are reserved.



contributors







Brian T. **Matchick** is a

Unix engineer, fine art photographer and amateur musician living in Chicago. He has no qualifications as a writer and was only hired because he happens to be friends with the editor-in-chief. Any 'facts' he presents should be considered dubious at best, and his opinions aren't to be trusted—but we edit most of them out of the magazine anyway. You'd be amazed at the stuff that still manages to get through.

Digital Bits.com editors Bill Huntand **Todd Doogan**

met in 1987 at the Air Force Academy, where they trained chimpanzees and small monkeys to fly simulators. When they learned their simian friends were being exposed to deadly radiation, however, they risked everything to free them. No, wait... that was Project X with Matthew Broderick. Never mind.

Photographer Bree Kristel Clarke

is equally comfortable on either side of the camera. In addition to doing a bang up job lensing this issue's Ed Helms' shoot, Bree can be seen this month on the VH1 series The Shot. Think Big Brother with big camera-wielding survivors and when they talk about 'killing a shot' it means the contestant is shown the door.



Born and raised in Fife, Scotland Calum Waddell

has written about movies for a variety of magazines since 2003. He is now a full time freelancer and is current co-producing and co-writing a new documentary called American Grindhouse. He also took in three back to back Morrissey concerts in LA recently.



Kristen **Ghodsee** has

her Ph.D. from Berkeley and is a professor at Bowdoin College in Maine. She is the author of The Red Riviera: Gender, Tourism and Postsocialism on the Black Sea, and was a Member at the Institute for Advanced Study in Princeton, New Jersey in 2006-2007...



As a full-time entertainment journalist and parttime Other, Matt **Cabral** manages to keep pretty busy. On a typical day he might watch a DVD, interview an actor or director, attend an industry press event, kidnap a pregnant castaway and write a videogame

review.

EDITORIAL

CASEY LOE BRIAN T. MATCHICK JEREMIAH GRIFFEY NICK DES BARRES ANDREZ BERGEN

ERIC PATTERSON

MARK A. AITMAN, KRISTEN GHODSEE, JEFFREY RENAUD, TODD DOOGAN, MATT CABRAL, CALUM WADDELL, MEGAN BURNS, STANLEY MANDERS, DAVE HALVERSON, MOJO, BILL HUNT, LARA CRIGGER, BLAIR BUTLER, BONNIE BURTON, BILL GRAY, BRIAN RUBIN, SCOTT SHAW, PJ HRUSCHAK, MARCUS ALEXANDER HART, MARIEL SHAW, DAI KOHAMA, BRADY FIECHTER, LEAH JACKSON, MICHAEL EISENBERG

ROBERT MEYER BURNETT

MARIEL SHAW DANIEL CAMPISI

DESIGN

CHIN "NELSON" LUI

ADVERTISING AND SALES

CASSANDRA MUSBERGER

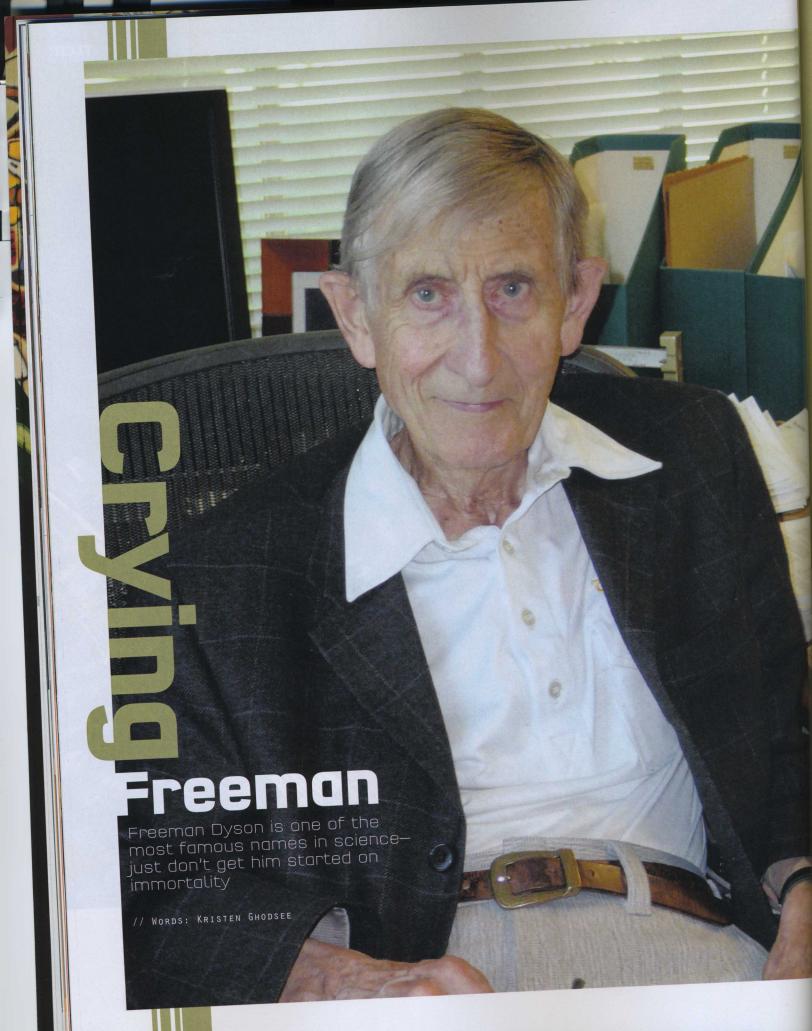
MICHAEL EISENBERG

CORPORATE

MICHAEL EISENBERG

Administrative Assistan **DANIEL CAMPISI**

EMAIL interface@geekmonthly.com
ORDERS 800.694.6506 FAX 818.707.7212
WEB geekmonthly.com
Postmaster Send address changes to:
Geek Monthly, PO Box 16567, North Hollywood, CA 91615-9684 or e-mail play@espccomp.com. For subscription questions call (800) 694-6506.



reeman Dyson is a theoretical physicist and mathematician, internationally recognized for his work in quantum mechanics, solid-state physics, design of nuclear reactors and space ships, and for his theorization of key concepts of futurism and science fiction—including the search for extraterrestrial intelligence. He is the author of nine popular science books, including most recently *The Scientist as Rebel* in 2006 and *A Many-Colored Glass* in 2007. We caught up with Professor Dyson in his office at the Institute for Advanced Study in Princeton, New Jersey where he has been a permanent faculty member for more than half a century.

Outside of the world of physics, one of the things you are most famous for is the creation of the Dyson Sphere. You say you lifted the idea from [the science fiction book] *Star Maker*, so I am curious how it got attributed to you. Did you further develop the idea, or write about it in a more popular place?

No, it was less popular. I wrote a technical article in *Science*. So this was in fact a serious proposal that we look in the sky for infrared sources as evidence of alien life. That was a serious proposal that was in the context that, the year before, the search for alien intelligence had become about looking for radio signals. So I said "Well fine, if they want to communicate then we can listen to radio signals. But suppose they don't want to communicate? Can we still find them?" And the answer was yes, if they are big enough, they have to radiate away their waste heat. So the way to look for them was through infrared. That was the point: I wrote this piece to stimulate the infrared astronomers to start looking. And then I mentioned the kind of thing you are looking for, which would be a habitat with a large surface area radiating infrared radiation with a star inside supplying the energy. That's how it developed. I actually used the word "Biosphere." And that was interpreted as being a round ball, which it did not have to be, of course.

And it has become known as the "Dyson Sphere."

Yes, and that was because of Larry Niven who wrote *Ringworld*, where he picked it up. But in Stapledon [author of *Star Maker*], he didn't talk about a sphere at all. He was talking about these galaxies whose lights were dimmed by inhabited structures. I forget just how he described it, but dimming the light of a whole galaxy or something like that.

In terms of recent science fiction, do you have a favorite application of the concept?

The one thing I really enjoyed was the piece out of *Star Trek*, which one of my daughters taped and sent to me [*Star Trek: The Next Generation*, Season 6, Episode 4, "Relics," Air date: 10-12-1992]. So there you have one of these big round balls and there is a very delightful conversation about it. So that's good fun. It's all nonsense, but it makes for a laugh.

In your book, *Imagined Worlds*, you were quite optimistic that in your lifetime there would be space colonization. So what happened? Why aren't we there yet?

Shots from the *Star Trek - The Next Generation* episode "Relics," which makes use of the Dyson Sphere concept.







"It is hard to remember how we lived without Google."

Yes, it is an interesting question. I think the main reason was the [space] shuttle. The shuttle was a huge step backward.

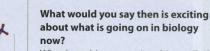
Why?

Because it is not going anywhere. And the [space] station is even worse. It is a dead end. It really set back exploring by 40 years. So that is the primary reason, but there are lots of other reasons, too. The original momentum which led to the Apollo program where people actually got to the moon would have taken us a lot further, but it was essentially just switched off and replaced by the shuttle. Of course, there were a lot of good reasons. The Vietnam War was going on at the time so people were distracted from any kind of bigger adventures. The Vietnam War was such a disaster and so the general feeling was that we don't trust the government to do anything, and certainly not space exploring. So the momentum was lost. I think that was the turning point. So in these forty years we could have done a lot. Whether we would actually have colonies, of course, I don't know. But there is nothing really standing in the way except for a loss of will.

What do you think was the most important technological innovation of the last ten years?

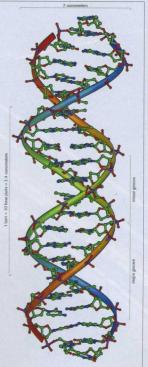
I think Google. It is hard to remember how we lived without Google. I actually visited Google last summer and just last week. It is really a fantastic place, you should go there if you ever have the chance. It is sort of like a sand box where you can just play around. And there are tennis courts and swimming pools and free food and drink for everybody. It is sort of a geek's paradise. Of course the founders were both Stanford people. Larry and Sergey, the two founders, are walking around in shorts and everybody

calls them by their first names. It is amazing as an institution. And I'm sure it can't last. It is bound to become rigid and bureaucratic in time. But it is still amazingly unbureaucratic considering that it is growing extremely fast. Somehow they manage to keep it informal. And it is not just a tool, it is a new way of life. And the way they are working there is also something new.



What is exciting to me is a thing called HAR1, which was actually discovered in Santa Cruz by a fellow called Haussler, who is a friend of mine. He is also really a computer scientist doing biology. And what he discovered was this thing called HAR1, which stands for Human Accelerated Region. It is a little stretch

The Human Accelerated Region in our DNA—a strange connection that leads us all the way back to fish.





"If we find a cure for death, which is quite likely to happen... I don't see much good coming of that. It could be a very unpleasant situation."

The Sloan Digital Survey Telescope, on the lookout for Baryon Oscillations. (NASA image)

of DNA in the human genome, which he discovered just essentially by clever data mining. He found this little stretch of DNA which is in fact almost totally conserved from fish...they have the genomes of zebra fish, of mice, of rats, of chickens and chimpanzees, of course. And so this stretch of DNA is totally identical all the way from zebra fish to chimpanzees, and so it evidently must be something important because it has been so jealously conserved and not allowed to vary for at least 300 million years all the way from chickens to chimpanzees. And in

humans it is very, very different. There are eighteen changes when you go from chimps to humans. So it has been evolving very fast; that is why they call it accelerated region. So this piece of DNA is doing something in humans which it was never doing before. And of course nobody has much idea what it is. But I think it is the start of a big breakthrough. I think it is the start of understanding what really happened to make humans so different from chimps. There are two things that are known about this little piece of DNA, which are highly significant. First of all, it does not code for a protein, which most genes do. This codes for RNA. So it is not a conventional gene, it is a stretch of RNA that has something to do with the organizing of genes. So it is a higher-level structure of some kind. And the second thing is we know when it operates, which is in the second trimester of pregnancy. And it operates in the cortex of the brain during the crucial period of the pregnancy when the brain is getting organized. So with luck it will tell us something important about brains. And to me, that is something really

And what about in astronomy?

Well, there is a corresponding thing in astronomy, which I think is called Baryon Oscillations. Anyway, the idea is that we are now actually able to see more or less all the way across the universe. These sky surveys have just revolutionized the picture of things. Ten years ago, we had only seen about one thousandth of the universe. The little piece of the universe that we had explored was about one thousandth of the volume of the whole thing. And just in the last ten years there have been sky surveys, particularly the Sloan Survey, which the people here have been very much involved with, and several other surveys, which essentially put the whole sky into digital memory. It multiplied the data by a factor of a thousand. So you have a complete record of everything in the sky, and it did not take very long. Data processing is the thing that just leapt ahead, and improved by a factor of two every fifteen months or something. The factors of two just multiply and multiply. So we now essentially have the universe on a plate. And the question is what can you actually do with that. And the plan is to look for the universe vibrating like a drum. And there is a good chance it can be picked out that at some point in the early universe there were sound waves spanning the whole thing from one side to the other. And they leave traces in clusters of galaxies, so that if you look at the large scale distribution of clusters of galaxies you can see it as a faint record of this periodicity so you get an accurate measure of the dynamics of the universe and not just that static situation. So that is a gleam in people's eyes at the

You talk a lot in your books about The Time Machine. What influence do you think science fiction has had on your development as a scientist, even just as inspiration, or in getting people interested in science more generally?

I would say none at all as far as my professional work is concerned. But of course it has a lot to do with what I do as a writer. There is a strong influence there. But no, the sort of science I do professionally is so totally detached from anything human. I became famous just for being able to calculate how electrons behave. I mean, that is sort of a miraculous fact of nature that electrons somehow pay attention to what we calculate.

So I could sit there and scribble and come out with all of these long calculations, and then somebody would do the experiment and find out that "Yes, that is exactly right." That is exactly what the electron does. That is a miracle, of course, but that had nothing to do with science fiction. It just happened. It is an amazing thing that the laws of physics are pure mathematics, and that by understanding deep structures in mathematics you craft nature, which is the sort of thing that made people like Einstein somewhat mystical. He said that most incomprehensible thing about nature is its comprehensibility. And that is still true of course.

So what is your favorite science fiction book of all time?

That is an interesting question. I don't know. There are so many good ones. Certainly the most perfect is The Time Machine. It is real work of art. I also like Sirius very much; it is another Stapledon book.

It is a very sad book...

Oh yes. Of course, most of the great books are. Sirius is a great story. [Stapleton] really knew dogs well. Then, of course, there is Octavia Butler, who recently died. Parable of the Sower and Parable of the Talents. Both of those are very good. Then there is Mary Russell, and *The Sparrow*. It's what I call theo-fiction rather than science fiction. It is very theological. And I think it is sort of a good genre. It really hasn't got that much to do with science, but much more to do with religion. But I met Mary Russell in London at the science fiction convention, and I liked her a lot. And she herself grew up Catholic and then converted to Judaism, so she knows both sides very well. I think it is a good form of literature, because it brings religion into contact with modernity, which is what it badly needs.

How would you like to be remembered? You write a lot about immortality, in the both literal and figurative sense. What would you like to be your immortality?

Of course, there are so many different meanings to the word. When I was writing about immortality I was just meaning the continuation of life. There was nothing about human beings particularly. And I wasn't making any distinction about any creature or a whole society. It was just a question of whether any sort of life could ever continue forever. And that is a more or less well-defined scientific question. You can argue about what life means, and I found that an interesting question. But this has nothing to do with personal immortality. As far as manipulating the human species is concerned, I look to that as a coming disaster. If we find a cure for death, which is quite likely to happen...There is a fellow in Cambridge who is promoting this idea...This guy is a sort of television evangelist or something. I have never met him, but I am told that he exists in Cambridge and apparently has quite a following. That sort of thing is certainly coming, and I don't know how we can avoid it. It will probably be easier than ectogenesis to keep people alive more or less forever. And I don't see much good coming of that. It could be a very unpleasant situation.

How so?

Well, just all these aged people just lying around and not leaving any room for the young. I can just imagine if we had to share the planet with Hannibal and Oliver Cromwell and all these...

But there might be some very interesting people to share the planet

Yes, but still it would make progress very difficult.

And so what about immortality in a figurative sense. Your legacies...

Well, there I am quite happy with the way things are. I see myself in my children and [15] grandchildren and of course books are sort of children as well. And there are grandbooks, which are books written by my kids. So I am quite happy with that.