Prairie U-U March 19, 2000 - Richard Feynman, A Curious Character

Musical Prelude: Samba Welcome & Chalice Lighting Hymn #1 Prairie Joys & Sorrows

Richard Feynman for Children: Bob Lawrence....Introduced by Warren:

Richard Feynman was a very famous physicist. Physicists study things like electricity, sound, and light. Richard Feynman taught us a lot about those things. But he was curious about everything in the natural world, and he showed us how we should all be curious. Bob will give you a couple of Feynman stories.

- 1. A Beagle Has a Good Nose. Do You? pp. 104-106, "Surely You're Joking..."
- 2. How To Teach Your Little Sister Tricks, pp.163f. "Most of the Good Stuff"

Children leave

Biographical Summary:

Richard Feynman was born in a part of NYC on Long Island in 1918. His father was in business, not very successfully, but thought his son should be a scientist. His mother thought that the highest vocation was that of a comedian; she might have been joking. Richard grew up on Long Island doing lots of experiments. Back there in the 1920s, he played with radios. [Al?.....]

He graduated from high school and went to MIT, and then he got his PhD from Princeton in 1942. (The fact that he was a Jew made people at Princeton reluctant to accept him as a grad student; it's embarrassing to read the correspondence about his application; Gleick, p. 116.) When he got his Ph.D., the war was on, and he was recruited for the Atomic Bomb project at Los Alamos. He was in love with a beautiful high school classmate, Arline Greenbaum. However, she had tuberculosis. Just the same, they married, and she moved out to Albuquerque to be close to him. It's a beautiful love story. They worried about whether he should kiss her and risk getting TB. Arline had the rare ability to embarrass Richard. She sent him a box of pencils emblazoned, "Richard darling, I love you! Putsie," and she caught him slicing off the incriminating legend for fear of leaving one on his professors' desks. "What do you care what other people think?" she said many times. He evidently got the point. Arline died in Albuquerque not long before the end of the war. Richard had a hard time dealing with it, and later he was quite open about it. Feynman made important contributions to the A-bomb. He was there at the first test at Alamagordo......Everyone else had thick sunglasses, but he quickly calculated that the windshield of his car would keep the dangerous rays out, so he might have been the only one who saw the first Bomb with his own eyes.

After the war he went off to Cornell and continued doing the work in theoretical physics that eventually led to the Nobel Prize. The theories of relativity and quantum physics had revolutionized physics in the 1920s and 1930s. But the theories were internally inconsistent, implying things such as that the mass of the electron should be infinite. Feynman, and a few others, solved the problem. The resulting theory of quantum electrodynamics, is one of the most successful in science, producing predictions that work out to the 20th decimal place.

When I was an undergraduate, I thought I had a little grasp of modern physics. But that was long ago, and physics has changed. [I don't especially like it, but who am I to choose?]

(Al....?)

Feynman was always interested in rhythm, he would always be drumming on the table or the glasses. When the first punched card machines arrived at Los Alamos, he assembled them, and found that he could program them to clatter out the cadence of well-known songs. In 1950 he went to Rio de Janeiro, where there was lots of drumming but very little theoretical physics. He taught physics and learned to drum Samba.

After Brazil he went to Caltech, where he taught for the rest of his life. He was a super teacher of undergraduates, perhaps the best we have had. When doing research for my doctoral dissertation I interviewed him—he was already famous in the physical sciences, and my scientist friends said I just had to have him in my sample of informants. I interviewed him for an hour or so in 1961 and still remember him as one of the most extraordinary people I've met.

[Al, CD for a few minutes]

Feynman got the Nobel Prize in 1965, and later did a bunch of other things worthy of another Prize.

After the death of Arline he became rather sexually promiscuous. Maybe no other woman could match her, or maybe he was afraid of getting too close to anyone, I don't know. He was open about it and didn't deceive the women, but he left many broken hearts behind. He had a very short second marriage in the early 1950s, and in 1960, he married again, to Gweneth Howard, from England. She was a pretty sexy character herself, but they settled down and had a happy marriage with two children. Feynman died in 1988 after a long bount with cancer. But he is still very much alive. There are a lot of Feynman fan clubs.

[Al?.....]

Feynman Stories: There are lots of Feynman stories. At his memorial service, he friend and occasional collaborator, Murray Gell-Mann, said "He surrounded himself with a cloud of myth, and he spent a great deal of time and energy generating anecdotes about himself." Gell-Mann angered the family, but he was right. Some of the stories were published in two little books, **Surely You're Joking, Mr. Feynman!** and **What Do You Care What Other People Think?** books that some of you have read.

[Who?show of hands.] We have time for a few stories.

1. Learning to play Samba, Surely You're Joking, pp. 209f, 205ff.

This doesn't mean that Feynman was musical. For him, Samba was rhythm. He had no appreciation for harmony or melody. Once at Los Alamos he was annoyed when a colleague was playing the recorder. He called it "an infernally popular wooden tube, for making noises bearing a one-on-one correspondence to black dots on a piece of paper..."

[A few bars of recorder music?]

He wasn't at all into literature or poetry either.

Samba: "Surely".....206.2---- skip 207.8-208.1----210.3, paraphrase 210.4

2. Ant pheromones: "Surely"....93.1-1: skim and paraphrase to 94.4 There are lots of other Feynman stories.

[Does anyone here have any to tell?.....safe-cracking at Los Alamos, Gleick, pp. 188f. Feynman's own version is more dramatic, **Surely...**, pp. 137ff.]

3. In 1986 Feynman was appointed to a Commission to investigate the space shuttle Challenger disaster. The Commission hearings were broadcast on national television. In a rather dramatic presentation, Feynman took a piece of the O-ring, the gasket at fault in the disaster, and dunked it into the ice water given the Commissioners. After a brief time, he took it out and pinched it ith a small clamp. The material from the O-ring did not bounce back to its original shape. It is now generally agreed that the disaster was caused by the failure of the O-rings, the rocket exhaust going in the wrong direction to produce the disaster. Feynman's drama was effective in pinpointing the blame in a situation where others would have preferred to waffle. But it was very clearly a staged bit of drama. Feynman spent some weeks in interviewing engineers and officials at NASA, and all of his stuff came from some of them. At the televised hearings, there was a problem because they hadn't brought ice water for the commissioners. But the ice water was a consummate actor. We can ask: What's the significance of his dramas?

Interpretations:

1. If you read what historians and social scientists write about science and scientists, you get two quite different images. On the one hand, you get the picture of the scientific genius and the idea that progress in science has been the product of a small number of people, Newton, Darwin, Einstein, and so on. On the other hand, there is a democratic image: science is a **method**, and any reasonable person using the method can find truths. What we call scientific knowledge is the product of many people over many periods using the method or methods of science.

As you might expect, there are reasons in support of both points of view. Sociologists of science demonstrate great inequality in the production of scientific knowledge—a small fraction of scientists write most of the papers, and about 2% of the scientists are responsible for more than half of the citations in the literature to the work of their predecessors. Richard Feynman knew this. He told me that there were only a few leaders in really fundamental physics.

I think Isaac Newton and Albert Einstein exemplify this elitist or genius view. Lots of us are genius worshipers; I have a picture of Einstein on the closet in my basement. Back there in the 1920s, people wrote that only about a dozen persons could understand Einstein's theories. I think that's wrong; lots of high school students understand things about objects getting heavier and shorter as they accelerate.

James Gleick' biography of Feynman is titled **Genius**. I think it's a misleading title. Feynman was a very smart character, and he knew it, but his performances were made to demonstrate that we can all make interesting scientific discoveries. It doesn't take some extraordinary genius to go around smelling people and the objects they have touched, or to look at the way ants behave on your windowsill. I think Feynman's little books have a message. You and I should be like him, curious characters. We should allow ourselves to be curious. We should be open to new experiences and to new ideas. And it's fun; science is fun.

2. This is related to Feynman's ideas about philosophy and religion. He was profoundly atheistic. The idea of being curious, being open, means not being committed to a philosophy or a religion. Those commitments cramp one's curiousity. You have to be free of those commitments to be a great scientist. I think this is true at Prairie. We have and have had some pretty good scientists at Prairie from time to time, but I don't think they ever have said anything interesting in terms of the religious aspects of their work..

Let me quote from one of Feynman's public lecture: (The Meaning of It All) "It is necessary and true that all of the things we say in science, all of the conclusions, are uncertain... They are only guesses....what we call scientific knowledge today is a body of statements of varying degrees of uncertainty...Scientists are used to this. We know that it is consistent to be able to live and not know. Some people say, "How can you live without knowing?" I do not now what they mean.

So.....what does physics have to tell us about the meaning of life? This little book that Al lent me has a wrong title, **The Meaning of It All**, because he says science cannot give us the answer. He was critical of those who thought they found the answer, because their religious answers led to so many human tragedies. (**The Meaning of It All**, pp, 32.3-...}

I think this is a kind of profound atheism. Maybe one can gleam some little religion from some of his other thoughts:

"It is a great adventure to contemplate the universe, beyond man, as it was in a great par of ...history and as it is in a great majority of places. When this objective view is finally attained, and the mystery and majesty are finally appreciated, to then turn the objective eye back on man viewed as matter, to view life as part of the universal mystery of greatest depth, is to sense an experience which is very rare, and very exciting. It usually ends in laughter and a delight in the futility of trying to understand what this atom in the universe is, this thing....that looks at itself and wonders why it wonders. Well, these scientific views end in awe and mystery, lost at the edge of uncertainty, But they appear to be so deep and so impressive that the theory that it is all arranged as a stage for God to watch man's struggle for good and evil seems inadequate." (Pp.38f)

That's what Feynman said in back then in the 1960s. It isn't the last word about religion. In my interview with him, at one point he expressed some irritation, saying to me, "You should argue. I'm used to talking with other physicists, where my wild ideas are refuted. So I can and you can. I agree with Feynman that the sciences of physics and astronomy won't give us any religious truths. It's interesting to know about theories of the first few milliseconds of the big bang, but Who cares, in any really deep religious sense? The Creation Science people and those like them are going nowhere in any religious fashion.

But what is religion all about? At one point in my interview he expressed some irritation, saying "You should argue. I'm used to talking with other physicists, where wild ideas are refuted."

So, if I were defending religion, I would say it's about something else than the physical universe. It's about something else, about **relationships**, about relationships among human beings and between humans and the natural world. Richard Feynman wasn't all that good on relationships.

Discussion

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Introductions of guests and visitors Prairie announcements

Concluding hymn, "For the Beauty of the Earth," #3 in Prairie Songbook

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