

Life on Mars: What Could it Mean?

Carl Sagan

Astronomer, Cornell University

Let's assume that the microbiology experiments are successful. That is, that there is some indication of Martian microbes. You can't see them, but there are meter readings that there are little microbes, so we're sure about indigenous life on Mars. Then it indicates that, independent of life on Earth, life has arisen on Mars. So we have now looked at two terrestrial planets, the Earth and Mars, and there is life on both of them. It immediately indicates that the origin of life is much easier than many people had thought.

There is a school of biochemical thought which has it that while the building blocks of life are easy to come by, their combination four billion years ago into self-replicating molecular systems is difficult, improbable, unlikely and therefore, that very few planets would have the origins of life. It is hard to do experiments on that. It takes billions of years, and even the most patient of laboratory scientists is unlikely to invest that amount of time. Well here is a natural experiment on the origin of life that's been going on for four and one-half billion years on a neighboring planet. If it turns out that there is life there as well, then, I would say, it would convince large numbers of people that the origins of life exist. And that then opens the door to speculation that there is life on innumerable planets throughout the Milky Way Galaxy.

In the minds of some people, the most difficult step in the origin of a technological civilization is the origin of life. People think that once you have life, in a few billion years you go like an arrow toward technical civilization. I myself don't happen to share that view, but there are a lot of people who have that view, and I think that many people would deduce from life on Mars that there are civilizations all over the Milky Way Galaxy. My personal view is that would be too powerful a conclusion, unsupported by the discovery of Martian microbes. But it certainly would make a probability of

What if there really is life on Mars or somewhere else beyond the Earth? What would it mean to us on Earth? Will it topple religions and philosophies, as was once speculated? Will it be a flash-in-the-pan media event that all but a few scientists quickly forget? Or might it, perhaps after several generations, sink into the soul of our culture and gradually but radically change the way we think about ourselves and our position in the universe?

No one has the answers to these questions, at least not yet, but some people have thought seriously about them. SCIENCE NEWS Behavioral Sciences editor Robert J. Trotter talked to an astronomer, a psychologist, a biologist and a philosopher and asked them to comment on the consequences of discovering life on Mars and on the more far-out possibility of eventually making contact with intelligent extraterrestrial beings.

some forms of life, nevermind civilization, in the Milky Way Galaxy. That is, I would say, the immediate scientific consequence. And it obviously has philosophical implications.

Then there are all sorts of questions about the life that is there. How similar is it to life here? If it's very different, does that mean there is an enormous variety of forms of life that are possible—of which on Earth we have one small subset? If, on the other hand, life on Mars is very similar to life on Earth, then does that mean there is a very limited biochemical variety of life forms that is possible? Again, there is no way to do experiments on that, except naturally occurring experiments.

If there are large organisms on Mars, I think responses will be less abstract or more emotional. I don't mean the scientific responses, but the lay responses. If it's something that you can see, something that crawls, slithers and slides, then I'm sure there will be a whole range of quite different responses. But mostly, I would predict, positive responses. I think the prevailing sense in that case would be of amazement that such wonders should be.

Intelligent life on Mars? Well, I'd say very unlikely. . . . But if we got a radio message from somewhere else? Far more important immediately than what we imagine the content is, is the fact that someone sends us a message. It says that

technical civilizations are not extremely rare, which in turn means that the dangerous period of technological adolescence that the Earth is in now can be gotten through. It might be that everybody at our stage has destroyed themselves—are not wise enough to deal with the great powers that science and technology bring. The existence of a message from anybody means that it is possible to get through that dangerous adolescent period.

Then, another aspect, again independent of the content of the message, is, I would think, the clear realization that whoever they are, they can't be human, because human beings are the product of a particular and unlikely stochastic evolutionary process. And those fellows, whoever they are, are going to have a very different biological, social, political and economic history. And that then means the diversity which some people are so quick to see among human populations is going to dwindle overnight. So in a very real sense, I think that the receipt of an interstellar radio message will make all of mankind brothers and sisters.

James V. McConnell

Psychologist, University of Michigan

It would be absolutely delightful if someone did contact us, because it would force us to look at things about our own behavior that we probably have never looked at before. It would be the first unbiased, really unbiased, observer that we would have. . . . We would at last have a mirror that would help us strip away a lot of our delusions. That would be superb.

Gerald Soffen

Biologist, Viking Project Scientist

If we don't find life, it doesn't prove anything other than that it's difficult to find life on Mars. That's all. Now let me turn to the positive case. I think it could range all the way from a ringing positive, an honest-to-god, everybody-believes-it sort of thing—you can see it because it's



to me that we have reached the place where there is no escaping that implication, if the theories are correct, that any time we have a congenial environment and some of the right chemicals are there, including carbon, that given enough time, life will evolve. We just can't avoid that implication any more. Which means to me that we are at the point where we can assume life is there and proceed now to operate on that assumption and try to find it.

In my own mind the ultimate implication is that we will at last have a mirror by which we can look at ourselves as human beings. We'll have a better perspective. And I have the weird feeling that the psychologists would say that we develop our personalities in terms of this mirror-image concept. Individually, we behave in terms of how we see ourselves. I think that holds collectively as well. Collectively, as small groups or large, we behave in terms of how we see ourselves. And this cosmic perspective, or the way we see ourselves in this cosmic perspective, would alter drastically. We could no longer see ourselves as little aristocratic, ethnocentric, chauvinistic, egocentric groups—little national groups. That marvelous view from space (Shapley's *View From A Distant Star*) I think would more and more permeate the way we think of ourselves. . . . That to me is the most significant implication of the whole thing. . . .

If you define religion in its most general sense as the search for ultimate meaning in life—and that can be one definition of religion—then to find this realistic perspective of ourselves will just give that much more firm ground on which we can build a meaningful religion, if you want to use religion that way. But in its more narrow sense, specific beliefs in various religions—that is, earth-centered beliefs, tribal-centered beliefs, anthropomorphic beliefs—all of these, I think, will eventually fade away. They'll no longer meet our needs. As human beings have begun to travel and mix all over our globe, they have had to face up to the fact that each religion has been anthropomorphic: black people made their gods black, Indians made theirs look like Indians, and so on. I think we have to face up to the same anthropomorphisms with other creatures—extraterrestrial life. And that should tell us something, if we can learn it. That's the big if.

But I'm optimistic. I think we can learn it. But those who learn it first are those who have a certain kind of creative imagination and can crank these new images into their own psyche. And then if we can disseminate these ideas as broadly as possible, the others can think with these images. I still love [science fiction writer] Larry Niven's phrase that the trouble with people who live on planets is that they think small. I think that's beautiful. That says the whole thing. □

growing and it's green and it's hanging there. That's not out of the realm of possibility. If that happens, I think there will be an immediate kind of hoopla. Everybody will be talking about it. I think it will be the current fad, like Watergate. Everybody was all of a sudden an expert on politics. But I think that will die down fast, as soon as something else comes along. Instead of the post-Watergate era, we'll have the postexobiology era.

I think the long-range response is more interesting and more important. What will eventually be? I think it will take 10 years, 20 years, decades or maybe more for it to really penetrate beyond the very superficial, to actually enter the philosophy of the world, the deep thoughts of mankind. Those things don't change overnight. Factual knowledge, I think, has a slow impact on society. It takes a while for people to digest it. It takes sort of an intellectual generation to accept and think and work it out and make its plans around that thing. It isn't easy to say, "Now that this is true, we will do so-and-so."

One of the more obvious reactions, and I'm speaking now as a scientist, I think eventually will be, "Bring it back alive." I think there is no question, the Frank Buck attitude will prevail: By god, if there are Martians there, we are going to bring them back and stick them in a test tube and look at them. I think that's part of our culture. There's no way to avoid it. People will demand it.

I think there will also be opposers, the ones who say, "Not in my soup you're not going to bring it back." You know, the Andromeda Strain and the Green Slime, etc. And that will be interesting. That will set up a forum, a public forum of people who think it's so important and so interesting that we ought to do it, and people who say we shouldn't do it. And that's healthy for society. It's very healthy when you draw others in, nonspecialists. It will be an enormous period of education for us. And people will think about living

things and living beings and the oneness of life on earth, and they will understand it. . . .

As a biologist, I spend many hours explaining that the question of a search is not to see if there is life on Mars, but if there is life, whether it is a different event than terrestrial life. Most people don't understand that the life we have on Earth is the same, it's really quite the same. The trees, the flowers, the birds and the bees really come from one sequence of events, not many. And the question we are asking is a question of the oneness of terrestrial life and the possible multiplicity of living things, rather than just, "Wouldn't it be cute if we found something there?" And I think it takes years to educate people to that thought, to that notion, to that idea before they begin to think it is important.

James Christian

Philosopher, Santa Ana College (Editor of *Extraterrestrial Intelligence: First Encounter*. See Books listing, p. 371.)

The person who is a student of the history of human understanding and watches over the progressive development of human understanding sees moments in history that stand head-and-shoulders above other moments. It's sort of like looking out over a sea and seeing islands that break the surface every so often. And those islands are the great ideas that begin to shape new world views. I see the breakthrough that chemical evolution has made as one of those islands. And I'm a little uneasy that others haven't seen the tremendous implications of what has been found in biochemical evolution. Or at least the scientists have seen it but, being good scientists, they have been quiet about it. But to me it's one of those great moments in the history of human understanding. . . .

Biochemical evolution already implies that life is all over the universe. It seems