

Who's Out There – 1975

Orson Welles: “Before the cylinder fell, there was a general persuasion that through all the deep of space no life existed beyond the petty surface of our own minute sphere. We know now that in the early years of the twentieth century this world was being watched closely by intelligences greater than man's. Across an immense ethereal gulf, minds that are to our minds as ours are to the beasts in the jungle, intellects vast, cool, and unsympathetic, regarded this earth with envious eyes and surely drew their plans against us.”

Hello, I'm Orson Welles, and I've been quoting from another Wells – no relation – H. G. Wells, the distinguished novelist, historian, prophet, who was also the great master of science fiction. He wrote *The War of the Worlds*, on which was based a certain notorious radio broadcast, which as some of you may remember, sent many thousands of our listeners panicking into the streets all over the country. H. G. denounced me for doing it, but later when he realized that our broadcast, like his story, was not intended to cause riots but just to entertain, we got to be good friends. And I was forgiven. Whether all those people who jammed the highways and even took to the hills to escape the Martians have forgiven me is another matter.

Woman 1: This is it.

Woman 2: We thought that this was it.

Woman 3: Listening to that show, I say we were very impressionable at that age because of Buck Rogers and Flash Gordon, and that really made a big impression on us.

Man 1: One fellow in particular who owned a store took the money from his cash register and loaded his car up with food and took off for the mountains and left his wife and children at home.

Woman 2: New York City was just demolished, and they were coming closer.

Woman 1: All of New– north Jersey is an inferno, and they are proceeding south.

George Wald: I can conceive of no nightmare as terrifying as establishing such communication with a so-called superior or, if you wish, advanced technology in outer space.

Narrator: George Wald is a Nobel Prize-winning biologist, one of a group of distinguished scientists meeting on the subject of extraterrestrial life. All of the people you will be seeing in this program – scientists, radio listeners, Orson Welles – have one thing in common: each has had reason to believe in the likely existence of non-Earthly life in the universe.

George Wald: I think there's no question but that we live in an inhabited universe that has life all over it.

Carl Sagan: What I'm imagining is the facts that I've just stated becoming generally known so that people know that out there is a million other civilizations, they all look fabulously ugly, and they're all a lot smarter than us. That seems to me useful and a character-building experience for mankind.

Narrator: From the monstrous Mars life of his famous broadcast, Orson Welles will be taking us through science fiction to science fact, to the new view of extraterrestrial life now emerging from probes to the planets, interstellar discoveries, and findings about the nature of life itself. A real picture as astonishing in its way as the science fiction of 1938.

Orson Welles: If there is life out there, intelligent life, how did we ever get the notion that it might be otherwise than friendly. Well, Mars of course is the god of war, so the planet bearing his name might be expected to have warlike intentions. In our broadcast the Martians were as aggressive and ruthless as any human being – a ridiculous assumption on the face of it. They were supposedly as bad as we are at our worst and also much uglier. They brandished death rays in their slimy tentacles. For a while at least, just toward the end of the radio play, they appeared to be totally invincible. What finally stopped them? Well here's the way it went, in the words of the mythical Professor Pierson of Princeton who was our commentator.

"I remember," he said, writing in his journal when the whole thing was put together again and the world was in business, "I remember wandering through Manhattan, standing alone on Times Square, catching sight of a lean dog running down 7th Avenue with a piece of dark brown meat in its jaws. I walked up Broadway past silent shop windows and suddenly I caught sight of a Martian machine. Then across Columbus Circle I could see standing in a silent row 19 of those great metal Titans, their cowls empty, their steel arms hanging listlessly by their sides. I looked for the monsters that inhabit those machines, and then, before my eyes, I saw them stark and silent, the Martians themselves, with a flock of hungry birds pecking and tearing brown shreds of flesh from their dead bodies. Later, when their bodies were examined in laboratories it was found that they had been killed by disease bacteria against which their systems were unprepared. Slain, after all man's defenses had failed, by the humblest thing that God in his wisdom had put upon this Earth: the common cold." And that's the way it was.

Well quite a lot of things have happened in the world since then. An invasion from the planet Mars, that at least is one thing that didn't happen. But in a way, you know, we have been invading Mars. If Mars hasn't exactly been invaded, well it's certainly been investigated, not attacked but thoroughly, very thoroughly, studied. Observations of Mars had begun long before our broadcast and even back then in 1938 it seemed plausible to many people that life could have developed on Mars, just as it had on Earth. Peering through telescopes, scientists had seen – what? Well, first a planet that like our own Earth had polar ice caps.

They were fascinated to see that the ice caps grew and receded with each year, large areas changed color with the seasons. Did that mean vegetation? Straight lines were sighted on the planet's surface; some called them canals. The American astronomer Percival Lowell believed that these Martian canals had been created by an advanced technological civilization. First in 1965 and then again in 1969, NASA sent spacecraft to fly by Mars and send back scientific measurements and close-up photographs.

NASA Employee: This is picture 21, a red picture, wide angle picture, fantastic picture. That's beautiful, that's beautiful, look at those little craters. This is a narrow angle camera view...

Orson Welles: The Mariner missions were great achievements for the scientists, but the pictures of Mars showed a world of total desolation. Was Mars less like the Earth then and

more like the Moon? There were no canals, no cities, no areas of cultivation, no signs of upheaval or layering in the Martian crust to indicate that the planet was active or evolving geologically. The pictures revealed no volcanoes to spew out gases that could enrich the atmosphere. And water, so essential to life, seemed to be present only in traces. The atmosphere was so thin as to make the possibility of life seem even more remote.

For the fans of science fiction, not very exciting. But for scientists, the whole excitement is finding out the facts; that's the whole name of the game. Now these first flybys had revealed only some of the facts. But all the same, the exploration of Mars and of all the other planets of the solar system was actually getting underway.

NASA Employee: I can't, I can't feel that any person with any soul can look out on that universe that surrounds us and can imagine the immensity of it and the history of it without being rather impressed with the idea that we, as little atoms made of the same stuff those stars are made of, have the capability to regard the other part of the universe. One piece of the universe has the ability to look at another part of the universe and wonder about it. That's a very amazing thing and it brings into one's mind all kinds of thoughts about religion and philosophy and so on. But don't ask me about life on Mars, okay?

Orson Welles: In the fictional Martian story in *The War of the Worlds*, it was understood that the Martians were fighting for their own survival. Their planet was growing so cold and inhospitable that they might perish if they remained. A real life confined to such a planet would fight for survival by trying to change itself, by evolving. Every living thing on Earth has evolved from the lowly, the invisibly small, microbe. Given nourishment the microbe will grow colonies so vast that they rapidly become visible to the eye. Here on our planet, microbes have adapted to survive the most hostile conditions: arid deserts, the frozen Himalayas, in trenches under thousands of tons of pressure in the ocean deeps.

Biologists at Ames Laboratory are discovering adaptive capabilities in life forms that a few years ago would have been regarded as fantastic. Within the cooling systems of atomic reactors organisms have been discovered flourishing where radiation could be expected to destroy any living thing. In hospitals that use ultraviolet for sterilization, strains have been found resistant to the killing radiation. Biologists are growing organisms in salt solutions, in acids, in alkalines, in ammonia gas, in boiling hot springs, in ice that is thawed for part of every day. In the vacuum of a space simulator life forms have been flourishing for years without oxygen.

Scientists are studying the kinds of environments that could challenge life forms on the planets and moons of the solar system. In 1971 Mariner 9 arrived at Mars equipped to go into orbit, stay for awhile; a good thing too, because when it arrived Mars' surface was obscured by a global dust storm. As the storm abated, a whole new Mars began to make its appearance. The first feature that swam into view, poking up through the dust, appeared to be a huge impact crater. But it stood miles above the Martian lowlands on the peak of an immense mountain, Nix Olympica. And as the dust settled further, the stunning truth emerged that the mountain on Mars was indeed a gigantic volcano. So geologically, Mars was not a dead planet after all. Vast stretch marks on the planet showed that Mars' surface is shifting and changing on a colossal scale. Mars is beginning to look, geologically at least, more like the Earth and less like the Moon.

And then new evidence of water has begun to turn up in surprising ways. Among the many clouds in the Martian atmosphere, some have been found to be composed of water. Then close-ups of the surface have begun to turn up strange, sinuous patterns. Some compare with the patterns cut into the surface of our own planet by the Mississippi River. Slowly the interpretation emerged that only a fluid flowing continuously over the Martian surface could have caused such patterns and erosion. Some scientists didn't agree, but astronomer Carl Sagan theorized that Mars indeed contained a great deal more water than we'd supposed. The water might remain locked within its crust as permafrost during ice age times such as the present, but during cycles of warmth when the polar caps release gases to form a heavier atmosphere the water may be released into clouds. Such clouds could bathe the planet in rains for thousands, and perhaps millions, of years. If Sagan's interpretation is correct, life could have originated on Mars in favorable cycles and may have adapted itself to harsher conditions as they developed and indeed may exist on Mars to this day.

Exobiologists are studying other environments even as they prepare to search directly for life beyond the planet Earth.

Flying by Jupiter, Pioneer 10 confirmed estimates that within its atmosphere are combinations of gases similar to those in which life originated on Earth. While a second Pioneer is being aimed to curve past Jupiter and fly by Saturn, Earth-based measurements show that a moon of Saturn, nearly the size of the planet Mercury, contains an atmosphere, water, and surprising warmth. A Viking spacecraft is being readied to land on Mars in 1976, carrying an automated chemical laboratory to sample Martian soil for life forms.

The discovery of just one bacteria on Mars, or any other body of the solar system, would indicate that the whole chain of evolutions – cosmic, chemical, and biological – is at work everywhere. In that case, the creation of life anywhere in the universe would be more the rule than the exception. In that case, there may be other intelligent civilizations capable of communicating with us.

An impact on ourselves of contact with another intelligent civilization – how it might come about and what the effects might be – is now being discussed by serious thinkers the world over. This symposium at Boston University includes astronomer Carl Sagan; anthropologist Ashley Montagu; Krister Stendahl is dean of the Harvard School of Divinity; Professor Berendzen teaches a course titled Search for Life in the Universe; Professor Philip Morrison of MIT coauthored the first seriously recent paper on possible modes of communication with extraterrestrial life; George Wald won the Nobel Prize in 1971 for his work in physiology.

Carl Sagan: It is now okay to talk about life elsewhere, or intelligent life elsewhere, whereas a decade or two ago it wasn't okay. It was considered too speculative to be worth any investment of time.

Richard Berendzen: ...is that the number of stars in our galaxy alone is so staggeringly large (on the order of 10^{11} or more), the probability of stars having planetary systems is so high (we think perhaps half), the probability that those planetary systems might be comparable with our own and that the stars have some kind of an ecosphere, a sphere in which the radiation is suitable for life (that it's not too hot, not too cold, meeting the other criteria), seems reasonable.

These bits of information come from astronomy primarily. Then we join with the biochemists who tell us about the probable evolution of life here on Earth, the kinds of elements that are necessary for it – DNA molecules, amino acids, and the like – amino acids which have now been found in meteorites, that we have now found interstellar molecules floating out in the space between stars. So that you know the materials for carbon-based life exist, we know that many of the building blocks of life in our own solar system exist off of our planet. If you put these kinds of probabilities together, it begins to lead to the sorts of conclusions that we started with as an initial premise, and which apparently no one on the panel has disagreed, and that is that life must exist in the universe and it must exist quite abundantly.

Carl Sagan: The most optimistic estimates, in the view of many, about the number of civilizations that there might be in the galaxy is of the order of a million, which means that only one in a few hundred thousand stars has such civilizations.

George Wald: That would mean a billion such places just in our own galaxy that might contain life.

Philip Morrison: As I believe there's a society of these groups, not just one, there're probably very many. There's only one, we have no hope of finding them; there're probably thousands, maybe as many as a million. They probably already have had long history of this same experience, of finding new ones and bringing them into the network.

Carl Sagan: And I would imagine, an advanced civilization wanted to talk to us, they would say "Oh, look, those guys must be extremely backwards, go into some ancient museum and pull out one of those – what are they called – radio telescopes and beam it at them."

Richard Berendzen: In 1970, a study of the feasibility for picking up interstellar communication was made in California by a number of radio scientists there, as well as astronomers and others; it's called Project Cyclops. The outcome of that study was that the United States had the technical capability of building a large radio array which would be able to scan the heavens with fairly great resolution and power sensitivity out to a distance of many hundreds or possibly thousands of light years with the very distinct possibility of picking up a signal if it were there.

Carl Sagan: Our present technology is able to detect ourselves anywhere in this galaxy of about 250 billion stars.

Philip Morrison: First, the people beaming the message will be incredibly alien. Even if their biochemistry resembles the biochemistry Professor Wald teaches, it will not be all that close you know; it will have enzymes, but it will be, the LR– the LD situation will be quite different, and I don't know what chains of enzyme systems they will have at all. And you couldn't eat their food very likely, even though they're the same biochemistry, any more than you would eat the food of a mushroom. It's very difficult to eat that.

But the– so I think first of all there'll be two great phases of this eventual time, which I think will come in 10 years or 100 years or, I don't know, maybe longer, when some satisfactory radio telescope work or something similar will acquire evidence of the deliberate beaming of a message, protracted message, out into space. So I think that will be easy and, of course, extraordinarily important. You will know very little of what that message says save that it exists

and maybe some general geographic information from how far away it's coming, what kind of a star, where. And then I think that you will have pouring into the recorders, pouring into the recorders, week after week, month after month, decade after decade, an enormous body of obviously interesting and meaningful pulses. And you'll be able to read them slowly and fitfully because they will not be coded but they'll be anti-coded. That's to say the people who designed them, the beings who designed them, will have thought very carefully how to make the maximum number of mathematical clues; the best way to single out the meaning will be made available. I think the most important thing that it will bring to us, if we can finally understand it, will be a description – if it exists at all – of how beings disposing of great technology were able to fashion a world in which they could live and persevere and maintain something of worth and beauty for a long period of time.

Richard Berendzen: And finally, it would end our social and cultural isolation. To date we have been bounded not only into our own countries and into our own small regions on this planet, but most assuredly within our solar system itself. If there are the tens of billions of other civilizations which the predictions indicate might be, then we would join a larger galactic community.

Orson Welles: In 1976 we're going to be able to explore Mars for perhaps not so humble microorganisms. Before and after that, we'll be searching the planets and the galaxies for clues to fill in the new patterns we're discovering, the evolution of evolutions that has produced us and the possible millions of other civilizations.

Philip Morrison: It is conceivable that a spherical ship will land in front of the Washington Monument and a figure with four antennas and otherwise looking like a professional football player will walk out and demand to see our leader. But I hope very much that the universe of circumstance is wider than the rather shoddy imaginations of science fiction writers for 30 or 40 years. And I'm pretty convinced it is. We've not found their guidance so great in any but the most modest activities, like going to the Moon, which is not very much.

Orson Welles: The difference between the spacecrafts of NASA and the lurid flying saucery of that old radio *War of the Worlds* is the difference between science and science fiction and, yes, between war and peace. It's our own world which has turned out to be the interplanetary visitor; we're the ones who are moving out there, not with death rays but with cameras, not to conquer but simply to learn. We are in fact behaving ourselves far better out there than we ever have back here at home on our own planet.