

Contact: The Search for Extraterrestrial Intelligence (A Space Viz Production--Directed, Written and Narrated by Mark Moidel)

Signature Beginning(Music and Images) (Time Code 10:00:00:00)

V.O. (Time Code 10:00:12:00)

Next on Contact:; we ask the age old question--Are we alone in the universe? Whos out there? Scientists around the world are trying to receive extraterrestrial signals. What do they hope for? What have they found? Where is the evolution of human beings headed?

Quote--Philip Morrison (MIT)

Its not a person to person call. Its not a station to station call. Its a species to species call.

V.O.

Join us, on Contact:..., as we search for extraterrestrial intelligence.

Opening (Music and Image only)  
10:00:47:00)

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Introduction

(Time Code 10:01:20:00)

If we are to learn about distant life, it must make itself perceptible. As far as we can see, only life that has followed our own evolution, to the extent of being able to send some mark of its presence across space, can be found. This must mean that intelligence develops naturally out of evolving life, that it can make signals capable of traversing space, and that for some period of time it wants to make its presence known, or at least, does not conceal it. If these conditions exist anywhere, we might hope to detect creatures far older and more capable than ourselves. Exploration would then cross a new frontier, the frontier of an intelligence biologically, wholly, unrelated to our own. But what would an extraterrestrial advanced culture have to say to us?

Quote-Jill Tarter (SETI Institute)

Theyd probably know a lot about how the Universe works. Theyve been out there and theyve been talking to other civilizations and there may be this whole galactic club, the ultimate Internet!

Quote-Gerrit L. Verschuur (Rhodes College)

If you asked the SETI people, those who are involved in the search, why are they doing it?...and theyve put this in

print...the answer is to get information from the extraterrestrials-what sort of information?-information to help us survive. Thats absurd! Its like searching for God- its a technological search for God!

Quote-Philip Morrison (MIT)

The important thing is to find out the kind of stars that seem likely and search as many as you can, for as long as you can, over as wide a band as you can, until you run out of patience-thats what youve got to do!

Quote-Arthur C. Clarke (Author)

I believe that the promise of SETI is far greater than its perils. It represents the highest possible form of exploration, and when we cease to explore, we will cease to be human!

Block 1

(Time Code 10:03:29:00)

The Vastness of Space

The Universe is vast. A half trillion stars wheel through the spiral patterns of the Milky Way galaxy. Of these, billions are indistinguishable in size and temperature from our Sun. Beyond the Milky Way, hundreds of billions of other galaxies exist, each with its own daunting complement of

stars. It is conceivable that there are more suns than there are grains of sand on Earth.

Life as we know it here on Earth appears to be the result of universal laws of chemistry and physics. Elsewhere among the 400 billion stars in the Milky Way Galaxy or in one of the one hundred billion other galaxies, the same processes may have produced beings who stare at the heavens and wonder about other occupants of their universe.

Cosmologists, scientists who study the history, evolution, and eventual fate of the universe, believe that the universe came into existence about 15 billion years ago.

The early universe contained only the two lightest elements, hydrogen and helium. The heavier elements, including those that make up the bulk of our planet and our bodies (carbon, oxygen, nitrogen, sulfur and phosphorus) were missing from the early universe. These other elements were slowly "cooked up" at the centers of massive stars by constant fusion of lighter elements into heavier ones.

Ultimately those stars died. Their deaths were marked by titanic explosions - supernovae - that ejected into space the heavy elements produced in their interiors.

Somewhere between 5 and 10 billion years ago, large clouds of gas began to coalesce under the influence of their own gravity. Within these large gas clouds, stars began to form. The result was billions of galaxies, each one expanding away from every other. The Milky Way is just one of these "island universes," each containing billions of stars.

Light takes 2.2 million years to reach the nearest comparable galaxy, M31 in Andromeda. At least 100 billion additional galaxies exist in the presently known universe.

It is important to understand that Earth and our Solar System do not occupy any special place within the Milky Way. We live on the edge of a small, unpretentious spiral arm, far from the center of our galaxy located close to the inner edge of the Orion spiral arm, 30,000 light-years away from the center of the Milky Way. Light takes 100 000 years to cross this huge spiral.

We orbit once every 200 million years with a velocity of about 250 kilometers (or 155 miles) per second. The solar system was formed 4.5 billion years ago out of interstellar gas and dust. Since then it orbited the center of the Milky Way less than 25 times. Mankind evolved very recently, during the last one hundredth of the current orbit.

Quote--Philip Morrison (MIT)

What controls everything, in this way of thinking, is the enormous dimensions of space, which every day experience does not prepare us for. But when you think about it, you learn that, that's what controls it all!

## V.O.

An infinitesimal fraction of the matter of the universe has been converted into the organic matter of the human brain. As a result, one part of the Universe can now reflect upon the whole process of cosmic evolution leading to the existence of human thought. We wonder whether this process is a frequent occurrence in the universe: in so doing some scientists come to the postulate that life is widespread, and at least in some cases, that it may have evolved to a similar level of intelligence and technological ability that it did on Earth.

A large number of factors must be considered in attempting to estimate how many intelligent civilizations might have arisen throughout the Galaxy. One attempt at assessing these factors, originated by the radio astronomer Frank Drake, expresses the number of technical civilizations in the Milky Way Galaxy as an equation in which letters of the equation represent factors necessary to sustain intelligent life.

The first four factors may be characterized as physical and take into account the rate of star formation, the fraction of

stars with planetary systems, and the number of planets in each system with conditions favorable to life.

The next two factors are biological and estimate the fraction of those planets on which life develops and the fraction with intelligent life.

The last two factors incorporate societal evolution and represent the fraction of those planets with intelligent life, that evolve technical civilizations capable of interstellar communication, and the lifetime of such a civilization.

Each of the factors in the Drake Equation is extremely uncertain.

#### Quote--Philip Morrison (MIT)

Until we know more, the best guess is to look for something as close to the Sun, I mean as like the Sun as possible. As old as the Sun, as single as the Sun, as steady as the Sun, the same color as the Sun, and then, that's the best we can do, we can't see the planet.

#### V.O.

The only known example of a technical civilization capable of radio communication is our own; whether a scientist believes a civilization would take 100 years or millions of years to develop such a technology depends on the indi-

vidual scientists beliefs. As a result of such uncertainties, widely different numbers are used in the Drake equation, and scientists have estimated that as many a 10 million technical civilizations exist in our galaxy or as few as 1, represented by the Earth.

### Quote--Philip Morrison (MIT)

It speaks to ourselves and not to anybody out there! And thats of course what the Drake equation does. It doesnt tell us how likely anything is. We dont know the factors to put in. Its an empty equation. But it makes you think about each of the factors and then from that you begin to learn more about the effort.

### V.O.

Although many gaps, puzzles, and uncertainties still remain, this unifying concept, in which the expansion of the Universe, the birth and death of galaxies and stars, the formation of planets, the origins of life, and the ascent of humans are all explained by different features of the process of cosmic evolution; some scientists believe provides a sound scientific rationale on which to base a program to search for extraterrestrial intelligence.

Genesis

For the first several hundred million years after its creation, the Earth's surface was a hellish inferno. Comets and meteorites fell continuously, contributing complex molecules to the early Earth, while volcanoes spewed up lava and gases. As the Earth cooled, the abating infall of comets and meteorites, together with outgassing from very active volcanoes, was sufficient to produce an atmosphere including water vapor that condensed to form the oceans.

The Earth began its life with only a few small island continents; the increasing continental mass achieved its present size by about 2 billion years ago. The early atmosphere contained an abundance of compounds, but virtually no free oxygen. There were copious supplies of free energy from lightning discharges, ultraviolet radiation, cosmic ray particles, and shock waves generated by active geology. This resulted in the synthesis of simple organic molecules that could condense out of this atmosphere.

In the oceans and on the seashores in the newly created tide pools, the combination of organic molecules and sufficient energy sources stimulated chemical reactions to produce increasingly complex systems. Somehow, perhaps with the help of simple clay surfaces to speed things up, these reactions produced molecules that could use

surrounding materials to replicate themselves. Life had begun!

Evidence for life can be seen as early as 3.5 billion years ago in the form of micro fossils embedded in preserved rocks of that age. The details of the origin of life are unclear.

Quote--Stuart Bowyer (UC Berkeley--SERENDIP search)

Is Earth unique? To our immediate knowledge, Earth is unique! We have very limited set of data to go by. On the other hand you now start looking at all the stars that are around, if every star had three planets in a nice zone, its hard to imagine that some of those arent as hospitable to life as Earth is.

V.O.

In the laboratory we have only been able to demonstrate that all the simple sugars and amino acids, the building blocks required for life as we know it, can be readily manufactured from the probable sets of raw materials and available energy sources. We do not know precisely how life began here, but however it happened, the emergence of life on Earth was swift and its effect on the planet was profound.

Quote--Gerritt Verschuur (Radio Astronomer)

Interstellar molecules, which have been discovered in an increasing number since 1968, are largely organic. That is to say, they are based on carbon, and human life is based on organic chemistry, the carbon based molecules. So we feel now that if there is life elsewhere its going to be extremely similar, in the fundamental chemistry, but its going to be alien in the sense of the forms that are expressed.

I think that life is capable of establishing a foothold virtually anywhere that is remotely possible. There are certain essential things that are needed, of course you need to have energy flowing through the system and so on...but even today there are living creatures, living in the solid rock, hundreds of feet below the earth, these are a form of bacteria . So thats pretty strange! If such creatures, and I suspect that there are many many planets with highly alien forms of life, but by definition theyre alien!

V.O.

Due to the invention of multicellularity and sexual reproduction evolution began to proceed at a far more rapid pace.

Thanks to the work of the algae, entirely new aerobic species arose that were capable of utilizing the increased oxygen in the atmosphere in the oceans.

The first fish appeared in the ocean 425 million years ago, they crawled onto the land and gave rise to reptiles 325 millions years ago. The reptiles dominated until the Cretaceous-Tertiary extinction 65 million years ago - which was probably due to the impact of a huge meteorite -this led to the demise of the dinosaurs. Then, small rodent-like mammals took advantage of the situation, rapidly evolving into new species, some even re-invading the seas. Although arriving very late on the scene, some 40,000 years ago, modern humans, with cognitive intelligence and technology, now have the capability to alter the environment as profoundly as did the blue-green algae.

The physical forces driving evolution were biological, geological and astrophysical. On many occasions, vast numbers of species became extinct and were replaced by an even greater diversity of new species. Throughout this entire period, neurophysiological complexity appears to have continually increased, although the fossil record can tell us nothing about the inevitability of the emergence of intelligence. However , intelligence does appear to result in significant survival benefits.

Quote--Arthur C. Clarke (Author)

We are end-products of countless throws of the genetic dice; never in the whole of time and space would that exact evolutionary sequence be repeated. From the engi-

neering point of view, men and apes are virtually identical, yet we seldom confuse them.

V.O.

In our ancestors, the combination of manual dexterity and intelligence led to the use of tools and to the development of a technology that is capable of modifying our environment on a planetary scale.

Quote--Michael Bisson (Archeological Anthropologist, McGill University)

Intelligence developing as an adaptive strategy is, I think, moderately likely--but in turn that intelligence becoming dependent in part, on technologies, and on a continually elaborating technology, is a somewhat lower probability. So that overall I would think that technological civilizations are quite rare.

V.O.

In the last hundred years, we have developed the means to communicate at the speed of light, not only with each other but also across the vast distances between the stars.

Chemical, biological, cultural, and technological evolution have given us the bodies and minds to explore our home

planet, the solar system, and the vast universe beyond. On our own planet, evolution has led to a civilization that is capable of signaling its presence across space. Can we possibly be the only beings, in all the universe, to have this ability? Daily our radio communication leave the planet. Might there be extraterrestrial signals, if we but listen?

Quote--Seth Shostak (SETI Institute)

It seems that the best way of getting information across space, is not to put two thousand people on the Starship Enterprise and try to fly them there, but its to send the information, send the bits and the bytes by radio, or light or any other electromagnetic radiation. Its very cheap, its very fast and at radio wavelengths itll penetrate the dust and the gas between the stars. So it has a lot of advantages. For a few dollars, you could send this program to the nearest stars.

History

V.O.

While interest in the question of extraterrestrial life is at least as old as historical civilizations, the modern SETI era can be defined as beginning in 1959. In that year, Cornell physicists Giuseppe Cocconi and Philip Morrison published an article in Nature in which they pointed out the potential for using microwave radio to communicate between the stars.

Quote--Philip Morrison (MIT)

The decision to use microwaves in the 1 000 mhz range was a decision first made by Giuseppe Cocconi and myself, that was the very first paper. And it still, dont think its the only possibility, but it still has a lot of support and I will try to explain why.

Because that lies in the most efficient place you could possibly use radio waves...because the nature of the stars and the nature of the gases in Space. They make too much noise at lower frequencies. They make too much noise at higher frequencies. But thats the place where they seem to make a minimum amount of noise. Now though its a minimum, it does contain one feature in a

rather broad set of channels. Lets call that channel 1420. Channel 1420 is occupied by Hydrogen gas, which everybody knows makes up most of the universe. So you go near that, channel 1422, channel 1418, and all the other channels from 1 000 to 10 000--thats the place to search. And thats because of the physical nature of the stars, it has nothing to do with our apparatus, as long as you can do that, thats the place to go.

### V.O.

In the spring of 1960, a young radio astronomer, Frank Drake, had independently reached the same conclusion and conducted the first microwave radio search for signals from other solar systems.

Frank Drakes original feedhorn designer for Project Ozma, T. Kutchu Menon.

### Quote--T.K. Menon (UBC, Professor Emeritus)

Personally I was never convinced that the receiver was going to detect anything, because I was aware of the stability and sensitivity of that receiver. Both of which were far, far below what was required to detect any significant signal, so I did not expect either the magnetic fields to be detected or any signals from other civilizations to be detected with that receiver. But historically that was the starting point.

The same feedhorns were used later on, by Gerrit Verschuur for detecting the magnetic fields. What he did, when he was at the National Radio Observatory, that was good science. So that feed played an important role, in that he detected the magnetic fields, even though the Project OZMA results were negative.

### Quote--Gerrit Verschuur (Radio Astronomer)

When I did my search in 1971, it was completely not allowed in the astronomical community. You were not allowed--nobody gave time to use a big radio telescope to do the search, not since Frank Drake and as far as I could gather, he really did very little observing and got essentially no meaningful results that were ever published. But I was still intrigued, I would love to know if there were extraterrestrials out there. So I did my experiment illegally--without permission. My experiment was a million times more sensitive than project OZMA, so I thought it would be neat to publish it, but I couldn't publish it, because I hadn't done the experiment, I mean officially. So then I asked for some time to continue my experiment, and the observatory gave me some spare time on the 140 foot telescope 6 or 8 months later, where I did the experiment, with, you know, officially recognized, and then published the results.

V.O.

For two months Drake aimed an 85-foot West Virginia antenna in the direction of two nearby Sun-like stars.

Drake's single channel receiver was tuned to the magic frequency of the 21 cm line of neutral hydrogen, a spot on the radio dial also favored by Cocconi and Morrison because of its astronomical significance.

### Quote--Philip Morrison (MIT)

Water is H<sub>2</sub>O we often say H<sub>2</sub>O. If I say H and HO, both the H and the HO independently have radio frequencies; and they define two frequency bands and the long region in between those two is the best place to listen from the standpoint of natural noise, the least natural noise, is there. And Barney Oliver got the bright idea of calling that band the waterhole, because it's two pieces between water. But it's mostly again, it does indicate the general frequency, we think is the most advantageous. We are no longer bound by that, were willing to go to one side or the other, or do everything we can, depending on our capabilities; but certainly, pay a lot of attention to that band. It's the optimum from the standpoint of efficiency and that's known to the other people as well as to us. So that's why it's good.

V.O.

While he didn't detect any signals of extraterrestrial origin, Drake's Project OZMA sparked the interest of others in the astronomical community, most immediately the Russians, the Canadians and the French.

Quote--Jill Tarter (SETI Institute)

France had a long running program and will again be back in France when their major telescope at Nancy is finished with an upgrade. There are searches running in Argentina, basically a clone of the search that is going on at Harvard at the Oakridge Observatory, its in parallel with Paul Horowitz...there has been a little effort in Germany, a little bit in England, but primarily the big, oh and some Japanese astronomers have made SETI searches using U.S. telescopes, not Japanese facilities. But the big players have been the U.S. and the Soviet Union.

V.O.

In the 1960s the Soviet Union took an interest in SETI, though very little observing was ever done. During the 1970s many radio astronomers conducted searches using existing antennas and receivers. Some of these microwave strategies, employing improved technology, have continued to the present time.

Foremost among these are the Planetary Societys Project META"; the University of Californias SERENDIP Project;

Big Ear, a long standing observing program at Ohio State University; and the SETI Institutes Project Phoenix, based in Mountainview, California.

In the near future, probes sent to other planets will be sending back data via laser beam, due to some of its superior qualities. Stuart Kingsley operates The Columbus Optical SETI Observatory, North Americas first. His scheme is to count photons emanating from a laser transmission from an advanced civilization.

### Quote-Stuart Kingsley-Optical SETI

I can basically look in the visible spectrum or the near IR, like a whole chunk of the optical spectrum and detect that simultaneously, and see if there is a pulsed beacon in there or not. When we send out probes to the nearest stars in 50 years time or so, and they eventually send back the signals, pictures of the star system, and data, those signals will come back on a laser, for sure. And when in the next century men step onto the surface of Mars, the historic pictures of that first footprint on Mars will come back by laser, there will be high definition TV signals coming back by laser to the earth, they will whiz around the earth between geostationary satellites by laser, they will come into most peoples homes on fiber optics. So truly the future is photonic. We know how this technology is developing. There isn't any doubt about that.

## Quote--Philip Morrison (MIT)

If there is life of a sufficiently complex kind, it could make itself known as we could do, almost, across the whole galaxy. And that was the basis of this proposition. And you have to ask, Can it be that the signals will cross the whole galaxy? Yes! Can there be enough energy in them? Yes! All those things are answered, it's possible, that's what we know, that's why it's not just speculation completely, but of course we don't know how probable the whole thing is. No! That's why we are trying to look. If we knew, we wouldn't have to look.

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10:28:07:00)

(Time Code

V.O.

SETI researchers anticipate, that extraterrestrial signals, which we could receive, would continue and repeat for many eons, to allow for the time it would take for a similar technology to develop, and to allow for the time it would take for a message to travel the vast distances between the stars.

Quote--Philip Morrison (MIT)

This is a time/depth problem and the signals would be very extended.

Quote--Robert Dixon (Ohio State University)

I would agree with Phil Morrison that, yes, if we wanted to do that, we would transmit a signal that lasted essentially forever. Let's imagine that we do receive a signal from some other civilization, and suppose that they are in our galactic backyard, maybe 1 000 light years away, which isn't very far. Well it took a thousand years for that signal to get here. Now if we are really ready to roll and we reply immediately, that's a thousand years to get back. And if they're really on the stick, that's another thousand years before the signal gets back

to us, so that's two thousand years before we know that they ever received our reply. This isn't exactly a snappy conversation. But, and so you say, well what good is all this? Oh come on we'll all be dead, it doesn't matter any longer. The important thing to remember here is we are not seeking a dialogue. We are seeking to know, are they there? We want to do a monologue. We simply want to listen to what they are saying. We can answer that question instantly, the first second we get the signal. Whether we ever reply or not is a totally different issue.

Quote--Philip Morrison (MIT)

So they are planning a long telephone call. Which is going to last thousands of years. Its not a person to person call. Its not a station to station call. Its a species to species call.

V.O.

It might be possible to understand the information contained in transmissions to us, especially if such transmissions are intentional.

Quote--Paul Horowitz--Harvard University

This is cryptography in reverse. This is the art of making an artful message whose structure reveals its content. It

contains a language lesson, and the means of symbols, to use as arithmetic or something to build up the meanings of the integers and plus signs, and equal and minus and division and all that...knowing full well, that whoever the folks are who received this will understand math at that level for sure, otherwise they're not in the radio communications business. And now it's simply a matter of conveying a whole set of symbols unambiguously.

### Quote--Philip Morrison (MIT)

That's exactly right! And therefore they have, for designing such a signal or message, they would use a science which I have somewhat jokingly called "Anti-Cryptography". Everybody knows that cryptography means you try to hide your message, they will use anti-cryptography. Which is another mathematical game--like cryptography. Trying to make the message stand out.. Now it's not easy. Just like cryptography. They will do, all they want to do is make us aware that it is definitely an artificial signal...not coming from some whirling star...that has nothing to do with intelligence; and once they do that, which they can easily do by many different means of putting structure into a signal, then we will be prepared to receive it for a good long time, and I'll bet you that the scholars will be able to decode that in no time at all, because it will be full of cues, full of rhyming, so to speak in the broad sense, full of methods that will enable us to understand the message.

### Quote--Ray Norris (Australian)

People often say, you know, well, if you get the signal, what are you going to say back to these people. And, the answer is, you don't actually. Two reasons: Firstly, it's just possible, it's very unlikely, but it's just possible that there are actually hostile aliens out there. The other thing about that is that, if we do get a signal, it's probably from a star which might be a hundred light years away, so it's taken 100 years for the signal to reach us. If we do decide to send a reply, it's going to take a hundred years for our reply to get back to them. So there is no rush about it. We can sit around for a few years thinking about what kind of reply we send. We don't have to rush into these things. And so for both those reasons, we don't send any replies. No attempt is made to reply until we've all had a good think about it.

### Quote--Michael Bisson (Archeological Anthropologist, McGill University)

It's really only in the last hundred years that humans have been sending out radio signals that could be detected in outer space. From an extraterrestrial standpoint, those signals would be the first evidence of intelligent life on Earth. Yet intelligent life has been around for a very long period of time prior to that, yet it would appear to have

started abruptly, to have started suddenly, and could of course conceivably disappear suddenly as well.

Quote-Jill Tarter (SETI Institute)

There's a spherical expanding wave going out from the Earth. There are almost 200 stars that would have had the ability to hear the first commercial television broadcast, which is Channel 2 in Chicago, and have been able to be motivated to respond to us and have that signal arrive back for us to detect. So there are already 200 stars, and it's growing every year, within our leakage horizon, that we could have turned on. So we listen to those, for sure!

Quote--Philip Morrison (MIT)

The main thing we want to find, is it authentic? That means, does it move like something out among the stars? Does its position in the sky, move, rise and set, you know, the way stars do. And that we could do very accurately. So nobody could fool us very much with that.

Quote-Jaymie Matthews, (University of British Columbia)

We are living in an era, when our view of the Universe expanded incredibly. And once again, mankind was shoved off the pedestal, from being, you know, from our vantage point of being a central part of the universe, to being part,

just one part of a universe of hundreds of billions of galaxies, at least as far as we can see, with telescopes.

Quote--Gerritt Verschuur (Radio Astronomer)

Are all the religious systems prepared to deal with this? The fact that this is not a unique place in the world? It was hard enough to accept the fact that the Earth was not the center of the solar system. Are we really ready? Are the majority of believers ready to accept that the universe was not created with humans in mind? That god did not create the universe in seven days for our benefit.

I've been studying interstellar neutral hydrogen for over 30 years. When I first started observing as a graduate student in England, and I used to listen to the noise coming out of our radio receivers, just in case there was a signal. But all the surveys made of the sky at 21 cm. have never revealed a narrow band signal that is obviously extraterrestrial. So then they argue that you have to look deeper, and more complex...and then I ask well, how long are you going to observe? Why are we doing these experiments really? I think the answer is because we are trying to understand ourselves, ultimately!

I said, this was a search for god, a technological search for god. The search for extraterrestrials, or ultimately, the way that it has been sold recently, is the technological search for god, in the sense of we're looking for answers

out there to our problems. Umm...whether people like it or not, I believe that technology and science have displaced god from its role. And now there are some people who are cashing in on that sort of, almost archetypal instinct for us to believe in something greater. But I think we'll have to transcend that if we want to survive on this planet, because we're going to have to solve our problems, not them! In fact if I was an extraterrestrial, I would say, I'm not making contact until they have solved their problems.

Quote--Ray Norris (Australian)

In a sense it comes down to belief, I suppose, in a way. There'll be some people who say, that it's so improbable that it just never happen, we were just very lucky on earth. I tend not to believe in luck in that sense, and so, to such an extent, if it happened on earth, I don't see why it can't happen somewhere else. But then again, I may be wrong, and I'm quite happy to accept that I may be wrong. That's why we're doing this!

Quote--Michael Bisson (Archeological Anthropologist, McGill University)

It is important for many people to believe in a superior being, to believe in god. And there is nothing in anthropology, for example, that belittles that. We think that's extremely important in many societies and many cultures, including our own.

The search for extraterrestrial intelligence has in many ways taken the part of a search for god today. There is no doubt about that. We find for example, many people who are fervent believers in UFO visitation place the characteristics or make the characteristics, of the visitors, god-like characteristics. The descriptions of extraterrestrials and their powers often parallel the descriptions of angels, or spirits or gods, in earlier times and in third world societies. Having been robbed of the traditional Judeo-Christian god by science, many people are reaching out for a superior, extraterrestrial intelligence to guide and control our actions.

Quote-Jaymie Matthews, (University of British Columbia)

It's not for me to say as an astronomer, but as just an average person, many people would like to believe that there is something beyond their existence, beyond their experience. Either something to aspire for, or somebody that is actually looking out for us?...in some sense that...some people are asking, is this all there is? You know, there must be something more! And you know, religion satisfies that in many respects, for some people science satisfies that...the mysteries associated with the more you know, the less you know, in a sense, because the more questions you're able to ask. And so perhaps that satisfies the same need.

Quote--Michael Bisson (Archeological Anthropologist, McGill University)

I think that if something we have something beamed directly to Earth, there is great potential danger. I think the SETI people are probably a little optimistic, a little too optimistic in their belief that contacts, intentional contacts with an extraterrestrial civilization, would be entirely benign. They may be intended to be benign, but unexpected consequences could flow from those that could be very serious.

Quote-Jaymie Matthews, (University of British Columbia)

If say, the astronomical community, you know, radio astronomers, the people involved in SETI were able to make an unambiguous detection, or contact with some kind of civilization, the effects would be profound because then, this belief would hit the upper levels of society. It would hit the academics and government and business and religion and churches and so on. And then that establishment would start to influence things going down to the more general public level.

Quote-Clive Goodall (SETI Philosopher, OSU)

I think that the impact, at least as far as some are concerned, is, seems to be under-estimated. I think that the impact of the discovery of ETI on human culture will be

very profound and that it will be felt quite rapidly indeed, within a generation or two. I think that the certain knowledge of the existence of alien civilizations will change human culture. Organized religious systems don't quite have the grip on the human consciousness that they used to do. And I think that the anthropocentric views, the most anthropocentric views of man's position in the cosmos, will be the ones that will suffer the most under the pressure.

Quote--Gerritt Verschuur (Radio Astronomer)

I think our species is at that point, that this is "Childhood's End" as Arthur C. Clarke called it, and I've forgotten what his book was about, I read it so long ago. But I see that as the big crisis that lies ahead. And the searching for extraterrestrials is part of this child-like belief that there is something out there that will enable us to continue in childhood, because, otherwise we're on our own. And I think deep down, that's the driving mechanism. It's a psychological need.

Quote--Mike M. Davis (Arecibo Observatory)

I think that SETI, the search for extraterrestrial intelligence, can have only one of two answers. We will either detect a signal or we will not. If we detect a signal, than we are not alone, and the future of mankind will go in one direction. If we, after centuries of work, find that we're effectively isolated, that we truly represent the only intelligent

species in our corner of the galaxy at least, and possibly in the universe; that may be an even more important result. That may be a result, that causes us to look inwards, and think more and more about how this one blue-green planet, circling a rather ordinary star, for the next several billion years, carries a rather important message.

Block 6: WHAT HAVE WE FOUND?  
10:41:47:00)

(Time code:

V.O.

What have we found? In 1973, observers at the Ohio State University discovered what is now known as the "WOW" signal.

Quote--Robert Dixon (Ohio State University)

The "WOW" signal, is regarded by many people as being perhaps, one of the best candidates, for a signal that might have come from some other civilization. We looked hundreds of times afterwards, in that same direction of space, at a wide variety of frequencies and we never found anything again.

Quote--Stuart Bowyer (UC Berkeley--SERENDIP search)

We're looking for a needle in a haystack, it may well be, that someone with a smaller, less effective search, just happens to sit down on the needle--and then knows it's there as a consequence.

Quote--Paul Horowitz--Harvard University

We've definitely received signals, and it's from intelligent life, a lot of it, but it's intelligent life on Earth.

### Quote--Seth Shostak (SETI Institute)

All of these things had to be checked out, and every single one that has been checked out, has either turned out to be very clearly local interference here on earth due to TV stations, or military radar, or whatever...or a signal that when you went back to look for it the next day, it was gone. And in that case, you can say, well gee, it might have been extraterrestrials, yes that's a possibility, but it might also be somebody's radio set that was turned on and then got turned off. All right, so that, unfortunately that's no detection. If it's not there when you go back, if you can't see it long enough to prove that it's coming from outside earth, it's not a detection.

### Quote--Gerritt Verschuur (Radio Astronomer)

I could say categorically, that there were no civilizations transmitting towards the earth, using radio telescopes like the one I was using, with the radars we had on earth.

### Voice-off: Quote--Stuart Bowyer (UC Berkeley--SERENDIP search)

I hope that someone during my lifetime, discovers extraterrestrial intelligence. It would be the most spectacular thing to happen to civilization. But I'm not at all guarantee-

ing it, or even overly optimistic that this will happen in my lifetime.

Voice-off: Quote--Ray Norris (Australian)

By doing this relatively simple experiment we actually have a way, maybe, of answering these questions. Clearly if we do detect another lifeform, than we know that, well, we're not alone. That probably means that life is an actually occurring process, and all the rest of it. With the technology we have now, it's the only way that we are going to answer that question in fact.

Voice-off: Quote-Jaymie Matthews, (University of British Columbia)

O.K....we're not at the center of the universe, but we are the only living, intelligent and thinking thing in the universe. And to be proven wrong, which I think probably will happen at some stage, will once again, just wipe out one more case of human ego.

Voice-off: Quote--Robert Dixon (Ohio State University)

The most important question is: Are we alone?

Voice-off: Quote--Jean Claude Pecker (France)

Est-ce que nous sommes seules, ou est-ce que nous sommes pas seules?

Voice-off: Quote-Philip Morrison (MIT)

We'll find out we're not alone. And that's an extremely important part of our general view of ourselves; our self-esteem, where we came from, how the world was made; if that happens, that will be there.

Voice-off: Quote--Gerritt Verschuur (Radio Astronomer)

It's far more frightening to think that we might be alone, in which case we would have to be responsible for our own destiny on this planet. And I think that is the most important thing that we must confront.

Voice-off: Quote-Stuart Kingsley-Optical SETI

We cannot be the only intelligent species in our galaxy. And we all have to assume that there are a large number of intelligent species alive at any instant in time, in our galaxy, in existence.

Voice-off: Quote--Robert Dixon (Ohio State University)

Most people have really very little concept of what goes on outside of the earth, or why it's important. Our civilization

needs to mature to the point where their universe now is the universe, not the Earth. That will cause a similar change in thinking and attitudes among people, that these internal conflicts we have among ourselves on earth are not that important, and we really have to get our act together and realize there are other things that we have to be doing here.

Voice-off: Quote--Gerritt Verschuur (Radio Astronomer)

I think we have to assume that we are the only ones until we have overwhelming evidence to the contrary. And that means taking responsibility for here and now, right here on the earth.

Voice-off: Quote-Arthur C. Clarke (Author)--becomes On-Camera

If however, after centuries of listening and looking, we still found no sign of extraterrestrial intelligence, we would be justified in assuming that we are alone in the universe. And that is the most awesome possibility of all. We are only now beginning to appreciate our duty towards planet Earth. That could be merely the prelude to far greater responsibilities. If we are indeed the sole heirs to the galaxy, we must also be its future guardians. Thank you and goodbye from Sri Lanka.

Music and credit roll.

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End

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