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This program is not science fiction.

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00:00:07,000 --> 00:00:18,000

It is a report on science's very real search today for the existence of life on other worlds.

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A search by microscope examining the smallest particles of matter in nature,

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by telescope viewing the largest objects in space, a probe into distant galaxies and star clusters,

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00:00:32,000 --> 00:00:37,000

looking with the enormous eyes of the optical telescopes,

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00:00:37,000 --> 00:00:44,000

and listening with the electronic ears of the radio telescope for signals from outer space.

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And eventually this search will be carried on by man himself through interplanetary travel.

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The elements that exist here on Earth and the chemistry of our world are the same as on the most distant star.

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If the atom, one of the smallest particles of matter, and the galaxy, the largest mass in the visible universe,

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are governed by the same physical laws, then life might well have evolved from the hydrogen atom in space.

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It has continued to the development of the human brain and may have repeated a similar process

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00:01:29,000 --> 00:01:35,000

unnumbered times in the hundreds of billions of worlds abounding in the cosmos,

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00:01:35,000 --> 00:01:42,000

making the probability great that intelligent creatures beside Earthman, people the universe.

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00:01:42,000 --> 00:02:01,000

On just the beginning of this search for life on other planets, the American taxpayer is spending \$2 billion in probes of Mars alone.

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Nobel Prize winning scientist Dr. Harold Urie says of the cost of the space program,

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00:02:08,000 --> 00:02:18,000

some people say that we can't afford this space program, but I say the Greeks couldn't afford the popular,

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00:02:18,000 --> 00:02:27,000

and the Egyptians couldn't afford the pyramids, and middle ages couldn't afford the great cathedral of Europe.

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00:02:27,000 --> 00:02:35,000

You could have always spent this money, as they say, for something else, but you know we can't afford this space program.

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00:02:35,000 --> 00:02:41,000

They wouldn't have proved that life existed on Mars or ever did exist on Mars.

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00:02:41,000 --> 00:02:47,000

In my opinion it would be one of the most horrendous discoveries of this century.

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00:03:05,000 --> 00:03:12,000

We are not alone.

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00:03:12,000 --> 00:03:20,000

Is brought to you by T. F. Goodrich, the name that sells quality,

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00:03:20,000 --> 00:03:31,000

entire, chemical, plastic, footwear, product, or whole industry and aviation.

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00:03:31,000 --> 00:03:36,000

T. F. Goodrich.

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00:03:36,000 --> 00:03:52,000

Phyllis! Phyllis! Isn't this the day you were going to buy new tires?

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00:03:52,000 --> 00:04:01,000

Phyllis!

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00:04:01,000 --> 00:04:06,000

Why is this tire buying day always seems like the morning after?

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00:04:06,000 --> 00:04:12,000

All the waiting around, the endless confusion about the right tire to buy,

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00:04:12,000 --> 00:04:17,000

as the biggest blow of all, the money it's got.

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00:04:17,000 --> 00:04:25,000

Now, the F. Goodrich doesn't give away free tires, but if tire buying day drags you down,

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00:04:25,000 --> 00:04:29,000

we'll wake you up with a brand new way of doing business.

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00:04:29,000 --> 00:04:34,000

No confusing tire talk, just straight talk.

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00:04:34,000 --> 00:04:40,000

We've got nothing apart from these, except this, a special tire value calculator

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00:04:40,000 --> 00:04:44,000

that'll find you the right tire at the right price.

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00:04:44,000 --> 00:04:50,000

The lowest price, the F. Goodrich's tire for the way you drive.

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00:04:50,000 --> 00:04:54,000

Well, you may be so happy at the money, F. Goodrich, you can take it.

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00:04:54,000 --> 00:04:59,000

You want to bring the money to life.

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00:04:59,000 --> 00:05:03,000

The F. Goodrich.

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00:05:03,000 --> 00:05:07,000

The straight talk tire people.

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00:05:07,000 --> 00:05:11,000

Here now, your narrator, Edward P. Morgan.

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00:05:11,000 --> 00:05:18,000

The fixed stars in our firmament have, through the ages, given man a feeling of security.

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00:05:18,000 --> 00:05:24,000

We have always wanted to believe that we have our feet firmly planted on a solid earth

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00:05:24,000 --> 00:05:27,000

with a protective heaven above.

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00:05:27,000 --> 00:05:32,000

But science has continually whittled away at this idea.

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00:05:32,000 --> 00:05:36,000

For some time, we have known that our earth, in reality,

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00:05:36,000 --> 00:05:41,000

is only a changing ball of rock and soil, water and air,

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00:05:41,000 --> 00:05:48,000

held together by a tenuous gravity, spinning and whirling in space around our sun.

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00:05:48,000 --> 00:05:52,000

And even as a planet, we are not very special,

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00:05:52,000 --> 00:05:57,000

being only one of nine in orbit around the mother sun.

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00:05:57,000 --> 00:06:03,000

Our sun itself, a star and only a small middle-aged one as stars go,

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00:06:03,000 --> 00:06:08,000

is a kind of lost child on the outskirts of its galaxy,

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00:06:08,000 --> 00:06:13,000

which we can see in the sky as the Milky Way.

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00:06:13,000 --> 00:06:18,000

It is only one of hundreds of billions of stars in our galaxy,

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00:06:18,000 --> 00:06:22,000

which is only one of hundreds of billions of galaxies,

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00:06:22,000 --> 00:06:26,000

all of which are in constant motion.

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00:06:26,000 --> 00:06:32,000

If we are not unchanging in space, neither are we eternal in time.

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Our sun, five billion years old, will, in another five billion years or so,

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00:06:39,000 --> 00:06:45,000

burn itself out and in doing so, expand and absorb all its planets

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00:06:45,000 --> 00:06:49,000

as countless other stars have done before.

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00:06:49,000 --> 00:06:54,000

Our sun's only real distinction that we know of thus far

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is that it has people whirling around it.

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The question is, might this have happened elsewhere in the universe

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or are we alone?

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It was recently discovered that stars and gases in space

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emit natural radio waves, which can be picked up and amplified by radio telescopes.

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The John Groll Bank radio telescope in England,

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the Green Bank radio telescope in West Virginia,

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and this one at RSC Bow in Puerto Rico, can be called man's largest ears.

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The bowl of the telescope, a thousand feet across,

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made of half-inch wire mesh, acts as a reflector,

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able to focus even extremely weak radio signals from space.

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In searching for life on other worlds,

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the theory is that intelligent civilizations in the universe

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00:07:56,000 --> 00:08:02,000

would use natural radio frequencies as a means of communicating with one another.

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By listening to signals from interstellar space,

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00:08:06,000 --> 00:08:12,000

intelligent codes could be distinguished from the patterns of natural radio waves.

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Radio astronomer of Cornell University and director of the RSC Bow Ionospheric Observatory,

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Dr. Frank Drake, conducted Project OSMA,

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the first search for intelligent life in space by radio telescope.

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Ten years ago it was suggested by Professors Morrison and Keconi at Cornell

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that there might be other civilizations in space attempting to send us messages.

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We use very sensitive and ingenious detecting devices

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to search for intelligent signals amongst static which comes to us from the interstellar space.

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By 1960 we made a short search for such signals.

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With existing telescopes such as the 85-foot telescope at Greenbank,

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using the 21-centimeter line frequency,

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there was time in fact to look at only two stars,

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the ones we picked of course were the two nearest stars which are like the sun.

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00:09:13,000 --> 00:09:18,000

The star is Tarsidi and the constellation of Cetus-Bewale

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00:09:18,000 --> 00:09:22,000

and epsilon-arythmi in the constellation of Arithmus.

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We found no evidence for extraterrestrial intelligence signals.

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But now we must realize that this was an extremely limited search

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and the fact that we found nothing should not discourage us

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or cause us to think that any future search is going to fail.

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One can estimate that a search which has a good chance of succeeding

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will take perhaps 30 years.

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But if one is going to make a realistic search, this is what is required

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and anything less than this is really not worth the effort because the chance of success is so small.

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Surely the results of the construction of extraterrestrial signals

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are going to be one of the most exciting things that ever happened.

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While some scientists in the discipline of astronomy

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press the search for intelligent life in the distant stellar regions

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beyond our solar system with the big ears and eyes of the radio and optical telescopes,

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00:10:18,000 --> 00:10:22,000

some, perhaps more down-to-earth investigators,

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00:10:22,000 --> 00:10:27,000

feel they would be making an historic discovery by a less ambitious find.

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These men are called exobiologists.

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00:10:31,000 --> 00:10:35,000

They are looking for microbiologic forms of life,

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lesser than intelligent man, and perhaps higher than the lowly virus,

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something between the organic molecule and the bacteria that might have evolved outside the Earth.

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The most likely candidates for such a search are the planets Mars and Venus,

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Earth's nearest neighbors in the solar system.

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The Mariner spacecraft has been our principal vehicle for unmanned planetary exploration.

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The planetary program is carried out by the Jet Propulsion Laboratory,

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operated by the California Institute of Technology,

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for the National Aeronautics and Space Administration.

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Dr. William H. Pickering is the director.

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Mars and Venus were both of the closest planets to the Earth.

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In some ways we know more about Mars than we do about Venus,

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because Venus is always covered with clouds.

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We do not believe we have ever seen down to the surface of Venus.

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That is with the telescope from the Earth.

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Whereas in the case of Mars, we usually see the surface of Mars.

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And Mars, on the other hand, is a planet which astronomers for many years have compared with the Earth.

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The size is a little smaller than the Earth.

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It happens that the day on Mars is almost exactly the same length as the day on the Earth.

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The year is about twice as long as the year on the Earth.

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The seasons change in the same manner that they do on the Earth.

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In other words, the spin axis of Mars is tilted,

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not the same way that the axis of the Earth is tilted.

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All of this has led astronomers to compare Mars with the Earth in many ways.

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And of course one comparison which one must always make is

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what about life? Is Mars a suitable planet for life as we know it?

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It is feasible.

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And what we know about life on Earth, life could exist on Mars.

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Dr. Richard S. Young, Chief of the Exobiology Division of NASA's Ames Research Center.

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Life on Earth probably arose as a result of a very natural sequence of events.

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We think we know what the primitive atmosphere of the Earth was like before there was any life on the Earth.

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We think we know what types of energies were available on the primitive Earth before there was any life on Earth.

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00:13:06,000 --> 00:13:11,000

The biological evolution took over and the atmosphere was changed rather drastically

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00:13:11,000 --> 00:13:14,000

until we have the sort of atmosphere we have on the Earth today

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and we have the tremendous diversity of life that we have today.

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A subsequent result over the next, say, 3 billion years of biological evolution.

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In fact, then, just about any primitive planet during its early history

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should have undergone a similar sequence of events.

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They were formed obeying the same laws of physics and chemistry.

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They should have had the same type of primitive atmosphere.

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They probably underwent chemical evolution much the same way the Earth did.

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Now, what we need is proof of that.

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If we can find life on one planet, say Mars,

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00:13:51,000 --> 00:13:56,000

then it is very probable that elsewhere within our own galaxy

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00:13:56,000 --> 00:14:02,000

there must certainly be planets comparable to Earth with life forms comparable to Earth.

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The optical telescope has been the principal tool of astronomers

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for studying the stars and the planets from the days of Galileo centuries ago.

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The 200-inch mirror in the Palomar Observatory Telescope in California

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can be called man's largest eye.

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It can bring into view the farthest observable objects in the universe,

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called quasars, points of light believed to be billions of light years away

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00:14:34,000 --> 00:14:38,000

and moving away from us at incredible speeds.

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Another kind of telescope is the 26-inch refractor or direct-view telescope

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like this one at the United States Naval Observatory in Washington, D.C.

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To find planets comparable to Earth revolving around stars comparable to our sun,

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Dr. Kai Strand, scientific director of the Observatory

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and his former colleague Dr. Peter Vandekamp of Swarthmore College

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used a telescope of this type.

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00:15:11,000 --> 00:15:16,000

They wanted to verify the argument that planets are abundant in the universe.

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In 1963, Vandekamp announced the discovery of a planet orbiting a neighboring star,

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00:15:23,000 --> 00:15:28,000

the first planet ever to be detected beyond our solar system,

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00:15:28,000 --> 00:15:32,000

although it has never been directly seen.

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What does that mean by seen?

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00:15:34,000 --> 00:15:40,000

Harvard astronomer Carl Sagan explains how the existence of this planet was deduced.

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The second nearest star system after the sun is called Barnard's star

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named after an American astronomer, E.E. Barnard.

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And the motion of this star, of course, the star is not a more or less uniform line

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00:15:58,000 --> 00:16:03,000

on the background stars as you might expect when it oscillates.

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00:16:03,000 --> 00:16:08,000

And the weirdly-path is due to the presence of a dark companion.

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00:16:08,000 --> 00:16:13,000

We don't see the dark companion, but we can quite reliably induce its presence

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00:16:13,000 --> 00:16:17,000

from the moving motion of this star.

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Let's suppose this is Jupiter and this is the sun,

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00:16:20,000 --> 00:16:24,000

and the two of them are moving, of course, to a space together.

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00:16:24,000 --> 00:16:27,000

However, Jupiter is also going around the sun.

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00:16:27,000 --> 00:16:32,000

Jupiter is on this side of the sun, its gravitational attraction moves a little bit that way.

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00:16:32,000 --> 00:16:37,000

What is on the other side of the sun? It moves a little bit that way.

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00:16:37,000 --> 00:16:44,000

And so, as the sun goes from space, it has, in addition to its ordinary motion that way,

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00:16:44,000 --> 00:16:50,000

it has a fan up and down wiggle due to the motion of the invisible Jupiter.

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00:16:50,000 --> 00:16:54,000

And so the wiggle tells you the presence of Jupiter, and not only that,

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00:16:54,000 --> 00:16:59,000

it tells you its mass and it tells you how far away it is.

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00:16:59,000 --> 00:17:05,000

If the existence of planetary systems around stars other than our own sun

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00:17:05,000 --> 00:17:09,000

is a scientifically established fact, and if, as we know,

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00:17:09,000 --> 00:17:14,000

there are hundreds of billions of such suns in our own galaxy alone,

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00:17:14,000 --> 00:17:20,000

some leading astronomers dedicated to the idea that life does exist elsewhere

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00:17:20,000 --> 00:17:27,000

have calculated the possible number of stars whose energy might support life.

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Astronomer Dr. Harlow Shatley, director emeritus of Harvard College Observatory,

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00:17:33,000 --> 00:17:39,000

who first measured the size of our galaxy, now retired to his New Hampshire farm,

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00:17:39,000 --> 00:17:46,000

discusses cosmic matters with two young friends, Georgia and Emily Huffley.

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00:17:46,000 --> 00:17:48,000

Hi, Star-Lady.

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00:17:48,000 --> 00:17:51,000

The whole sky, how many stars are there?

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00:17:51,000 --> 00:17:58,000

You can see a thousand stars, and you go out some here, dark night, a thousand stars,

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00:17:58,000 --> 00:18:01,000

make a die star as we call them, but if we put a telescope into action,

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00:18:01,000 --> 00:18:05,000

we get deeper and deeper into space, and the further out we go, Emily,

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00:18:05,000 --> 00:18:07,000

the more stars we find.

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00:18:07,000 --> 00:18:10,000

And so now, how many stars are there?

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00:18:10,000 --> 00:18:17,000

Well, I've measured these galaxies and these stars, and these shooting stars and so forth,

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00:18:17,000 --> 00:18:19,000

and you know what I find out?

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00:18:19,000 --> 00:18:22,000

That there are just billions of these galaxies.

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00:18:22,000 --> 00:18:25,000

Now, billions, you know what the billion is, it's a thousand billion.

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00:18:25,000 --> 00:18:31,000

Well, there are more than a thousand million of these galaxies in the sky,

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00:18:31,000 --> 00:18:36,000

and each galaxy has more than ten thousand million stars, and so is just lots of stars in the sky.

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00:18:36,000 --> 00:18:39,000

I'll give you the number of future I remember.

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00:18:39,000 --> 00:18:44,000

The number of stars is more than a hundred thousand million billion.

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00:18:44,000 --> 00:18:48,000

Stars are not for everybody, see if you want some stars, you have a lot of them.

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00:18:48,000 --> 00:18:51,000

I don't know where is anybody living on those stars.

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00:18:51,000 --> 00:18:55,000

I'm not on the stars, you can't live on the stars, you can't live on the sun.

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00:18:55,000 --> 00:18:57,000

Oh, a planet.

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00:18:57,000 --> 00:18:59,000

Yes, it's too hot, that's it.

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00:18:59,000 --> 00:19:01,000

That's too hot.

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00:19:01,000 --> 00:19:06,000

But planets, yes you can live on it, that is here on this planet we can.

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00:19:06,000 --> 00:19:10,000

Do you know where we have the planet, where we might have to fly a life?

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00:19:10,000 --> 00:19:13,000

No, you have to hear Mars.

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00:19:13,000 --> 00:19:16,000

The planet Mars, that might have some life on it.

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00:19:16,000 --> 00:19:20,000

It might have, we'll have to give more and more observations, and then we'll come out.

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00:19:20,000 --> 00:19:28,000

My guess is that there are more than a hundred million planets that have living things on them.

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00:19:28,000 --> 00:19:32,000

By living, I mean like trees and grass and people of that kind.

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00:19:32,000 --> 00:19:36,000

I think at least that many, and I'm a very conservative person.

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00:19:36,000 --> 00:19:41,000

Like how these wheelshapes are known, it's flattened like this, but has a big center,

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00:19:41,000 --> 00:19:45,000

and it has that hundred thousand million stars, it's got it all the way through it.

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00:19:45,000 --> 00:19:49,000

It's rotating too, you've measured that, it's turning around.

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00:19:49,000 --> 00:19:51,000

It's a long time it's turning around.

228

00:19:51,000 --> 00:19:59,000

I'll tell you how long, it'll take about two hundred million years to make one complete turn around in our galaxy.

229

00:19:59,000 --> 00:20:01,000

From where we are.

230

00:20:01,000 --> 00:20:03,000

Any other questions?

231

00:20:03,000 --> 00:20:05,000

How are the planets formed?

232

00:20:05,000 --> 00:20:07,000

Oh, how are planets formed?

233

00:20:07,000 --> 00:20:09,000

Oh, that's a hard job.

234

00:20:09,000 --> 00:20:18,000

But I'll tell you, we think that once before, long ago, long, long ago there's a whole lot of dust and gas in space.

235

00:20:18,000 --> 00:20:23,000

And it contracted, it came together, and it's harder and harder, it came together,

236

00:20:23,000 --> 00:20:28,000

and it left off some chunks that went floating around, and those were the things that became planets.

237

00:20:28,000 --> 00:20:34,000

So we had the Sun, you see, built out of a shrinking nebula, we call it.

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00:20:34,000 --> 00:20:39,000

Other than shrinking nebula is Sun, and it threw off these particular little chunks,

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00:20:39,000 --> 00:20:45,000

little compared with the Sun, and those little chunks developed into being the planets.

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00:20:45,000 --> 00:20:55,000

So we have the Earth, once was gaseous nebulosity, we call it, it once was gas, and it shrunk down, and now it's just hard.

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00:20:55,000 --> 00:20:57,000

See how hard this is?

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00:20:57,000 --> 00:20:59,000

We are not alone.

243

00:20:59,000 --> 00:21:05,000

We'll continue with science's search for life on Mars, and the exploration of life's origin on Earth,

244

00:21:05,000 --> 00:21:09,000

after this message from the B.F. Goodrich Company.

245

00:21:10,000 --> 00:21:29,000

If you have little feet, big feet, old feet, cold feet, casting feet, blasting feet,

246

00:21:30,000 --> 00:21:41,000

plastic feet, roll plastic feet, splashing feet, B.F. Goodrich is always coming up with innovations in footwear,

247

00:21:41,000 --> 00:21:47,000

innovations like the posture foundation wedge we build into the heels of sneakers,

248

00:21:47,000 --> 00:21:53,000

to take the strain off foot and leg muscles, innovations in cold weather boots,

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00:21:53,000 --> 00:22:01,000

insulated to keep feet warm even at 25 below zero, innovations to protect women's clothes,

250

00:22:01,000 --> 00:22:05,000

and all kinds of fashion footwear.

251

00:22:05,000 --> 00:22:07,000

We make just the good fun of it.

252

00:22:23,000 --> 00:22:41,000

All from B.F. Goodrich, a company known for being pretty fat on its feet.

253

00:22:41,000 --> 00:22:46,000

You're again your narrator, Edward P. Morgan.

254

00:22:46,000 --> 00:22:55,000

If you were riding the nose cone of a rocket to the moon, this is what you would see as you approached the lunar surface for a landing.

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00:22:55,000 --> 00:23:07,000

These pictures were made by television cameras in Ranger 9, the unmanned American picture taking expedition to the moon in March of 1965.

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00:23:07,000 --> 00:23:15,000

Since then, thousands of spectacular close-up pictures of the moon's surface have been returned by Surveyor 1,

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00:23:15,000 --> 00:23:20,000

which soft landed on the moon in June of 1966.

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00:23:20,000 --> 00:23:29,000

Pictures from the probe of lunar orbiter in August of 1966 showed our planet as seen from the vicinity of the moon.

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00:23:30,000 --> 00:23:37,000

This representation of the lunar landscape shows us what a man might see from the moon,

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00:23:37,000 --> 00:23:43,000

a bright sun in a sky black as night due to the lack of light diffusion by an atmosphere,

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00:23:43,000 --> 00:23:51,000

and the earth visible in the lunar night hanging in its black sky like an oversized moon itself.

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00:23:51,000 --> 00:23:57,000

Surveyor 1 and lunar orbiter returned much valuable information,

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00:23:57,000 --> 00:24:07,000

and they have also shown us what we have known the moon to be, a body without atmosphere, without water, without life.

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00:24:07,000 --> 00:24:15,000

Not unlike the moon in some aspects is Earth's neighbor in the solar system, the planet Mars.

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00:24:15,000 --> 00:24:24,000

When in July of 1965, the Mariner 4 spacecraft completed a successful Mars flyby

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00:24:24,000 --> 00:24:34,000

after a journey of 8 months and 325 million miles passing within 6,500 miles of the planet,

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00:24:34,000 --> 00:24:44,000

21 pictures of the Martian surface were returned to Earth, including one of the most remarkable scientific photographs of this age.

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00:24:44,000 --> 00:24:58,000

Mariner's 11th picture of Mars. Many scientists felt that this picture settled once and for all the century-long controversy over Martian canals.

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00:24:58,000 --> 00:25:11,000

In 1877, the Italian astronomer Giovanni Scaparelli claimed to have seen canals which he thought could be evidence for intelligent life on Mars.

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00:25:11,000 --> 00:25:19,000

As late as 1908, the American astronomer Percival Lowell confirmed the sightings.

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00:25:19,000 --> 00:25:28,000

The spacecraft Mariner was too far away in its flyby to be able to show decisively what exists on the Martian surface,

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00:25:28,000 --> 00:25:37,000

but most scientists agree that if life does exist there, it will not be intelligent but of a very low order.

273

00:25:37,000 --> 00:25:44,000

Of course, the earliest astronomers saw canals and saw a lot of other things, but Dr. Richard Deon was Ames Research Center.

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00:25:44,000 --> 00:25:51,000

We no longer think canals really exist on Mars. We think they're primarily optical illusions,

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00:25:51,000 --> 00:26:01,000

and they're not something that the Martians constructed to transport water from the pole to the equator and keep the desert wet and all that sort of thing.

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00:26:01,000 --> 00:26:09,000

Mars has, although it's a harsh environment by biological standards, Mars has an atmosphere,

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00:26:09,000 --> 00:26:14,000

but it has a very rare atmosphere. The smaller planet has a lower gravitational field,

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00:26:14,000 --> 00:26:24,000

and its atmosphere is probably something like 100 or perhaps even closer to 1,000 of the total pressure on the surface of the Earth.

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00:26:24,000 --> 00:26:32,000

It also contains water. Life can't exist without water, but the fact that Mars has water is terribly significant.

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00:26:32,000 --> 00:26:38,000

Now, unfortunately, from a biological point of view, the amount of water in the atmosphere of Mars is very slight.

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00:26:38,000 --> 00:26:44,000

It's about 1 in 1,000 for the amount that one would detect in the Earth's atmosphere with a similar observation.

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00:26:44,000 --> 00:26:50,000

There are other features of Mars that we're reasonably familiar with. Astronomers have been observing it for something approaching 100 years now,

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00:26:50,000 --> 00:26:58,000

and they've known that there are light areas and there are dark areas. The dark areas are assumed to be, at least by the early astronomers,

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00:26:58,000 --> 00:27:04,000

were assumed to be vegetation. The light areas were assumed to be desert.

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00:27:04,000 --> 00:27:09,000

There are also pole caps on Mars, which have been shown to be water.

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00:27:09,000 --> 00:27:17,000

However, although they're pretty extensive, the total amount of water in these pole caps is very slight, probably nothing more than a layer of frost.

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00:27:18,000 --> 00:27:24,000

However, these pole caps do recede seasonally. In the spring, the pole cap recedes.

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00:27:24,000 --> 00:27:34,000

At the same time, the pole cap is receding or disappearing, the dark areas are getting darker, implying, at least to the early astronomers,

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00:27:34,000 --> 00:27:45,000

that, well, water is becoming available now from the pole caps and the vegetation in the dark areas is literally inhaling the water and disforshing during the spring.

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00:27:45,000 --> 00:27:54,000

We really simply don't know enough about the intimate detail of the surface of Mars to critically analyze any of these visual phenomena,

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00:27:54,000 --> 00:27:57,000

or we can do a speculate about them.

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00:27:57,000 --> 00:28:05,000

And so far, the best of our speculations has failed to demonstrate that life on Mars must be ruled out.

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00:28:05,000 --> 00:28:14,000

In fact, the best of what we know still leaves well within the range of possibility the idea that life may well exist on Mars,

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00:28:14,000 --> 00:28:18,000

and would be well worth the search, if you will.

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00:28:18,000 --> 00:28:24,000

I feel that in the 6th or extra direction, a live of the three approaches, one, first to the one that you named,

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00:28:24,000 --> 00:28:29,000

to go to Mars and see whether there's life there.

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00:28:29,000 --> 00:28:37,000

The other one, which Frank Drake has sometimes tried out, listening to radio communication from other species.

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00:28:37,000 --> 00:28:43,000

The third one is the one that we are working on here, retracing the part by which life appeared.

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00:28:44,000 --> 00:28:52,000

Dr. Cyril Panam Varuma, chemist at Ames Research Center, is searching for answers to extraterrestrial life

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00:28:52,000 --> 00:28:56,000

by studying the chemical evolution of life on Earth.

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00:28:56,000 --> 00:29:04,000

From the information we have today, we know that the Earth is one and a half billion years old.

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00:29:04,000 --> 00:29:07,000

Let me put that down as one of our starting points.

303

00:29:08,000 --> 00:29:13,000

4.7 billion years is the exact date given.

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00:29:13,000 --> 00:29:22,000

Life as we know it, or the first ever time in life, in the fossil record, is about 3 billion.

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00:29:22,000 --> 00:29:27,000

Now, biology or the Darwinian theory takes over from here.

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00:29:27,000 --> 00:29:32,000

You'll find the life evolving into a variety of organisms.

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00:29:33,000 --> 00:29:44,000

We know that mammals are around 160 million, and then so on, become the evolution of man.

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00:29:44,000 --> 00:29:49,000

Finally, what went on before this?

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00:29:49,000 --> 00:29:57,000

From the time the Earth was formed, or even further back, from the time the solar system was formed?

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00:29:58,000 --> 00:30:02,000

This can be described as the chemical evolution.

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00:30:02,000 --> 00:30:07,000

We know that the solar system is about 5 billion.

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00:30:07,000 --> 00:30:17,000

And then, if you go backwards in time, you'll come to the origin of the universe, which is greater than 10 billion.

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00:30:17,000 --> 00:30:23,000

That's 13, so that's 20, but we know that it's definitely more than 10 billion years.

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00:30:23,000 --> 00:30:27,000

Now, we have some starting points to go on.

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00:30:27,000 --> 00:30:31,000

We know that 90% of the universe is hydrogen.

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00:30:31,000 --> 00:30:38,000

So, the hydrogen, then, by the years of reaction, that you're in the birth of a star,

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00:30:38,000 --> 00:30:44,000

gave rise to the other element of the periodic table, carbon, nitrogen, oxygen, and so on.

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00:30:44,000 --> 00:30:50,000

In other words, you would have thermonuclear reactions taking place within a star.

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00:30:51,000 --> 00:30:58,000

Well, the idea of chemical evolution, then, is the gradual evolution of hydrogen,

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00:30:58,000 --> 00:31:04,000

the initial matter of the universe, to fuel the elements of the periodic table,

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00:31:04,000 --> 00:31:13,000

to fuel the constituents of the early Earth atmosphere, the methane, ammonia, and water.

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00:31:13,000 --> 00:31:18,000

Simple chemistry tells us that the carbon will be in the normal methane.

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00:31:18,000 --> 00:31:24,000

The nitrogen will be in the form of ammonia, and the oxygen will be in the form of water.

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00:31:24,000 --> 00:31:30,000

So, the early atmosphere of the planet would have been made up of methane, ammonia, and water.

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00:31:30,000 --> 00:31:38,000

From here on, we visualize what happened, the atmosphere being asked to be formed by lightning,

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00:31:38,000 --> 00:31:44,000

or water life from the sun, or heat, producing organic molecules,

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00:31:44,000 --> 00:31:49,000

until the early oceans became something like a prime audio tube.

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00:31:49,000 --> 00:31:54,000

So, from this primitive atmosphere, we are hoping to go to this stage

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00:31:54,000 --> 00:32:00,000

when the two molecules that are important to doing things, the nucleic acid and the protein,

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00:32:00,000 --> 00:32:05,000

will form first molecules capable of replication.

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00:32:05,000 --> 00:32:11,000

So, the stepwise process appears to be a beautiful plan

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00:32:11,000 --> 00:32:17,000

going all the way from the hydrogen atom to the time you get to the intelligent human being.

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00:32:17,000 --> 00:32:23,000

So, it is a coherent story. It is something that appears to be the most logical.

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00:32:23,000 --> 00:32:26,000

It is rational.

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00:32:26,000 --> 00:32:34,000

So, the discovery of life on Mars to people studying the argument of life will be the greatest thing.

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00:32:34,000 --> 00:32:39,000

As a matter of fact, in my mind, the search for extraterrestrial life is only part of it,

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00:32:39,000 --> 00:32:44,000

the study of the origin of life. This is the scientifically broader question,

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00:32:44,000 --> 00:32:51,000

the origin of life in the universe, and bring to Mars the unique opportunity that we have,

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00:32:51,000 --> 00:32:58,000

perhaps the one only opportunity that we have of showing this great life on Mars,

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00:32:58,000 --> 00:33:04,000

and especially if we can show that it is origin of different from the origin of life on Earth,

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00:33:04,000 --> 00:33:12,000

or it is independent, then we will have a very hard thing on the description of uniqueness in life.

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00:33:12,000 --> 00:33:18,000

New York Times Science Editor, Walter Sullivan, author of the book on which this program is based,

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00:33:18,000 --> 00:33:24,000

raised this question with Nobel Prize-winning chemist Dr. Harold Urey.

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00:33:24,000 --> 00:33:28,000

Dr. Urey, a lot of the discussion on the origin of life was down to the question

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00:33:28,000 --> 00:33:32,000

whether there are other worlds, other solar systems.

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00:33:32,000 --> 00:33:39,000

You believe there are. It is my belief that if you have conditions such as we have on the Earth,

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00:33:39,000 --> 00:33:46,000

life will spontaneously appear. I don't know how long it takes, maybe a million years, maybe a billion years,

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00:33:46,000 --> 00:33:51,000

but sometimes life as we know it will appear.

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00:33:51,000 --> 00:33:58,000

Every indication is that the properties of the elements and the most distant stars that we look at

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00:33:58,000 --> 00:34:04,000

are the same as those that we have on Earth.

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00:34:04,000 --> 00:34:10,000

The physical universe is the same everywhere. That is our conclusion.

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00:34:10,000 --> 00:34:16,000

The Lord is the same as far as we go, as we understand it.

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00:34:16,000 --> 00:34:23,000

And this of course means that the chemistry of carbon, nitrogen, oxygen, hydrogen,

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00:34:23,000 --> 00:34:30,000

the four abundant elements in living things, the chemical properties of these elements

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00:34:30,000 --> 00:34:35,000

will be the same wherever we are in the universe.

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00:34:35,000 --> 00:34:45,000

And therefore we expect that they will have the capacity to revolve into what we would call living organisms,

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00:34:45,000 --> 00:34:50,000

no matter where we go. Now, we don't expect that they will be the same.

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00:34:50,000 --> 00:34:57,000

Dr. Philip Morrison is Professor of Physics at the Massachusetts Institute of Technology.

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00:34:57,000 --> 00:35:04,000

The evolution of complex beings, certainly of man and of any other word of the word of the word,

360

00:35:04,000 --> 00:35:08,000

is a very chancey thing. You can show that there were many, many choices.

361

00:35:08,000 --> 00:35:11,000

They had to be made just to choose. This ends on that and that.

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00:35:11,000 --> 00:35:14,000

And if it hadn't been that way, it wouldn't have been this way.

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00:35:14,000 --> 00:35:19,000

So for that point of view, you look at the place you've come to, you say, well, it was impossible to get here.

364

00:35:19,000 --> 00:35:24,000

And they say, therefore, it will never happen again in the same way. That's the general view.

365

00:35:24,000 --> 00:35:32,000

I mean, I had to look at the, I guess, right? But if you look at the results, it's quite different.

366

00:35:32,000 --> 00:35:42,000

If I go down the museum across the park here, I can see very beautiful skeletons, impressions, soft-mole impressions,

367

00:35:42,000 --> 00:35:46,000

and even impressions of the fleshy part in the soft stone.

368

00:35:46,000 --> 00:35:49,000

From a beast, I'd forgotten his name.

369

00:35:49,000 --> 00:35:51,000

That's your son.

370

00:35:51,000 --> 00:35:52,000

Yeah.

371

00:35:52,000 --> 00:35:55,000

You're playing that's right. All right.

372

00:35:55,000 --> 00:36:02,000

Who is really reptile and was extinct some hundred and millions of years.

373

00:36:02,000 --> 00:36:05,000

Who swam in the ocean in an apological way as a marine reptile.

374

00:36:05,000 --> 00:36:13,000

And he looks for all the world like a large torpedo-shaped object about eight or ten feet long.

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00:36:13,000 --> 00:36:21,000

Now then, you look at a tuna, a big tuna. He looks very similar.

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00:36:21,000 --> 00:36:28,000

Not at all a reptile, but a fish. Quite a difference and really around more primitive objects.

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00:36:28,000 --> 00:36:37,000

And finally, you may look at a dolphin with a mammal whose ancestors were in land, land, air-breathing, flowers, like ourselves.

378

00:36:37,000 --> 00:36:40,000

They themselves still breathe every two or three minutes comes up.

379

00:36:40,000 --> 00:36:48,000

But all of these beasts were beautifully adapted by flection, by many, many, many generations of careful-fetched, all kinds of genes,

380

00:36:48,000 --> 00:36:55,000

to be able to swim very well, make a living in the scale of eight to ten feet long by catching fat, fishing the sea.

381

00:36:55,000 --> 00:37:01,000

There are many, many paths you get to Central Park, but when you get there, you arrive at the same place.

382

00:37:01,000 --> 00:37:07,000

If you look at any path that you've taken, every turn, every street, you certainly can't predict where I start out exactly how I'll go.

383

00:37:07,000 --> 00:37:09,000

But I'm pretty sure what the end is going to be.

384

00:37:09,000 --> 00:37:12,000

Because that end is not a statuette and I persist when I'm there.

385

00:37:12,000 --> 00:37:16,000

Because there's any chance for a form to evolve on personal fire.

386

00:37:16,000 --> 00:37:19,000

I'm a very complex rich form of life. Let's go back.

387

00:37:19,000 --> 00:37:28,000

Now, if this is true, if it seems reasonable to suppose that there's intelligence on many other planets, what will these photos look like?

388

00:37:28,000 --> 00:37:43,000

I don't know. I think that's more like us than one might believe, but less like us than the common run of what we would regard as human.

389

00:37:43,000 --> 00:37:54,000

In other words, I don't think there'll be 50-foot skeletal figures with long, towering, with long, wirey arms.

390

00:37:54,000 --> 00:37:57,000

I don't think there'll be round spheres of four inches diameter.

391

00:37:57,000 --> 00:38:00,000

That's simply for evolutionary reasons.

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00:38:00,000 --> 00:38:04,000

Simply for evolutionary reasons. You've got to have a certain size, not too big, not too small.

393

00:38:04,000 --> 00:38:07,000

It's not big enough to have this complicated machinery on it. It can't be too small.

394

00:38:07,000 --> 00:38:12,000

It can't be too big or it's very hard to manage on a planet, but if anything like a chemical

composition we're talking about.

395

00:38:13,000 --> 00:38:17,000

But as to inconsequential things, I don't know.

396

00:38:17,000 --> 00:38:22,000

Some people go for it. Some people say, yes, the number of fingers will not be five.

397

00:38:22,000 --> 00:38:29,000

It could be something like fingers. But I would be willing to believe there might be four, there might be eight, there might even be sixteen.

398

00:38:29,000 --> 00:38:33,000

But I don't think there'll be 500. I don't think there'll be one.

399

00:38:33,000 --> 00:38:35,000

We are not alone.

400

00:38:35,000 --> 00:38:41,000

We'll continue with the story of the race for planetary exploration and the UFO controversy.

401

00:38:41,000 --> 00:38:45,000

After this message from the B. F. Goodrich Company.

402

00:38:47,000 --> 00:38:50,000

Meet Jeffrey Masters, your career physicist.

403

00:38:50,000 --> 00:38:54,000

When it comes to splitting atoms, nothing stops Jeffrey.

404

00:38:54,000 --> 00:38:58,000

But when it comes to buying tires, everything does.

405

00:39:02,000 --> 00:39:05,000

Jeffrey is snowed by tire talks.

406

00:39:05,000 --> 00:39:10,000

Cross brace threads, four ply rayon, second line, third line, fourth line.

407

00:39:10,000 --> 00:39:14,000

And faced with tire sizes and tire prices.

408

00:39:14,000 --> 00:39:16,000

He draws a blank.

409

00:39:16,000 --> 00:39:19,000

So Jeffrey has been sold some pretty peculiar tires.

410

00:39:25,000 --> 00:39:30,000

Jeffrey, you know there's got to be an easier way to buy tires.

411

00:39:30,000 --> 00:39:36,000

Come on over to B. F. Goodrich. We've got a brand new way of doing business. We call it straight talk.

412

00:39:37,000 --> 00:39:40,000

We know you don't know a lot of technical tire talk.

413

00:39:40,000 --> 00:39:43,000

But you know a lot about how you drive, right?

414

00:39:43,000 --> 00:39:47,000

Okay, take this. Our B. F. Goodrich tire value calculator.

415

00:39:47,000 --> 00:39:50,000

Come on, work it yourself. Tell us how you draw it.

416

00:39:50,000 --> 00:39:52,000

Now turn it over.

417

00:39:52,000 --> 00:39:56,000

It tells you what kind of B. F. Goodrich tire is best for you.

418

00:39:56,000 --> 00:39:58,000

You don't have to be confused anymore.

419

00:39:58,000 --> 00:40:02,000

You see just what you're getting, just what you're paying for.

420

00:40:02,000 --> 00:40:06,000

Jeffrey, what do you think of B. F. Goodrich's straight talk?

421

00:40:06,000 --> 00:40:09,000

And apparently speaking, I explicitly endorse you.

422

00:40:09,000 --> 00:40:12,000

Yeah, I know it's a lot, Jeff. Tell your friends.

423

00:40:12,000 --> 00:40:18,000

B. F. Goodrich. The straight talk tire people.

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00:40:20,000 --> 00:40:24,000

Here again, ABC News Correspondent, Edward P. Morgan.

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00:40:24,000 --> 00:40:30,000

Sometime in 1973, a spacecraft will take off from Earth.

426

00:40:30,000 --> 00:40:33,000

Its name will be Voyager.

427

00:40:44,000 --> 00:40:51,000

The Voyager, a new kind of space vehicle, will begin a trek to the planet Mars.

428

00:40:51,000 --> 00:40:55,000

The first of a series of missions that will eventually carry

429

00:40:55,000 --> 00:41:00,000

sophisticated life detection devices to the Martian surface.

430

00:41:00,000 --> 00:41:05,000

The success of a Voyager mission would be a scientific breakthrough

431

00:41:05,000 --> 00:41:08,000

in our unmanned planetary program.

432

00:41:08,000 --> 00:41:16,000

It will be our first attempt to soft land an instrument package on another planet.

433

00:41:16,000 --> 00:41:24,000

Looking beyond Voyager to 1977, 1979, and the 1980s,

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00:41:24,000 --> 00:41:30,000

space engineers are already at the hard practical model stage

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of designing devices that are still emerging from the minds of scientific dreamers.

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One such device designed for a Mars life search

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is the automated biological laboratory called an ABL.

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One concept of it has been developed by the Aero Neutronic Division of the Philco Corporation.

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00:41:53,000 --> 00:41:57,000

It would operate remotely and automatically on Mars,

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00:41:57,000 --> 00:42:02,000

so says space research engineer William Hofstettler.

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00:42:02,000 --> 00:42:06,000

Basically, there are several processes that can be performed.

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00:42:06,000 --> 00:42:11,000

First, of course, you have to obtain physical samples of the surface of Mars,

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00:42:11,000 --> 00:42:17,000

physical samples of the soil, because that's where the organisms will congregate

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00:42:17,000 --> 00:42:19,000

if there are living organisms.

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I might comment, evidently, that we are concerned more with the lower forms of life,

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00:42:25,000 --> 00:42:32,000

the molecular forms of life, rather than pelopons and horses and so forth.

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00:42:32,000 --> 00:42:36,000

We are prepared to take pictures of these things if they happen to be there.

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The ABL is divided really into three basic integrated subsystems.

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00:42:41,000 --> 00:42:46,000

One of these is the sampling subsystem that is used to obtain the surface samples

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00:42:46,000 --> 00:42:49,000

from the soil sample from the surface of Mars.

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00:42:49,000 --> 00:42:52,000

At the very bottom of the ABL, directly underneath,

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00:42:52,000 --> 00:42:57,000

there is a system that uses a brush and vacuum system to obtain samples

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00:42:57,000 --> 00:43:00,000

of the Martian surface directly under the ABL.

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00:43:00,000 --> 00:43:05,000

Also, there is a core drill system that drills into the surface of our canopy

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00:43:05,000 --> 00:43:11,000

to obtain subsurface samples, in case the water availability or other conditions

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00:43:11,000 --> 00:43:17,000

make it more likely as a place for Martian biological life.

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00:43:17,000 --> 00:43:23,000

A second system picks up samples around the ABL with the samplers you see here,

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00:43:23,000 --> 00:43:27,000

which is located with our linking to the status of the main body,

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00:43:27,000 --> 00:43:33,000

and will pick up samples generally around the ABL location.

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00:43:33,000 --> 00:43:37,000

A third system is used for getting samples from a considerably further distance,

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00:43:37,000 --> 00:43:43,000

and in particular selected areas that the visual survey system has pointed out

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00:43:43,000 --> 00:43:48,000

as being particularly desirable because possibly they are warmer than the surrounding spots

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00:43:48,000 --> 00:43:54,000

or they have a different appearance that might appear to be vegetation or something of that nature.

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00:43:54,000 --> 00:44:01,000

So, a sampling line is deployed ballistically, fired out like a small rocket,

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00:44:01,000 --> 00:44:07,000

carrying this line to some distance up to possibly a thousand feet from the ABL location.

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00:44:07,000 --> 00:44:12,000

A sampler, then similar to the one that works in the vicinity of the ABL,

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00:44:12,000 --> 00:44:16,000

is carried up on an elevator latched onto a trolley on this line

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00:44:16,000 --> 00:44:21,000

and deployed out to the desired spot to obtain the surface sample,

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00:44:21,000 --> 00:44:26,000

returning and delivering it to the operating parts of the ABL.

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00:44:26,000 --> 00:44:32,000

These samples are then processed and brought into the interior of the ABL

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00:44:32,000 --> 00:44:36,000

for chemical processing prior to reading out the experiment.

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00:44:36,000 --> 00:44:41,000

The chemical processing equipment is located generally in the central area of the ABL

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00:44:41,000 --> 00:44:47,000

in the form of 13 chemical processes located to come French, we are on the central core.

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00:44:47,000 --> 00:44:52,000

Certain supplies, water, certain gases are stored in tanks around the center of the ABL.

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00:44:52,000 --> 00:44:58,000

Other chemical reagents are stored in ampules which hold individual quantities

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00:44:58,000 --> 00:45:02,000

in this area that surrounds the processors.

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00:45:02,000 --> 00:45:07,000

These ampules are put into cartridges like this

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00:45:07,000 --> 00:45:12,000

so that they feed to the outer end and can be picked up by the processing,

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00:45:12,000 --> 00:45:18,000

by the transport device which internally then moves them to the proper location

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00:45:18,000 --> 00:45:20,000

to conduct chemical analysis.

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00:45:20,000 --> 00:45:26,000

After the analysis is completed, the samples are then transferred to the instruments

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00:45:26,000 --> 00:45:28,000

to read out the experiment results.

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00:45:28,000 --> 00:45:31,000

The data from these are then processed internally

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00:45:31,000 --> 00:45:35,000

and transmitted through the high-gain system back to Earth.

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00:45:35,000 --> 00:45:40,000

If the scientific and engineering problems that must be solved to accomplish this feat

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00:45:40,000 --> 00:45:46,000

are not overwhelming, the political obstacles may indeed be insurmountable.

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Congress will soon have to make the most important decision on space policy

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00:45:51,000 --> 00:45:57,000

since President Kennedy first won approval to commit us to the Space Age.

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00:45:57,000 --> 00:46:03,000

The future of planetary exploration will hinge on the outcome of congressional action

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00:46:03,000 --> 00:46:09,000

that will begin with hearings now set for February 1967.

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Because of the need for long lead times, planning policy and funds must be committed now,

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00:46:18,000 --> 00:46:22,000

not only for the Voyager program in 1973,

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00:46:22,000 --> 00:46:29,000

but for the life detection missions to Mars and Venus to come in the next decade or two.

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00:46:29,000 --> 00:46:35,000

Whether the Soviet Union has its equivalent of our Voyager ready to shoot for Mars or Venus

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00:46:35,000 --> 00:46:37,000

is no longer in question.

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00:46:37,000 --> 00:46:44,000

In Russia, cosmic expositions and public displays of space vehicles are commonplace.

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Interest in planetary exploration and the search for extraterrestrial life

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is at a high pitch among scientists and the public alike.

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00:46:53,000 --> 00:47:00,000

If our race for space with the Soviet Union were to be judged by who will first land a man on the moon,

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00:47:00,000 --> 00:47:05,000

the contest at this stage might be considered a dead heat.

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00:47:05,000 --> 00:47:09,000

But if the second lap of this race is one of planetary discovery

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00:47:09,000 --> 00:47:15,000

on which depends the exciting scientific trophies of the foreseeable future,

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00:47:15,000 --> 00:47:19,000

then the United States is estimated far behind.

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00:47:19,000 --> 00:47:27,000

Soviet cosmonauts, male and female, become the honored protégés of the state,

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00:47:27,000 --> 00:47:31,000

symbols of Soviet communist achievement.

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00:47:32,000 --> 00:47:38,000

Not so burdened by war costs, the Soviet budget, according to a recent analysis,

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00:47:38,000 --> 00:47:45,000

has allocated to planetary exploration from five to ten times as much as the United States,

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00:47:45,000 --> 00:47:51,000

and as a result, the great discoveries concerning our neighboring planets, Mars and Venus,

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00:47:51,000 --> 00:47:57,000

will be made by the Russians unless early steps are taken to escalate the American effort.

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00:47:58,000 --> 00:48:03,000

In the field of radio astronomy too, the Soviets have been more consistently searching

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00:48:03,000 --> 00:48:11,000

for extraterrestrial signals and recently reported having observed beacons of an interstellar civilization.

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00:48:11,000 --> 00:48:16,000

Although later observations by American scientists negated their claims,

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00:48:16,000 --> 00:48:21,000

the Russians never completely revised their earlier contention.

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00:48:21,000 --> 00:48:26,000

However, in the area of the extraterrestrial life search,

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00:48:26,000 --> 00:48:32,000

they have held the door open to international cooperation, says astronomer Carl Sagan.

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00:48:32,000 --> 00:48:40,000

They have made a recommendation that a worldwide international cooperation be established

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00:48:40,000 --> 00:48:46,000

for a further growing search of large numbers of stars and galaxies

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00:48:46,000 --> 00:48:51,000

to see if there is any intelligible radio communication being sent.

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00:48:51,000 --> 00:48:59,000

And who knows if possible, if there is a collaborative effort like the established previous collaborative efforts,

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00:48:59,000 --> 00:49:04,000

for example the I.G.Y. between the United States, Soviet Union and other countries,

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00:49:04,000 --> 00:49:09,000

have been enormously productive scientifically and in fact in other ways.

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00:49:09,000 --> 00:49:15,000

A persistent furor in the past few years is the one over the alleged sightings

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00:49:15,000 --> 00:49:22,000

of flying saucers. The number of officially reported sightings of UFOs,

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00:49:22,000 --> 00:49:30,000

unidentified flying objects, has risen from 399 in 1963 to more than 1500

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00:49:30,000 --> 00:49:35,000

in the last 18 months according to U.S. Air Force figures.

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00:49:35,000 --> 00:49:40,000

A cult of enthusiasts has developed, promoting the theory that these phenomena

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00:49:40,000 --> 00:49:44,000

are visitations from intelligent beings in outer space.

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00:49:44,000 --> 00:49:52,000

And according to a recent Gallup poll, about 5 million people have reported seeing UFOs over the years.

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00:49:52,000 --> 00:49:58,000

Organizations with names like Flying Saucer News Club of America

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00:49:58,000 --> 00:50:04,000

and National Investigations Committee on Aerial Phenomena, which has doubled its membership

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00:50:04,000 --> 00:50:11,000

of 5,000 in the last year and a half, have sprung up complete with annual conventions,

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00:50:11,000 --> 00:50:17,000

recruiting drives and publicity bulletins arguing for acceptance of the idea

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00:50:17,000 --> 00:50:24,000

that flying saucers must be dealt with as emissaries far out-diplomats from space.

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00:50:24,000 --> 00:50:29,000

The scientific community, even though scientists committed to the belief

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00:50:29,000 --> 00:50:34,000

that other intelligent life does exist somewhere in the cosmos,

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00:50:34,000 --> 00:50:39,000

has greeted the flying saucer theory in the main with open skepticism.

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00:50:39,000 --> 00:50:45,000

Physicist Dr. Philip Morrison of Massachusetts Institute of Technology.

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00:50:45,000 --> 00:50:49,000

The social phenomena, the phenomena of journalism and television.

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If you look in the record newspapers, 100 to 120 years ago,

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00:50:53,000 --> 00:50:57,000

exactly the same things were seen, exactly the same stories were given.

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00:50:57,000 --> 00:51:02,000

They're much more frequent now. And what has happened is a infernal invention of the phrase,

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00:51:02,000 --> 00:51:08,000

the flying saucer. However, most of the things they see are, as we all well know,

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00:51:08,000 --> 00:51:12,000

planets and lights in the sky and aircraft and so on.

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00:51:12,000 --> 00:51:17,000

And I think one of the most striking evidences, if I may exploit the subterraneanity,

545

00:51:17,000 --> 00:51:22,000

that we don't really have a deep spread of understanding and education in science

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00:51:22,000 --> 00:51:26,000

is the fact that people are not able to cope with the phenomena they see

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00:51:26,000 --> 00:51:29,000

in any other way than inventing what I agree is a possible theory,

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00:51:29,000 --> 00:51:33,000

but a very much more improbable theory than most of the things it describes in fact.

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00:51:33,000 --> 00:51:38,000

And I think there's a sneaking suspicion, also in the literature of the flying saucer,

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00:51:38,000 --> 00:51:42,000

that this is just some terrestrial object of secret kind,

551

00:51:42,000 --> 00:51:46,000

which is surely another social phenomenon in response to the enormous importance

552

00:51:46,000 --> 00:51:49,000

given to secrecy and military preparations in secret,

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00:51:49,000 --> 00:51:52,000

which is the characteristic feature of the last 20 or 30 years.

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00:51:52,000 --> 00:51:55,000

And if you take these two things out of it, then you don't have a great deal left,

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00:51:55,000 --> 00:52:00,000

except a lot of interesting phenomena seen by people, some of which are new and quite unexplained

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00:52:00,000 --> 00:52:04,000

and would be nice to find out more about, but a great many of which are rather familiar things,

557

00:52:04,000 --> 00:52:06,000

the under-unfamiliarity.

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00:52:06,000 --> 00:52:11,000

We are not alone. We'll continue with the religious and philosophical implications

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00:52:11,000 --> 00:52:15,000

that would result from the discovery of life on other worlds

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00:52:15,000 --> 00:52:18,000

after this message from the B.F. Goodrich Company.

561

00:52:18,000 --> 00:52:24,000

Music

562

00:52:24,000 --> 00:52:29,000

How come the typical American motorist puts off flying tires

563

00:52:29,000 --> 00:52:32,000

until they can't put it off any longer?

564

00:52:32,000 --> 00:52:34,000

Shhhhhh!

565

00:52:34,000 --> 00:52:39,000

Music

566

00:52:39,000 --> 00:52:44,000

Maybe it's because the typical American tire store is like a foreign country.

567

00:52:45,000 --> 00:52:49,000

Alone you were over the range of different languages.

568

00:52:49,000 --> 00:52:53,000

When you asked for help, you needed an interpreter to help you with the answers.

569

00:52:53,000 --> 00:52:56,000

And when you finally get the bill.

570

00:52:56,000 --> 00:52:59,000

Music

571

00:52:59,000 --> 00:53:02,000

Now you don't have to let tire buying get you down.

572

00:53:02,000 --> 00:53:04,000

Go see B.F. Goodrich.

573

00:53:04,000 --> 00:53:06,000

Music

574

00:53:06,000 --> 00:53:08,000

At B.F. Goodrich, we speak your language.

575

00:53:08,000 --> 00:53:10,000

Straight talk.

576

00:53:10,000 --> 00:53:15,000

If you don't understand that sports life for slime miracle trepidin,

577

00:53:15,000 --> 00:53:19,000

try this, the B.F. Goodrich Tire Value Calculator.

578

00:53:19,000 --> 00:53:22,000

It takes the confusion out of tire buying.

579

00:53:22,000 --> 00:53:25,000

You feed it the facts about how you drive.

580

00:53:25,000 --> 00:53:27,000

Best thing to do is spin the dial.

581

00:53:27,000 --> 00:53:30,000

And it comes up with the right B.F. Goodrich Tire,

582

00:53:30,000 --> 00:53:33,000

the lowest price tire for your driving needs.

583

00:53:33,000 --> 00:53:36,000

Music

584

00:53:36,000 --> 00:53:38,000

Straight talk.

585

00:53:38,000 --> 00:53:40,000

How about a typical American motorist?

586

00:53:40,000 --> 00:53:42,000

Ready for a little straight talk?

587

00:53:42,000 --> 00:53:46,000

Music

588

00:53:46,000 --> 00:53:48,000

B.F. Goodrich.

589

00:53:48,000 --> 00:53:50,000

The straight talk tire people.

590

00:53:50,000 --> 00:53:52,000

Music

591

00:53:52,000 --> 00:53:57,000

What if one day we do actually establish radio communication

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00:53:57,000 --> 00:54:01,000

with some other civilization out in the cosmos?

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00:54:01,000 --> 00:54:03,000

The possibility cannot be dismissed.

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00:54:03,000 --> 00:54:07,000

The prospect has captured the imaginations and stirred the emotions

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00:54:07,000 --> 00:54:10,000

of scientists and laymen alike.

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00:54:10,000 --> 00:54:16,000

One of the stunning questions raised by the possibility of life on other planets

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00:54:16,000 --> 00:54:19,000

in other solar systems is this.

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00:54:19,000 --> 00:54:23,000

If proved, what will it do to theology?

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00:54:23,000 --> 00:54:27,000

Man has been inclined to conceive of himself as cast in an earthly

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00:54:27,000 --> 00:54:31,000

but divine image of God or gods.

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00:54:31,000 --> 00:54:36,000

What if God supervised the beginnings of other civilizations

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00:54:36,000 --> 00:54:38,000

on other planets first?

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00:54:38,000 --> 00:54:44,000

Do the Martians, if any, have their equivalent of Adam and Eve?

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00:54:44,000 --> 00:54:48,000

Did somebody else out there discover long before Darwin

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00:54:48,000 --> 00:54:51,000

the Darwinian theory of evolution?

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00:54:51,000 --> 00:54:56,000

These and countless other related religious questions, of course,

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00:54:56,000 --> 00:55:01,000

must await the results of these new Christopher Columbus voyages

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00:55:01,000 --> 00:55:05,000

of science through the solar system.

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00:55:05,000 --> 00:55:10,000

Dr. Martin, for centuries, and really ever since man evolved on this planet,

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00:55:10,000 --> 00:55:14,000

he thought of himself as being central, as being unique,

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00:55:14,000 --> 00:55:19,000

as being the supreme representation of life.

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00:55:19,000 --> 00:55:22,000

Supposing we discover that this is not the case,

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00:55:22,000 --> 00:55:24,000

we know we're not central,

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00:55:24,000 --> 00:55:29,000

suppose we discover we're also not really as superior as other beings elsewhere.

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00:55:29,000 --> 00:55:33,000

When is going to be the effect of this on our concept of our place in the universe

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00:55:33,000 --> 00:55:37,000

and of ourselves and the everyone who tries to think of himself

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00:55:37,000 --> 00:55:43,000

as having a view of the world and seeing his place in whatever his attitudes

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00:55:43,000 --> 00:55:47,000

will agree, I think, that above all, you have to be true.

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00:55:47,000 --> 00:55:48,000

What's right now?

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00:55:48,000 --> 00:55:51,000

If it turns out we have to adjust to this, certainly we can do so.

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00:55:51,000 --> 00:55:56,000

I think in some ways we move what must be an essential loneliness of this tradition,

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00:55:56,000 --> 00:56:00,000

of the Arabian sense of responsibility, one of the structures, not all ours.

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00:56:00,000 --> 00:56:05,000

Is it not true that, at least in the western world,

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00:56:05,000 --> 00:56:11,000

in the galactic community, as far as the Yoram Mountains,

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00:56:11,000 --> 00:56:13,000

the Europe of the North America,

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00:56:13,000 --> 00:56:20,000

there's been a lengthy tradition of saying that all that is most valuable

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00:56:20,000 --> 00:56:25,000

and the view of life, the view of the state, the view of the individual, the view of morality,

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00:56:25,000 --> 00:56:29,000

a great deal of that comes, of course, from our religious development.

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00:56:29,000 --> 00:56:36,000

But an equally large, or almost equally large, contribution comes from the study of societies

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00:56:36,000 --> 00:56:39,000

which are absolutely gone, which only never again communicate,

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00:56:39,000 --> 00:56:42,000

the most important being the world of Greece.

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00:56:42,000 --> 00:56:48,000

The Greek playwright, the Greek philosophers, the Greek historians and statesmen are,

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00:56:48,000 --> 00:56:53,000

their thought and what they did is on the lips and on the pens

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00:56:53,000 --> 00:56:55,000

of most of the most learned people in the world.

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00:56:55,000 --> 00:56:59,000

All we have is containing about 10 or 15,000 books,

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00:56:59,000 --> 00:57:04,000

which are a small library easily held in a good size office.

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00:57:04,000 --> 00:57:08,000

Those are all the Greek texts about everything that we will ever have,

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00:57:08,000 --> 00:57:12,000

and yet scholars and students have gone over and over and over those, and they're terribly valuable.

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00:57:12,000 --> 00:57:16,000

Now we've extended that in our time because most of us are by studying other cultures

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00:57:16,000 --> 00:57:19,000

with their rich traditions, the culture of the Orient, the culture of the Orient,

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00:57:19,000 --> 00:57:25,000

the cultures of America, old America, the cultures of West Africa and so on,

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00:57:25,000 --> 00:57:29,000

each of which have been contributions and give us a lot of understanding, a lot of insight.

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00:57:29,000 --> 00:57:34,000

And I don't even make a real human culture until we have all of this said in.

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00:57:34,000 --> 00:57:39,000

And I think on top of that, enriching it by having the story equally complex and much longer,

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00:57:39,000 --> 00:57:44,000

but in less detail, which was the kind of thing we'd have to have from some remote society,

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00:57:44,000 --> 00:57:51,000

could do anything but add a tremendous challenge and enrichment and satisfaction to those people.

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00:57:51,000 --> 00:57:55,000

Indeed, I think if I put this over their place, that's the reason they would do it.

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00:57:55,000 --> 00:57:59,000

Because then, the added to their libraries too, what our history has been,

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00:57:59,000 --> 00:58:02,000

and that must be the only thing they can guess from science,

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00:58:02,000 --> 00:58:07,000

the complexity of playwriting or the histories of kings or folk lore,

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00:58:07,000 --> 00:58:10,000

you can get their general part, but the detail is too rich.

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00:58:10,000 --> 00:58:13,000

You can easily show it mathematically. There's just too many possibilities.

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00:58:13,000 --> 00:58:19,000

But they will also be happy to have one more library coming into their signals, and that's what I'd like to put.

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00:58:19,000 --> 00:58:21,000

Mr. Walter Sullivan.

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00:58:21,000 --> 00:58:28,000

What a wonderful planet is our world and how far it may be to anything else like it.

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00:58:28,000 --> 00:58:33,000

We are reasonably believe there are other planets, less to our advantages,

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00:58:33,000 --> 00:58:39,000

a kindly, stable, parent star, a well-placed orbit, a suitable atmosphere,

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00:58:39,000 --> 00:58:47,000

dry continents for advanced life forms, great seas within which their primitive ancestors evolved.

659

00:58:47,000 --> 00:58:55,000

But the fragile green hue of life appears only here and there on our planet as things in space.

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00:58:55,000 --> 00:59:05,000

Its hold is tenuous. If any great passion overcome reason, we can now render the planet uninhabitable.

661

00:59:05,000 --> 00:59:10,000

Is that the face of all technological societies?

662

00:59:10,000 --> 00:59:18,000

It is up to us on this wonderful world of ours to prove that it is not so.

663

00:59:18,000 --> 00:59:33,000

We are not alone.

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