

1

00:00:00,000 --> 00:00:13,089

This series presents information based in part on theory and conjecture.

2

00:00:13,089 --> 00:00:17,610

The producer's purpose is to suggest some possible explanations, but not necessarily

3

00:00:17,610 --> 00:00:27,373

the only ones to the mysteries we will examine.

4

00:00:27,373 --> 00:00:33,336

Our voices have ascended into space, announcing our presence to the universe.

5

00:00:33,336 --> 00:00:38,497

Other men on other worlds may be listening.

6

00:00:38,497 --> 00:00:43,619

We await an answer from afar, placed by an intelligence we do not know.

7

00:00:43,619 --> 00:00:45,580

We will not recognize.

8

00:00:45,580 --> 00:00:51,862

We may not even understand.

9

00:00:51,862 --> 00:00:56,263

Radio waves that might bear the conversations of distant beings are monitored.

10

00:00:56,263 --> 00:01:05,346

Day and night, by astronomers throughout the world.

11

00:01:05,346 --> 00:01:09,468

Our understanding of life in outer space may begin with reaching out to another form of

12

00:01:09,468 --> 00:01:13,229

intelligence here on Earth.

13

00:01:13,229 --> 00:01:17,911

If we can communicate with one strange intelligence, we can hope to communicate with others.

14

00:01:26,274 --> 00:01:36,557

We have always dreamed of talking with celestial beings.

15

00:01:36,557 --> 00:01:40,759

Discoveries in deep space have revealed that the same chemistry that created earthly life

16

00:01:40,759 --> 00:01:42,999

operates elsewhere.

17

00:01:42,999 --> 00:01:46,200

Perhaps we are not accidents of creation.

18

00:01:46,200 --> 00:01:52,923

Perhaps we are not alone.

19

00:01:52,923 --> 00:02:11,329

Our search for intelligent life beyond the planet Earth has begun, and the job is as

20

00:02:11,329 --> 00:02:13,770

immense as the universe itself.

21

00:02:13,770 --> 00:02:19,612

Our galaxy alone contains an estimated 250 billion stars, and there are at least 100

22

00:02:19,612 --> 00:02:21,613

billion other galaxies.

23

00:02:21,613 --> 00:02:25,854

How many of these stars have Earth-like planets harboring life?

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00:02:25,854 --> 00:02:29,375

Until recently, we searched with our eyes, aided by telescopes.

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00:02:29,375 --> 00:02:36,658

Then, with the advent of radio, a whole new noisy universe emerged, and man began to listen

26

00:02:36,658 --> 00:02:39,379

to the stars.

27

00:02:39,379 --> 00:02:45,381

In 1971, at Mass' Ames Research Center, 24 scientists and engineers began the search

28

00:02:45,381 --> 00:02:47,261

for other life.

29

00:02:47,261 --> 00:02:52,023

Developed by Dr. Bernard Oliver and Dr. John Billingham, the group concluded that radio

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00:02:52,023 --> 00:02:56,264

is the most effective way of detecting other voices in space.

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00:02:56,264 --> 00:03:02,426

The search for extraterrestrial intelligence, nicknamed SETI, became a reality.

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00:03:02,426 --> 00:03:04,587

Dr. Oliver explains.

33

00:03:04,587 --> 00:03:09,789

The concept of doing this really has its origin and the belief that we will have to go to

34

00:03:09,789 --> 00:03:14,591

other stars rather than just other planets of our own system before we find intelligent

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00:03:14,591 --> 00:03:22,313

life, and the belief that that is an extremely difficult thing to do physically.

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00:03:22,313 --> 00:03:27,635

If we are not going to cross the Gulf of interstellar space, how then are we going to ever detect

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00:03:27,635 --> 00:03:30,076

other intelligent life?

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00:03:30,076 --> 00:03:35,358

The answer seems to be by looking for evidence of it in the form of signals that it may either

39

00:03:35,358 --> 00:03:41,800

radiate on purpose to arouse our attention or simply in the course of its own activities.

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00:03:41,800 --> 00:03:47,322

It's quite possible that signals have been falling on the Earth for millions or billions

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00:03:47,322 --> 00:03:48,882

of years.

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00:03:48,882 --> 00:03:54,484

In 1931, extraterrestrial radio signals were accidentally discovered by Bell Telephone

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00:03:54,484 --> 00:03:57,445

engineer Carl Jansky.

44

00:03:57,445 --> 00:04:02,607

Jansky detected a hiss that seemed to be coming from the very center of our galaxy.

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00:04:02,607 --> 00:04:09,850

For the first time, dense star clouds invisible to optical telescopes revealed their presence

46

00:04:09,850 --> 00:04:13,891

through radio emissions.

47

00:04:13,891 --> 00:04:20,693

Growth Reber, an enthusiastic radio amateur, confirmed Jansky's observations.

48

00:04:20,693 --> 00:04:26,535

Using a homemade backyard antenna, Reber found that radio emissions of natural origin occur

49

00:04:26,535 --> 00:04:29,056

throughout our galaxy.

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00:04:29,056 --> 00:04:34,418

Then in 1961, the search for intentional signals began.

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00:04:34,418 --> 00:04:39,420

At Green Bank, West Virginia, a radio telescope was used for the first time to listen for

52

00:04:39,420 --> 00:04:42,141

intelligent signals from space.

53

00:04:42,141 --> 00:04:47,662

Project OSMA, a whimsical reference to the land lying over the rainbow, was followed

54

00:04:47,662 --> 00:04:54,825

ten years later by the most far-reaching life search program ever devised.

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00:04:54,825 --> 00:05:00,227

The Cyclops plan was to start with a modest size antenna element, say something like 300

56

00:05:00,227 --> 00:05:06,709

feet in diameter, and simply add additional ones as time went on to increase the total

57

00:05:06,709 --> 00:05:08,550

collecting area.

58

00:05:08,550 --> 00:05:13,471

This sort of a system is known as an antenna array, and it works by having all of the antennas

59

00:05:13,471 --> 00:05:19,433

feed their signals together into a common receiver, a common detector, so that they

60

00:05:19,433 --> 00:05:24,555

add in phase and act as if they had been picked up by a single antenna.

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00:05:24,555 --> 00:05:28,636

So we believe we can take as many as a thousand antennas and connect them together in this

62

00:05:28,636 --> 00:05:35,759

fashion and get a huge collecting area.

63

00:05:35,759 --> 00:05:42,681

A listening post beyond Earth is an alternative explored by SETI astronomer Dr. Charles Seeger.

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00:05:42,681 --> 00:05:49,244

A basic problem in a search for extraterrestrial signals has to do with the interference to

65

00:05:49,244 --> 00:05:55,886

receiving systems produced by all our transmissions in the same radio frequency spectrum.

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00:05:55,886 --> 00:06:02,328

Space may offer some advantages and may not be all that more expensive for a large receiving

67

00:06:02,328 --> 00:06:04,329

system than on Earth.

68

00:06:04,329 --> 00:06:08,570

Space has the advantage of a more benign environment.

69

00:06:08,570 --> 00:06:12,531

You don't have winds and storms and rain and repainting to do all the time.

70

00:06:12,531 --> 00:06:13,532

It's very quiet.

71

00:06:13,532 --> 00:06:16,093

Well, it's even put up a very light system in space.

72

00:06:16,093 --> 00:06:17,933

It floats there.

73

00:06:17,933 --> 00:06:22,295

The backside of the moon is attractive since there you are beautifully shielded from all

74

00:06:22,295 --> 00:06:30,698

Earth activity.

75

00:06:30,698 --> 00:06:38,860

What we envision is to reproduce in the craters of the moon a series of arocebo type antennas.

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00:06:38,860 --> 00:06:44,502

And it's estimated by engineers that one could build a thousand or three thousand foot, even

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00:06:44,502 --> 00:06:50,584

larger perhaps, arocebo type structures relatively economically, scattering them among a bunch

78

00:06:50,584 --> 00:06:55,106

of adjacent craters on the back of the moon.

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00:06:55,106 --> 00:07:02,068

An alternative to the moon is to have an antenna floating in space in orbit around the Earth.

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00:07:02,068 --> 00:07:07,790

The early antennas would be so arranged that they could be constructed in space, carried

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00:07:07,790 --> 00:07:12,312

out in pieces on a shuttle along with the work as necessary to construct it.

82

00:07:12,312 --> 00:07:23,476

It would then be set into orbit and the shuttle would return while we tried out the device.

83

00:07:23,476 --> 00:07:27,877

While we wait for a call from space, we have not ruled out breaking the silence of the

84

00:07:27,877 --> 00:07:37,120

universe by sending our own signals to cosmic neighbors.

85

00:07:37,120 --> 00:07:41,882

Nestled in the tropical mountain jungle of Puerto Rico is the largest radio telescope

86

00:07:41,882 --> 00:07:44,883

on Earth.

87

00:07:44,883 --> 00:07:52,686

A thousand feet across and 300 feet deep, the Arecibo telescope can listen to signals

88

00:07:52,686 --> 00:07:56,887

from the farthest reaches of the universe.

89

00:07:56,887 --> 00:08:01,049

It can also converse with other beings in the cosmos.

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00:08:01,049 --> 00:08:09,211

On November 16, 1974, man prepared to beam his first and only intentional signal to intelligence

91

00:08:09,211 --> 00:08:36,901

beyond the Earth.

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00:08:36,901 --> 00:08:43,383

Our message, traveling at the speed of light, will take 24,000 years to reach star cluster

93

00:08:43,383 --> 00:08:47,745

M13 in the constellation Hercules.

94

00:08:47,745 --> 00:08:54,587

In code, the message describes our solar system, the Earth, and the life upon it.

95

00:08:54,587 --> 00:09:01,469

The chemical basis of life on Earth is represented by the famous double helix of DNA.

96

00:09:01,469 --> 00:09:08,272

The final depiction of a human being is like a cry in the night of space.

97

00:09:08,272 --> 00:09:17,515

Who or what will answer our call?

98

00:09:17,515 --> 00:09:36,041

On March 2, 1972, Pioneer 10 began its 21 month journey to Jupiter.

99

00:09:36,041 --> 00:09:41,403

Attached to the spacecraft is a plaque, a kind of planetary Rosetta stone, designed

100

00:09:41,403 --> 00:09:43,764

by astronomer Dr. Carl Sagan.

101

00:09:43,764 --> 00:09:50,246

In the remote contingency, there are interstellar space faring societies, which might someday

102

00:09:50,246 --> 00:09:53,847

pick up this derelict and no longer radioing.

103

00:09:53,847 --> 00:09:59,329

We thought we would put a message on it to indicate a little bit of where we are, when

104

00:09:59,329 --> 00:10:02,450

we are, and who we are.

105

00:10:02,450 --> 00:10:07,052

We think that the information on where we are and when we are indicated in this part

106

00:10:07,052 --> 00:10:12,814

of the message by the configuration of certain cosmic objects called pulsars will be completely

107

00:10:12,814 --> 00:10:17,775

obvious to any society capable of traveling between the stars.

108

00:10:17,775 --> 00:10:21,817

These two objects will be more mysterious because it is unlikely that there will be

109

00:10:21,817 --> 00:10:26,138

human beings anywhere else, even though there may be other creatures elsewhere.

110

00:10:26,138 --> 00:10:31,740

And the plaque has served a very useful purpose in making us think about what sort of impression

111

00:10:31,740 --> 00:10:37,422

we might wish to give to the cosmos.

112

00:10:37,422 --> 00:10:41,583

Pioneer 10 flew past Jupiter in December 1973.

113

00:10:41,583 --> 00:10:46,305

In 1984, it will leave the solar system forever.

114

00:10:46,305 --> 00:10:51,067

Who will pick up our message floating in interstellar space?

115

00:10:51,067 --> 00:10:57,629

Radio waves traveling much faster than Pioneer will provide our first clue.

116

00:10:57,629 --> 00:11:02,231

Any signal that we pick up will certainly not have originated from a civilization much

117

00:11:02,231 --> 00:11:07,632

less advanced technically than we because it is only very recently that we have been

118

00:11:07,632 --> 00:11:11,714

able to radiate and detect such signals.

119

00:11:11,714 --> 00:11:16,355

If we look at the enormous time spans involved, then it seems very likely that what we will

120

00:11:16,355 --> 00:11:23,678

find is a civilization considerably more advanced than ourselves and which might have reasons

121

00:11:23,678 --> 00:11:29,720

for attempting to contact us that we do not even comprehend at the present time.

122

00:11:29,720 --> 00:11:35,762

At AIMS Research Center, psychologist Dr. Mary Connors is working to determine what

123

00:11:35,762 --> 00:11:39,923

an extraterrestrial civilization might be like.

124

00:11:39,923 --> 00:11:47,446

Basically on the non-technological issues, which is what I'm primarily concerned with,

125

00:11:47,446 --> 00:11:51,687

we're concerned with two basic questions.

126

00:11:51,687 --> 00:11:58,970

One is what can we know about the nature of the intelligence that we're likely to contact?

127

00:11:59,410 --> 00:12:01,651

Well, what do we know about intelligence?

128

00:12:01,651 --> 00:12:04,532

We could ask what is intelligence?

129

00:12:04,532 --> 00:12:07,093

What possible forms can it take?

130

00:12:07,093 --> 00:12:10,174

What can we learn from animal intelligence?

131

00:12:10,174 --> 00:12:15,376

The dolphin, although it shares our planet, exists in a world of its own.

132

00:12:15,376 --> 00:12:18,537

It speaks a language we do not comprehend.

133

00:12:18,537 --> 00:12:24,859

Its brain size is comparable to man's, yet the dolphin is still an enigma, as alien to

134

00:12:24,859 --> 00:12:28,820

us as a creature from outer space.

135

00:12:28,860 --> 00:12:35,062

At San Diego's SeaWorld, trainers and scientists work behind the scenes in an intensive effort

136

00:12:35,062 --> 00:12:39,304

to unravel the mysteries of dolphin sonar and communication.

137

00:12:39,304 --> 00:12:41,464

I'll tell you what, we'll give you another munchie for that.

138

00:12:41,464 --> 00:12:46,946

The dolphin has always seemed akin to man, and some have wondered if this creature, even

139

00:12:46,946 --> 00:12:51,468

now, is attempting to communicate with us.

140

00:12:51,468 --> 00:12:54,549

But he doesn't know yet what the difference means.

141

00:12:55,549 --> 00:13:01,551

The greatest problem remains the limit of our own experience.

142

00:13:01,551 --> 00:13:03,552

There you go.

143

00:13:03,552 --> 00:13:11,555

Despite our theories and our hopes, man has yet to exchange one word with the dolphin.

144

00:13:11,555 --> 00:13:17,397

SeaWorld's curator of mammals, Dr. Lanny Cornell and researchers Sherry Gish, are interested

145

00:13:17,397 --> 00:13:20,358

in cracking the communication barrier.

146

00:13:20,358 --> 00:13:26,160

One of the projects that we have in an overall study of communications amongst dolphins is

147

00:13:26,160 --> 00:13:34,763

one between two animals in a crew pool separated by a soundproof gate, which allows us to determine

148

00:13:34,763 --> 00:13:39,764

specifically when the animals will be able to communicate with one another.

149

00:13:39,764 --> 00:13:45,646

Cornell and his assistant will monitor every sound emitted by the two dolphins.

150

00:13:45,646 --> 00:13:51,128

In the exchange, each signal and response will be carefully studied and patterns of

151

00:13:51,128 --> 00:13:54,810

sound production analyzed.

152

00:13:54,810 --> 00:13:59,971

Sound waves are converted into a form that can be measured electronically.

153

00:13:59,971 --> 00:14:08,934

An oscilloscope reveals the changes in frequencies, some inaudible to the human ear.

154

00:14:08,934 --> 00:14:15,937

At one-sixteenth normal speed, the intricacies of dolphin signals become apparent.

155

00:14:22,859 --> 00:14:26,540

The dolphin is one form of non-human intelligence.

156

00:14:26,540 --> 00:14:32,102

The form that extraterrestrial life may take is subject to scientific speculation.

157

00:14:32,102 --> 00:14:40,785

It does appear that at least at our present stage of evolution there may be some advantages

158

00:14:40,785 --> 00:14:45,987

to being structured, at least with some of the characteristics that we have.

159

00:14:45,987 --> 00:14:54,270

There are clear advantages, for example, to having two eyes with which you can see in

160

00:14:54,270 --> 00:14:58,391

color and with which you can achieve binocular vision.

161

00:14:58,391 --> 00:15:01,432

It's clear that there are advantages to having an upright posture.

162

00:15:01,432 --> 00:15:07,794

It's clear that there are advantages to having a brain located at one end of the body and

163

00:15:07,794 --> 00:15:09,955

you can go on like this.

164

00:15:09,955 --> 00:15:15,197

If it is inevitable that another civilization will have had at one point some of the characteristics

165

00:15:15,197 --> 00:15:22,199

we have now, we'll contact with these alien beings from some unknown planet, bring Doomsday

166

00:15:22,600 --> 00:15:28,602

to our tiny world, or do the benefits to our future outweigh the dangers.

167

00:15:28,602 --> 00:15:34,123

The greatest miracle that we have before us is the fact that within a few billion years,

168

00:15:34,123 --> 00:15:38,605

the universe through the marvelous laws of chemistry and physics has converted part of

169

00:15:38,605 --> 00:15:44,807

itself into consciousness and that part can now contemplate the universe that began it.

170

00:15:44,807 --> 00:15:52,810

A French scientist put it this way, astronomy is useful because it shows us how small is

171

00:15:52,810 --> 00:15:57,291

man's body, how great is mine.

172

00:15:57,291 --> 00:16:02,413

Dr. John Kraus is an electrical engineer and astronomer at Ohio State University.

173

00:16:02,413 --> 00:16:07,615

He is one of a few who are working intently to solve the riddle of the universe.

174

00:16:07,615 --> 00:16:10,176

To answer the question, are we alone?

175

00:16:10,176 --> 00:16:13,057

He is philosophical about his mission.

176

00:16:13,297 --> 00:16:19,299

I think one of the exciting things about all this work is that those of us who are involved

177

00:16:19,299 --> 00:16:20,899

are like pioneers.

178

00:16:20,899 --> 00:16:25,261

We are exploring the universe.

179

00:16:25,261 --> 00:16:34,264

It's a pioneering venture to find out what is out there and perhaps who is out there.

180

00:16:35,224 --> 00:16:43,707

Searching for extraterrestrial intelligence is like looking for a needle in a haystack.

181

00:16:43,707 --> 00:16:48,909

Assuming that we're not unique and that there are intelligent beings elsewhere, we have

182

00:16:48,909 --> 00:16:51,310

to try and second guess them.

183

00:16:51,310 --> 00:16:55,471

But you need some kind of roadmap.

184

00:16:55,791 --> 00:16:57,792

Roadmap.

185

00:16:59,793 --> 00:17:05,075

Dr. Kraus' roadmap is a giant radio telescope that he helped design and build.

186

00:17:05,075 --> 00:17:08,276

He affectionately calls it Big Ear.

187

00:17:08,276 --> 00:17:12,917

Larger than three football fields in area, Big Ear has detected signals from the most

188

00:17:12,917 --> 00:17:16,038

distant known objects in the universe.

189

00:17:16,118 --> 00:17:20,600

Big Ear now finds intelligent signals in the vastness of space.

190

00:17:32,924 --> 00:17:39,646

We began our search on Friday, the 7th of December, 1973.

191

00:17:39,646 --> 00:17:45,889

Bob Dixon and Ed Tega worked for weeks setting up the testing in a channel filter

192

00:17:45,889 --> 00:17:49,810

and getting it ready for the life search.

193

00:17:49,810 --> 00:17:51,650

Well, why not run it?

194

00:17:51,650 --> 00:17:53,011

Let's give it a go.

195

00:17:53,011 --> 00:17:55,012

All right.

196

00:17:56,052 --> 00:17:58,773

There was no fuss or fanfare.

197

00:17:58,773 --> 00:18:03,655

Switches were set, recorders started, and the data began to flow.

198

00:18:08,056 --> 00:18:14,778

Now our Big Ear was listening for other men on other planets circling other stars

199

00:18:14,778 --> 00:18:18,780

who might have built beacon stations to announce their presence.

200

00:18:24,622 --> 00:18:30,784

If Bob Dixon said, we got something that looks interesting, John, I'm sure it wouldn't be

201

00:18:30,784 --> 00:18:36,066

that he had recorded a voice saying, this is planet MX-3 calling Earth.

202

00:18:36,706 --> 00:18:40,707

It wouldn't be anything as direct and unequivocal as that.

203

00:18:41,668 --> 00:18:48,710

It would just be a little bump on a squiggly line record that went on for hundreds of feet

204

00:18:49,350 --> 00:18:52,791

that occurred in a way that set it off from others.

205

00:18:59,754 --> 00:19:07,356

The probability of life developing elsewhere is hard to determine definitely, but I don't think

206

00:19:07,356 --> 00:19:12,318

it is zero. And if it is not zero, then I think we have a chance.

207

00:19:13,679 --> 00:19:19,521

Someday this call from space may come. It's hard to say when it will.

208

00:19:20,321 --> 00:19:27,443

The signal that we're looking for might be found within a day, but it might take might be weeks,

209

00:19:27,443 --> 00:19:32,485

years, but it will have profound significance to man.

210

00:19:32,565 --> 00:19:38,727

If we are not alone, what will we say to our neighbors?

211

00:19:45,369 --> 00:19:49,051

For centuries man thought that the Earth was the center of the universe.

212

00:19:49,051 --> 00:19:52,092

The sun, moon and stars would light our days and nights.

213

00:19:52,652 --> 00:19:58,254

Then Galileo turned his telescope to the sky and we learned that the moon and planets were worlds

214

00:19:58,254 --> 00:20:03,936

beyond dispute, that the stars weren't just ornaments in the sky, but represented a cosmos far

215

00:20:03,936 --> 00:20:10,018

beyond man's earthly imagination. We dreamt of life beyond the planet Earth and set out to

216

00:20:10,018 --> 00:20:14,019

explore the universe. We began humbly with the moon.

217

00:20:20,261 --> 00:20:25,623

We found that there is no man in the moon, but there are nine other planets in our solar system.

218

00:20:26,583 --> 00:20:29,304

So we set our sights on Mars and sent our probe.

219

00:20:32,185 --> 00:20:38,347

Now we look beyond to the vastness of the universe and search the stars for voices of other beings.

220

00:20:38,988 --> 00:20:45,230

If we were in fact to decipher messages from the other civilizations over and above simply

221

00:20:45,230 --> 00:20:51,952

receiving a signal and knowing that they are there, then it is conceivable we might learn about

222

00:20:52,032 --> 00:20:57,154

the pathways that they took when they were at our present stage of development.

223

00:20:57,714 --> 00:21:04,356

I think in this way one can easily visualize a network of intercommunicating societies growing up

224

00:21:04,997 --> 00:21:14,360

in our galaxy. Such a network could achieve results in science and in philosophy and in other fields

225

00:21:15,320 --> 00:21:19,001

that would be more painful if they were isolated.

226

00:21:19,882 --> 00:21:25,324

Past human history may be only the prelude to our future as members of a galactic society.

227

00:21:26,444 --> 00:21:29,965

Our future will begin with a call from space.

228

00:21:34,847 --> 00:21:40,609

Coming up next, a high-tension investigation starts off when a federal judge is gunned down

229

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in front of his home on FBI The Untold Stories. Then histories, crimes and trials, probes,

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controversial and conflicting theories about the JFK assassination.