



The UFO Rabbit Hole

**ARE UFOS  
ALIEN  
TECHNOLOGY?**

Episode 3

1  
00:00:21,029 --> 00:00:16,040

[Music]

2  
00:00:24,010 --> 00:00:23,050

do

3  
00:00:32,709 --> 00:00:24,020

[Music]

4  
00:00:35,670 --> 00:00:32,719  
welcome back to the ufo rabbit hole

5  
00:00:37,990 --> 00:00:35,680  
podcast i'm your host kelly chase

6  
00:00:39,350 --> 00:00:38,000  
so now we're really starting to get to

7  
00:00:41,430 --> 00:00:39,360  
the good part

8  
00:00:43,830 --> 00:00:41,440  
as we discussed in the last two episodes

9  
00:00:44,790 --> 00:00:43,840  
the pentagon has confirmed that ufos are

10  
00:00:47,750 --> 00:00:44,800  
real

11  
00:00:50,150 --> 00:00:47,760  
however they very conspicuously avoided

12  
00:00:51,830 --> 00:00:50,160  
public speculation about what they could

13  
00:00:53,670 --> 00:00:51,840

actually be

14

00:00:54,869 --> 00:00:53,680

what they have said basically boils down

15

00:00:56,630 --> 00:00:54,879

to this

16

00:00:58,790 --> 00:00:56,640

there are intelligently controlled

17

00:01:01,029 --> 00:00:58,800

technological objects being tracked in

18

00:01:03,110 --> 00:01:01,039

our skies and in our oceans that can do

19

00:01:05,350 --> 00:01:03,120

things that we can't explain

20

00:01:07,910 --> 00:01:05,360

we don't know what they are exactly and

21

00:01:09,910 --> 00:01:07,920

we don't know who they belong to but

22

00:01:12,390 --> 00:01:09,920

they aren't ours and we don't believe

23

00:01:14,390 --> 00:01:12,400

that they belong to any other country

24

00:01:16,149 --> 00:01:14,400

so what the heck are they

25

00:01:17,350 --> 00:01:16,159

and does this mean what it sounds like

26

00:01:19,190 --> 00:01:17,360

it means

27

00:01:22,070 --> 00:01:19,200

although the pentagon has very

28

00:01:23,670 --> 00:01:22,080

purposefully not said the words alien or

29

00:01:25,030 --> 00:01:23,680

extraterrestrial

30

00:01:27,510 --> 00:01:25,040

they have yet to offer any other

31

00:01:29,670 --> 00:01:27,520

explanation and so the natural

32

00:01:31,109 --> 00:01:29,680

conclusion for many is that if they

33

00:01:33,670 --> 00:01:31,119

aren't from here

34

00:01:35,749 --> 00:01:33,680

they must be from out there

35

00:01:36,870 --> 00:01:35,759

so what evidence is there that it's

36

00:01:38,550 --> 00:01:36,880

aliens

37

00:01:40,550 --> 00:01:38,560

like everything else that has to do with

38

00:01:42,630 --> 00:01:40,560

this topic the answer is more

39

00:01:45,670 --> 00:01:42,640  
complicated than you might think

40

00:01:48,389 --> 00:01:45,680  
so get some snacks clear your schedule

41

00:01:50,630 --> 00:01:48,399  
and buckle up friends we've got a lot of

42

00:01:54,310 --> 00:01:50,640  
ground to cover today and a great place

43

00:01:57,749 --> 00:01:54,320  
for us to start is with fermi's paradox

44

00:02:00,709 --> 00:01:57,759  
in 1950 enrico fermi a physicist at los

45

00:02:02,870 --> 00:02:00,719  
alamos national laboratory who as a side

46

00:02:04,389 --> 00:02:02,880  
note developed the first nuclear reactor

47

00:02:05,830 --> 00:02:04,399  
was having lunch with his friends when

48

00:02:08,710 --> 00:02:05,840  
he wondered aloud

49

00:02:10,469 --> 00:02:08,720  
where is everybody fermi had been

50

00:02:12,630 --> 00:02:10,479  
thinking about the lack of evidence for

51  
00:02:13,990 --> 00:02:12,640  
extraterrestrial life and it just didn't

52  
00:02:17,110 --> 00:02:14,000  
make sense to him

53  
00:02:20,070 --> 00:02:17,120  
after all if the universe is 14 billion

54  
00:02:23,190 --> 00:02:20,080  
years old and there are over a billion

55  
00:02:24,390 --> 00:02:23,200  
trillion stars how could we possibly be

56  
00:02:29,190 --> 00:02:24,400  
alone

57  
00:02:30,790 --> 00:02:29,200  
heard from some of our neighbors by now

58  
00:02:33,750 --> 00:02:30,800  
just look at our own development as a

59  
00:02:35,990 --> 00:02:33,760  
species in less than a million years we

60  
00:02:37,589 --> 00:02:36,000  
went from rudimentary wooden tools to

61  
00:02:39,110 --> 00:02:37,599  
landing on the moon

62  
00:02:41,430 --> 00:02:39,120  
launching a probe beyond our solar

63  
00:02:43,350 --> 00:02:41,440

system and we're starting to eye mars

64

00:02:44,949 --> 00:02:43,360

for colonization

65

00:02:46,869 --> 00:02:44,959

fermi crunched some numbers and he

66

00:02:48,710 --> 00:02:46,879

reasoned that any species with the

67

00:02:50,949 --> 00:02:48,720

ability and drive to colonize other

68

00:02:55,190 --> 00:02:50,959

worlds would be able to colonize an

69

00:02:57,830 --> 00:02:55,200

entire galaxy in about 10 million years

70

00:02:59,350 --> 00:02:57,840

now 10 million years may sound like a

71

00:03:00,790 --> 00:02:59,360

crazy long time

72

00:03:04,710 --> 00:03:00,800

but when you think about the fact that

73

00:03:06,550 --> 00:03:04,720

our galaxy is 10 000 million years old

74

00:03:07,350 --> 00:03:06,560

you realize that's actually no time at

75

00:03:09,990 --> 00:03:07,360

all

76  
00:03:11,750 --> 00:03:10,000  
so given those odds we almost certainly

77  
00:03:13,350 --> 00:03:11,760  
should have encountered extraterrestrial

78  
00:03:16,309 --> 00:03:13,360  
intelligence by now

79  
00:03:19,110 --> 00:03:16,319  
but as fermi asked where is everybody

80  
00:03:21,270 --> 00:03:19,120  
and that's the paradox there are a bunch

81  
00:03:23,110 --> 00:03:21,280  
of possible explanations for why this is

82  
00:03:25,509 --> 00:03:23,120  
the case and all of them are super

83  
00:03:28,710 --> 00:03:25,519  
interesting and also very relevant to

84  
00:03:30,949 --> 00:03:28,720  
this whole is aliens conversation so

85  
00:03:32,789 --> 00:03:30,959  
let's spend a little time with this

86  
00:03:35,270 --> 00:03:32,799  
one thing that makes fermi's paradox

87  
00:03:37,110 --> 00:03:35,280  
particularly perplexing is that the

88  
00:03:38,470 --> 00:03:37,120

earth is relatively young in the context

89

00:03:40,789 --> 00:03:38,480

of the universe

90

00:03:43,270 --> 00:03:40,799

the universe is estimated to be 14

91

00:03:46,470 --> 00:03:43,280

billion years old but the earth is only

92

00:03:48,149 --> 00:03:46,480

about 4.5 billion years old if we think

93

00:03:49,910 --> 00:03:48,159

about how difficult it would be for

94

00:03:51,350 --> 00:03:49,920

someone from a thousand years ago to

95

00:03:53,750 --> 00:03:51,360

comprehend our current level of

96

00:03:55,830 --> 00:03:53,760

technology and then recognize how our

97

00:03:57,670 --> 00:03:55,840

technological development has seemed to

98

00:04:00,149 --> 00:03:57,680

increase exponentially over the last

99

00:04:01,990 --> 00:04:00,159

century it can be hard to imagine what a

100

00:04:03,670 --> 00:04:02,000

civilization that's a thousand years

101  
00:04:05,670 --> 00:04:03,680  
ahead of us would look like

102  
00:04:07,429 --> 00:04:05,680  
much less one that had a head start of

103  
00:04:09,509 --> 00:04:07,439  
billions of years

104  
00:04:11,589 --> 00:04:09,519  
there is this model called the kardashev

105  
00:04:13,350 --> 00:04:11,599  
scale that we use to try to wrap our

106  
00:04:15,350 --> 00:04:13,360  
minds around this

107  
00:04:17,749 --> 00:04:15,360  
the kardashev scale is based on the

108  
00:04:19,749 --> 00:04:17,759  
assumption that as a civilization

109  
00:04:20,789 --> 00:04:19,759  
advances and begins to colonize the

110  
00:04:22,550 --> 00:04:20,799  
universe

111  
00:04:24,870 --> 00:04:22,560  
that its population growth and

112  
00:04:27,189 --> 00:04:24,880  
technological developments will require

113  
00:04:29,510 --> 00:04:27,199

increasing amounts of energy and it

114

00:04:31,830 --> 00:04:29,520

categorizes civilizations by the amount

115

00:04:33,909 --> 00:04:31,840

of energy that they're able to harness

116

00:04:37,590 --> 00:04:33,919

and there are three main categories type

117

00:04:40,230 --> 00:04:37,600

1 type 2 and type 3 civilizations

118

00:04:42,790 --> 00:04:40,240

a type 1 civilization is able to harness

119

00:04:44,070 --> 00:04:42,800

all of the energy of its planet

120

00:04:46,310 --> 00:04:44,080

humans aren't even a type one

121

00:04:48,790 --> 00:04:46,320

civilization yet we're still down at

122

00:04:50,870 --> 00:04:48,800

type zero and to give you a sense of how

123

00:04:53,189 --> 00:04:50,880

far we are from that right now we're

124

00:04:56,070 --> 00:04:53,199

actually only able to produce about one

125

00:04:58,150 --> 00:04:56,080

one hundred thousands of that energy but

126

00:05:00,150 --> 00:04:58,160

as a type 1 civilization we'd

127

00:05:02,390 --> 00:05:00,160

hypothetically be able to harness all of

128

00:05:05,670 --> 00:05:02,400

the power of the earth's oceans volcanic

129

00:05:07,990 --> 00:05:05,680

activity and more a type 2 civilization

130

00:05:10,550 --> 00:05:08,000

is able to harness all of the energy of

131

00:05:12,469 --> 00:05:10,560

its host star that would take a level of

132

00:05:13,670 --> 00:05:12,479

technology that we can scarcely

133

00:05:15,590 --> 00:05:13,680

understand

134

00:05:17,749 --> 00:05:15,600

scientists proposed that it could be

135

00:05:19,830 --> 00:05:17,759

done with a hypothetical megastructure

136

00:05:21,990 --> 00:05:19,840

called a dyson sphere that would

137

00:05:24,390 --> 00:05:22,000

basically be built around the sun to

138

00:05:27,590 --> 00:05:24,400

catch every bit of solar radiation

139

00:05:30,469 --> 00:05:27,600

a type 3 civilization is able to harness

140

00:05:31,749 --> 00:05:30,479

all of the energy of its galaxy

141

00:05:33,670 --> 00:05:31,759

i'm not even going to pretend to

142

00:05:35,430 --> 00:05:33,680

speculate on how that might be done it

143

00:05:37,990 --> 00:05:35,440

truly boggles the mind

144

00:05:39,670 --> 00:05:38,000

however if a civilization was really

145

00:05:41,590 --> 00:05:39,680

billions of years ahead of us in their

146

00:05:43,590 --> 00:05:41,600

development this is the level of

147

00:05:44,790 --> 00:05:43,600

advanced civilization that would be

148

00:05:46,710 --> 00:05:44,800

possible

149

00:05:49,270 --> 00:05:46,720

and if they're out there you'd think

150

00:05:51,510 --> 00:05:49,280

they'd be super noticeable especially if

151

00:05:53,430 --> 00:05:51,520

there were a lot of them so

152

00:05:55,590 --> 00:05:53,440

how many of these advanced civilizations

153

00:05:58,469 --> 00:05:55,600

do we think might be out there

154

00:06:00,469 --> 00:05:58,479

now that's where things get complicated

155

00:06:02,790 --> 00:06:00,479

there's a generally accepted formula for

156

00:06:04,550 --> 00:06:02,800

determining how many alien civilizations

157

00:06:06,710 --> 00:06:04,560

there should be who have reached a level

158

00:06:08,469 --> 00:06:06,720

of technological sophistication that we

159

00:06:10,790 --> 00:06:08,479

should be able to detect

160

00:06:12,629 --> 00:06:10,800

this is called the drake equation and

161

00:06:14,629 --> 00:06:12,639

while scientists agree on the formula

162

00:06:16,950 --> 00:06:14,639

itself when you start plugging in

163

00:06:18,550 --> 00:06:16,960

numbers there's a lot of debate i'm not

164

00:06:21,189 --> 00:06:18,560

even going to attempt to read this

165

00:06:22,870 --> 00:06:21,199

equation to you i don't really math

166

00:06:25,350 --> 00:06:22,880

but it's pretty straightforward and

167

00:06:27,189 --> 00:06:25,360

logical once you break it down

168

00:06:29,510 --> 00:06:27,199

basically you just multiply the

169

00:06:31,749 --> 00:06:29,520

following variables together

170

00:06:34,150 --> 00:06:31,759

the rate of formation of stars suitable

171

00:06:35,830 --> 00:06:34,160

for the development of intelligent life

172

00:06:37,749 --> 00:06:35,840

the fraction of those stars with

173

00:06:40,230 --> 00:06:37,759

planetary systems

174

00:06:41,830 --> 00:06:40,240

the number of planets per solar system

175

00:06:42,790 --> 00:06:41,840

with an environment that's suitable for

176  
00:06:44,790 --> 00:06:42,800  
life

177  
00:06:47,270 --> 00:06:44,800  
the fraction of suitable planets on

178  
00:06:49,350 --> 00:06:47,280  
which life actually appears

179  
00:06:52,070 --> 00:06:49,360  
the fraction of life-bearing planets on

180  
00:06:54,070 --> 00:06:52,080  
which intelligent life emerges

181  
00:06:55,990 --> 00:06:54,080  
the fraction of civilizations that

182  
00:06:58,390 --> 00:06:56,000  
develop a technology that produces

183  
00:07:00,390 --> 00:06:58,400  
detectable signs of their existence

184  
00:07:03,749 --> 00:07:00,400  
and the average length of time such

185  
00:07:05,589 --> 00:07:03,759  
civilizations produce such signs

186  
00:07:07,589 --> 00:07:05,599  
that makes a lot of sense right

187  
00:07:10,469 --> 00:07:07,599  
the issue with the drake equation is

188  
00:07:12,629 --> 00:07:10,479

that it's one big multiplication problem

189

00:07:15,270 --> 00:07:12,639

so if even one of the numbers you plug

190

00:07:16,950 --> 00:07:15,280

in is zero for instance if the number of

191

00:07:18,710 --> 00:07:16,960

other planets on which intelligent life

192

00:07:20,710 --> 00:07:18,720

can evolve is zero

193

00:07:22,710 --> 00:07:20,720

then the answer is zero and the reason

194

00:07:24,469 --> 00:07:22,720

we haven't found anyone else is because

195

00:07:26,629 --> 00:07:24,479

they aren't there

196

00:07:28,150 --> 00:07:26,639

and because that has been our experience

197

00:07:30,710 --> 00:07:28,160

it can be easy to want to stop right

198

00:07:33,110 --> 00:07:30,720

there and say case closed

199

00:07:34,790 --> 00:07:33,120

the problem is is that if we assume that

200

00:07:36,469 --> 00:07:34,800

any of those variables in the drake

201  
00:07:38,629 --> 00:07:36,479  
equation are zero

202  
00:07:39,670 --> 00:07:38,639  
or close enough to it to effectively be

203  
00:07:42,710 --> 00:07:39,680  
zero

204  
00:07:44,390 --> 00:07:42,720  
that makes us very special

205  
00:07:47,830 --> 00:07:44,400  
we're not just talking about one in a

206  
00:07:49,430 --> 00:07:47,840  
million but one in 100 billion and

207  
00:07:51,110 --> 00:07:49,440  
that's just talking about the planets in

208  
00:07:52,550 --> 00:07:51,120  
our own galaxy

209  
00:07:54,230 --> 00:07:52,560  
what are the chances that we are

210  
00:07:56,070 --> 00:07:54,240  
actually that special

211  
00:07:58,070 --> 00:07:56,080  
that's a question that's actually

212  
00:08:00,070 --> 00:07:58,080  
impossible to answer at least with the

213  
00:08:01,990 --> 00:08:00,080

data we currently have because of

214

00:08:03,510 --> 00:08:02,000

something called the observation

215

00:08:07,909 --> 00:08:03,520

selection effect

216

00:08:09,830 --> 00:08:07,919

when some property of a thing is

217

00:08:11,990 --> 00:08:09,840

correlated with the observer existing in

218

00:08:14,390 --> 00:08:12,000

the first place when such an effect is

219

00:08:15,909 --> 00:08:14,400

present the data will be biased often in

220

00:08:17,830 --> 00:08:15,919

significant ways

221

00:08:19,749 --> 00:08:17,840

the more extreme the correlation

222

00:08:22,469 --> 00:08:19,759

basically the more that the thing being

223

00:08:25,029 --> 00:08:22,479

observed is related to the observer the

224

00:08:26,950 --> 00:08:25,039

more unusual effects it could have

225

00:08:28,950 --> 00:08:26,960

so in this case the thing that we're

226

00:08:30,869 --> 00:08:28,960

trying to observe is whether or not we

227

00:08:33,350 --> 00:08:30,879

are unique on a level that would make

228

00:08:35,509 --> 00:08:33,360

finding others like us unlikely

229

00:08:37,670 --> 00:08:35,519

the problem is that our human intellect

230

00:08:40,389 --> 00:08:37,680

that we use to even ask that question

231

00:08:43,589 --> 00:08:40,399

inherently makes us special as far as we

232

00:08:45,590 --> 00:08:43,599

know we're the only species in the 4.5

233

00:08:46,949 --> 00:08:45,600

billion year history of this planet that

234

00:08:48,949 --> 00:08:46,959

has reached this level of sentient

235

00:08:51,190 --> 00:08:48,959

consciousness and intelligence

236

00:08:53,509 --> 00:08:51,200

that's pretty special right there

237

00:08:55,590 --> 00:08:53,519

so ultimately we really have no way of

238

00:08:56,790 --> 00:08:55,600

knowing how special or how not special

239

00:08:58,790 --> 00:08:56,800

we are

240

00:09:01,350 --> 00:08:58,800

even if there was only one intelligent

241

00:09:03,829 --> 00:09:01,360

species in the entire universe that

242

00:09:05,269 --> 00:09:03,839

intelligent species would inevitably ask

243

00:09:07,990 --> 00:09:05,279

this question

244

00:09:10,870 --> 00:09:08,000

we could be that one or we could be one

245

00:09:12,470 --> 00:09:10,880

of billions we simply don't know

246

00:09:13,509 --> 00:09:12,480

and so that leaves a lot of unanswered

247

00:09:15,910 --> 00:09:13,519

questions

248

00:09:18,630 --> 00:09:15,920

but also a lot of possibilities in terms

249

00:09:20,230 --> 00:09:18,640

of what could explain the fermi paradox

250

00:09:22,870 --> 00:09:20,240

we can't really narrow it down without

251

00:09:25,190 --> 00:09:22,880

more information so let's talk about

252

00:09:26,630 --> 00:09:25,200

what those possibilities are

253

00:09:29,110 --> 00:09:26,640

when we get down to basics with the

254

00:09:31,110 --> 00:09:29,120

fermi paradox we recognize that one of

255

00:09:32,790 --> 00:09:31,120

two things has to be true

256

00:09:34,790 --> 00:09:32,800

either we haven't found signs of

257

00:09:36,949 --> 00:09:34,800

intelligent life outside of our planet

258

00:09:38,310 --> 00:09:36,959

because it isn't there in other words

259

00:09:40,550 --> 00:09:38,320

we're special

260

00:09:42,389 --> 00:09:40,560

or there's intelligent life all over the

261

00:09:44,070 --> 00:09:42,399

place but there's a good explanation for

262

00:09:46,230 --> 00:09:44,080

why we haven't found it yet in other

263

00:09:47,670 --> 00:09:46,240

words we're not special

264

00:09:49,590 --> 00:09:47,680

so let's start with that first

265

00:09:51,190 --> 00:09:49,600

possibility that we haven't found signs

266

00:09:53,750 --> 00:09:51,200

of intelligent life outside of our

267

00:09:55,430 --> 00:09:53,760

planet because it isn't there

268

00:09:57,829 --> 00:09:55,440

so this is a world in which we are

269

00:09:59,910 --> 00:09:57,839

special but as we'll see that's not

270

00:10:02,230 --> 00:09:59,920

necessarily good news for us

271

00:10:04,230 --> 00:10:02,240

because while fermi's math calculated

272

00:10:05,910 --> 00:10:04,240

that there were potentially thousands of

273

00:10:08,470 --> 00:10:05,920

other intelligent civilizations in our

274

00:10:10,870 --> 00:10:08,480

galaxy and other people claim much

275

00:10:12,389 --> 00:10:10,880

smaller and much more specific numbers

276

00:10:14,710 --> 00:10:12,399

like 36

277

00:10:17,110 --> 00:10:14,720

if even one of them is a type 2 or a

278

00:10:19,190 --> 00:10:17,120

type 3 civilization their presence

279

00:10:19,990 --> 00:10:19,200

should be pretty obvious

280

00:10:21,350 --> 00:10:20,000

so

281

00:10:23,509 --> 00:10:21,360

if they're supposed to be other

282

00:10:25,750 --> 00:10:23,519

intelligent civilizations here and they

283

00:10:27,910 --> 00:10:25,760

aren't then that means that there must

284

00:10:30,069 --> 00:10:27,920

be something else going on and to

285

00:10:32,630 --> 00:10:30,079

address this problem there is a theory

286

00:10:34,630 --> 00:10:32,640

of the great filter which is basically

287

00:10:37,190 --> 00:10:34,640

the idea that somewhere between the

288

00:10:40,310 --> 00:10:37,200

pre-life stage of a planet and the type

289

00:10:43,190 --> 00:10:40,320

3 stage there's a filtering event that

290

00:10:44,150 --> 00:10:43,200

all or nearly all species fail to get

291

00:10:46,550 --> 00:10:44,160

past

292

00:10:49,030 --> 00:10:46,560

if that's the case then our fate is very

293

00:10:51,110 --> 00:10:49,040

much tied to where we are in relation to

294

00:10:52,550 --> 00:10:51,120

the great filter and there are three

295

00:10:54,790 --> 00:10:52,560

possibilities

296

00:10:59,030 --> 00:10:54,800

either one were rare

297

00:11:01,110 --> 00:10:59,040

two or first or three we're screwed

298

00:11:02,550 --> 00:11:01,120

so let's start with number one that

299

00:11:04,790 --> 00:11:02,560

we're rare

300

00:11:06,710 --> 00:11:04,800

in this scenario the great filter is

301  
00:11:08,949 --> 00:11:06,720  
already behind us and we're one of the

302  
00:11:10,470 --> 00:11:08,959  
vanishingly small amount of species that

303  
00:11:11,829 --> 00:11:10,480  
ever make it this far

304  
00:11:14,069 --> 00:11:11,839  
yay us

305  
00:11:15,990 --> 00:11:14,079  
so if this is the case then what could

306  
00:11:17,670 --> 00:11:16,000  
the great filter have been

307  
00:11:19,190 --> 00:11:17,680  
it's hard to tell but there are some

308  
00:11:20,949 --> 00:11:19,200  
strong candidates

309  
00:11:23,590 --> 00:11:20,959  
it could be that the conditions that

310  
00:11:25,910 --> 00:11:23,600  
create life are extremely rare and that

311  
00:11:27,269 --> 00:11:25,920  
the vast majority of planets never even

312  
00:11:29,590 --> 00:11:27,279  
get that far

313  
00:11:31,350 --> 00:11:29,600

or it could be that simple forms of life

314

00:11:33,190 --> 00:11:31,360

like single-celled organisms are

315

00:11:35,350 --> 00:11:33,200

relatively common but that it's

316

00:11:37,590 --> 00:11:35,360

extremely rare for those to develop into

317

00:11:39,829 --> 00:11:37,600

multicellular organisms

318

00:11:42,150 --> 00:11:39,839

or it could be that complex life like

319

00:11:44,630 --> 00:11:42,160

plants and animals as we know them are

320

00:11:47,509 --> 00:11:44,640

pretty common but that developing human

321

00:11:49,430 --> 00:11:47,519

level intelligence is super rare

322

00:11:51,750 --> 00:11:49,440

it could also be that the earth itself

323

00:11:53,829 --> 00:11:51,760

is just super rare we tend to take for

324

00:11:56,629 --> 00:11:53,839

granted how perfectly calibrated our

325

00:11:58,629 --> 00:11:56,639

planet is to support life just the fact

326

00:12:00,790 --> 00:11:58,639

that we have such a big moon that orbits

327

00:12:03,110 --> 00:12:00,800

so closely to the planet and is tidally

328

00:12:05,030 --> 00:12:03,120

locked with the earth creates the ocean

329

00:12:07,430 --> 00:12:05,040

tides and currents that stabilize our

330

00:12:09,509 --> 00:12:07,440

seasons making our planet particularly

331

00:12:11,030 --> 00:12:09,519

hospitable to life

332

00:12:13,030 --> 00:12:11,040

maybe it's our moon that's allowed

333

00:12:15,030 --> 00:12:13,040

complex life to evolve and flourish long

334

00:12:16,470 --> 00:12:15,040

enough to produce intelligent life it's

335

00:12:18,389 --> 00:12:16,480

certainly possible

336

00:12:19,910 --> 00:12:18,399

and actually we have lots of reasons to

337

00:12:22,230 --> 00:12:19,920

believe that our moon is nothing like

338

00:12:23,110 --> 00:12:22,240

other moons it's an outlier in a lot of

339

00:12:24,550 --> 00:12:23,120

ways

340

00:12:26,389 --> 00:12:24,560

i know i don't have time to talk to you

341

00:12:28,310 --> 00:12:26,399

about the moon right now we're right in

342

00:12:30,230 --> 00:12:28,320

the middle of something but stick a pin

343

00:12:32,150 --> 00:12:30,240

in that and we'll get back to it because

344

00:12:34,230 --> 00:12:32,160

the moon is weird

345

00:12:35,190 --> 00:12:34,240

so possibility number two is that we're

346

00:12:37,190 --> 00:12:35,200

first

347

00:12:39,350 --> 00:12:37,200

if we're not rare but we still can't

348

00:12:41,030 --> 00:12:39,360

find anybody else could it be that we

349

00:12:41,990 --> 00:12:41,040

just got to the stage of development

350

00:12:43,430 --> 00:12:42,000

first

351  
00:12:45,030 --> 00:12:43,440  
perhaps

352  
00:12:47,190 --> 00:12:45,040  
one obvious complication for this

353  
00:12:49,430 --> 00:12:47,200  
possibility though is that as we

354  
00:12:51,430 --> 00:12:49,440  
discussed the earth is relatively young

355  
00:12:53,430 --> 00:12:51,440  
compared to the universe itself

356  
00:12:55,509 --> 00:12:53,440  
so how could we be first if we're

357  
00:12:57,350 --> 00:12:55,519  
seemingly late to the party

358  
00:12:59,350 --> 00:12:57,360  
one explanation could be that the

359  
00:13:01,670 --> 00:12:59,360  
universe was just too chaotic for life

360  
00:13:03,190 --> 00:13:01,680  
to develop during the time before the

361  
00:13:05,110 --> 00:13:03,200  
earth was formed

362  
00:13:06,710 --> 00:13:05,120  
the earth may have just popped up at the

363  
00:13:08,790 --> 00:13:06,720

earliest time where there was enough

364

00:13:11,509 --> 00:13:08,800

stability to support the development and

365

00:13:13,350 --> 00:13:11,519

evolution of complex life forms

366

00:13:15,509 --> 00:13:13,360

in this scenario there wouldn't even

367

00:13:17,670 --> 00:13:15,519

necessarily need to be a great filtering

368

00:13:19,590 --> 00:13:17,680

event we just have to be patient until

369

00:13:21,509 --> 00:13:19,600

everyone else catches up

370

00:13:23,829 --> 00:13:21,519

and the final possibility is that the

371

00:13:25,430 --> 00:13:23,839

great filter is ahead of us and we're

372

00:13:27,750 --> 00:13:25,440

most likely on a collision course with

373

00:13:30,069 --> 00:13:27,760

our ultimate demise as a species in

374

00:13:31,910 --> 00:13:30,079

short we're screwed it could be that

375

00:13:34,069 --> 00:13:31,920

once a species reaches a certain level

376  
00:13:35,910 --> 00:13:34,079  
of technological advancement that most

377  
00:13:37,110 --> 00:13:35,920  
if not all of them end up destroying

378  
00:13:38,949 --> 00:13:37,120  
themselves

379  
00:13:41,030 --> 00:13:38,959  
this scenario hits pretty close to home

380  
00:13:43,030 --> 00:13:41,040  
when you think about the absolute havoc

381  
00:13:45,750 --> 00:13:43,040  
that our technological advancements have

382  
00:13:46,949 --> 00:13:45,760  
reeked on the planet and on each other

383  
00:13:49,389 --> 00:13:46,959  
not only are we destroying the

384  
00:13:52,470 --> 00:13:49,399  
environment but we currently have

385  
00:13:54,629 --> 00:13:52,480  
150 times more nuclear bombs on the

386  
00:13:56,389 --> 00:13:54,639  
planet than it would take to effectively

387  
00:13:58,069 --> 00:13:56,399  
end life as we know it

388  
00:13:59,829 --> 00:13:58,079

the idea that the great filter is ahead

389

00:14:01,030 --> 00:13:59,839

of us doesn't really feel like that much

390

00:14:03,670 --> 00:14:01,040

of a stretch

391

00:14:05,590 --> 00:14:03,680

however luckily for us there's still the

392

00:14:08,069 --> 00:14:05,600

second possible explanation for fermi's

393

00:14:10,150 --> 00:14:08,079

paradox which is that there is

394

00:14:11,670 --> 00:14:10,160

intelligent life all over the place but

395

00:14:13,110 --> 00:14:11,680

there's a good explanation for why we

396

00:14:14,790 --> 00:14:13,120

haven't found it yet

397

00:14:16,550 --> 00:14:14,800

while the first explanation depends

398

00:14:17,750 --> 00:14:16,560

heavily on the idea that we're special

399

00:14:19,509 --> 00:14:17,760

in some way

400

00:14:21,910 --> 00:14:19,519

this explanation relies on the

401

00:14:23,670 --> 00:14:21,920

mediocrity principle which basically

402

00:14:25,430 --> 00:14:23,680

assumes that our planet and our solar

403

00:14:27,189 --> 00:14:25,440

system are pretty average and not

404

00:14:29,030 --> 00:14:27,199

different from most other solar systems

405

00:14:31,509 --> 00:14:29,040

in any meaningful way

406

00:14:33,430 --> 00:14:31,519

so if we're not special in any way then

407

00:14:34,629 --> 00:14:33,440

there should be intelligent species in

408

00:14:36,790 --> 00:14:34,639

the galaxy

409

00:14:38,150 --> 00:14:36,800

and so if we can't see them we have to

410

00:14:40,389 --> 00:14:38,160

assume that there's just something

411

00:14:42,629 --> 00:14:40,399

that's preventing us from detecting them

412

00:14:44,150 --> 00:14:42,639

as for what that something could be

413

00:14:46,870 --> 00:14:44,160

the possibilities are pretty

414

00:14:49,110 --> 00:14:46,880

mind-bending and i'm not gonna lie some

415

00:14:49,910 --> 00:14:49,120

of them are actually pretty terrifying

416

00:14:52,629 --> 00:14:49,920

so

417

00:14:53,670 --> 00:14:52,639

possibility number one is that we are

418

00:14:55,430 --> 00:14:53,680

[h\_\_\h]

419

00:14:57,110 --> 00:14:55,440

it could be that we're just projecting

420

00:14:59,750 --> 00:14:57,120

the idea that a highly advanced

421

00:15:01,829 --> 00:14:59,760

technological society would want to do

422

00:15:03,590 --> 00:15:01,839

things like colonize space and find

423

00:15:05,829 --> 00:15:03,600

increasingly elaborate ways to harness

424

00:15:07,910 --> 00:15:05,839

more energy to meet perpetually rising

425

00:15:09,910 --> 00:15:07,920

demand because those are the kind of

426

00:15:12,470 --> 00:15:09,920

[h\_\_h] moves that we would make

427

00:15:15,269 --> 00:15:12,480

and yet those are the very assumptions

428

00:15:18,389 --> 00:15:15,279

upon which the kardashev scale is based

429

00:15:20,629 --> 00:15:18,399

so our idea of what a type 1 type 2 and

430

00:15:22,470 --> 00:15:20,639

type 3 civilization would be could just

431

00:15:24,310 --> 00:15:22,480

be way off base

432

00:15:25,990 --> 00:15:24,320

maybe most higher intelligences are

433

00:15:27,990 --> 00:15:26,000

smart enough to pursue more worthy and

434

00:15:29,509 --> 00:15:28,000

less destructive pursuits

435

00:15:31,350 --> 00:15:29,519

maybe at a certain point they just

436

00:15:33,509 --> 00:15:31,360

upload their consciousness to a nebula

437

00:15:34,790 --> 00:15:33,519

and just vibe it's possible that they're

438

00:15:36,790 --> 00:15:34,800

out there and we just don't know what

439

00:15:38,629 --> 00:15:36,800

we're looking at because we expect them

440

00:15:40,870 --> 00:15:38,639

all to be dicks like us

441

00:15:43,509 --> 00:15:40,880

possibility number two is that there are

442

00:15:45,430 --> 00:15:43,519

way bigger [h\_\_h] out there than us

443

00:15:47,590 --> 00:15:45,440

it could be that there are scary

444

00:15:49,509 --> 00:15:47,600

predator civilizations out there and

445

00:15:51,670 --> 00:15:49,519

it's so quiet because most intelligent

446

00:15:53,509 --> 00:15:51,680

civilizations are smart enough to not go

447

00:15:55,430 --> 00:15:53,519

announcing their location

448

00:15:57,670 --> 00:15:55,440

if you think about it we've actually

449

00:15:59,829 --> 00:15:57,680

been pretty cavalier about broadcasting

450

00:16:02,230 --> 00:15:59,839

signals out into space and trying to

451  
00:16:05,990 --> 00:16:02,240  
contact alien life considering that we

452  
00:16:07,670 --> 00:16:06,000  
have no idea who is out there and who or

453  
00:16:09,030 --> 00:16:07,680  
what might respond to our little

454  
00:16:10,870 --> 00:16:09,040  
messages

455  
00:16:12,949 --> 00:16:10,880  
some of the greatest scientific minds of

456  
00:16:15,189 --> 00:16:12,959  
our times including carl sagan and

457  
00:16:17,030 --> 00:16:15,199  
stephen hawking were both vehemently

458  
00:16:19,430 --> 00:16:17,040  
opposed to trying to make contact with

459  
00:16:21,509 --> 00:16:19,440  
extraterrestrial intelligences because

460  
00:16:24,230 --> 00:16:21,519  
of this exact danger

461  
00:16:26,069 --> 00:16:24,240  
in the always poetic words of carl sagan

462  
00:16:28,389 --> 00:16:26,079  
the newest children in a strange and

463  
00:16:29,829 --> 00:16:28,399

uncertain cosmos should listen quietly

464

00:16:31,829 --> 00:16:29,839

for a long time

465

00:16:34,069 --> 00:16:31,839

patiently learning about the universe

466

00:16:35,910 --> 00:16:34,079

and comparing notes before shouting into

467

00:16:37,189 --> 00:16:35,920

an unknown jungle that we do not

468

00:16:39,269 --> 00:16:37,199

understand

469

00:16:41,350 --> 00:16:39,279

possibility three is that there's just

470

00:16:44,230 --> 00:16:41,360

one super [h\_\_h]

471

00:16:46,710 --> 00:16:44,240

it could be that there's just one super

472

00:16:49,030 --> 00:16:46,720

advanced predator species out there that

473

00:16:50,470 --> 00:16:49,040

keeps tabs on all other technologically

474

00:16:52,230 --> 00:16:50,480

developing species

475

00:16:54,230 --> 00:16:52,240

and basically exterminates them when

476

00:16:56,310 --> 00:16:54,240

they cross a certain threshold

477

00:16:58,870 --> 00:16:56,320

terrifying moving on

478

00:17:00,550 --> 00:16:58,880

another possibility is that aliens have

479

00:17:01,749 --> 00:17:00,560

been here but it was just a long time

480

00:17:04,949 --> 00:17:01,759

ago

481

00:17:06,710 --> 00:17:04,959

earth is 4.5 billion years old but we've

482

00:17:08,470 --> 00:17:06,720

only had the ability to meaningfully

483

00:17:11,029 --> 00:17:08,480

look for signs of other intelligent life

484

00:17:13,189 --> 00:17:11,039

in the galaxy for the last century or so

485

00:17:15,350 --> 00:17:13,199

a tiny blip in the history of both

486

00:17:16,630 --> 00:17:15,360

humanity and of the planet

487

00:17:18,309 --> 00:17:16,640

just because we don't see

488

00:17:20,470 --> 00:17:18,319

extraterrestrials hanging out in our

489

00:17:22,069 --> 00:17:20,480

cosmic neighborhood now doesn't mean

490

00:17:23,829 --> 00:17:22,079

that they've never been here

491

00:17:25,750 --> 00:17:23,839

or that they won't return

492

00:17:27,510 --> 00:17:25,760

the next possibility is just that we

493

00:17:29,830 --> 00:17:27,520

live in the boonies

494

00:17:32,150 --> 00:17:29,840

it could be that the galaxy is colonized

495

00:17:34,549 --> 00:17:32,160

but that we just live in some far-flung

496

00:17:36,390 --> 00:17:34,559

outposts that they rarely visit

497

00:17:38,470 --> 00:17:36,400

basically the earth could just be in a

498

00:17:40,390 --> 00:17:38,480

very unfashionable zip code

499

00:17:42,710 --> 00:17:40,400

in all seriousness though our solar

500

00:17:45,190 --> 00:17:42,720

system actually is way out on the edge

501  
00:17:46,789 --> 00:17:45,200  
of one of the milky way's spiral arms

502  
00:17:48,630 --> 00:17:46,799  
maybe we're just too far out to get

503  
00:17:50,390 --> 00:17:48,640  
visitors very often

504  
00:17:52,549 --> 00:17:50,400  
the next possibility is that our

505  
00:17:53,750 --> 00:17:52,559  
technology is just too primitive to

506  
00:17:55,190 --> 00:17:53,760  
detect them

507  
00:17:56,630 --> 00:17:55,200  
just like you wouldn't be able to talk

508  
00:17:58,870 --> 00:17:56,640  
to someone on a cell phone with a

509  
00:18:00,950 --> 00:17:58,880  
messenger pigeon it could be that the

510  
00:18:02,710 --> 00:18:00,960  
technology that's out there is just so

511  
00:18:04,630 --> 00:18:02,720  
advanced and so different that we're

512  
00:18:06,310 --> 00:18:04,640  
basically looking for the wrong evidence

513  
00:18:07,830 --> 00:18:06,320

with the wrong tools

514

00:18:09,590 --> 00:18:07,840

we assume that the signatures of

515

00:18:11,990 --> 00:18:09,600

intelligent communication would look the

516

00:18:13,430 --> 00:18:12,000

way that ours do but we could be very

517

00:18:15,830 --> 00:18:13,440

wrong about that

518

00:18:17,750 --> 00:18:15,840

the next possibility is that we are too

519

00:18:20,070 --> 00:18:17,760

primitive to detect them

520

00:18:21,669 --> 00:18:20,080

in the wise words of renowned physicist

521

00:18:23,750 --> 00:18:21,679

michiao cuckoo

522

00:18:25,669 --> 00:18:23,760

quote if ants and anthill detect a

523

00:18:27,350 --> 00:18:25,679

10-lane superhighway being built near

524

00:18:29,190 --> 00:18:27,360

them would they understand how to

525

00:18:30,549 --> 00:18:29,200

communicate with the workers

526

00:18:33,190 --> 00:18:30,559

would they assume that the workers

527

00:18:35,270 --> 00:18:33,200

communicate only on ant frequencies

528

00:18:37,029 --> 00:18:35,280

in fact the ants are so primitive that

529

00:18:39,830 --> 00:18:37,039

they would not even understand what a 10

530

00:18:41,590 --> 00:18:39,840

lane superhighway was unquote it could

531

00:18:43,909 --> 00:18:41,600

be that we're ants in this scenario and

532

00:18:46,070 --> 00:18:43,919

that extraterrestrial civilizations are

533

00:18:47,909 --> 00:18:46,080

right in front of us potentially even

534

00:18:49,669 --> 00:18:47,919

sharing space with us

535

00:18:51,510 --> 00:18:49,679

and our perspective from our current

536

00:18:53,590 --> 00:18:51,520

stage of evolutionary development is

537

00:18:55,029 --> 00:18:53,600

such that we don't even comprehend what

538

00:18:56,549 --> 00:18:55,039

we're seeing

539

00:18:58,789 --> 00:18:56,559

the next possibility is that the

540

00:19:00,390 --> 00:18:58,799

government is hiding the evidence

541

00:19:01,990 --> 00:19:00,400

we're going to talk about this one a lot

542

00:19:04,390 --> 00:19:02,000

more later so we don't need to spend

543

00:19:06,710 --> 00:19:04,400

much time on it but it is a possibility

544

00:19:08,070 --> 00:19:06,720

the next possibility is that the earth

545

00:19:09,990 --> 00:19:08,080

is a zoo

546

00:19:11,909 --> 00:19:10,000

it could be that we are being observed

547

00:19:13,990 --> 00:19:11,919

by another species as part of some sort

548

00:19:15,750 --> 00:19:14,000

of experiment or it could be that the

549

00:19:17,909 --> 00:19:15,760

solar system is being treated like some

550

00:19:19,750 --> 00:19:17,919

sort of protected national park

551

00:19:22,230 --> 00:19:19,760

either way there might be a look but

552

00:19:24,630 --> 00:19:22,240

don't communicate or interfere policy

553

00:19:27,029 --> 00:19:24,640

with regards to our planet sort of like

554

00:19:28,630 --> 00:19:27,039

the prime directive from star trek

555

00:19:29,990 --> 00:19:28,640

and if you feel like we're starting to

556

00:19:32,230 --> 00:19:30,000

get into crazy town with these

557

00:19:34,710 --> 00:19:32,240

possibilities you should know that some

558

00:19:36,630 --> 00:19:34,720

of the most respected names in ufology

559

00:19:39,830 --> 00:19:36,640

and the disclosure movement including lu

560

00:19:41,669 --> 00:19:39,840

elizondo do not scoff at this idea and

561

00:19:43,190 --> 00:19:41,679

throw it around regularly as a genuine

562

00:19:44,710 --> 00:19:43,200

possibility

563

00:19:46,789 --> 00:19:44,720

i told you in episode one that i was

564

00:19:48,549 --> 00:19:46,799

going to make you 75 weirder at dinner

565

00:19:50,390 --> 00:19:48,559

parties and i meant it

566

00:19:52,390 --> 00:19:50,400

we're just getting started

567

00:19:54,390 --> 00:19:52,400

the next possibility is that we are

568

00:19:55,909 --> 00:19:54,400

fundamentally wrong about the nature of

569

00:19:57,830 --> 00:19:55,919

our reality

570

00:19:59,750 --> 00:19:57,840

in recent years scientists have

571

00:20:02,149 --> 00:19:59,760

increasingly discussed the possibility

572

00:20:03,190 --> 00:20:02,159

that we could be living in a simulation

573

00:20:05,270 --> 00:20:03,200

for real

574

00:20:06,789 --> 00:20:05,280

so hypothetically it could be that there

575

00:20:08,549 --> 00:20:06,799

just weren't any other advanced

576

00:20:09,909 --> 00:20:08,559

intelligences programmed into the

577

00:20:11,990 --> 00:20:09,919

simulation

578

00:20:14,549 --> 00:20:12,000

in fact regardless of whether or not it

579

00:20:16,470 --> 00:20:14,559

helps us explain the fermi paradox the

580

00:20:17,590 --> 00:20:16,480

simulation hypothesis still might end up

581

00:20:19,029 --> 00:20:17,600

being true

582

00:20:21,029 --> 00:20:19,039

the more we learn about quantum

583

00:20:23,830 --> 00:20:21,039

mechanics the more evidence we find that

584

00:20:25,590 --> 00:20:23,840

could point to that startling conclusion

585

00:20:27,510 --> 00:20:25,600

a lot of those findings are too complex

586

00:20:29,510 --> 00:20:27,520

to get into now but i'll give you this

587

00:20:31,110 --> 00:20:29,520

little thought experiment

588

00:20:33,110 --> 00:20:31,120

if you think about the evolution of

589

00:20:35,110 --> 00:20:33,120

computer and video games from the early

590

00:20:36,710 --> 00:20:35,120

8-bit systems to the current emergence

591

00:20:38,549 --> 00:20:36,720

of virtual reality

592

00:20:40,549 --> 00:20:38,559

it's clear that our ability to create

593

00:20:43,430 --> 00:20:40,559

more and more realistic virtual

594

00:20:45,909 --> 00:20:43,440

environments is increasing exponentially

595

00:20:48,149 --> 00:20:45,919

even with vr headsets now it may not

596

00:20:50,070 --> 00:20:48,159

look real exactly but your body still

597

00:20:52,149 --> 00:20:50,080

responds to it like it is

598

00:20:55,430 --> 00:20:52,159

and with this exponential improvement of

599

00:20:57,190 --> 00:20:55,440

vr technologies it's not hard to imagine

600

00:20:59,830 --> 00:20:57,200

that at some point we're going to be

601  
00:21:02,549 --> 00:20:59,840  
able to create simulated experiences and

602  
00:21:05,350 --> 00:21:02,559  
environments that are indistinguishable

603  
00:21:07,110 --> 00:21:05,360  
from reality from there the logic is

604  
00:21:09,190 --> 00:21:07,120  
that if you could create this sort of

605  
00:21:11,669 --> 00:21:09,200  
simulation you would

606  
00:21:13,590 --> 00:21:11,679  
and hypothetically someone could create

607  
00:21:15,510 --> 00:21:13,600  
a simulated universe and in that

608  
00:21:17,669 --> 00:21:15,520  
simulated universe a species could

609  
00:21:20,870 --> 00:21:17,679  
advance to the point that it creates its

610  
00:21:23,190 --> 00:21:20,880  
own simulation within the simulation and

611  
00:21:25,270 --> 00:21:23,200  
so on hypothetically there could be a

612  
00:21:27,990 --> 00:21:25,280  
near infinite number of simulated

613  
00:21:30,390 --> 00:21:28,000

universes within the real universe

614

00:21:32,310 --> 00:21:30,400

so if that's the case then what are the

615

00:21:34,630 --> 00:21:32,320

chances that we're actually in base

616

00:21:35,990 --> 00:21:34,640

reality and that's actually one of the

617

00:21:38,390 --> 00:21:36,000

least convincing arguments for the

618

00:21:40,710 --> 00:21:38,400

simulation hypothesis we'll definitely

619

00:21:42,630 --> 00:21:40,720

get into others in another episode but

620

00:21:44,549 --> 00:21:42,640

for now we're still on the alien

621

00:21:46,470 --> 00:21:44,559

question and through the lens of the

622

00:21:49,270 --> 00:21:46,480

fermi paradox and its many many

623

00:21:52,070 --> 00:21:49,280

explanations we can start to see how

624

00:22:05,540 --> 00:21:52,080

complex this question is and how many

625

00:22:05,550 --> 00:22:45,190

[Music]

626

00:22:49,350 --> 00:22:46,870

i don't know what your experience was

627

00:22:51,110 --> 00:22:49,360

but as a kid born in the 80s when i was

628

00:22:52,630 --> 00:22:51,120

growing up the idea that we were alone

629

00:22:55,110 --> 00:22:52,640

in the universe seemed like it was

630

00:22:56,710 --> 00:22:55,120

treated as the default and the most

631

00:22:59,110 --> 00:22:56,720

likely option

632

00:23:01,270 --> 00:22:59,120

and i'm talking like completely alone as

633

00:23:03,990 --> 00:23:01,280

in the conditions for even the most

634

00:23:05,990 --> 00:23:04,000

simplistic and rudimentary forms of life

635

00:23:07,909 --> 00:23:06,000

are so rare and mysterious that the

636

00:23:09,430 --> 00:23:07,919

earth was likely the only place that it

637

00:23:11,029 --> 00:23:09,440

ever happened

638

00:23:13,510 --> 00:23:11,039

but as i've gotten older and

639

00:23:15,830 --> 00:23:13,520

particularly in the last 10 years it

640

00:23:17,590 --> 00:23:15,840

feels like a shift has occurred where

641

00:23:19,909 --> 00:23:17,600

more and more people believe that the

642

00:23:21,669 --> 00:23:19,919

universe is likely teeming with life and

643

00:23:22,710 --> 00:23:21,679

that it's only a matter of time until we

644

00:23:24,390 --> 00:23:22,720

find it

645

00:23:27,190 --> 00:23:24,400

and we're even taking a long hard look

646

00:23:29,270 --> 00:23:27,200

at places within our own solar system

647

00:23:31,110 --> 00:23:29,280

i did some digging and it turns out that

648

00:23:33,350 --> 00:23:31,120

there have actually been some pretty

649

00:23:34,710 --> 00:23:33,360

dramatic swings throughout history when

650

00:23:37,029 --> 00:23:34,720

it comes to our belief about the

651  
00:23:39,750 --> 00:23:37,039  
existence of life on other planets

652  
00:23:41,190 --> 00:23:39,760  
however by and large the dominant belief

653  
00:23:43,029 --> 00:23:41,200  
throughout most of recorded human

654  
00:23:45,190 --> 00:23:43,039  
history has been that the existence of

655  
00:23:48,230 --> 00:23:45,200  
life elsewhere in the universe wasn't

656  
00:23:50,149 --> 00:23:48,240  
just a possibility but a probability

657  
00:23:52,310 --> 00:23:50,159  
our more cynical outlook on the prospect

658  
00:23:53,830 --> 00:23:52,320  
in recent decades is more the exception

659  
00:23:55,350 --> 00:23:53,840  
than the rule

660  
00:23:57,430 --> 00:23:55,360  
these days our outlook on the

661  
00:23:59,190 --> 00:23:57,440  
possibility of finding extraterrestrial

662  
00:24:01,110 --> 00:23:59,200  
life is much sunnier

663  
00:24:03,029 --> 00:24:01,120

two-thirds of americans say that their

664

00:24:05,510 --> 00:24:03,039

best guess is that intelligent life

665

00:24:07,510 --> 00:24:05,520

exists on other planets

666

00:24:10,070 --> 00:24:07,520

to find evidence of the possibility of

667

00:24:11,669 --> 00:24:10,080

life existing elsewhere in the cosmos we

668

00:24:13,110 --> 00:24:11,679

don't need to look any further than our

669

00:24:14,710 --> 00:24:13,120

own planet

670

00:24:15,909 --> 00:24:14,720

like we were discussing with the fermi

671

00:24:17,909 --> 00:24:15,919

paradox

672

00:24:20,549 --> 00:24:17,919

until we find evidence of life somewhere

673

00:24:22,870 --> 00:24:20,559

else it's hard to know how common it is

674

00:24:24,630 --> 00:24:22,880

for life to develop on a planet

675

00:24:26,070 --> 00:24:24,640

especially considering that we don't

676  
00:24:28,470 --> 00:24:26,080  
actually know what causes life to

677  
00:24:30,470 --> 00:24:28,480  
develop in the first place

678  
00:24:33,110 --> 00:24:30,480  
we do know that our planet appears to be

679  
00:24:35,430 --> 00:24:33,120  
uniquely calibrated to support life so

680  
00:24:37,350 --> 00:24:35,440  
we can probably assume that if there are

681  
00:24:39,430 --> 00:24:37,360  
certain conditions that are particularly

682  
00:24:41,669 --> 00:24:39,440  
favorable to the spontaneous creation of

683  
00:24:44,230 --> 00:24:41,679  
life they probably existed on earth

684  
00:24:46,310 --> 00:24:44,240  
about 3.7 billion years ago

685  
00:24:48,710 --> 00:24:46,320  
and how many other earth-like planets

686  
00:24:50,950 --> 00:24:48,720  
might there actually be out there

687  
00:24:53,750 --> 00:24:50,960  
as we continue to identify more and more

688  
00:24:55,590 --> 00:24:53,760

exoplanets outside of our solar system

689

00:24:57,830 --> 00:24:55,600

we're getting more and more data to help

690

00:24:59,669 --> 00:24:57,840

us answer that question although there

691

00:25:02,230 --> 00:24:59,679

is considerable debate about what

692

00:25:04,390 --> 00:25:02,240

exactly constitutes an earth-like planet

693

00:25:06,549 --> 00:25:04,400

and how likely a planet that is like

694

00:25:08,390 --> 00:25:06,559

ours would be to develop life

695

00:25:11,029 --> 00:25:08,400

evidence suggests that there may be as

696

00:25:13,350 --> 00:25:11,039

many as one earth-like planet for every

697

00:25:14,390 --> 00:25:13,360

five sun-like stars in the milky way

698

00:25:16,630 --> 00:25:14,400

alone

699

00:25:17,750 --> 00:25:16,640

that gives us a lot of chances for life

700

00:25:19,750 --> 00:25:17,760

to develop

701  
00:25:22,470 --> 00:25:19,760  
but what about places that are nothing

702  
00:25:24,070 --> 00:25:22,480  
like earth could life possibly arise in

703  
00:25:26,070 --> 00:25:24,080  
environments that aren't as friendly to

704  
00:25:26,830 --> 00:25:26,080  
life as we know it the more we learn

705  
00:25:28,789 --> 00:25:26,840  
about

706  
00:25:30,710 --> 00:25:28,799  
extremophiles the more we think that the

707  
00:25:32,870 --> 00:25:30,720  
answer could be yes

708  
00:25:34,310 --> 00:25:32,880  
extremophiles are organisms that live in

709  
00:25:36,870 --> 00:25:34,320  
conditions that we would normally

710  
00:25:39,990 --> 00:25:36,880  
consider to be hostile to life including

711  
00:25:42,390 --> 00:25:40,000  
extreme temperature acidity alkalinity

712  
00:25:44,549 --> 00:25:42,400  
or chemical concentration

713  
00:25:46,230 --> 00:25:44,559

these organisms challenge everything

714

00:25:48,149 --> 00:25:46,240

that we thought we knew about what it

715

00:25:50,630 --> 00:25:48,159

takes to support life

716

00:25:52,230 --> 00:25:50,640

for example there's a bacterium called

717

00:25:54,549 --> 00:25:52,240

d-radiodurans

718

00:25:56,789 --> 00:25:54,559

that not only thrives in the cores of

719

00:25:58,789 --> 00:25:56,799

nuclear reactors but it can survive

720

00:26:01,669 --> 00:25:58,799

exposure to everything from toxic

721

00:26:03,990 --> 00:26:01,679

chemicals and corrosive acids to extreme

722

00:26:06,149 --> 00:26:04,000

heat above the boiling point of water

723

00:26:07,830 --> 00:26:06,159

sub-zero temperatures and even the

724

00:26:10,310 --> 00:26:07,840

vacuum of space

725

00:26:11,990 --> 00:26:10,320

there are also three species of fungi

726  
00:26:14,630 --> 00:26:12,000  
that were discovered inside the

727  
00:26:16,789 --> 00:26:14,640  
abandoned chernobyl nuclear power plant

728  
00:26:18,710 --> 00:26:16,799  
scientists studied these fungi and found

729  
00:26:20,470 --> 00:26:18,720  
out that they grow faster in the

730  
00:26:23,029 --> 00:26:20,480  
presence of radiation and even

731  
00:26:25,110 --> 00:26:23,039  
effectively eat the radiation

732  
00:26:27,590 --> 00:26:25,120  
using the pigment melanin that captures

733  
00:26:30,149 --> 00:26:27,600  
the radiant energy similar to the way it

734  
00:26:32,149 --> 00:26:30,159  
absorbs uv radiation in human skin to

735  
00:26:34,390 --> 00:26:32,159  
help avoid sunburns

736  
00:26:36,390 --> 00:26:34,400  
these extremophiles force us to rethink

737  
00:26:39,110 --> 00:26:36,400  
what it even means for something to be

738  
00:26:41,029 --> 00:26:39,120

alive and to reconsider all of the

739

00:26:43,510 --> 00:26:41,039

vastly different ways that life might

740

00:26:45,669 --> 00:26:43,520

adapt itself to various environments

741

00:26:48,070 --> 00:26:45,679

it even begs the question of whether or

742

00:26:50,549 --> 00:26:48,080

not the earth really is uniquely suited

743

00:26:51,830 --> 00:26:50,559

to support life or if we just view it

744

00:26:53,510 --> 00:26:51,840

that way because it's the only

745

00:26:55,110 --> 00:26:53,520

environment we know of that supports

746

00:26:56,950 --> 00:26:55,120

life as we know it

747

00:26:59,190 --> 00:26:56,960

there's even evidence that some

748

00:27:01,590 --> 00:26:59,200

extremophiles on earth could survive in

749

00:27:03,430 --> 00:27:01,600

the conditions on mars so it's not

750

00:27:05,190 --> 00:27:03,440

difficult to imagine that there might be

751

00:27:07,350 --> 00:27:05,200

a wide variety of environments that

752

00:27:09,350 --> 00:27:07,360

could potentially give rise to at least

753

00:27:11,590 --> 00:27:09,360

simple life forms

754

00:27:13,990 --> 00:27:11,600

and speaking of mars the idea that there

755

00:27:16,549 --> 00:27:14,000

could be life on mars could actually be

756

00:27:19,110 --> 00:27:16,559

more than hypothetical in fact former

757

00:27:21,669 --> 00:27:19,120

nasa scientist gilbert v levin

758

00:27:24,789 --> 00:27:21,679

claims that evidence of life on mars was

759

00:27:26,710 --> 00:27:24,799

found back in the 1970s when the viking

760

00:27:28,630 --> 00:27:26,720

landers were sent to explore the martian

761

00:27:30,630 --> 00:27:28,640

surface levin was the principal

762

00:27:33,750 --> 00:27:30,640

investigator on an experiment that he

763

00:27:35,269 --> 00:27:33,760

claims detected microbial respiration in

764

00:27:37,750 --> 00:27:35,279

the martian soil

765

00:27:40,310 --> 00:27:37,760

he claims his team actually recorded

766

00:27:43,029 --> 00:27:40,320

four separate positive results supported

767

00:27:45,190 --> 00:27:43,039

by five varied controls coming from each

768

00:27:48,549 --> 00:27:45,200

of the twin viking spacecraft which

769

00:27:51,430 --> 00:27:48,559

landed around 4 000 miles apart for

770

00:27:53,909 --> 00:27:51,440

levin finding what was a clear byproduct

771

00:27:56,070 --> 00:27:53,919

of life was incontrovertible proof that

772

00:27:58,149 --> 00:27:56,080

there must be some sort of microbial

773

00:28:01,029 --> 00:27:58,159

life in the soil of mars

774

00:28:03,909 --> 00:28:01,039

however because actual organic matter

775

00:28:05,830 --> 00:28:03,919

wasn't found nasa dismissed the positive

776

00:28:07,990 --> 00:28:05,840

results as being evidence of some sort

777

00:28:10,070 --> 00:28:08,000

of inorganic matter that was mimicking

778

00:28:11,830 --> 00:28:10,080

life but was not life

779

00:28:13,430 --> 00:28:11,840

no other explanation was offered for

780

00:28:16,070 --> 00:28:13,440

what that might be

781

00:28:17,830 --> 00:28:16,080

in other words don't worry about it

782

00:28:19,909 --> 00:28:17,840

still it does make sense why nasa would

783

00:28:21,350 --> 00:28:19,919

hold off until finding actual life

784

00:28:22,470 --> 00:28:21,360

itself before making such an

785

00:28:24,630 --> 00:28:22,480

announcement

786

00:28:27,029 --> 00:28:24,640

the profound implications for finding

787

00:28:28,630 --> 00:28:27,039

even microbial life on other planets is

788

00:28:30,389 --> 00:28:28,640

hard to overstate

789

00:28:32,149 --> 00:28:30,399

for one it would eliminate most of the

790

00:28:34,549 --> 00:28:32,159

answers to the fermi paradox that are

791

00:28:36,470 --> 00:28:34,559

based on the idea that we're special if

792

00:28:38,389 --> 00:28:36,480

our nearest neighbor who we previously

793

00:28:41,350 --> 00:28:38,399

thought was potentially too hostile for

794

00:28:43,350 --> 00:28:41,360

life proves to have microbial life it

795

00:28:45,190 --> 00:28:43,360

would mean that we weren't that special

796

00:28:46,149 --> 00:28:45,200

and the universe is likely teeming with

797

00:28:48,470 --> 00:28:46,159

life

798

00:28:50,310 --> 00:28:48,480

so for now we continue to look for signs

799

00:28:51,830 --> 00:28:50,320

of life in our solar system

800

00:28:54,149 --> 00:28:51,840

and it turns out that we actually have

801  
00:28:56,950 --> 00:28:54,159  
some pretty strong candidates europa is

802  
00:28:58,950 --> 00:28:56,960  
the smallest of jupiter's galilean moons

803  
00:29:01,590 --> 00:28:58,960  
named for galileo who first discovered

804  
00:29:03,830 --> 00:29:01,600  
them in the early 1600s and is slightly

805  
00:29:05,750 --> 00:29:03,840  
smaller than our own moon ice-covered

806  
00:29:07,350 --> 00:29:05,760  
europa might not seem like a great

807  
00:29:08,310 --> 00:29:07,360  
candidate for finding life at first

808  
00:29:10,389 --> 00:29:08,320  
glance

809  
00:29:12,710 --> 00:29:10,399  
but due to an elliptical orbit around

810  
00:29:15,269 --> 00:29:12,720  
jupiter that causes geothermal activity

811  
00:29:17,830 --> 00:29:15,279  
within the moon itself there's believed

812  
00:29:19,830 --> 00:29:17,840  
to be an ocean of liquid water beneath

813  
00:29:22,789 --> 00:29:19,840

the surface of europa

814

00:29:24,789 --> 00:29:22,799

this along with a thin oxygen atmosphere

815

00:29:27,669 --> 00:29:24,799

gives scientists hope of one day finding

816

00:29:30,149 --> 00:29:27,679

signs of life in europa's icy depths

817

00:29:31,669 --> 00:29:30,159

although titan is a moon of saturn it

818

00:29:33,110 --> 00:29:31,679

actually has more in common with the

819

00:29:34,549 --> 00:29:33,120

earth than it does with other moons in

820

00:29:36,470 --> 00:29:34,559

our solar system

821

00:29:38,149 --> 00:29:36,480

and as far as we know it's the only

822

00:29:40,230 --> 00:29:38,159

other place in our solar system where

823

00:29:41,669 --> 00:29:40,240

stable bodies of liquid can be found on

824

00:29:43,510 --> 00:29:41,679

the surface

825

00:29:45,190 --> 00:29:43,520

titan also has many other features that

826  
00:29:47,750 --> 00:29:45,200  
would be familiar to us

827  
00:29:50,070 --> 00:29:47,760  
including a seasonal climate

828  
00:29:53,110 --> 00:29:50,080  
weather and familiar surface features

829  
00:29:55,029 --> 00:29:53,120  
like rivers dunes and deltas

830  
00:29:55,909 --> 00:29:55,039  
however that's where the similarities

831  
00:29:58,230 --> 00:29:55,919  
end

832  
00:30:01,190 --> 00:29:58,240  
unlike earth titan's atmosphere is made

833  
00:30:03,510 --> 00:30:01,200  
of nitrogen not oxygen and instead of

834  
00:30:05,990 --> 00:30:03,520  
oceans and rivers of water titan's

835  
00:30:07,350 --> 00:30:06,000  
liquid bodies are made of liquid methane

836  
00:30:09,510 --> 00:30:07,360  
and ethane

837  
00:30:12,710 --> 00:30:09,520  
that combined with recorded temperatures

838  
00:30:14,549 --> 00:30:12,720

of negative 290 degrees fahrenheit and

839

00:30:16,230 --> 00:30:14,559

we have to assume that if life does

840

00:30:18,070 --> 00:30:16,240

exist on titan that it looks very

841

00:30:20,870 --> 00:30:18,080

different from life as we know it

842

00:30:23,190 --> 00:30:20,880

another moon of saturn enceladus may

843

00:30:26,310 --> 00:30:23,200

also be harboring alien life

844

00:30:28,710 --> 00:30:26,320

like europa enceladus has an icy crust

845

00:30:29,909 --> 00:30:28,720

covering subsurface oceans of liquid

846

00:30:32,470 --> 00:30:29,919

salt water

847

00:30:34,149 --> 00:30:32,480

tectonic activity inside the moon causes

848

00:30:37,110 --> 00:30:34,159

cracks and rifts in the surface of the

849

00:30:39,269 --> 00:30:37,120

ice causing huge geysers that spray out

850

00:30:41,269 --> 00:30:39,279

of the moon the trail of which helps to

851

00:30:43,430 --> 00:30:41,279

form one of saturn's rings

852

00:30:45,750 --> 00:30:43,440

and in those geysers scientists have

853

00:30:47,350 --> 00:30:45,760

been able to detect evidence of organic

854

00:30:49,669 --> 00:30:47,360

compounds that make up some of the

855

00:30:51,029 --> 00:30:49,679

building blocks of life here on earth

856

00:30:53,190 --> 00:30:51,039

so while we still don't have a

857

00:30:54,789 --> 00:30:53,200

definitive answer about the existence of

858

00:30:56,549 --> 00:30:54,799

life on other planets

859

00:30:58,310 --> 00:30:56,559

based on the existing evidence it

860

00:31:00,950 --> 00:30:58,320

appears that our chances of finding life

861

00:31:02,470 --> 00:31:00,960

elsewhere in the cosmos is pretty good

862

00:31:04,070 --> 00:31:02,480

now whether any of that life could

863

00:31:06,149 --> 00:31:04,080

potentially be intelligent life is

864

00:31:07,750 --> 00:31:06,159

another question entirely

865

00:31:09,590 --> 00:31:07,760

but let's assume for a minute that there

866

00:31:11,750 --> 00:31:09,600

was intelligent life on a planet in

867

00:31:13,750 --> 00:31:11,760

another solar system would it even be

868

00:31:15,350 --> 00:31:13,760

possible for them to get here

869

00:31:17,029 --> 00:31:15,360

there are many who believe that while

870

00:31:18,549 --> 00:31:17,039

there could very well be intelligent

871

00:31:20,950 --> 00:31:18,559

life on other planets

872

00:31:23,190 --> 00:31:20,960

the vast distances between solar systems

873

00:31:25,669 --> 00:31:23,200

would make it impossible for any species

874

00:31:27,669 --> 00:31:25,679

to visit even their nearest neighbors

875

00:31:29,190 --> 00:31:27,679

and this isn't an insignificant problem

876  
00:31:31,110 --> 00:31:29,200  
to overcome

877  
00:31:33,269 --> 00:31:31,120  
let's take our closest star alpha

878  
00:31:35,029 --> 00:31:33,279  
centauri and imagine that there is an

879  
00:31:37,430 --> 00:31:35,039  
earth-like planet around it that we'd

880  
00:31:40,070 --> 00:31:37,440  
like to visit it takes light from alpha

881  
00:31:41,110 --> 00:31:40,080  
centauri about 4.3 years to reach the

882  
00:31:43,029 --> 00:31:41,120  
earth

883  
00:31:45,269 --> 00:31:43,039  
obviously we need to travel much slower

884  
00:31:47,669 --> 00:31:45,279  
than the speed of light so how might we

885  
00:31:49,830 --> 00:31:47,679  
get there and how long would it take

886  
00:31:51,430 --> 00:31:49,840  
well to start with rocket fuel which

887  
00:31:53,590 --> 00:31:51,440  
we've traditionally used for space

888  
00:31:55,830 --> 00:31:53,600

travel is completely out

889

00:31:57,590 --> 00:31:55,840

the fastest manned vehicle ever was the

890

00:32:00,389 --> 00:31:57,600

apollo 10 rocket that reached a

891

00:32:01,269 --> 00:32:00,399

blistering speed of 25 000 miles per

892

00:32:04,470 --> 00:32:01,279

hour

893

00:32:07,350 --> 00:32:04,480

however at that speed it would take 120

894

00:32:09,669 --> 00:32:07,360

000 years to reach alpha centauri

895

00:32:12,310 --> 00:32:09,679

obviously that's not ideal to get to

896

00:32:14,310 --> 00:32:12,320

alpha centauri in one human lifetime

897

00:32:15,909 --> 00:32:14,320

we'd need to be able to travel at one

898

00:32:18,310 --> 00:32:15,919

tenth the speed of light

899

00:32:20,549 --> 00:32:18,320

but to travel that fast with rocket fuel

900

00:32:22,310 --> 00:32:20,559

we'd need a fuel tank that is the size

901  
00:32:24,470 --> 00:32:22,320  
of the known universe

902  
00:32:26,789 --> 00:32:24,480  
that's definitely not going to work what

903  
00:32:29,029 --> 00:32:26,799  
we need is a much more efficient fuel

904  
00:32:31,350 --> 00:32:29,039  
than rocket fuel so what else could we

905  
00:32:33,430 --> 00:32:31,360  
use to achieve interstellar travel

906  
00:32:37,029 --> 00:32:33,440  
well one possibility is that we could

907  
00:32:38,789 --> 00:32:37,039  
use fusion or put more directly and i

908  
00:32:40,070 --> 00:32:38,799  
swear i learned this from an actual

909  
00:32:41,990 --> 00:32:40,080  
scientist

910  
00:32:44,310 --> 00:32:42,000  
we could basically blow up a bunch of

911  
00:32:46,789 --> 00:32:44,320  
nuclear bombs behind us and ride that

912  
00:32:50,310 --> 00:32:46,799  
wave into another solar system

913  
00:32:52,789 --> 00:32:50,320

specifically we'd need about 300 000 one

914

00:32:55,190 --> 00:32:52,799

megaton hydrogen bombs that we'd set off

915

00:32:57,269 --> 00:32:55,200

behind us one at a time at regular

916

00:32:59,350 --> 00:32:57,279

intervals for a month straight

917

00:33:01,590 --> 00:32:59,360

that would be enough to get us to 1 10

918

00:33:03,909 --> 00:33:01,600

the speed of light into alpha centauri

919

00:33:06,470 --> 00:33:03,919

in about 44 years

920

00:33:08,710 --> 00:33:06,480

however it's not just enough to arrive

921

00:33:10,870 --> 00:33:08,720

at alpha centauri we actually need to be

922

00:33:13,350 --> 00:33:10,880

able to stop when we get there and

923

00:33:15,990 --> 00:33:13,360

stopping in space is not easy

924

00:33:18,470 --> 00:33:16,000

in order to stop using this method we'd

925

00:33:19,990 --> 00:33:18,480

need just as much energy to slow down as

926  
00:33:22,230 --> 00:33:20,000  
we would need to get up to our cruising

927  
00:33:23,590 --> 00:33:22,240  
speed which means that we need to double

928  
00:33:24,789 --> 00:33:23,600  
the amount of time that it would take to

929  
00:33:26,630 --> 00:33:24,799  
get there

930  
00:33:28,549 --> 00:33:26,640  
so in this scenario it will actually

931  
00:33:31,269 --> 00:33:28,559  
take us about 90 years to get to alpha

932  
00:33:33,430 --> 00:33:31,279  
centauri so we'd probably need to take

933  
00:33:34,870 --> 00:33:33,440  
three human generations on that trip to

934  
00:33:37,269 --> 00:33:34,880  
ensure that they had enough people to

935  
00:33:38,230 --> 00:33:37,279  
man the ship for their entire journey so

936  
00:33:40,789 --> 00:33:38,240  
that's starting to get pretty

937  
00:33:42,389 --> 00:33:40,799  
complicated so are there ways that we

938  
00:33:44,470 --> 00:33:42,399

could go faster

939

00:33:46,230 --> 00:33:44,480

after all although nuclear fusion is

940

00:33:48,710 --> 00:33:46,240

significantly more efficient as a source

941

00:33:50,630 --> 00:33:48,720

of energy than rocket fuel it's actually

942

00:33:53,029 --> 00:33:50,640

still not very efficient at all

943

00:33:55,750 --> 00:33:53,039

fusion only turns about one percent of

944

00:33:57,269 --> 00:33:55,760

its rest mass into energy if we wanted

945

00:33:59,269 --> 00:33:57,279

something that could turn close to a

946

00:34:00,230 --> 00:33:59,279

hundred percent of its rest mass into

947

00:34:02,389 --> 00:34:00,240

energy

948

00:34:04,070 --> 00:34:02,399

we could use a theoretical device called

949

00:34:06,070 --> 00:34:04,080

an anti-matter drive

950

00:34:08,230 --> 00:34:06,080

now i'm not even going to attempt to

951  
00:34:09,829 --> 00:34:08,240  
explain what anti-matter is the top

952  
00:34:11,349 --> 00:34:09,839  
minds in science are still working on

953  
00:34:13,510 --> 00:34:11,359  
figuring that one out

954  
00:34:16,149 --> 00:34:13,520  
just know that antimatter is like the

955  
00:34:18,310 --> 00:34:16,159  
weird wario version of matter

956  
00:34:20,310 --> 00:34:18,320  
it's matter's exact opposite

957  
00:34:21,990 --> 00:34:20,320  
so if you have one electron of matter

958  
00:34:23,909 --> 00:34:22,000  
you could also have another particle

959  
00:34:26,069 --> 00:34:23,919  
that is identical to this electron

960  
00:34:28,550 --> 00:34:26,079  
except with an opposite charge called a

961  
00:34:31,030 --> 00:34:28,560  
positron and if an electron and a

962  
00:34:32,629 --> 00:34:31,040  
positron collide they completely

963  
00:34:34,629 --> 00:34:32,639

annihilate each other releasing a

964

00:34:36,710 --> 00:34:34,639

hundred percent of their energy

965

00:34:38,149 --> 00:34:36,720

so perhaps anti-matter drives could one

966

00:34:40,710 --> 00:34:38,159

day be the answer to unlocking

967

00:34:43,190 --> 00:34:40,720

interstellar travel for humanity

968

00:34:45,750 --> 00:34:43,200

but for now it costs a hundred billion

969

00:34:48,310 --> 00:34:45,760

dollars to make even one milligram of

970

00:34:50,310 --> 00:34:48,320

antimatter making it far too expensive

971

00:34:52,230 --> 00:34:50,320

to be a possibility until we find a way

972

00:34:53,909 --> 00:34:52,240

to create it at scale

973

00:34:55,510 --> 00:34:53,919

there's another hypothetical device that

974

00:34:57,829 --> 00:34:55,520

we could potentially use to travel the

975

00:34:59,829 --> 00:34:57,839

cosmos called a light sail

976

00:35:01,670 --> 00:34:59,839

a light sail would essentially allow us

977

00:35:04,069 --> 00:35:01,680

to harness light in much the same way

978

00:35:05,670 --> 00:35:04,079

that a sail harnesses wind which would

979

00:35:07,430 --> 00:35:05,680

have the added benefit of meaning that

980

00:35:09,349 --> 00:35:07,440

we wouldn't have to weigh ourselves down

981

00:35:11,030 --> 00:35:09,359

carrying a bunch of fuel

982

00:35:13,030 --> 00:35:11,040

so how does it work

983

00:35:15,270 --> 00:35:13,040

let's say that you have a kilometer wide

984

00:35:18,390 --> 00:35:15,280

sail that's coated in a reflective and

985

00:35:20,470 --> 00:35:18,400

heat-resistant substance like sapphire

986

00:35:22,470 --> 00:35:20,480

if you blasted it with a giant laser

987

00:35:24,870 --> 00:35:22,480

with the power equivalent of a hundred

988

00:35:26,790 --> 00:35:24,880

nuclear power plants the sail would

989

00:35:28,790 --> 00:35:26,800

catch that light like wind and could

990

00:35:31,190 --> 00:35:28,800

conceivably get us up to one tenth the

991

00:35:33,109 --> 00:35:31,200

speed of light hypothetically we'd only

992

00:35:34,870 --> 00:35:33,119

be limited by the size of our sail and

993

00:35:35,910 --> 00:35:34,880

the power of our laser

994

00:35:37,750 --> 00:35:35,920

however

995

00:35:39,829 --> 00:35:37,760

the scale of such a project would be

996

00:35:42,069 --> 00:35:39,839

truly mind-boggling considering that the

997

00:35:43,670 --> 00:35:42,079

laser would be so big that we'd likely

998

00:35:45,190 --> 00:35:43,680

have to build it on the moon or we

999

00:35:46,310 --> 00:35:45,200

wouldn't be able to get it up into space

1000

00:35:47,910 --> 00:35:46,320

at all

1001  
00:35:50,310 --> 00:35:47,920  
and it would have to be powered by

1002  
00:35:52,069 --> 00:35:50,320  
massive reactors which adds plenty of

1003  
00:35:54,150 --> 00:35:52,079  
complication on its own

1004  
00:35:56,230 --> 00:35:54,160  
another hypothetical device we could use

1005  
00:35:58,310 --> 00:35:56,240  
would be a black hole drive which would

1006  
00:36:00,630 --> 00:35:58,320  
literally involve creating a tiny black

1007  
00:36:02,470 --> 00:36:00,640  
hole and harnessing its power

1008  
00:36:04,870 --> 00:36:02,480  
in this case the black hole would be

1009  
00:36:06,950 --> 00:36:04,880  
created with light and not mass

1010  
00:36:09,589 --> 00:36:06,960  
if you had a sufficient density of light

1011  
00:36:11,430 --> 00:36:09,599  
concentrated into a small enough area

1012  
00:36:15,030 --> 00:36:11,440  
we're talking about the equivalent of

1013  
00:36:17,030 --> 00:36:15,040

600 billion kilograms or two empire

1014

00:36:18,710 --> 00:36:17,040

state buildings down to the size of a

1015

00:36:20,710 --> 00:36:18,720

single proton

1016

00:36:22,550 --> 00:36:20,720

it could bend the fabric of space-time

1017

00:36:24,470 --> 00:36:22,560

enough to create a singularity and

1018

00:36:26,390 --> 00:36:24,480

therefore a black hole

1019

00:36:28,790 --> 00:36:26,400

this black hole would radiate hawking

1020

00:36:30,310 --> 00:36:28,800

radiation and the smaller the black hole

1021

00:36:32,710 --> 00:36:30,320

the more it would radiate and

1022

00:36:35,109 --> 00:36:32,720

hypothetically we could use that energy

1023

00:36:36,870 --> 00:36:35,119

to travel the milky way one of the top

1024

00:36:38,550 --> 00:36:36,880

candidates for interstellar travel

1025

00:36:40,710 --> 00:36:38,560

doesn't even concern itself with next

1026  
00:36:41,750 --> 00:36:40,720  
level propulsion systems or efficient

1027  
00:36:44,069 --> 00:36:41,760  
fuel

1028  
00:36:45,430 --> 00:36:44,079  
because with this method hypothetically

1029  
00:36:47,750 --> 00:36:45,440  
anywhere in the universe would

1030  
00:36:49,670 --> 00:36:47,760  
effectively be right next door because

1031  
00:36:51,109 --> 00:36:49,680  
we'd be traveling through a wormhole i

1032  
00:36:53,190 --> 00:36:51,119  
won't even attempt to get into the

1033  
00:36:54,550 --> 00:36:53,200  
physics of wormholes right now but all

1034  
00:36:56,550 --> 00:36:54,560  
you really need to know is that

1035  
00:36:58,310 --> 00:36:56,560  
wormholes are basically tunnels between

1036  
00:37:00,710 --> 00:36:58,320  
two black holes that connect two

1037  
00:37:02,310 --> 00:37:00,720  
different places in space time obviously

1038  
00:37:03,910 --> 00:37:02,320

this would be ideal because we wouldn't

1039

00:37:06,550 --> 00:37:03,920

have to deal with figuring out a way to

1040

00:37:08,069 --> 00:37:06,560

travel across mine bending distances

1041

00:37:10,950 --> 00:37:08,079

but there are a few issues with this

1042

00:37:12,550 --> 00:37:10,960

method the first is that technically we

1043

00:37:15,270 --> 00:37:12,560

don't even know for sure that wormholes

1044

00:37:17,510 --> 00:37:15,280

exist it should be possible but until we

1045

00:37:19,349 --> 00:37:17,520

actually manage to find one or make one

1046

00:37:21,430 --> 00:37:19,359

it's all just speculative

1047

00:37:23,750 --> 00:37:21,440

and the second is that even if they do

1048

00:37:26,069 --> 00:37:23,760

exist we don't know if it would even be

1049

00:37:28,470 --> 00:37:26,079

possible for a human or anything else

1050

00:37:29,990 --> 00:37:28,480

for that matter to travel through one

1051  
00:37:31,670 --> 00:37:30,000  
and i don't know about you but i don't

1052  
00:37:32,950 --> 00:37:31,680  
think i'd volunteer to be the first one

1053  
00:37:35,270 --> 00:37:32,960  
to try it out

1054  
00:37:37,670 --> 00:37:35,280  
so going back to the question of whether

1055  
00:37:40,310 --> 00:37:37,680  
or not interstellar travel is possible

1056  
00:37:41,750 --> 00:37:40,320  
the answer is a hard maybe

1057  
00:37:43,430 --> 00:37:41,760  
we can't do it now with our current

1058  
00:37:45,510 --> 00:37:43,440  
technology but we're at least

1059  
00:37:47,750 --> 00:37:45,520  
tantalizingly close enough to be able to

1060  
00:37:49,190 --> 00:37:47,760  
speculate about potential methods

1061  
00:37:51,430 --> 00:37:49,200  
and it seems likely that we'll

1062  
00:37:53,109 --> 00:37:51,440  
eventually be able to make it happen

1063  
00:37:55,109 --> 00:37:53,119

though whether that'll be in a hundred

1064

00:37:57,430 --> 00:37:55,119

years or a thousand years or ten

1065

00:37:59,430 --> 00:37:57,440

thousand years is hard to say but

1066

00:38:02,069 --> 00:37:59,440

certainly if we think about an advanced

1067

00:38:04,790 --> 00:38:02,079

civilization especially a type two or a

1068

00:38:06,710 --> 00:38:04,800

type three civilization it seems almost

1069

00:38:08,470 --> 00:38:06,720

a foregone conclusion that a species

1070

00:38:10,790 --> 00:38:08,480

that has achieved that level of

1071

00:38:13,030 --> 00:38:10,800

technological advancement would be able

1072

00:38:14,550 --> 00:38:13,040

to crack interstellar travel

1073

00:38:15,589 --> 00:38:14,560

so who's to say that they couldn't come

1074

00:38:22,880 --> 00:38:15,599

here

1075

00:39:21,990 --> 00:38:37,070

[Music]

1076

00:39:26,310 --> 00:39:23,829

there's another pretty major piece of

1077

00:39:27,670 --> 00:39:26,320

evidence that i frankly don't totally

1078

00:39:29,510 --> 00:39:27,680

know what to do with

1079

00:39:30,790 --> 00:39:29,520

and that's reported cases of alien

1080

00:39:32,150 --> 00:39:30,800

abductions

1081

00:39:33,670 --> 00:39:32,160

it's one thing to talk about the

1082

00:39:36,230 --> 00:39:33,680

likelihood of the existence of

1083

00:39:37,670 --> 00:39:36,240

intelligent life in the abstract or even

1084

00:39:40,390 --> 00:39:37,680

to have the more nuts and bolts

1085

00:39:42,230 --> 00:39:40,400

conversation about the craft themselves

1086

00:39:44,470 --> 00:39:42,240

but as soon as you start talking about

1087

00:39:45,670 --> 00:39:44,480

actual human encounters with non-human

1088

00:39:47,990 --> 00:39:45,680

intelligence

1089

00:39:50,230 --> 00:39:48,000

things get even more complicated

1090

00:39:52,790 --> 00:39:50,240

one major complicating factor is that

1091

00:39:54,150 --> 00:39:52,800

alien abduction is usually an individual

1092

00:39:56,150 --> 00:39:54,160

experience

1093

00:39:58,310 --> 00:39:56,160

and even when multiple people claim to

1094

00:40:00,310 --> 00:39:58,320

have been abducted at the same time

1095

00:40:03,190 --> 00:40:00,320

their experiences often differ in ways

1096

00:40:04,870 --> 00:40:03,200

that range from minor to significant

1097

00:40:07,510 --> 00:40:04,880

this also happens a lot with ufo

1098

00:40:09,430 --> 00:40:07,520

sightings for instance take the phoenix

1099

00:40:11,910 --> 00:40:09,440

lights incident which was witnessed by

1100

00:40:15,430 --> 00:40:11,920

hundreds if not thousands of people

1101  
00:40:17,270 --> 00:40:15,440  
over three hours and across 300 miles

1102  
00:40:18,710 --> 00:40:17,280  
from the nevada line all the way down

1103  
00:40:20,630 --> 00:40:18,720  
through tucson

1104  
00:40:22,390 --> 00:40:20,640  
when you have that many people reporting

1105  
00:40:25,190 --> 00:40:22,400  
this sighting independent from each

1106  
00:40:27,990 --> 00:40:25,200  
other and at the same time it's hard to

1107  
00:40:29,910 --> 00:40:28,000  
deny that they saw something but even

1108  
00:40:32,790 --> 00:40:29,920  
among those witnesses there is a lot of

1109  
00:40:35,030 --> 00:40:32,800  
variability in terms of what they saw

1110  
00:40:36,470 --> 00:40:35,040  
some people saw four lights some saw

1111  
00:40:38,150 --> 00:40:36,480  
five or six

1112  
00:40:39,750 --> 00:40:38,160  
some people said the lights were white

1113  
00:40:42,069 --> 00:40:39,760

while others said that they were orange

1114

00:40:43,990 --> 00:40:42,079

or red and while many people agree that

1115

00:40:46,550 --> 00:40:44,000

the lights were part of one solid

1116

00:40:48,150 --> 00:40:46,560

v-shaped or triangular craft

1117

00:40:50,710 --> 00:40:48,160

others report seeing the lights moving

1118

00:40:52,470 --> 00:40:50,720

around independently of each other

1119

00:40:54,710 --> 00:40:52,480

this is pretty typical of reports

1120

00:40:57,109 --> 00:40:54,720

related to the ufo phenomenon

1121

00:40:59,270 --> 00:40:57,119

there's an infuriating variability and

1122

00:41:01,910 --> 00:40:59,280

lack of consistency not just between

1123

00:41:04,309 --> 00:41:01,920

different sightings but even within each

1124

00:41:06,630 --> 00:41:04,319

of the individual sightings themselves

1125

00:41:08,230 --> 00:41:06,640

and these inconsistencies become even

1126

00:41:10,710 --> 00:41:08,240

harder to parse when you're talking

1127

00:41:12,870 --> 00:41:10,720

about incidents that involve just one or

1128

00:41:14,790 --> 00:41:12,880

a handful of people as is typically the

1129

00:41:16,390 --> 00:41:14,800

case with abduction reports

1130

00:41:18,230 --> 00:41:16,400

further complicating the issue is that

1131

00:41:20,550 --> 00:41:18,240

many of the hallmarks of alien abduction

1132

00:41:22,870 --> 00:41:20,560

reports sound remarkably similar to a

1133

00:41:24,710 --> 00:41:22,880

relatively common phenomenon that nearly

1134

00:41:26,069 --> 00:41:24,720

half of all people experience at some

1135

00:41:27,589 --> 00:41:26,079

point in their lives

1136

00:41:29,829 --> 00:41:27,599

sleep paralysis

1137

00:41:31,910 --> 00:41:29,839

when you enter rem sleep a combination

1138

00:41:33,990 --> 00:41:31,920

of neurotransmitters in your brain

1139

00:41:36,550 --> 00:41:34,000

switches off moto neuron activity

1140

00:41:38,150 --> 00:41:36,560

effectively paralyzing you which keeps

1141

00:41:39,270 --> 00:41:38,160

you from harming yourself or others as

1142

00:41:41,109 --> 00:41:39,280

you dream

1143

00:41:42,790 --> 00:41:41,119

when this mechanism in the brain doesn't

1144

00:41:45,510 --> 00:41:42,800

work correctly people can end up

1145

00:41:47,589 --> 00:41:45,520

sleepwalking which can be dangerous in

1146

00:41:49,589 --> 00:41:47,599

extreme cases sleepwalkers have been

1147

00:41:52,630 --> 00:41:49,599

reported to do things like jump out of

1148

00:41:54,309 --> 00:41:52,640

fifth floor windows walk into traffic or

1149

00:41:56,710 --> 00:41:54,319

even commit murders

1150

00:41:59,270 --> 00:41:56,720

in many ways sleep paralysis is the

1151  
00:42:01,349 --> 00:41:59,280  
opposite of sleepwalking during normal

1152  
00:42:03,349 --> 00:42:01,359  
sleep the paralysis of rem sleep is

1153  
00:42:05,109 --> 00:42:03,359  
basically switched off before you wake

1154  
00:42:07,109 --> 00:42:05,119  
up but when this doesn't happen

1155  
00:42:08,950 --> 00:42:07,119  
correctly a person can wake up in a

1156  
00:42:11,270 --> 00:42:08,960  
state somewhere between sleeping and

1157  
00:42:12,950 --> 00:42:11,280  
waking up and find themselves still

1158  
00:42:15,109 --> 00:42:12,960  
unable to move

1159  
00:42:16,230 --> 00:42:15,119  
when this happens the amygdala the part

1160  
00:42:18,710 --> 00:42:16,240  
of your brain that deals with

1161  
00:42:20,550 --> 00:42:18,720  
identifying threats freaks out and

1162  
00:42:22,630 --> 00:42:20,560  
triggers a fight or flight response that

1163  
00:42:24,390 --> 00:42:22,640

causes feelings of extreme fear in the

1164

00:42:27,030 --> 00:42:24,400

sleeper and in this state of

1165

00:42:29,349 --> 00:42:27,040

semi-wakefulness people can still have

1166

00:42:32,069 --> 00:42:29,359

dreamlike hallucinations which often

1167

00:42:33,510 --> 00:42:32,079

take on terrifying forms because of the

1168

00:42:34,790 --> 00:42:33,520

terror that the person is already

1169

00:42:36,870 --> 00:42:34,800

experiencing

1170

00:42:39,430 --> 00:42:36,880

and while these hallucinations can vary

1171

00:42:41,109 --> 00:42:39,440

wildly there are a lot of similarities

1172

00:42:44,069 --> 00:42:41,119

between common descriptions of sleep

1173

00:42:46,309 --> 00:42:44,079

paralysis and reports of alien abduction

1174

00:42:48,950 --> 00:42:46,319

people often report awakening to find a

1175

00:42:51,030 --> 00:42:48,960

malevolent intruder standing over them

1176

00:42:53,109 --> 00:42:51,040

feelings of extreme fear

1177

00:42:55,430 --> 00:42:53,119

feelings of being pulled or dragged out

1178

00:42:57,990 --> 00:42:55,440

of their bed and even experiences that

1179

00:43:00,150 --> 00:42:58,000

sound very similar to the grotesque and

1180

00:43:02,630 --> 00:43:00,160

often weirdly sexual experiments and

1181

00:43:03,990 --> 00:43:02,640

procedures that people report during an

1182

00:43:05,750 --> 00:43:04,000

alien abduction

1183

00:43:07,990 --> 00:43:05,760

so many people believe that alien

1184

00:43:09,510 --> 00:43:08,000

abductions are just misidentified cases

1185

00:43:10,950 --> 00:43:09,520

of sleep paralysis

1186

00:43:12,470 --> 00:43:10,960

and there's other evidence that this

1187

00:43:14,069 --> 00:43:12,480

could be the case beyond just the

1188

00:43:15,270 --> 00:43:14,079

similarities of the experiences

1189

00:43:17,190 --> 00:43:15,280

themselves

1190

00:43:19,430 --> 00:43:17,200

a significant number of people who claim

1191

00:43:21,190 --> 00:43:19,440

to have been abducted by aliens say that

1192

00:43:23,109 --> 00:43:21,200

they have had this experience multiple

1193

00:43:24,950 --> 00:43:23,119

times throughout their life and these

1194

00:43:26,950 --> 00:43:24,960

experiences often seem to run in

1195

00:43:29,190 --> 00:43:26,960

families where multiple family members

1196

00:43:30,950 --> 00:43:29,200

over multiple generations claim to have

1197

00:43:32,950 --> 00:43:30,960

experienced abduction

1198

00:43:35,270 --> 00:43:32,960

sleep paralysis more or less follows the

1199

00:43:37,190 --> 00:43:35,280

same pattern with around 40 percent of

1200

00:43:39,349 --> 00:43:37,200

people experiencing sleep paralysis at

1201  
00:43:41,349 --> 00:43:39,359  
least once in their lifetime and a much

1202  
00:43:44,069 --> 00:43:41,359  
smaller percentage of people about six

1203  
00:43:46,309 --> 00:43:44,079  
percent experiencing multiple episodes

1204  
00:43:47,109 --> 00:43:46,319  
of sleep paralysis over long periods of

1205  
00:43:49,030 --> 00:43:47,119  
time

1206  
00:43:51,349 --> 00:43:49,040  
and there's even evidence now that sleep

1207  
00:43:53,430 --> 00:43:51,359  
paralysis likely has a genetic component

1208  
00:43:55,910 --> 00:43:53,440  
suggesting that it could run in families

1209  
00:43:57,829 --> 00:43:55,920  
just like abduction experiences

1210  
00:44:00,390 --> 00:43:57,839  
however one glaring problem with this

1211  
00:44:01,750 --> 00:44:00,400  
theory is that not all alien abductees

1212  
00:44:03,270 --> 00:44:01,760  
claimed to have been taken at night

1213  
00:44:05,430 --> 00:44:03,280

while they were sleeping

1214

00:44:07,270 --> 00:44:05,440

so while sleep paralysis could offer a

1215

00:44:08,630 --> 00:44:07,280

solid explanation for many alien

1216

00:44:10,470 --> 00:44:08,640

abduction cases

1217

00:44:12,550 --> 00:44:10,480

it can't explain all of them

1218

00:44:14,150 --> 00:44:12,560

so what else could be going on here

1219

00:44:15,829 --> 00:44:14,160

let's look at the example of what is

1220

00:44:18,069 --> 00:44:15,839

largely considered to be the first

1221

00:44:20,309 --> 00:44:18,079

reported case of alien abduction the

1222

00:44:23,510 --> 00:44:20,319

betty and barney hill incident in

1223

00:44:26,069 --> 00:44:23,520

september 1961 married couple betty and

1224

00:44:27,990 --> 00:44:26,079

barney hill were driving down a dark and

1225

00:44:29,190 --> 00:44:28,000

winding country road in new hampshire's

1226

00:44:31,510 --> 00:44:29,200

white mountains

1227

00:44:33,190 --> 00:44:31,520

they hadn't seen another car for miles

1228

00:44:34,870 --> 00:44:33,200

but the couple started to notice a

1229

00:44:36,390 --> 00:44:34,880

bright light in the sky that seemed to

1230

00:44:37,750 --> 00:44:36,400

be following them

1231

00:44:40,230 --> 00:44:37,760

the next thing they remembered was

1232

00:44:42,150 --> 00:44:40,240

arriving home in portsmouth at dawn

1233

00:44:45,030 --> 00:44:42,160

they were dirty their watches had

1234

00:44:47,270 --> 00:44:45,040

stopped betty's dress was torn and there

1235

00:44:48,870 --> 00:44:47,280

were two hours of the drive that neither

1236

00:44:50,309 --> 00:44:48,880

of them could remember

1237

00:44:51,990 --> 00:44:50,319

the hills sought the help of a

1238

00:44:54,630 --> 00:44:52,000

psychiatrist to help them understand

1239

00:44:57,109 --> 00:44:54,640

this terrifying and unsettling incident

1240

00:44:59,349 --> 00:44:57,119

and under hypnosis they claim to have

1241

00:45:01,750 --> 00:44:59,359

recovered memories of being abducted by

1242

00:45:04,230 --> 00:45:01,760

gray beings with large black eyes who

1243

00:45:06,390 --> 00:45:04,240

took them into a metallic disk shaped

1244

00:45:07,829 --> 00:45:06,400

craft the betty said was roughly the

1245

00:45:09,829 --> 00:45:07,839

size of their house

1246

00:45:11,910 --> 00:45:09,839

on the ship they were subjected to an

1247

00:45:13,990 --> 00:45:11,920

examination before their memories were

1248

00:45:16,150 --> 00:45:14,000

erased and they were returned home

1249

00:45:18,390 --> 00:45:16,160

in many ways this story has become the

1250

00:45:19,990 --> 00:45:18,400

blueprint for alien abduction

1251

00:45:22,069 --> 00:45:20,000

despite the stunning variety of

1252

00:45:23,750 --> 00:45:22,079

differences between abduction stories

1253

00:45:26,390 --> 00:45:23,760

there are certain elements of the hills

1254

00:45:28,870 --> 00:45:26,400

story that pop up again and again

1255

00:45:31,030 --> 00:45:28,880

a bright light in the sky a metallic and

1256

00:45:33,829 --> 00:45:31,040

often disc shaped craft

1257

00:45:35,829 --> 00:45:33,839

gray beings with large black eyes

1258

00:45:37,190 --> 00:45:35,839

failure of clocks and other machinery

1259

00:45:38,950 --> 00:45:37,200

and electronics

1260

00:45:40,950 --> 00:45:38,960

missing chunks of time

1261

00:45:42,390 --> 00:45:40,960

and being the subject of examinations

1262

00:45:44,069 --> 00:45:42,400

and experiments

1263

00:45:46,950 --> 00:45:44,079

and also like with the betty and barney

1264

00:45:48,950 --> 00:45:46,960

hill incident many abductees are only

1265

00:45:51,750 --> 00:45:48,960

able to initially access memories of

1266

00:45:53,349 --> 00:45:51,760

these incidents through hypnosis which

1267

00:45:55,349 --> 00:45:53,359

complicates things

1268

00:45:57,270 --> 00:45:55,359

there is a lot of controversy around the

1269

00:45:58,950 --> 00:45:57,280

use of hypnosis to recover lost or

1270

00:46:01,030 --> 00:45:58,960

repressed memories

1271

00:46:02,870 --> 00:46:01,040

some psychologists even question whether

1272

00:46:04,630 --> 00:46:02,880

it's even actually possible to banish

1273

00:46:07,109 --> 00:46:04,640

memories to your unconscious mind and

1274

00:46:09,589 --> 00:46:07,119

only become aware of them under hypnosis

1275

00:46:11,270 --> 00:46:09,599

because memories are entirely subjective

1276  
00:46:13,190 --> 00:46:11,280  
and there's no way to know definitively

1277  
00:46:15,190 --> 00:46:13,200  
what another person remembers or doesn't

1278  
00:46:16,630 --> 00:46:15,200  
remember at any given time

1279  
00:46:19,510 --> 00:46:16,640  
the scientific evidence for this

1280  
00:46:21,510 --> 00:46:19,520  
phenomenon is dubious at best

1281  
00:46:23,430 --> 00:46:21,520  
and even if the skeptics are wrong and

1282  
00:46:25,030 --> 00:46:23,440  
it is possible to entirely forget a

1283  
00:46:26,470 --> 00:46:25,040  
traumatic event and then recover it

1284  
00:46:28,309 --> 00:46:26,480  
under hypnosis

1285  
00:46:29,750 --> 00:46:28,319  
there is the added layer of complication

1286  
00:46:31,910 --> 00:46:29,760  
that comes from the fact that there's

1287  
00:46:33,990 --> 00:46:31,920  
considerable evidence that it's possible

1288  
00:46:36,390 --> 00:46:34,000

to implant false memories into a

1289

00:46:39,670 --> 00:46:36,400

person's mind through hypnosis

1290

00:46:42,470 --> 00:46:39,680

for example in 2011 a woman named lisa

1291

00:46:44,630 --> 00:46:42,480

nassef of saint paul minnesota sued her

1292

00:46:46,550 --> 00:46:44,640

former therapist mark schwartz and

1293

00:46:48,470 --> 00:46:46,560

castlewood treatment center

1294

00:46:50,550 --> 00:46:48,480

saying that he had falsely implanted

1295

00:46:51,990 --> 00:46:50,560

memories during hypnosis that made her

1296

00:46:54,470 --> 00:46:52,000

believe that she had been part of a

1297

00:46:57,190 --> 00:46:54,480

satanic cult while receiving treatment

1298

00:46:59,349 --> 00:46:57,200

for anorexia nasa claimed that she had

1299

00:47:01,430 --> 00:46:59,359

experienced extreme anguish and was

1300

00:47:03,109 --> 00:47:01,440

isolated from her family and friends

1301  
00:47:05,109 --> 00:47:03,119  
because schwartz had made her believe

1302  
00:47:07,589 --> 00:47:05,119  
that her family and friends were members

1303  
00:47:10,309 --> 00:47:07,599  
of the satanic cult who had subjected

1304  
00:47:12,870 --> 00:47:10,319  
her to ritualistic abuse including

1305  
00:47:14,710 --> 00:47:12,880  
forcing her to eat babies

1306  
00:47:16,710 --> 00:47:14,720  
it wasn't until she left the facility

1307  
00:47:18,870 --> 00:47:16,720  
and began to connect with multiple other

1308  
00:47:20,790 --> 00:47:18,880  
patients who also believed that they had

1309  
00:47:23,349 --> 00:47:20,800  
recovered memories of being abused by a

1310  
00:47:25,030 --> 00:47:23,359  
satanic cult that lisa began to question

1311  
00:47:26,950 --> 00:47:25,040  
these recovered memories

1312  
00:47:28,870 --> 00:47:26,960  
after all what are the chances that

1313  
00:47:31,750 --> 00:47:28,880

multiple people in this one small

1314

00:47:33,109 --> 00:47:31,760

facility had this exact same bizarre

1315

00:47:35,030 --> 00:47:33,119

experience

1316

00:47:37,670 --> 00:47:35,040

this questioning eventually led to the

1317

00:47:40,150 --> 00:47:37,680

lawsuit by nassif along with lawsuits by

1318

00:47:41,510 --> 00:47:40,160

three other unnamed women including one

1319

00:47:43,670 --> 00:47:41,520

who had come home from the treatment

1320

00:47:46,069 --> 00:47:43,680

center with memories of horrific sexual

1321

00:47:48,790 --> 00:47:46,079

abuse by a neighbor that her family says

1322

00:47:50,630 --> 00:47:48,800

logistically just couldn't have occurred

1323

00:47:52,549 --> 00:47:50,640

dr schwartz and castlewood treatment

1324

00:47:54,230 --> 00:47:52,559

center denied these claims

1325

00:47:56,870 --> 00:47:54,240

all four lawsuits were settled out of

1326

00:47:58,549 --> 00:47:56,880

court two years later in 2013.

1327

00:48:00,790 --> 00:47:58,559

many cases similar to this one have

1328

00:48:02,870 --> 00:48:00,800

occurred over the past several decades

1329

00:48:04,549 --> 00:48:02,880

including the infamous satanic panic of

1330

00:48:06,390 --> 00:48:04,559

the 80s and 90s

1331

00:48:07,829 --> 00:48:06,400

many of these cases have been debunked

1332

00:48:09,910 --> 00:48:07,839

and even more have been called into

1333

00:48:12,069 --> 00:48:09,920

serious question due to the lack of

1334

00:48:13,510 --> 00:48:12,079

evidence to support the validity of the

1335

00:48:14,549 --> 00:48:13,520

memories people have claimed to have

1336

00:48:16,470 --> 00:48:14,559

recovered

1337

00:48:18,549 --> 00:48:16,480

so it seems likely that at least in some

1338

00:48:20,230 --> 00:48:18,559

of these cases where people recover lost

1339

00:48:21,349 --> 00:48:20,240

memories that there's something deeper

1340

00:48:22,790 --> 00:48:21,359

going on

1341

00:48:24,790 --> 00:48:22,800

could this be the case with betty and

1342

00:48:27,030 --> 00:48:24,800

barney hill and other people who claim

1343

00:48:28,230 --> 00:48:27,040

to have experienced alien abduction

1344

00:48:30,390 --> 00:48:28,240

could their memories have been

1345

00:48:32,150 --> 00:48:30,400

intentionally fabricated or even

1346

00:48:33,510 --> 00:48:32,160

implanted into their minds during

1347

00:48:35,910 --> 00:48:33,520

hypnosis

1348

00:48:37,990 --> 00:48:35,920

it's hard to say but it seems like it's

1349

00:48:40,069 --> 00:48:38,000

probably possible and that's what makes

1350

00:48:41,750 --> 00:48:40,079

it so difficult to come to any clear

1351

00:48:44,470 --> 00:48:41,760

conclusion on the alien abduction

1352

00:48:46,390 --> 00:48:44,480

phenomenon and what it really represents

1353

00:48:47,910 --> 00:48:46,400

it's a highly subjective and messy

1354

00:48:49,910 --> 00:48:47,920

business to try to come up with an

1355

00:48:52,230 --> 00:48:49,920

answer that satisfies all the twists and

1356

00:48:54,630 --> 00:48:52,240

turns of this bizarre phenomenon and

1357

00:48:57,109 --> 00:48:54,640

likely there is no simple answer

1358

00:48:59,270 --> 00:48:57,119

however there is one aspect of the alien

1359

00:49:01,349 --> 00:48:59,280

abduction phenomenon that is especially

1360

00:49:03,589 --> 00:49:01,359

compelling and also deeply relevant to

1361

00:49:05,190 --> 00:49:03,599

the alien question and it's worth taking

1362

00:49:07,030 --> 00:49:05,200

a minute to explore

1363

00:49:09,030 --> 00:49:07,040

and that is the fact that in the vast

1364

00:49:12,230 --> 00:49:09,040

majority of alleged alien abduction

1365

00:49:15,109 --> 00:49:12,240

cases the aliens that abductees report

1366

00:49:17,589 --> 00:49:15,119

seeing are all similar in one very eerie

1367

00:49:18,790 --> 00:49:17,599

and seemingly impossible way they look

1368

00:49:20,790 --> 00:49:18,800

like us

1369

00:49:23,030 --> 00:49:20,800

many abductees claim to have encountered

1370

00:49:25,190 --> 00:49:23,040

gray big-eyed beings similar to those

1371

00:49:27,910 --> 00:49:25,200

reported by betty and barney hill

1372

00:49:30,549 --> 00:49:27,920

often referred to as the grays

1373

00:49:32,309 --> 00:49:30,559

some abductees report seeing tall grays

1374

00:49:33,990 --> 00:49:32,319

others see short grays that are only

1375

00:49:36,309 --> 00:49:34,000

about three feet tall

1376

00:49:39,349 --> 00:49:36,319

some see reptilian beings while others

1377

00:49:41,430 --> 00:49:39,359

see tall blonde human looking beings but

1378

00:49:43,750 --> 00:49:41,440

in the vast majority of cases these

1379

00:49:45,670 --> 00:49:43,760

various alien species despite their

1380

00:49:49,030 --> 00:49:45,680

differing appearances are still

1381

00:49:51,349 --> 00:49:49,040

distinctly and undeniably humanoid

1382

00:49:53,510 --> 00:49:51,359

by and large they have two eyes two ears

1383

00:49:55,990 --> 00:49:53,520

a mouth and a nose they have two arms

1384

00:49:58,470 --> 00:49:56,000

and two legs they walk upright

1385

00:50:01,430 --> 00:49:58,480

their entire body has the basic schema

1386

00:50:03,510 --> 00:50:01,440

of a human body and for many people that

1387

00:50:05,589 --> 00:50:03,520

right there is evidence that the alien

1388

00:50:08,150 --> 00:50:05,599

abduction phenomena must be the product

1389

00:50:09,430 --> 00:50:08,160

of sleep paralysis false memories or

1390

00:50:11,750 --> 00:50:09,440

even a hoax

1391

00:50:13,349 --> 00:50:11,760

basically anything except for actual

1392

00:50:15,510 --> 00:50:13,359

extraterrestrials

1393

00:50:17,349 --> 00:50:15,520

because when you think about it what are

1394

00:50:19,270 --> 00:50:17,359

the actual chances that beings from

1395

00:50:19,990 --> 00:50:19,280

another planet would look so much like

1396

00:50:22,309 --> 00:50:20,000

us

1397

00:50:24,390 --> 00:50:22,319

if evolution happens as the result of a

1398

00:50:26,230 --> 00:50:24,400

mind-bending number of random mutations

1399

00:50:28,069 --> 00:50:26,240

over time and then those genes are

1400

00:50:30,390 --> 00:50:28,079

selected based on their ability to help

1401

00:50:32,950 --> 00:50:30,400

a particular species better thrive in a

1402

00:50:34,790 --> 00:50:32,960

particular environment how likely is it

1403

00:50:36,790 --> 00:50:34,800

that beings that look so similar to

1404

00:50:38,950 --> 00:50:36,800

humans would evolve on a completely

1405

00:50:40,790 --> 00:50:38,960

different planet just think about how

1406

00:50:42,309 --> 00:50:40,800

different a human is from animals that

1407

00:50:44,790 --> 00:50:42,319

have evolved to live in the extreme

1408

00:50:46,470 --> 00:50:44,800

conditions of the mariana trench and yet

1409

00:50:48,069 --> 00:50:46,480

if you go far back enough we have a

1410

00:50:49,990 --> 00:50:48,079

common ancestor

1411

00:50:51,750 --> 00:50:50,000

how different might a species look that

1412

00:50:53,910 --> 00:50:51,760

evolved on a planet with completely

1413

00:50:56,870 --> 00:50:53,920

different gravity chemical makeup

1414

00:50:58,950 --> 00:50:56,880

atmosphere temperature etc

1415

00:51:01,109 --> 00:50:58,960

it feels logical to assume that if there

1416

00:51:02,950 --> 00:51:01,119

are extraterrestrial beings out there

1417

00:51:04,470 --> 00:51:02,960

they would almost certainly look vastly

1418

00:51:07,670 --> 00:51:04,480

different than anything that we've ever

1419

00:51:09,349 --> 00:51:07,680

seen before and yet surprisingly many

1420

00:51:11,430 --> 00:51:09,359

scientists are beginning to come around

1421

00:51:13,270 --> 00:51:11,440

to the idea that aliens might actually

1422

00:51:15,589 --> 00:51:13,280

look a lot more like us than we would

1423

00:51:17,430 --> 00:51:15,599

assume according to charles cockle a

1424

00:51:19,670 --> 00:51:17,440

professor of astrobiology at the

1425

00:51:22,069 --> 00:51:19,680

university of edinburgh in scotland

1426

00:51:24,150 --> 00:51:22,079

extraterrestrial life might look eerily

1427

00:51:26,390 --> 00:51:24,160

similar to the life that we see on earth

1428

00:51:29,109 --> 00:51:26,400

in cockles book the equations of life

1429

00:51:32,230 --> 00:51:29,119

how physics shapes evolution he suggests

1430

00:51:34,150 --> 00:51:32,240

that a universal biology may exist and

1431

00:51:35,990 --> 00:51:34,160

that life forms on earth could provide

1432

00:51:37,990 --> 00:51:36,000

us with a basic blueprint for the kinds

1433

00:51:40,390 --> 00:51:38,000

of life we are likely to find elsewhere

1434

00:51:42,390 --> 00:51:40,400

in the universe his basic premise is

1435

00:51:45,030 --> 00:51:42,400

that although the genetic mutations that

1436

00:51:46,870 --> 00:51:45,040

fuel evolution are random the particular

1437

00:51:48,790 --> 00:51:46,880

mutations that are selected for through

1438

00:51:50,710 --> 00:51:48,800

natural selection are not

1439

00:51:52,630 --> 00:51:50,720

these mutations are still subject to the

1440

00:51:54,150 --> 00:51:52,640

same laws of physics and are also

1441

00:51:56,950 --> 00:51:54,160

restricted by the conditions and

1442

00:51:59,270 --> 00:51:56,960

materials necessary for life to thrive

1443

00:52:01,030 --> 00:51:59,280

and according to cockle these factors

1444

00:52:02,870 --> 00:52:01,040

narrow the scope of evolution to a

1445

00:52:05,510 --> 00:52:02,880

degree that it's likely that life would

1446

00:52:07,190 --> 00:52:05,520

evolve in similar ways on another planet

1447

00:52:09,030 --> 00:52:07,200

we can see examples of how this might

1448

00:52:10,790 --> 00:52:09,040

work right here on earth

1449

00:52:12,549 --> 00:52:10,800

animals that live in cold environments

1450

00:52:13,990 --> 00:52:12,559

usually have thick fur

1451

00:52:15,829 --> 00:52:14,000

animals that live in the ocean are

1452

00:52:18,230 --> 00:52:15,839

typically hairless and have long sleek

1453

00:52:19,750 --> 00:52:18,240

bodies perfect for swimming in water

1454

00:52:21,589 --> 00:52:19,760

it's obvious just by looking at the

1455

00:52:23,270 --> 00:52:21,599

different species on earth that certain

1456

00:52:24,630 --> 00:52:23,280

environments and conditions tend to

1457

00:52:26,309 --> 00:52:24,640

produce certain body types and

1458

00:52:28,549 --> 00:52:26,319

characteristics

1459

00:52:30,630 --> 00:52:28,559

and despite these many differences there

1460

00:52:32,710 --> 00:52:30,640

are certain distinct similarities that

1461

00:52:35,750 --> 00:52:32,720

the vast majority of life on earth seems

1462

00:52:37,670 --> 00:52:35,760

to share such as bilateral symmetry

1463

00:52:39,430 --> 00:52:37,680

bilateral symmetry basically means that

1464

00:52:41,270 --> 00:52:39,440

you can draw a line down the center of

1465

00:52:42,309 --> 00:52:41,280

an organism and it's the same on both

1466

00:52:44,390 --> 00:52:42,319

sides

1467

00:52:46,390 --> 00:52:44,400

bilateral symmetry is great for things

1468

00:52:48,150 --> 00:52:46,400

like being able to walk or swim in a

1469

00:52:49,430 --> 00:52:48,160

straight line an accurate depth

1470

00:52:51,190 --> 00:52:49,440

perception

1471

00:52:53,510 --> 00:52:51,200

when you try to imagine an animal that

1472

00:52:55,750 --> 00:52:53,520

has any kind of significant asymmetry

1473

00:52:57,829 --> 00:52:55,760

and how it might operate it's easy to

1474

00:52:59,990 --> 00:52:57,839

see how bilateral symmetry could very

1475

00:53:02,790 --> 00:53:00,000

possibly be necessary to the evolution

1476  
00:53:04,790 --> 00:53:02,800  
of complex and intelligent life forms so

1477  
00:53:05,990 --> 00:53:04,800  
evolution really might not be as random

1478  
00:53:08,150 --> 00:53:06,000  
as we think

1479  
00:53:09,750 --> 00:53:08,160  
more evidence to support this idea comes

1480  
00:53:11,589 --> 00:53:09,760  
in the form of a concept called

1481  
00:53:16,230 --> 00:53:11,599  
convergent evolution

1482  
00:53:18,230 --> 00:53:16,240  
that evolve similar features entirely

1483  
00:53:20,790 --> 00:53:18,240  
independently from one another

1484  
00:53:23,190 --> 00:53:20,800  
for example sharks and dolphins look

1485  
00:53:25,109 --> 00:53:23,200  
very similar despite sharks being an

1486  
00:53:27,589 --> 00:53:25,119  
egg-laying fish and dolphins being a

1487  
00:53:31,349 --> 00:53:27,599  
mammal and their last common ancestor

1488  
00:53:33,510 --> 00:53:31,359

swam the seas 290 million years ago

1489

00:53:36,069 --> 00:53:33,520

that's 60 million years before the

1490

00:53:38,630 --> 00:53:36,079

earliest dinosaurs appeared on the earth

1491

00:53:40,630 --> 00:53:38,640

even more surprisingly flight appears to

1492

00:53:42,390 --> 00:53:40,640

have evolved separately and at four

1493

00:53:46,470 --> 00:53:42,400

different times in history

1494

00:53:48,069 --> 00:53:46,480

in insects bats birds and pterosaurs

1495

00:53:50,790 --> 00:53:48,079

and the mechanism for how these animals

1496

00:53:53,349 --> 00:53:50,800

fly is virtually identical stranger

1497

00:53:55,589 --> 00:53:53,359

still both octopuses and humans

1498

00:53:59,109 --> 00:53:55,599

separately evolved camera-like eyes with

1499

00:54:01,109 --> 00:53:59,119

an iris a lens and a retina a very exact

1500

00:54:02,870 --> 00:54:01,119

and complex set of structures all of

1501  
00:54:05,190 --> 00:54:02,880  
which are essential parts of an imaging

1502  
00:54:07,630 --> 00:54:05,200  
device and this happened despite our

1503  
00:54:11,109 --> 00:54:07,640  
last common ancestor existing

1504  
00:54:12,390 --> 00:54:11,119  
750 million years ago all of this is to

1505  
00:54:13,870 --> 00:54:12,400  
say that although it might be

1506  
00:54:15,750 --> 00:54:13,880  
counterintuitive to think that

1507  
00:54:17,589 --> 00:54:15,760  
extraterrestrials could have similar

1508  
00:54:20,710 --> 00:54:17,599  
features and body structures to humans

1509  
00:54:22,390 --> 00:54:20,720  
as is reported by most alleged abductees

1510  
00:54:24,630 --> 00:54:22,400  
the more we learn about how evolution

1511  
00:54:26,309 --> 00:54:24,640  
actually works the more likely it seems

1512  
00:54:27,430 --> 00:54:26,319  
that these beings could look very much

1513  
00:54:29,750 --> 00:54:27,440

like us

1514

00:54:32,069 --> 00:54:29,760

so i've thrown a ton of information at

1515

00:54:33,990 --> 00:54:32,079

you and yet it probably feels like we're

1516

00:54:35,910 --> 00:54:34,000

no closer to an answer when it comes to

1517

00:54:38,150 --> 00:54:35,920

the question of whether or not ufos

1518

00:54:39,990 --> 00:54:38,160

could be extraterrestrial technology

1519

00:54:41,430 --> 00:54:40,000

than we were when we started

1520

00:54:42,710 --> 00:54:41,440

and that's okay

1521

00:54:44,870 --> 00:54:42,720

if we're going to continue down this

1522

00:54:47,270 --> 00:54:44,880

rabbit hole we need to get cozy with

1523

00:54:49,430 --> 00:54:47,280

ambiguity and uncertainty because there

1524

00:54:51,910 --> 00:54:49,440

are no straightforward answers here

1525

00:54:54,069 --> 00:54:51,920

we can say that it's probable that alien

1526

00:54:55,829 --> 00:54:54,079

life forms exist and that a certain

1527

00:54:57,829 --> 00:54:55,839

percentage of that life though we don't

1528

00:55:00,150 --> 00:54:57,839

know how large or vanishingly small that

1529

00:55:01,750 --> 00:55:00,160

percentage might be has likely evolved

1530

00:55:03,670 --> 00:55:01,760

to a level of intelligence that would

1531

00:55:05,430 --> 00:55:03,680

make space travel possible

1532

00:55:07,190 --> 00:55:05,440

we can say that interstellar space

1533

00:55:08,470 --> 00:55:07,200

travel is theoretically possible and

1534

00:55:10,069 --> 00:55:08,480

that it seems likely that a more

1535

00:55:12,309 --> 00:55:10,079

advanced civilization than ourselves

1536

00:55:13,990 --> 00:55:12,319

could undertake such an enterprise and

1537

00:55:15,670 --> 00:55:14,000

while we can't say with certainty that

1538

00:55:18,150 --> 00:55:15,680

humans have yet encountered any of these

1539

00:55:20,390 --> 00:55:18,160

beings the reports that we do have of

1540

00:55:21,670 --> 00:55:20,400

such alleged encounters are more or less

1541

00:55:23,829 --> 00:55:21,680

in line with what scientists would

1542

00:55:25,750 --> 00:55:23,839

expect these beings to look like

1543

00:55:27,990 --> 00:55:25,760

but is it aliens

1544

00:55:29,829 --> 00:55:28,000

that's hard to say there's this idea in

1545

00:55:33,270 --> 00:55:29,839

math called a transitive property that

1546

00:55:34,549 --> 00:55:33,280

basically says that if a equals b and b

1547

00:55:39,109 --> 00:55:34,559

equals c

1548

00:55:41,750 --> 00:55:39,119

so for example cats are mammals

1549

00:55:43,829 --> 00:55:41,760

mammals are warm-blooded therefore cats

1550

00:55:45,829 --> 00:55:43,839

are warm-blooded and this feels like a

1551

00:55:48,470 --> 00:55:45,839

situation where you could say that if

1552

00:55:51,510 --> 00:55:48,480

ufos are real and if ufos are alien

1553

00:55:54,230 --> 00:55:51,520

technology then aliens must be real

1554

00:55:56,870 --> 00:55:54,240

but that logical leap only works if ufos

1555

00:55:58,710 --> 00:55:56,880

are alien technology and we're not at a

1556

00:56:00,630 --> 00:55:58,720

place where we can assume that

1557

00:56:03,270 --> 00:56:00,640

in fact as we'll discuss in our next

1558

00:56:05,510 --> 00:56:03,280

episode although we tend to equate ufos

1559

00:56:06,789 --> 00:56:05,520

with extraterrestrials there are several

1560

00:56:09,349 --> 00:56:06,799

other possibilities that could

1561

00:56:11,349 --> 00:56:09,359

potentially explain the ufo phenomenon

1562

00:56:13,990 --> 00:56:11,359

and if you listen closely to what former

1563

00:56:15,829 --> 00:56:14,000

atip director lou elizondo and others in

1564

00:56:18,150 --> 00:56:15,839

the disclosure movement with access to

1565

00:56:20,390 --> 00:56:18,160

privileged information are actually

1566

00:56:21,910 --> 00:56:20,400

saying you may begin to wonder if what

1567

00:56:24,309 --> 00:56:21,920

we're dealing with is really of

1568

00:56:26,390 --> 00:56:24,319

extraterrestrial origin listen to lou

1569

00:56:28,549 --> 00:56:26,400

elizondo's response to a question on the

1570

00:56:30,069 --> 00:56:28,559

fade to black podcast when host jimmy

1571

00:56:32,710 --> 00:56:30,079

church asked a question about the

1572

00:56:34,390 --> 00:56:32,720

origins of the infamous tic tac ufo from

1573

00:56:36,549 --> 00:56:34,400

the nimitz incident

1574

00:56:41,510 --> 00:56:36,559

the tic tac

1575

00:56:43,670 --> 00:56:41,520

not of this earth

1576

00:56:47,589 --> 00:56:43,680

the nimitz encounter

1577

00:56:48,710 --> 00:56:47,599

that the tic tac is that not of this

1578

00:56:50,710 --> 00:56:48,720

earth

1579

00:56:52,069 --> 00:56:50,720

jimmy forgive me for saying this i i

1580

00:56:54,630 --> 00:56:52,079

don't want to correct you publicly but

1581

00:56:57,990 --> 00:56:54,640

you're asking the wrong question

1582

00:57:02,150 --> 00:56:58,000

the question should be is the tic tac

1583

00:57:04,789 --> 00:57:02,160

man-made or is the tic tac us or is it

1584

00:57:07,670 --> 00:57:04,799

tic tac us or foreign adversary

1585

00:57:09,829 --> 00:57:07,680

technology the answer is no but when you

1586

00:57:12,230 --> 00:57:09,839

say is it from this earth

1587

00:57:15,750 --> 00:57:12,240

we don't know that's that's you know

1588

00:57:17,270 --> 00:57:15,760

this is why we've always stated before

1589

00:57:18,470 --> 00:57:17,280

from our position

1590

00:57:20,549 --> 00:57:18,480

we don't know if these things are from

1591

00:57:22,390 --> 00:57:20,559

outer space inner space or frankly the

1592

00:57:24,470 --> 00:57:22,400

space in between as you you begin to

1593

00:57:26,710 --> 00:57:24,480

understand the world of quantum physics

1594

00:57:28,870 --> 00:57:26,720

there's a whole lot of reality around us

1595

00:57:30,710 --> 00:57:28,880

and we don't interact with it um you

1596

00:57:32,710 --> 00:57:30,720

know we're used to the newtonian uh

1597

00:57:34,150 --> 00:57:32,720

understanding of the world physics where

1598

00:57:36,309 --> 00:57:34,160

you know gravity and apple falls from a

1599

00:57:37,910 --> 00:57:36,319

tree and then along comes einstein

1600

00:57:39,430 --> 00:57:37,920

several hundred years later and talks

1601  
00:57:41,829 --> 00:57:39,440  
about this thing called relativity where

1602  
00:57:43,589 --> 00:57:41,839  
space time is actually flexible and only

1603  
00:57:45,750 --> 00:57:43,599  
in the last 20 30 years have we really

1604  
00:57:47,510 --> 00:57:45,760  
begin to explore the world of quantum

1605  
00:57:50,230 --> 00:57:47,520  
quantum physics the quantum world the

1606  
00:57:53,510 --> 00:57:50,240  
quantum states and we're realizing all

1607  
00:57:55,829 --> 00:57:53,520  
these realities as as as opposite as

1608  
00:57:57,430 --> 00:57:55,839  
they may seem to us are actually very

1609  
00:58:00,230 --> 00:57:57,440  
much part of the natural environment and

1610  
00:58:02,390 --> 00:58:00,240  
so my point being there may be realities

1611  
00:58:03,349 --> 00:58:02,400  
all around us that we simply don't

1612  
00:58:05,430 --> 00:58:03,359  
perceive

1613  
00:58:07,829 --> 00:58:05,440

you know we're very limited as a species

1614

00:58:10,390 --> 00:58:07,839

we live in a three-dimensional space x y

1615

00:58:12,309 --> 00:58:10,400

z axis and time which is a function of i

1616

00:58:15,270 --> 00:58:12,319

guess of the fourth dimension and and

1617

00:58:18,789 --> 00:58:15,280

that's expressed in a linear linear

1618

00:58:20,789 --> 00:58:18,799

if you will linear motion for us

1619

00:58:22,470 --> 00:58:20,799

but that's not to say that there aren't

1620

00:58:24,950 --> 00:58:22,480

other things all around us we sense the

1621

00:58:27,829 --> 00:58:24,960

universe through the five primary senses

1622

00:58:29,030 --> 00:58:27,839

of sight smell touch taste and hearing

1623

00:58:31,270 --> 00:58:29,040

and yet

1624

00:58:33,190 --> 00:58:31,280

we know that we only perceive

1625

00:58:34,789 --> 00:58:33,200

one percent of one percent of the

1626

00:58:36,789 --> 00:58:34,799

universe that's around us

1627

00:58:38,630 --> 00:58:36,799

most of the universe remains completely

1628

00:58:40,789 --> 00:58:38,640

invisible to us and i don't mean the

1629

00:58:43,270 --> 00:58:40,799

universe out there i mean the universe

1630

00:58:45,670 --> 00:58:43,280

right here let me put that into context

1631

00:58:48,549 --> 00:58:45,680

we know less than five percent about our

1632

00:58:49,510 --> 00:58:48,559

deepest oceans right we we

1633

00:58:50,870 --> 00:58:49,520

really don't even have a good

1634

00:58:53,670 --> 00:58:50,880

understanding of what lives in our own

1635

00:58:55,750 --> 00:58:53,680

planet let alone anywhere else

1636

00:58:58,390 --> 00:58:55,760

we when you look at the human being we

1637

00:59:00,470 --> 00:58:58,400

are exactly in the middle of the scale

1638

00:59:02,069 --> 00:59:00,480

of the universe

1639

00:59:03,870 --> 00:59:02,079

if you were to take us being the

1640

00:59:06,230 --> 00:59:03,880

smallest thing and look at the

1641

00:59:08,390 --> 00:59:06,240

grandiosity of the universe which is

1642

00:59:10,710 --> 00:59:08,400

13.5 billion light years in this

1643

00:59:13,190 --> 00:59:10,720

direction and 13.5 billion light years

1644

00:59:15,349 --> 00:59:13,200

in that direction right 27 billion light

1645

00:59:17,030 --> 00:59:15,359

years in distance which is a lot we seem

1646

00:59:20,390 --> 00:59:17,040

pretty small

1647

00:59:23,430 --> 00:59:20,400

by that scale there is equally the same

1648

00:59:26,549 --> 00:59:23,440

amount of space inside of the human body

1649

00:59:28,710 --> 00:59:26,559

there is this entire universe inside of

1650

00:59:30,390 --> 00:59:28,720

us when you talk about not just the

1651

00:59:31,589 --> 00:59:30,400

cells of the body or even the atom if

1652

00:59:33,510 --> 00:59:31,599

you start talking about subatomic

1653

00:59:35,190 --> 00:59:33,520

particles you start talking about muons

1654

00:59:37,190 --> 00:59:35,200

and quarks

1655

00:59:38,870 --> 00:59:37,200

this is reality this is real even though

1656

00:59:41,270 --> 00:59:38,880

we can't interact with it there is this

1657

00:59:42,789 --> 00:59:41,280

entire universe inside each and every

1658

00:59:43,670 --> 00:59:42,799

one of us now i don't want to get you

1659

00:59:46,470 --> 00:59:43,680

know

1660

00:59:48,630 --> 00:59:46,480

to off off the beaten path here but my

1661

00:59:51,910 --> 00:59:48,640

point being is that

1662

00:59:54,230 --> 00:59:51,920

there is so much we don't understand

1663

00:59:55,190 --> 00:59:54,240

about the universe let alone our own

1664

00:59:59,670 --> 00:59:55,200

selves

1665

01:00:03,430 --> 00:59:59,680

so i think it is it is foolhardy for us

1666

01:00:04,789 --> 01:00:03,440

to even begin to say definitively that

1667

01:00:06,710 --> 01:00:04,799

well

1668

01:00:08,789 --> 01:00:06,720

the buck stops with us

1669

01:00:10,789 --> 01:00:08,799

crazy right and then there was a

1670

01:00:13,430 --> 01:00:10,799

puzzling and intriguing answer that he

1671

01:00:15,349 --> 01:00:13,440

gave on that ufo podcast when he was

1672

01:00:17,270 --> 01:00:15,359

asked about a previous statement he had

1673

01:00:21,750 --> 01:00:17,280

made where he said basically

1674

01:00:22,950 --> 01:00:21,760

what if it's not mankind but mankind's

1675

01:00:24,710 --> 01:00:22,960

listen

1676  
01:00:25,990 --> 01:00:24,720  
you've led me very nicely into this next

1677  
01:00:28,069 --> 01:00:26,000  
question because i'm actually going to

1678  
01:00:30,549 --> 01:00:28,079  
throw back at you a question you once

1679  
01:00:31,910 --> 01:00:30,559  
asked on a piece you'd run the youtube

1680  
01:00:33,750 --> 01:00:31,920  
videos out there i'm not too sure of the

1681  
01:00:34,950 --> 01:00:33,760  
context behind it but

1682  
01:00:36,150 --> 01:00:34,960  
it was certainly something that stuck

1683  
01:00:38,630 --> 01:00:36,160  
with me and a lot of other people as

1684  
01:00:41,030 --> 01:00:38,640  
well and you asked once for people to

1685  
01:00:42,470 --> 01:00:41,040  
consider what if it wasn't mankind but

1686  
01:00:44,230 --> 01:00:42,480  
mankind's

1687  
01:00:45,589 --> 01:00:44,240  
and what would that mean for us

1688  
01:00:47,349 --> 01:00:45,599

could you elaborate on that because

1689

01:00:49,510 --> 01:00:47,359

that's something people go back to more

1690

01:00:50,950 --> 01:00:49,520

and more and as

1691

01:00:52,630 --> 01:00:50,960

more or less hypothetical that's what

1692

01:00:54,630 --> 01:00:52,640

i'm going to put it as but people would

1693

01:00:56,390 --> 01:00:54,640

assume you come from a better

1694

01:00:57,829 --> 01:00:56,400

understanding a place of knowledge than

1695

01:01:01,030 --> 01:00:57,839

most would

1696

01:01:02,870 --> 01:01:01,040

yeah wow uh

1697

01:01:05,670 --> 01:01:02,880

boy you're getting some really really

1698

01:01:07,510 --> 01:01:05,680

good and personal questions um

1699

01:01:09,750 --> 01:01:07,520

let me see if i can answer that in a

1700

01:01:11,990 --> 01:01:09,760

meaningful way without leading the

1701  
01:01:13,750 --> 01:01:12,000  
witness we live in a three-dimensional

1702  
01:01:17,030 --> 01:01:13,760  
world

1703  
01:01:19,750 --> 01:01:17,040  
where time is a function of the fourth

1704  
01:01:21,670 --> 01:01:19,760  
dimension if you will and we experience

1705  
01:01:23,750 --> 01:01:21,680  
time as being linear it's a linear

1706  
01:01:26,789 --> 01:01:23,760  
function or a process

1707  
01:01:28,390 --> 01:01:26,799  
but we now know in the quantum world

1708  
01:01:32,309 --> 01:01:28,400  
that

1709  
01:01:34,069 --> 01:01:32,319  
time because of the work of einstein and

1710  
01:01:36,549 --> 01:01:34,079  
others that space and time are are

1711  
01:01:38,630 --> 01:01:36,559  
joined together and we know that space

1712  
01:01:40,230 --> 01:01:38,640  
time is flexible it's called relativity

1713  
01:01:42,150 --> 01:01:40,240

we see it around massive objects all the

1714

01:01:43,430 --> 01:01:42,160

time not just earth but the sun black

1715

01:01:46,549 --> 01:01:43,440

holes

1716

01:01:48,630 --> 01:01:46,559

so the linear universe that

1717

01:01:50,950 --> 01:01:48,640

we experience

1718

01:01:53,510 --> 01:01:50,960

to some degree really isn't and when you

1719

01:01:55,430 --> 01:01:53,520

look at the quantum state of things even

1720

01:01:57,270 --> 01:01:55,440

an electron for example

1721

01:01:59,670 --> 01:01:57,280

uh you learned in high school that an

1722

01:02:01,750 --> 01:01:59,680

electron orbits an atom and we now know

1723

01:02:03,349 --> 01:02:01,760

that's really a very simplistic way of

1724

01:02:05,029 --> 01:02:03,359

looking at things that the electron

1725

01:02:07,190 --> 01:02:05,039

doesn't orbit around the atom in fact

1726

01:02:09,510 --> 01:02:07,200

it's called an electron cloud because

1727

01:02:11,589 --> 01:02:09,520

the electron is is

1728

01:02:13,589 --> 01:02:11,599

both all in all places and none of the

1729

01:02:14,950 --> 01:02:13,599

places all at the same time it's kind of

1730

01:02:16,470 --> 01:02:14,960

weird but

1731

01:02:19,029 --> 01:02:16,480

my point being is that if you were to

1732

01:02:20,630 --> 01:02:19,039

look at time and think of a think of a

1733

01:02:22,069 --> 01:02:20,640

cigarette burning

1734

01:02:23,990 --> 01:02:22,079

when you look at the notion of the

1735

01:02:26,150 --> 01:02:24,000

future most people would would define

1736

01:02:28,789 --> 01:02:26,160

the future as those events that have not

1737

01:02:30,950 --> 01:02:28,799

yet happened and the past is defined by

1738

01:02:32,710 --> 01:02:30,960

events that have already happened

1739

01:02:35,670 --> 01:02:32,720

and when you look at that construct then

1740

01:02:37,829 --> 01:02:35,680

the definition of the present must be a

1741

01:02:40,589 --> 01:02:37,839

a moment in space time probably measured

1742

01:02:42,630 --> 01:02:40,599

in playing time very infinitesimal and

1743

01:02:45,670 --> 01:02:42,640

infinitesimally small

1744

01:02:48,150 --> 01:02:45,680

moment of space time where the future is

1745

01:02:50,710 --> 01:02:48,160

transitioning into the past it's it's

1746

01:02:53,190 --> 01:02:50,720

it's it's not a point in time it's a

1747

01:02:54,630 --> 01:02:53,200

process it's an event that's occurring

1748

01:02:56,789 --> 01:02:54,640

so a way to look at that in late

1749

01:02:57,829 --> 01:02:56,799

perspective is think of a cigarette or a

1750

01:03:03,589 --> 01:02:57,839

cigar

1751

01:03:05,349 --> 01:03:03,599

already burnt to ash is the past

1752

01:03:07,510 --> 01:03:05,359

that part of the cigar cigarette or

1753

01:03:10,069 --> 01:03:07,520

cigar that has not yet burned

1754

01:03:11,430 --> 01:03:10,079

is the future and the cherry that moment

1755

01:03:14,230 --> 01:03:11,440

of ignition

1756

01:03:16,549 --> 01:03:14,240

that spark of where the future is now be

1757

01:03:18,230 --> 01:03:16,559

getting consumed and becoming the past

1758

01:03:20,870 --> 01:03:18,240

that is the present and we as human

1759

01:03:23,029 --> 01:03:20,880

beings we live at that moment all of our

1760

01:03:26,470 --> 01:03:23,039

hopes our fears our memories love hate

1761

01:03:29,670 --> 01:03:26,480

good bad all that is an expression

1762

01:03:30,510 --> 01:03:29,680

of of an experience that occurs

1763

01:03:32,470 --> 01:03:30,520

at an

1764

01:03:34,309 --> 01:03:32,480

infinitesimally small moment of space

1765

01:03:36,870 --> 01:03:34,319

time like i said probably measured in

1766

01:03:41,109 --> 01:03:38,870

that is how we we

1767

01:03:42,950 --> 01:03:41,119

we experience the present but what if

1768

01:03:45,510 --> 01:03:42,960

there were

1769

01:03:47,829 --> 01:03:45,520

things that had the ability to

1770

01:03:49,109 --> 01:03:47,839

experience where where the present was a

1771

01:03:52,630 --> 01:03:49,119

much bigger

1772

01:03:54,150 --> 01:03:52,640

transition where more elements of the

1773

01:03:55,589 --> 01:03:54,160

future in the past

1774

01:03:57,109 --> 01:03:55,599

are experienced

1775

01:03:59,029 --> 01:03:57,119

as in the present

1776

01:04:03,430 --> 01:03:59,039

and can do that also physically right so

1777

01:04:06,230 --> 01:04:03,440

it's not just not just uh uh a an idea

1778

01:04:08,789 --> 01:04:06,240

but uh what if there were species out

1779

01:04:11,109 --> 01:04:08,799

there that that experienced the universe

1780

01:04:13,270 --> 01:04:11,119

uh in it with it with an extra level of

1781

01:04:14,630 --> 01:04:13,280

dimension and so you and i are having

1782

01:04:16,230 --> 01:04:14,640

this conversation right now with your

1783

01:04:18,950 --> 01:04:16,240

audience and we're having this

1784

01:04:20,390 --> 01:04:18,960

conversation right here right now but if

1785

01:04:22,150 --> 01:04:20,400

i were to have the ability to have this

1786

01:04:24,549 --> 01:04:22,160

conversation right here but five minutes

1787

01:04:26,230 --> 01:04:24,559

ago or five minutes from now

1788

01:04:28,069 --> 01:04:26,240

we would never meet we'd be like two

1789

01:04:29,029 --> 01:04:28,079

ships passing in the night

1790

01:04:30,789 --> 01:04:29,039

um

1791

01:04:33,270 --> 01:04:30,799

is it possible that maybe some of these

1792

01:04:35,910 --> 01:04:33,280

things these uap have the ability

1793

01:04:37,990 --> 01:04:35,920

we experience in them we we experience

1794

01:04:40,390 --> 01:04:38,000

them when they are right here right now

1795

01:04:41,589 --> 01:04:40,400

and every other every other time we we

1796

01:04:45,190 --> 01:04:41,599

don't because we're simply not

1797

01:04:48,630 --> 01:04:45,200

intersecting uh with that with that uh

1798

01:04:50,549 --> 01:04:48,640

extra dimensional space of of of time

1799

01:04:52,870 --> 01:04:50,559

um you know when you look at that

1800

01:04:55,510 --> 01:04:52,880

cigarette or cigar burning

1801  
01:04:57,190 --> 01:04:55,520  
you'll notice that it never burns evenly

1802  
01:04:58,950 --> 01:04:57,200  
when you look at it up close and you can

1803  
01:05:00,630 --> 01:04:58,960  
kind of remove the glare and the flare

1804  
01:05:03,109 --> 01:05:00,640  
from the from the burn

1805  
01:05:05,910 --> 01:05:03,119  
we realize that that

1806  
01:05:07,990 --> 01:05:05,920  
there are portions of the future of the

1807  
01:05:09,109 --> 01:05:08,000  
portions of the cigar that haven't

1808  
01:05:11,510 --> 01:05:09,119  
burned yet

1809  
01:05:13,829 --> 01:05:11,520  
uh behind portions of the cigar that

1810  
01:05:15,029 --> 01:05:13,839  
already has burned it's it's not an even

1811  
01:05:16,230 --> 01:05:15,039  
burn

1812  
01:05:21,270 --> 01:05:16,240  
quantum

1813  
01:05:23,510 --> 01:05:21,280

theory uh is beginning to to show some

1814

01:05:25,670 --> 01:05:23,520

of the models for that so

1815

01:05:27,430 --> 01:05:25,680

um i know i'm going in a very

1816

01:05:28,789 --> 01:05:27,440

long-winded roundabout way to answer

1817

01:05:30,789 --> 01:05:28,799

your question about what i meant about

1818

01:05:32,549 --> 01:05:30,799

mankind

1819

01:05:33,829 --> 01:05:32,559

but i guess my answer to that is it's

1820

01:05:37,109 --> 01:05:33,839

limitless

1821

01:05:39,270 --> 01:05:37,119

we every time we put a limitation on

1822

01:05:40,309 --> 01:05:39,280

mother nature she defies

1823

01:05:44,069 --> 01:05:40,319

our

1824

01:05:46,470 --> 01:05:44,079

so that's where we'll pick up next time

1825

01:05:49,430 --> 01:05:46,480

with the idea that the extraterrestrial

1826

01:05:51,109 --> 01:05:49,440

hypothesis for the origin of ufos is

1827

01:05:53,029 --> 01:05:51,119

actually one of the least bizarre and

1828

01:05:54,950 --> 01:05:53,039

exotic explanations

1829

01:05:57,029 --> 01:05:54,960

and that what we're dealing with here

1830

01:05:59,109 --> 01:05:57,039

might lead us to answers that shatter

1831

01:06:01,109 --> 01:05:59,119

our paradigms in ways that could make us

1832

01:06:03,750 --> 01:06:01,119

wish for something as simple and

1833

01:06:07,440 --> 01:06:03,760

clear-cut as an alien invasion