



Ask An Astrobiologist



EPISODE 52: SEPTEMBER 28TH, 2022

LUKE STELLER



Astrobiology Program

1
00:00:30,070 --> 00:00:24,910

[Music]

2
00:00:35,630 --> 00:00:32,810
greetings friends and fellow earthlings

3
00:00:38,030 --> 00:00:35,640
tell me have you heard that scientists

4
00:00:39,770 --> 00:00:38,040
have recently successfully grown human

5
00:00:40,670 --> 00:00:39,780
vocal cords in a Petri dish for the

6
00:00:43,010 --> 00:00:40,680
first time

7
00:00:44,090 --> 00:00:43,020
I'll tell you the results speak for

8
00:00:46,430 --> 00:00:44,100
themselves

9
00:00:48,410 --> 00:00:46,440
welcome to ask an astrobiologist the

10
00:00:50,389 --> 00:00:48,420
show that celebrates the science and

11
00:00:51,889 --> 00:00:50,399
celebrates the scientists involved in

12
00:00:55,069 --> 00:00:51,899
our quest to understand the nature of

13
00:00:57,170 --> 00:00:55,079

life I'm your host Dr Graham Astro B

14

00:01:00,229 --> 00:00:57,180

flau and we're brought to you by the

15

00:01:02,389 --> 00:01:00,239

NASA astrobiology program and segnet.org

16

00:01:03,889 --> 00:01:02,399

now as always before we get into the

17

00:01:06,050 --> 00:01:03,899

meat of our show and have a wonderful

18

00:01:07,730 --> 00:01:06,060

conversation with our guest in their

19

00:01:09,770 --> 00:01:07,740

realm of expertise and about their

20

00:01:11,630 --> 00:01:09,780

history and their Hobbies we want to

21

00:01:14,510 --> 00:01:11,640

thank all of you out there who are

22

00:01:15,710 --> 00:01:14,520

interested in our show who tune in for

23

00:01:18,410 --> 00:01:15,720

all of the events and opportunities

24

00:01:20,510 --> 00:01:18,420

available from NASA astrobiology and who

25

00:01:22,670 --> 00:01:20,520

promote our show on Twitter and

26
00:01:24,350 --> 00:01:22,680
Instagram Facebook LinkedIn Tick Tock

27
00:01:27,469 --> 00:01:24,360
wherever you happen to be out there on

28
00:01:29,210 --> 00:01:27,479
the interwebs uh I'm old by the way

29
00:01:32,210 --> 00:01:29,220
um today we especially want to thank two

30
00:01:34,670 --> 00:01:32,220
of you out there Skyler Borges thank you

31
00:01:37,010 --> 00:01:34,680
very much for sharing on Twitter you can

32
00:01:39,350 --> 00:01:37,020
find Skyler at planetscientist on

33
00:01:41,149 --> 00:01:39,360
Twitter also Terry Trevino thank you

34
00:01:43,490 --> 00:01:41,159
very much for sharing about our show

35
00:01:45,770 --> 00:01:43,500
today about our guests and how excited

36
00:01:47,990 --> 00:01:45,780
you are for him to join us for this show

37
00:01:50,510 --> 00:01:48,000
oh and Terry Trevino by the way is at

38
00:01:52,550 --> 00:01:50,520

Terry Trevino on Twitter uh so thank you

39

00:01:55,249 --> 00:01:52,560

Skyler and Terry so much for promoting

40

00:01:57,050 --> 00:01:55,259

our show for us so let's get down to it

41

00:01:59,210 --> 00:01:57,060

today's episode is going to take us down

42

00:02:01,429 --> 00:01:59,220

under uh as our guest will be joining us

43

00:02:03,469 --> 00:02:01,439

from Australia and even though it's the

44

00:02:05,690 --> 00:02:03,479

evening here for me in the U.S it's

45

00:02:07,670 --> 00:02:05,700

actually the morning for him today I'm

46

00:02:11,270 --> 00:02:07,680

being joined by my friend and colleague

47

00:02:12,890 --> 00:02:11,280

and fellow cycomer Luke Stellar Luke is

48

00:02:15,350 --> 00:02:12,900

a current doctoral candidate at the

49

00:02:16,850 --> 00:02:15,360

Australian Center for astrobiology and I

50

00:02:19,190 --> 00:02:16,860

can tell you he's also one of the most

51
00:02:21,710 --> 00:02:19,200
recent research Affiliates to join the

52
00:02:23,750 --> 00:02:21,720
Blue Marble space Institute of science

53
00:02:26,330 --> 00:02:23,760
in his research Luke explores the

54
00:02:28,550 --> 00:02:26,340
geochemistry of both ancient and modern

55
00:02:30,290 --> 00:02:28,560
hot spring systems studying their

56
00:02:32,510 --> 00:02:30,300
potential to promote environments that

57
00:02:34,490 --> 00:02:32,520
are favorable for the origins and the

58
00:02:37,250 --> 00:02:34,500
evolution of life on Earth and

59
00:02:39,470 --> 00:02:37,260
potentially Beyond Luke is also a

60
00:02:40,970 --> 00:02:39,480
renowned science Communicator he's

61
00:02:43,309 --> 00:02:40,980
recently created and performed in the

62
00:02:45,170 --> 00:02:43,319
steam room where seven scientists were

63
00:02:47,030 --> 00:02:45,180

treated by comedians to perform stand-up

64

00:02:49,369 --> 00:02:47,040

comedy selling out shows at the City

65

00:02:51,170 --> 00:02:49,379

Comedy Festival and performing at music

66

00:02:52,369 --> 00:02:51,180

festivals and for those who know me you

67

00:02:54,050 --> 00:02:52,379

know that I've also done some stand-up

68

00:02:56,449 --> 00:02:54,060

science comedy you know that's near and

69

00:02:58,250 --> 00:02:56,459

dear to my heart and so I am so excited

70

00:03:00,170 --> 00:02:58,260

and happy to welcome Luke to the show

71

00:03:01,729 --> 00:03:00,180

Luke Stellar welcome to ask an

72

00:03:04,490 --> 00:03:01,739

astrobiologist

73

00:03:06,770 --> 00:03:04,500

thanks Graham it's uh so nice to be here

74

00:03:07,610 --> 00:03:06,780

it's so great to have you on the show

75

00:03:09,410 --> 00:03:07,620

um you know we've been we've been

76

00:03:10,729 --> 00:03:09,420

friends online for a long time we've

77

00:03:12,770 --> 00:03:10,739

known of each other's work for a long

78

00:03:13,729 --> 00:03:12,780

time we've really only had one chance to

79

00:03:15,410 --> 00:03:13,739

hang out

80

00:03:17,210 --> 00:03:15,420

um so far the pandemics made things hard

81

00:03:18,290 --> 00:03:17,220

for a lot of us for travel hope that all

82

00:03:19,430 --> 00:03:18,300

change soon

83

00:03:20,930 --> 00:03:19,440

um we had a chance to hang out at the

84

00:03:23,210 --> 00:03:20,940

astrobiology science conference this

85

00:03:25,430 --> 00:03:23,220

year which was awesome and I feel like I

86

00:03:27,470 --> 00:03:25,440

know a good bit about you but there's a

87

00:03:29,630 --> 00:03:27,480

lot I don't know and my job as the host

88

00:03:31,610 --> 00:03:29,640

is really to introduce you to our

89

00:03:33,229 --> 00:03:31,620

audience so they can get to know you and

90

00:03:35,750 --> 00:03:33,239

one of the places I really like to start

91

00:03:38,630 --> 00:03:35,760

with all of my guests is to have you

92

00:03:41,270 --> 00:03:38,640

tell us your origin story what got you

93

00:03:43,670 --> 00:03:41,280

involved and interested either in in

94

00:03:46,130 --> 00:03:43,680

science in general or maybe even in

95

00:03:47,990 --> 00:03:46,140

astrobiology what was the moment that

96

00:03:49,369 --> 00:03:48,000

sparked your interest in the career that

97

00:03:51,830 --> 00:03:49,379

you've pursued

98

00:03:54,170 --> 00:03:51,840

yeah no that's a really great question

99

00:03:56,030 --> 00:03:54,180

um I guess I grew up in a really bushy

100

00:03:57,649 --> 00:03:56,040

area next to a national park so I was

101
00:03:59,750 --> 00:03:57,659
always getting outside and I loved the

102
00:04:01,729 --> 00:03:59,760
environment I also love figuring out how

103
00:04:03,170 --> 00:04:01,739
it all came together and you know the

104
00:04:04,550 --> 00:04:03,180
chemistry of the water and what makes

105
00:04:05,930 --> 00:04:04,560
all the trees grow

106
00:04:08,330 --> 00:04:05,940
um I went and I did you know

107
00:04:09,649 --> 00:04:08,340
environmental science at Uni and I kind

108
00:04:12,289 --> 00:04:09,659
of found myself falling into

109
00:04:13,850 --> 00:04:12,299
astrobiology research really looking at

110
00:04:15,470 --> 00:04:13,860
these fossils out in the desert of

111
00:04:17,330 --> 00:04:15,480
Australia which we'll talk about in a

112
00:04:19,129 --> 00:04:17,340
bit and I did my research I did my

113
00:04:20,509 --> 00:04:19,139

honors in this space and I went up to

114

00:04:23,150 --> 00:04:20,519

the dark and India and it was all

115

00:04:24,770 --> 00:04:23,160

exciting but I wasn't really sold on

116

00:04:27,290 --> 00:04:24,780

astrobiology I was like oh that's a bit

117

00:04:29,270 --> 00:04:27,300

of fun but whatever but it was actually

118

00:04:31,189 --> 00:04:29,280

um when I was hanging out with Sadaf

119

00:04:32,870 --> 00:04:31,199

Pandi who um some of your viewers may

120

00:04:35,150 --> 00:04:32,880

know set up the

121

00:04:38,150 --> 00:04:35,160

um Indian astrology Research Center and

122

00:04:40,249 --> 00:04:38,160

now at JPL and we'll add a you know a

123

00:04:42,350 --> 00:04:40,259

talk in Sydney about Mars and

124

00:04:44,030 --> 00:04:42,360

astrobiology and afterwards at the pub

125

00:04:46,189 --> 00:04:44,040

there was just so many interested people

126
00:04:48,230 --> 00:04:46,199
asking us questions you know and people

127
00:04:50,210 --> 00:04:48,240
who had no idea what astrobiology was

128
00:04:52,070 --> 00:04:50,220
but had some really really you know

129
00:04:54,350 --> 00:04:52,080
interesting insightful ideas about

130
00:04:55,490 --> 00:04:54,360
Enceladus or they talk to an alien the

131
00:04:56,810 --> 00:04:55,500
other week and wanted to ask us

132
00:04:58,430 --> 00:04:56,820
questions you know and I feel like it

133
00:05:00,110 --> 00:04:58,440
was just very

134
00:05:01,909 --> 00:05:00,120
um beautiful human Connection in

135
00:05:03,830 --> 00:05:01,919
astrobiology that really links us all

136
00:05:05,749 --> 00:05:03,840
together about figuring out where we're

137
00:05:07,490 --> 00:05:05,759
from figuring out if this other you know

138
00:05:09,170 --> 00:05:07,500

life out there and that's what

139

00:05:11,270 --> 00:05:09,180

captivated me and I think as you can

140

00:05:13,249 --> 00:05:11,280

tell I love having to chat with people I

141

00:05:15,530 --> 00:05:13,259

love communicating and I thought this is

142

00:05:17,450 --> 00:05:15,540

it this is my way to sort of engage with

143

00:05:19,370 --> 00:05:17,460

people um outside of science through

144

00:05:21,590 --> 00:05:19,380

astrobiology and that's what hooked me

145

00:05:23,510 --> 00:05:21,600

in so yeah now I'm a PhD student I'm

146

00:05:25,790 --> 00:05:23,520

doing all the things and yeah it's great

147

00:05:27,469 --> 00:05:25,800

I love that yeah I've always you know

148

00:05:30,050 --> 00:05:27,479

I've always thought myself like my best

149

00:05:31,850 --> 00:05:30,060

science hasn't been in the laboratory or

150

00:05:33,950 --> 00:05:31,860

even out in the field it's been around a

151

00:05:35,629 --> 00:05:33,960

campfire talking with people about

152

00:05:38,029 --> 00:05:35,639

science and about the cool things that

153

00:05:39,469 --> 00:05:38,039

we know so I love that but one thing I I

154

00:05:40,969 --> 00:05:39,479

do want to touch back on there you

155

00:05:42,590 --> 00:05:40,979

mentioned the dark

156

00:05:43,969 --> 00:05:42,600

um so maybe our audience or some of the

157

00:05:45,590 --> 00:05:43,979

folks watching right now are watching

158

00:05:47,150 --> 00:05:45,600

later on the YouTube recording aren't

159

00:05:48,950 --> 00:05:47,160

really aware of what ladakh is would you

160

00:05:52,550 --> 00:05:48,960

mind explaining what you did in ladakh

161

00:05:54,350 --> 00:05:52,560

in 26 scene yeah definitely so um I was

162

00:05:56,270 --> 00:05:54,360

very lucky as an honors student so in

163

00:05:57,770 --> 00:05:56,280

Australia we kind of do a mini Masters

164

00:06:01,189 --> 00:05:57,780

called honors it's just like a year of

165

00:06:02,810 --> 00:06:01,199

research after your undergrad and um I

166

00:06:04,909 --> 00:06:02,820

was very lucky that we were studying

167

00:06:06,710 --> 00:06:04,919

ancient hot springs that were preserved

168

00:06:09,469 --> 00:06:06,720

in the fossils in the pilbara so that's

169

00:06:11,330 --> 00:06:09,479

in Western Australia this amazing Arcane

170

00:06:13,370 --> 00:06:11,340

so it's three and a half billion years

171

00:06:15,830 --> 00:06:13,380

old like this super super super old

172

00:06:17,930 --> 00:06:15,840

fossils in Australia and we found there

173

00:06:20,510 --> 00:06:17,940

was Boron like the element Boron Rich

174

00:06:22,370 --> 00:06:20,520

Hot Springs preserved in those rocks and

175

00:06:24,890 --> 00:06:22,380

then it just so happened that the NASA

176
00:06:27,110 --> 00:06:24,900
space were down program which is a field

177
00:06:29,090 --> 00:06:27,120
trip of scientists and Educators were

178
00:06:30,110 --> 00:06:29,100
just going to Le dark so that's this

179
00:06:32,570 --> 00:06:30,120
north

180
00:06:34,909 --> 00:06:32,580
um North ish of India up in the

181
00:06:36,890 --> 00:06:34,919
Himalayas this beautiful high desert

182
00:06:39,050 --> 00:06:36,900
with sand dunes and places and all this

183
00:06:41,029 --> 00:06:39,060
amazing stuff but there's a boron Rich

184
00:06:43,129 --> 00:06:41,039
hot spring there and they'll go in there

185
00:06:45,890 --> 00:06:43,139
to investigate it and my supervisor was

186
00:06:48,350 --> 00:06:45,900
like mate just tag on like I'll pay you

187
00:06:50,749 --> 00:06:48,360
go up there and do all that stuff so um

188
00:06:52,850 --> 00:06:50,759

I was devastating enjoy some who's also

189

00:06:54,529 --> 00:06:52,860

you know our one of our fearless leaders

190

00:06:57,110 --> 00:06:54,539

at Blue Marble and a few other amazing

191

00:06:59,689 --> 00:06:57,120

NASA scientists um and I was collecting

192

00:07:01,730 --> 00:06:59,699

water samples and understanding what you

193

00:07:03,350 --> 00:07:01,740

need to concentrate elements in a hot

194

00:07:05,809 --> 00:07:03,360

spring what do you need happening

195

00:07:07,850 --> 00:07:05,819

underground to get all of boron or

196

00:07:10,610 --> 00:07:07,860

calcium whatever you want to make life

197

00:07:12,110 --> 00:07:10,620

bubbling up to the surface and um yeah

198

00:07:13,129 --> 00:07:12,120

it was a brilliant time it was really

199

00:07:15,110 --> 00:07:13,139

amazing

200

00:07:17,689 --> 00:07:15,120

that's so cool and I really wanted to go

201
00:07:18,890 --> 00:07:17,699
myself to the dock this past year due to

202
00:07:20,990 --> 00:07:18,900
the pandemic unfortunately it wasn't

203
00:07:22,730 --> 00:07:21,000
possible but there is still so much

204
00:07:24,890 --> 00:07:22,740
really awesome research going on in

205
00:07:26,930 --> 00:07:24,900
ladakh Siddharth founding as part of

206
00:07:28,730 --> 00:07:26,940
that and so for those interested there

207
00:07:30,350 --> 00:07:28,740
is Cosmic Adventures there they're

208
00:07:32,029 --> 00:07:30,360
taking people out to explore the field

209
00:07:33,830 --> 00:07:32,039
site in ladakh it's worth checking out

210
00:07:36,409 --> 00:07:33,840
if you're interested in exploring that

211
00:07:37,909 --> 00:07:36,419
part of India before the show you

212
00:07:39,409 --> 00:07:37,919
mentioned to me

213
00:07:41,450 --> 00:07:39,419

um an interesting I'd say uh

214

00:07:43,909 --> 00:07:41,460

serendipitous experience you have with

215

00:07:46,249 --> 00:07:43,919

Martin Van granenbank I've done you know

216

00:07:47,330 --> 00:07:46,259

I've read amas with Martin before he's a

217

00:07:50,089 --> 00:07:47,340

really well known scientist in

218

00:07:51,950 --> 00:07:50,099

astrobiology but you had an interesting

219

00:07:53,029 --> 00:07:51,960

experience where you offered for you to

220

00:07:55,010 --> 00:07:53,039

come along

221

00:07:56,990 --> 00:07:55,020

um into the bush and I wonder if you can

222

00:07:58,430 --> 00:07:57,000

explain that experience to our guests or

223

00:08:00,110 --> 00:07:58,440

to our to our audience

224

00:08:01,070 --> 00:08:00,120

no definitely

225

00:08:02,629 --> 00:08:01,080

um so

226

00:08:04,129 --> 00:08:02,639

um this is when I was an undergrad so I

227

00:08:05,689 --> 00:08:04,139

was in my like second year of University

228

00:08:07,309 --> 00:08:05,699

and

229

00:08:08,689 --> 00:08:07,319

um Martin was just like some distant

230

00:08:10,309 --> 00:08:08,699

Professor you know and as an undergrad

231

00:08:12,110 --> 00:08:10,319

you hardly get much chance to talk to

232

00:08:14,330 --> 00:08:12,120

them but he knew I was interested in

233

00:08:16,309 --> 00:08:14,340

camping he knew I really enjoyed um

234

00:08:17,809 --> 00:08:16,319

driving around the desert in big you

235

00:08:20,749 --> 00:08:17,819

know banged up four wheel drives and

236

00:08:23,270 --> 00:08:20,759

Utes and stuff and um he had a master's

237

00:08:24,770 --> 00:08:23,280

student who was mapping all of these

238

00:08:27,350 --> 00:08:24,780

um hydrothermal veins so they almost

239

00:08:29,270 --> 00:08:27,360

looked like brick walls cutting through

240

00:08:31,369 --> 00:08:29,280

the desert where they're kind of deep

241

00:08:33,649 --> 00:08:31,379

underground veins that used to fill up

242

00:08:35,089 --> 00:08:33,659

with fluids and then solidify and it

243

00:08:37,550 --> 00:08:35,099

kind of crisscrossed the landscape and

244

00:08:39,529 --> 00:08:37,560

as a landscape of Roads a bit more

245

00:08:40,730 --> 00:08:39,539

resistant to getting eroded away and

246

00:08:43,610 --> 00:08:40,740

weathering so you get these kind of

247

00:08:45,710 --> 00:08:43,620

lines crossing everywhere and he had his

248

00:08:47,570 --> 00:08:45,720

master student from Iran it's amazing

249

00:08:49,130 --> 00:08:47,580

guy called Sahand who was driving around

250

00:08:50,630 --> 00:08:49,140

mapping all these veins and what way

251
00:08:52,730 --> 00:08:50,640
they went but he didn't have an

252
00:08:54,050 --> 00:08:52,740
Australian driver's license so he was

253
00:08:55,730 --> 00:08:54,060
like hey Luke do you want you know when

254
00:08:57,710 --> 00:08:55,740
all expenses paid for a trip to the

255
00:08:59,570 --> 00:08:57,720
desert and basically be this guy's

256
00:09:01,670 --> 00:08:59,580
chauffeur dry driving around in the

257
00:09:03,650 --> 00:09:01,680
desert so for a month when I was you

258
00:09:06,170 --> 00:09:03,660
know 20 years old I would drive this guy

259
00:09:07,730 --> 00:09:06,180
out and it was beautiful because he had

260
00:09:09,650 --> 00:09:07,740
to walk to all of these vents you know

261
00:09:10,850 --> 00:09:09,660
and a big Arc and mapped them all and

262
00:09:12,050 --> 00:09:10,860
I'll just like drop them out there in

263
00:09:14,090 --> 00:09:12,060

the morning and pick him up from the

264

00:09:15,710 --> 00:09:14,100

other side of the afternoon and I had a

265

00:09:17,930 --> 00:09:15,720

hammock and I had a book and I said it's

266

00:09:19,430 --> 00:09:17,940

lovely you know Adventure in the desert

267

00:09:21,290 --> 00:09:19,440

um hanging out you know watching this

268

00:09:23,570 --> 00:09:21,300

guy and making sure he's walking between

269

00:09:24,650 --> 00:09:23,580

these mountains and um yeah I fell in

270

00:09:26,690 --> 00:09:24,660

love with the desert it was really

271

00:09:27,829 --> 00:09:26,700

beautiful yeah I love it yeah and like

272

00:09:29,449 --> 00:09:27,839

our audience they're often you know they

273

00:09:31,670 --> 00:09:29,459

want to know like how do I become an

274

00:09:32,870 --> 00:09:31,680

astrobiologist and sometimes it's those

275

00:09:34,009 --> 00:09:32,880

little things just you know someone

276

00:09:36,050 --> 00:09:34,019

comes up to you hey do you want to drive

277

00:09:37,310 --> 00:09:36,060

a car around the Outback for a month

278

00:09:39,170 --> 00:09:37,320

there's a little things that can happen

279

00:09:40,430 --> 00:09:39,180

that can can build not just your

280

00:09:43,130 --> 00:09:40,440

community and the people that you know

281

00:09:44,750 --> 00:09:43,140

but also your your life experiences oh

282

00:09:46,550 --> 00:09:44,760

definitely yeah and I think that's the

283

00:09:48,530 --> 00:09:46,560

beautiful thing where I you know got

284

00:09:51,050 --> 00:09:48,540

into astrobiology and done some amazing

285

00:09:53,389 --> 00:09:51,060

stuff especially out into pilbra before

286

00:09:54,949 --> 00:09:53,399

I love camping and I love you know

287

00:09:56,509 --> 00:09:54,959

forward driving and these kind of things

288

00:09:58,250 --> 00:09:56,519

that I never would have thought would

289

00:10:00,110 --> 00:09:58,260

have um you know helped me get a career

290

00:10:01,730 --> 00:10:00,120

in science so yeah I think just your

291

00:10:04,670 --> 00:10:01,740

passions can take you in really weird

292

00:10:05,870 --> 00:10:04,680

and wacky ways very cool so let's talk

293

00:10:07,730 --> 00:10:05,880

about where your passions have taken you

294

00:10:09,590 --> 00:10:07,740

then in your research from undergrad

295

00:10:11,210 --> 00:10:09,600

getting interested in Hot Springs a

296

00:10:12,470 --> 00:10:11,220

little bit in the environment and kind

297

00:10:13,910 --> 00:10:12,480

of transitioning more into you know

298

00:10:15,590 --> 00:10:13,920

environmental geochemistry and kind of

299

00:10:17,030 --> 00:10:15,600

working more in this realm

300

00:10:18,290 --> 00:10:17,040

um tell us a bit about your graduate

301
00:10:20,630 --> 00:10:18,300
research and what's really been

302
00:10:22,370 --> 00:10:20,640
propelling you these last few years yeah

303
00:10:23,389 --> 00:10:22,380
no definitely um so I've got this

304
00:10:25,009 --> 00:10:23,399
amazing

305
00:10:27,769 --> 00:10:25,019
um group of people that are supporting

306
00:10:29,509 --> 00:10:27,779
my PhD research so I have

307
00:10:31,970 --> 00:10:29,519
um people at University of California so

308
00:10:33,530 --> 00:10:31,980
Dave Dima and Bruce damer who are really

309
00:10:34,670 --> 00:10:33,540
looking at the chemistry of these Hot

310
00:10:36,410 --> 00:10:34,680
Springs

311
00:10:39,470 --> 00:10:36,420
um as well as pseudo rajamani over in

312
00:10:40,970 --> 00:10:39,480
Isa and Pune India and Kathy Campbell in

313
00:10:43,130 --> 00:10:40,980

um New Zealand so there's all these

314

00:10:45,470 --> 00:10:43,140

amazing hot spring researchers that are

315

00:10:48,769 --> 00:10:45,480

thinking about could life form in a hot

316

00:10:50,150 --> 00:10:48,779

spring and what our Research Center kind

317

00:10:51,470 --> 00:10:50,160

of realized was that there's all these

318

00:10:53,090 --> 00:10:51,480

chemists figuring that out and doing

319

00:10:54,769 --> 00:10:53,100

stuff in the lab and there's all these

320

00:10:56,210 --> 00:10:54,779

geologists going out you know into the

321

00:10:58,190 --> 00:10:56,220

field and studying ancient and modern

322

00:10:59,990 --> 00:10:58,200

Hot Springs but it wasn't a lot of

323

00:11:02,269 --> 00:11:00,000

communication between those two groups

324

00:11:04,449 --> 00:11:02,279

so I'm really lucky I've got you know my

325

00:11:07,790 --> 00:11:04,459

rock expert my

326

00:11:09,410 --> 00:11:07,800

and then I've got Albert farrenback who

327

00:11:11,090 --> 00:11:09,420

um went through the you know NASA

328

00:11:12,829 --> 00:11:11,100

postdoc program in the states and then

329

00:11:15,290 --> 00:11:12,839

came out here to Australia to set up a

330

00:11:17,269 --> 00:11:15,300

lab in pre-building chemistry and

331

00:11:19,250 --> 00:11:17,279

together we're kind of figuring out what

332

00:11:21,470 --> 00:11:19,260

works in the lab why wouldn't that work

333

00:11:22,370 --> 00:11:21,480

in the field or what rocks what minerals

334

00:11:24,710 --> 00:11:22,380

what

335

00:11:26,630 --> 00:11:24,720

um you know real life scenarios could we

336

00:11:28,730 --> 00:11:26,640

bring into the lab the kind of ground

337

00:11:30,590 --> 00:11:28,740

truth to try and make these you know

338

00:11:32,990 --> 00:11:30,600

very lofty ideas that chemists make

339

00:11:35,090 --> 00:11:33,000

about lipids and RNA and things coming

340

00:11:36,769 --> 00:11:35,100

together if the water was super muddy

341

00:11:38,329 --> 00:11:36,779

and if there was you know gases and

342

00:11:40,370 --> 00:11:38,339

splashing and all the kind of fun stuff

343

00:11:43,370 --> 00:11:40,380

you get in a hot spring could that still

344

00:11:45,350 --> 00:11:43,380

work like how resistant are our chemical

345

00:11:48,470 --> 00:11:45,360

systems so yeah that's the work I'm

346

00:11:49,790 --> 00:11:48,480

working on at the moment oh it's so cool

347

00:11:51,350 --> 00:11:49,800

um you know and so you mentioned a few

348

00:11:53,030 --> 00:11:51,360

excellent other scientists there one of

349

00:11:54,530 --> 00:11:53,040

them has been on our show uh Bruce

350

00:11:55,850 --> 00:11:54,540

steamer joined us in a previous episode

351

00:11:58,670 --> 00:11:55,860

a few years ago for asking

352

00:12:00,350 --> 00:11:58,680

astrobiologist and you know as folks

353

00:12:02,690 --> 00:12:00,360

might know from from their work and from

354

00:12:05,750 --> 00:12:02,700

their work with the biota Institute they

355

00:12:07,790 --> 00:12:05,760

they have a hypothesis that an origin of

356

00:12:10,190 --> 00:12:07,800

life on Earth would have been more

357

00:12:13,250 --> 00:12:10,200

likely to happen around a terrestrial

358

00:12:14,509 --> 00:12:13,260

hot spring environment as opposed to as

359

00:12:17,470 --> 00:12:14,519

some people have favorite on the ocean

360

00:12:19,970 --> 00:12:17,480

floor around an ocean a submarine

361

00:12:21,889 --> 00:12:19,980

hydrothermal van and so we asked our our

362

00:12:26,210 --> 00:12:21,899

audience on the NASA astrobio Twitter

363

00:12:29,449 --> 00:12:26,220

account what they thought today and uh

364

00:12:30,590 --> 00:12:29,459

76 of the respondents thought that life

365

00:12:33,230 --> 00:12:30,600

on Earth would be more likely to

366

00:12:35,509 --> 00:12:33,240

originate and an ocean hydrothermal vein

367

00:12:37,490 --> 00:12:35,519

I'm curious Luke what do you think would

368

00:12:39,290 --> 00:12:37,500

you think life could originate or what

369

00:12:40,910 --> 00:12:39,300

is more likely to originate around a

370

00:12:42,650 --> 00:12:40,920

terrestrial hot spring environment or

371

00:12:44,389 --> 00:12:42,660

more likely around a submarine

372

00:12:47,629 --> 00:12:44,399

hydrothermal vent

373

00:12:49,129 --> 00:12:47,639

um yeah um so firstly I think that um no

374

00:12:51,290 --> 00:12:49,139

one really knows yet you know we're

375

00:12:52,970 --> 00:12:51,300

doing great research in this space

376

00:12:55,670 --> 00:12:52,980

um both within you know research around

377

00:12:57,470 --> 00:12:55,680

these fans but also in these fields

378

00:12:59,030 --> 00:12:57,480

um I personally love these hot spring

379

00:13:00,590 --> 00:12:59,040

fields and maybe I'm biased because I

380

00:13:02,449 --> 00:13:00,600

get to go there more and they're a lot

381

00:13:05,509 --> 00:13:02,459

easier to walk around in and collect

382

00:13:07,310 --> 00:13:05,519

samples from but to me um the two things

383

00:13:09,350 --> 00:13:07,320

I love about these Hot Springs is one

384

00:13:11,150 --> 00:13:09,360

their ability to

385

00:13:12,889 --> 00:13:11,160

um and this is drawing on like Bruce and

386

00:13:14,990 --> 00:13:12,899

Dave's work and other people's research

387

00:13:17,449 --> 00:13:15,000

in this space it's the ability to

388

00:13:19,670 --> 00:13:17,459

promote evaporation so if you want to

389

00:13:21,530 --> 00:13:19,680

make polymers so long chains of DNA or

390

00:13:23,690 --> 00:13:21,540

proteins and that kind of stuff it's

391

00:13:26,629 --> 00:13:23,700

quite hard to do without you know

392

00:13:28,730 --> 00:13:26,639

enzymes and complex cellular Machinery

393

00:13:30,290 --> 00:13:28,740

um in a totally wet solution but if you

394

00:13:31,670 --> 00:13:30,300

can just remove that water it's really

395

00:13:33,769 --> 00:13:31,680

easy to get these individual building

396

00:13:35,690 --> 00:13:33,779

blocks of RNA to link up into long

397

00:13:36,949 --> 00:13:35,700

chains so I think that's one reason why

398

00:13:38,449 --> 00:13:36,959

people love

399

00:13:40,730 --> 00:13:38,459

um An Origin of Life happening on the

400

00:13:42,410 --> 00:13:40,740

Earth's surface but also it's to do with

401
00:13:44,509 --> 00:13:42,420
complexity so if you go to a hot spring

402
00:13:45,829 --> 00:13:44,519
site there are literally tens of

403
00:13:48,170 --> 00:13:45,839
thousands of hot springs and they've all

404
00:13:50,329 --> 00:13:48,180
got different temperatures different PHS

405
00:13:52,430 --> 00:13:50,339
different you know um Elements and

406
00:13:54,230 --> 00:13:52,440
Minerals dissolved in them and when you

407
00:13:55,850 --> 00:13:54,240
think about how complex life is and how

408
00:13:57,410 --> 00:13:55,860
many different reactions are needed for

409
00:13:59,870 --> 00:13:57,420
life to form

410
00:14:01,910 --> 00:13:59,880
um I think that having a place of 10 000

411
00:14:03,590 --> 00:14:01,920
different chemical environments would be

412
00:14:05,329 --> 00:14:03,600
a lot easier to get that you know one

413
00:14:07,370 --> 00:14:05,339

little chance of it just linking up the

414

00:14:09,410 --> 00:14:07,380

right way we're an event which is you

415

00:14:12,350 --> 00:14:09,420

know beautifully chemically Rich systems

416

00:14:14,150 --> 00:14:12,360

the more um even though if in within a

417

00:14:16,250 --> 00:14:14,160

field it's a single point source it's

418

00:14:18,110 --> 00:14:16,260

like one vent going out into a dilute

419

00:14:21,290 --> 00:14:18,120

ocean and it's you only get one real

420

00:14:22,550 --> 00:14:21,300

main chemical gradient in that space so

421

00:14:25,009 --> 00:14:22,560

that's um some of the arguments people

422

00:14:27,170 --> 00:14:25,019

make but also events are really cool so

423

00:14:29,150 --> 00:14:27,180

yeah the jury's still out as far as I'm

424

00:14:31,190 --> 00:14:29,160

concerned that's very cool it kind of

425

00:14:34,250 --> 00:14:31,200

reminds me of an ecology course like

426

00:14:35,449 --> 00:14:34,260

learning of biogeography in and how you

427

00:14:37,310 --> 00:14:35,459

have all these different experiments

428

00:14:39,650 --> 00:14:37,320

occurring around an island chain and how

429

00:14:40,850 --> 00:14:39,660

you know in Ireland or an archipelago of

430

00:14:42,710 --> 00:14:40,860

Hot Springs you might have a lot of

431

00:14:44,870 --> 00:14:42,720

different experiments occurring as well

432

00:14:46,310 --> 00:14:44,880

that's really cool to think about

433

00:14:47,629 --> 00:14:46,320

um now I do want to talk a little bit

434

00:14:48,710 --> 00:14:47,639

before I open another Twitter to our

435

00:14:50,750 --> 00:14:48,720

audience and by the way for those

436

00:14:52,370 --> 00:14:50,760

watching on YouTube right now uh you can

437

00:14:54,889 --> 00:14:52,380

ask questions in the chat as we'll start

438

00:14:56,389 --> 00:14:54,899

coming over to me to ask Luke as well

439

00:14:57,410 --> 00:14:56,399

um and also for those watching later on

440

00:14:58,610 --> 00:14:57,420

you can always reach out to Luke later

441

00:14:59,750 --> 00:14:58,620

on as well

442

00:15:02,449 --> 00:14:59,760

um I do want to talk a bit about your

443

00:15:03,650 --> 00:15:02,459

work now in science communication too

444

00:15:05,269 --> 00:15:03,660

um not only have you been working in

445

00:15:06,949 --> 00:15:05,279

this realm of Hot Springs both with

446

00:15:08,269 --> 00:15:06,959

ancient and modern

447

00:15:09,829 --> 00:15:08,279

um you've also been doing a lot of work

448

00:15:11,210 --> 00:15:09,839

in communicating science and as I

449

00:15:13,250 --> 00:15:11,220

mentioned you know like seeing these

450

00:15:14,269 --> 00:15:13,260

people in a bar or wherever where you

451

00:15:15,769 --> 00:15:14,279

know they're just interested in what

452

00:15:18,410 --> 00:15:15,779

we're learning about astrobiology and

453

00:15:20,870 --> 00:15:18,420

what we can share I'd love to hear from

454

00:15:22,850 --> 00:15:20,880

your perspective why you think we

455

00:15:24,470 --> 00:15:22,860

scientists should

456

00:15:26,090 --> 00:15:24,480

um maybe communicate our science or why

457

00:15:27,710 --> 00:15:26,100

we should be involved in the process of

458

00:15:29,569 --> 00:15:27,720

communicating our science

459

00:15:31,250 --> 00:15:29,579

yeah no definitely

460

00:15:32,930 --> 00:15:31,260

um so I think on one hand and I don't

461

00:15:34,550 --> 00:15:32,940

know how it worked in the states I

462

00:15:36,590 --> 00:15:34,560

imagine it's similar but in Australia

463

00:15:39,050 --> 00:15:36,600

all the funding we do is really

464

00:15:41,269 --> 00:15:39,060

government funded by taxpayers dollars

465

00:15:43,850 --> 00:15:41,279

you know and I think that people always

466

00:15:45,949 --> 00:15:43,860

critique astrobiology about what's the

467

00:15:47,750 --> 00:15:45,959

real world applications you know you're

468

00:15:49,910 --> 00:15:47,760

not curing cancer you're not building a

469

00:15:52,129 --> 00:15:49,920

faster car like what's what's the value

470

00:15:54,290 --> 00:15:52,139

of this society which you know is a

471

00:15:57,530 --> 00:15:54,300

valid point you know resources are you

472

00:15:59,210 --> 00:15:57,540

know finite but I see so much Beauty in

473

00:16:01,250 --> 00:15:59,220

astrobiology I see so much of that

474

00:16:03,470 --> 00:16:01,260

ability to connect humans together but

475

00:16:05,389 --> 00:16:03,480

also to understand complex you know

476

00:16:07,009 --> 00:16:05,399

biology and medicine to develop new

477

00:16:09,829 --> 00:16:07,019

technology to go to other planets is

478

00:16:11,750 --> 00:16:09,839

such an amazing value of astrobiology

479

00:16:13,790 --> 00:16:11,760

it's just the way we communicate that

480

00:16:17,750 --> 00:16:13,800

but then again at the same time I think

481

00:16:20,150 --> 00:16:17,760

that we have a um a duty to you know in

482

00:16:22,069 --> 00:16:20,160

tax payer funded research to give that

483

00:16:24,470 --> 00:16:22,079

research back to the people you know and

484

00:16:26,689 --> 00:16:24,480

there may not be a new vaccine or a new

485

00:16:28,189 --> 00:16:26,699

car but it might be a really exciting

486

00:16:29,990 --> 00:16:28,199

talk that they can listen to to and

487

00:16:31,850 --> 00:16:30,000

learn about how we're you know looking

488

00:16:33,470 --> 00:16:31,860

deep into these events or looking at you

489

00:16:35,689 --> 00:16:33,480

know Europa or Mars or that kind of

490

00:16:37,430 --> 00:16:35,699

thing so I see it as a bit of a Duty as

491

00:16:39,050 --> 00:16:37,440

a community of astrobiologists to get

492

00:16:41,329 --> 00:16:39,060

involved in that space

493

00:16:43,129 --> 00:16:41,339

very cool and then you you found it or

494

00:16:44,930 --> 00:16:43,139

co-founded practical

495

00:16:46,730 --> 00:16:44,940

um a platform for sharing your science

496

00:16:48,470 --> 00:16:46,740

and for developing science communication

497

00:16:50,509 --> 00:16:48,480

science education would you mind

498

00:16:53,269 --> 00:16:50,519

explaining that for our audience yeah no

499

00:16:55,790 --> 00:16:53,279

definitely so I created practical with

500

00:16:58,069 --> 00:16:55,800

um an amazing PhD student in the lab I

501
00:17:00,530 --> 00:16:58,079
was in Bonnie tease who's now graduated

502
00:17:02,389 --> 00:17:00,540
and just got a postdoc at JPL which is

503
00:17:04,370 --> 00:17:02,399
very exciting so for anyone on the stage

504
00:17:05,390 --> 00:17:04,380
she'll be over there shortly

505
00:17:07,329 --> 00:17:05,400
um and Bonnie and I were really

506
00:17:09,890 --> 00:17:07,339
interested in how do you engage

507
00:17:11,929 --> 00:17:09,900
audiences outside a general you know

508
00:17:14,510 --> 00:17:11,939
choir that we preach to in science

509
00:17:16,610 --> 00:17:14,520
communicators so you do a talk in a pub

510
00:17:18,350 --> 00:17:16,620
or you know you do something and that's

511
00:17:20,210 --> 00:17:18,360
you know trying to get out into your

512
00:17:21,949 --> 00:17:20,220
community but it's still just a whole

513
00:17:24,949 --> 00:17:21,959

bunch of PhD students turning up to the

514

00:17:27,049 --> 00:17:24,959

pub you know how do you get people

515

00:17:29,450 --> 00:17:27,059

um you know artists people at music

516

00:17:31,730 --> 00:17:29,460

festivals people you know outside of our

517

00:17:33,590 --> 00:17:31,740

little bubble of science excited about

518

00:17:35,990 --> 00:17:33,600

science and learning and engaging in

519

00:17:38,029 --> 00:17:36,000

that dialogue so we create a practical

520

00:17:40,850 --> 00:17:38,039

we started off building a whole bunch of

521

00:17:43,490 --> 00:17:40,860

online workshops from that you know um

522

00:17:45,169 --> 00:17:43,500

it's been a container for us to work

523

00:17:46,490 --> 00:17:45,179

with dancers you know contemporary

524

00:17:48,169 --> 00:17:46,500

dancers thinking about how could the

525

00:17:50,029 --> 00:17:48,179

origin of Life be expressed through

526
00:17:51,950 --> 00:17:50,039
movement you know we work with neural

527
00:17:53,390 --> 00:17:51,960
artists we work with Comedians and

528
00:17:55,909 --> 00:17:53,400
performers and it's all these amazing

529
00:17:57,950 --> 00:17:55,919
ways to bring people outside of science

530
00:18:00,409 --> 00:17:57,960
into what we do and also bring

531
00:18:03,470 --> 00:18:00,419
scientists out of our little world into

532
00:18:05,270 --> 00:18:03,480
the broader community so yeah absolutely

533
00:18:07,250 --> 00:18:05,280
and I'd love to unpack two things there

534
00:18:08,870 --> 00:18:07,260
one is the comedy and we'll talk about

535
00:18:10,430 --> 00:18:08,880
that in a moment but but also you

536
00:18:12,710 --> 00:18:10,440
mentioned contemporary dance and I love

537
00:18:14,750 --> 00:18:12,720
there's like the the dancier thesis

538
00:18:16,909 --> 00:18:14,760

competition that some people have and

539

00:18:18,950 --> 00:18:16,919

there's other ways to explore like our

540

00:18:20,690 --> 00:18:18,960

science and dance and one of my old lab

541

00:18:24,049 --> 00:18:20,700

mates for instance uh Betsy Swanner

542

00:18:26,570 --> 00:18:24,059

who's now a professor in geology uh she

543

00:18:29,630 --> 00:18:26,580

had done a dance of her thesis exploring

544

00:18:31,430 --> 00:18:29,640

uh subsurface microbes mediating iron

545

00:18:32,510 --> 00:18:31,440

metabolism

546

00:18:34,490 --> 00:18:32,520

um I wonder if you can explain for us

547

00:18:37,010 --> 00:18:34,500

like how do you see dance how do you see

548

00:18:40,370 --> 00:18:37,020

contemporary dance actually effectively

549

00:18:42,289 --> 00:18:40,380

sharing science yeah definitely so um

550

00:18:45,110 --> 00:18:42,299

the one example that I think is the best

551
00:18:47,330 --> 00:18:45,120
is that we um partner with Eliza Cooper

552
00:18:50,270 --> 00:18:47,340
who's an amazing um contemporary dancer

553
00:18:53,029 --> 00:18:50,280
here in Sydney and she had already been

554
00:18:55,490 --> 00:18:53,039
she's also studying um microbiology and

555
00:18:57,230 --> 00:18:55,500
science was thinking about life and its

556
00:18:58,970 --> 00:18:57,240
formation and put together this show and

557
00:19:02,810 --> 00:18:58,980
we thought we need scientists to see

558
00:19:04,970 --> 00:19:02,820
that and what um so we know I we got her

559
00:19:06,529 --> 00:19:04,980
to come to unsw we facilitated a big

560
00:19:08,029 --> 00:19:06,539
panel discussion and kind of got his

561
00:19:10,850 --> 00:19:08,039
Round Table talk of everyone together

562
00:19:12,350 --> 00:19:10,860
and what I loved about it was that most

563
00:19:16,010 --> 00:19:12,360

of the dance was

564

00:19:17,510 --> 00:19:16,020

um very slow and it was like little

565

00:19:19,070 --> 00:19:17,520

um actually it's really cute it had like

566

00:19:21,350 --> 00:19:19,080

you know Dances crawling around with

567

00:19:23,090 --> 00:19:21,360

like lettuce leaves as little ears and

568

00:19:25,370 --> 00:19:23,100

were kind of like moving across the

569

00:19:27,409 --> 00:19:25,380

stage and at the end she was saying that

570

00:19:29,270 --> 00:19:27,419

when we think about the evolution and

571

00:19:30,590 --> 00:19:29,280

history of life you often get a

572

00:19:32,870 --> 00:19:30,600

highlights reel you know it's like

573

00:19:34,130 --> 00:19:32,880

origin of life and then eukaryotes and

574

00:19:35,450 --> 00:19:34,140

then they all started having sex and

575

00:19:36,710 --> 00:19:35,460

then they had eyes and like it's just

576

00:19:38,990 --> 00:19:36,720

you can really

577

00:19:41,390 --> 00:19:39,000

um go through it so quickly but so much

578

00:19:44,210 --> 00:19:41,400

of hour of shared history as you know

579

00:19:46,310 --> 00:19:44,220

living entities on this planet revolved

580

00:19:48,830 --> 00:19:46,320

around like billions of years of just

581

00:19:50,990 --> 00:19:48,840

stromatolite slowly bubbling away oxygen

582

00:19:53,630 --> 00:19:51,000

in an ocean or little slugs just moving

583

00:19:54,830 --> 00:19:53,640

around eating dirt and um I think it's

584

00:19:56,870 --> 00:19:54,840

really

585

00:19:58,370 --> 00:19:56,880

humbling to think about the long history

586

00:20:00,590 --> 00:19:58,380

we have and the very boring history

587

00:20:02,029 --> 00:20:00,600

really of life and I think that helped

588

00:20:04,370 --> 00:20:02,039

me as a scientists understand that

589

00:20:06,169 --> 00:20:04,380

better for sitting for an hour of a very

590

00:20:08,570 --> 00:20:06,179

um exciting but slow dance that

591

00:20:10,370 --> 00:20:08,580

sometimes yeah yeah I mean there's

592

00:20:11,810 --> 00:20:10,380

there's so many interesting ways for us

593

00:20:13,610 --> 00:20:11,820

to like untangle those little bits of

594

00:20:15,350 --> 00:20:13,620

knowledge that we have and we've

595

00:20:17,570 --> 00:20:15,360

uncovered through Millennia now of

596

00:20:18,950 --> 00:20:17,580

developing science as a tool and for for

597

00:20:20,750 --> 00:20:18,960

us to have learned so much it's what's

598

00:20:22,190 --> 00:20:20,760

interesting I it's actually kind of put

599

00:20:23,690 --> 00:20:22,200

it into that framework too where you

600

00:20:24,890 --> 00:20:23,700

slow things down

601
00:20:26,570 --> 00:20:24,900
um because you're right I think a lot of

602
00:20:28,610 --> 00:20:26,580
us just we have these certain images of

603
00:20:30,529 --> 00:20:28,620
certain scientific ideas and even our

604
00:20:32,690 --> 00:20:30,539
scientists have certain images or some

605
00:20:34,370 --> 00:20:32,700
other scientific ideas outside of our

606
00:20:35,810 --> 00:20:34,380
own fields and when we start learning

607
00:20:38,330 --> 00:20:35,820
more about it we really find that we

608
00:20:39,710 --> 00:20:38,340
need analogies and we need other ways to

609
00:20:42,049 --> 00:20:39,720
speak to what it means to be human to

610
00:20:43,610 --> 00:20:42,059
really understand those topics and so

611
00:20:45,350 --> 00:20:43,620
um that's very cool

612
00:20:47,750 --> 00:20:45,360
um now of course I do want to talk about

613
00:20:49,430 --> 00:20:47,760

stand-up science comedy with you I

614

00:20:51,710 --> 00:20:49,440

myself have been fortunate to be on a

615

00:20:53,630 --> 00:20:51,720

stage doing comedy um both at a museum

616

00:20:55,730 --> 00:20:53,640

as well as at a bar

617

00:20:58,310 --> 00:20:55,740

um you know it's a very entry experience

618

00:21:00,169 --> 00:20:58,320

I'd love to hear like what what really

619

00:21:01,850 --> 00:21:00,179

turned you all into doing stand-up

620

00:21:02,990 --> 00:21:01,860

science comedy and kind of got you into

621

00:21:05,390 --> 00:21:03,000

that Realm

622

00:21:06,289 --> 00:21:05,400

yeah um so I just want to say I'm not a

623

00:21:08,750 --> 00:21:06,299

comedian

624

00:21:11,029 --> 00:21:08,760

um I don't really find myself

625

00:21:12,590 --> 00:21:11,039

um I wasn't particularly funny or you

626

00:21:14,150 --> 00:21:12,600

know in that space I just had a lot of

627

00:21:16,070 --> 00:21:14,160

friends who work in meetings and ran

628

00:21:18,529 --> 00:21:16,080

comedy rooms so I would see a lot of

629

00:21:20,690 --> 00:21:18,539

comedy and I think sitting there I saw

630

00:21:22,490 --> 00:21:20,700

that

631

00:21:24,830 --> 00:21:22,500

stage and just say

632

00:21:26,810 --> 00:21:24,840

hey and everyone's captivated you know

633

00:21:28,850 --> 00:21:26,820

or like ask a simple question or open up

634

00:21:30,470 --> 00:21:28,860

a single you know statement and the

635

00:21:32,750 --> 00:21:30,480

whole crowds on the edge of their seat

636

00:21:35,029 --> 00:21:32,760

and I was like why can't professors at

637

00:21:37,010 --> 00:21:35,039

Uni do that why can't we have

638

00:21:38,630 --> 00:21:37,020

um you know scientists who get really

639

00:21:41,029 --> 00:21:38,640

excited about these things being able to

640

00:21:43,909 --> 00:21:41,039

get there and get people interested and

641

00:21:45,890 --> 00:21:43,919

engaged so quickly and um yeah I wanted

642

00:21:47,750 --> 00:21:45,900

to get comedians to teach scientists to

643

00:21:49,970 --> 00:21:47,760

be more engaging and also get people

644

00:21:53,029 --> 00:21:49,980

talking science on a bigger comedy stage

645

00:21:54,110 --> 00:21:53,039

so that's where it all came from yeah so

646

00:21:55,850 --> 00:21:54,120

it's interesting that you said you

647

00:21:57,830 --> 00:21:55,860

weren't particularly funny or you don't

648

00:21:59,690 --> 00:21:57,840

think of yourself as being a comedian uh

649

00:22:02,450 --> 00:21:59,700

so you you did share with us a little

650

00:22:03,890 --> 00:22:02,460

clip uh of some of your comedy and so I

651
00:22:05,450 --> 00:22:03,900
think we're actually going to share just

652
00:22:08,330 --> 00:22:05,460
a little piece of your comedy with our

653
00:22:10,549 --> 00:22:08,340
audience right now uh and so I I think

654
00:22:11,570 --> 00:22:10,559
uh we'll roll it here into the moment

655
00:22:13,250 --> 00:22:11,580
um of course you know I won't be seeing

656
00:22:14,810 --> 00:22:13,260
it but our audience will and for the

657
00:22:16,310 --> 00:22:14,820
audiences you're watching this thing to

658
00:22:17,810 --> 00:22:16,320
yourself was that funny or not let us

659
00:22:19,930 --> 00:22:17,820
know in the chat

660
00:22:22,430 --> 00:22:19,940
um so like the other day

661
00:22:24,710 --> 00:22:22,440
instructor and they asked me what I do

662
00:22:27,549 --> 00:22:24,720
and I told them I studied astrobiology

663
00:22:31,750 --> 00:22:27,559

and all of a sudden they go oh my God

664

00:22:34,250 --> 00:22:31,760

I'm a Gemini foreign

665

00:22:38,409 --> 00:22:34,260

you get to do your whole PhD in

666

00:22:40,970 --> 00:22:38,419

astrology that is so Aquarius of you

667

00:22:42,830 --> 00:22:40,980

you've got to help me out my boyfriend

668

00:22:44,529 --> 00:22:42,840

and I have been a mess ever since the

669

00:22:46,850 --> 00:22:44,539

Venus retrograde

670

00:22:48,950 --> 00:22:46,860

and as I said you know this could be a

671

00:22:50,570 --> 00:22:48,960

great learning opportunity and after

672

00:22:52,789 --> 00:22:50,580

another bit of a chat and I've found out

673

00:22:54,770 --> 00:22:52,799

what astrology means today

674

00:22:56,570 --> 00:22:54,780

say Hey I'm really sorry

675

00:22:58,530 --> 00:22:56,580

I can't help you understand why the

676
00:23:02,630 --> 00:22:58,540
rotation of space

677
00:23:07,510 --> 00:23:04,789
and even though the surface of Venus is

678
00:23:08,750 --> 00:23:07,520
actually 400 degrees Celsius

679
00:23:10,669 --> 00:23:08,760
[Music]

680
00:23:13,250 --> 00:23:10,679
all right folks coming back to our show

681
00:23:15,230 --> 00:23:13,260
now I think it was pretty funny

682
00:23:17,450 --> 00:23:15,240
um so so Luke I have to say I found your

683
00:23:18,529 --> 00:23:17,460
your stand-up set very good

684
00:23:19,730 --> 00:23:18,539
um now of course there's some other

685
00:23:22,010 --> 00:23:19,740
parts of your standards that we haven't

686
00:23:23,390 --> 00:23:22,020
shared and so um I'd love it for any of

687
00:23:25,610 --> 00:23:23,400
our audience members especially those in

688
00:23:27,230 --> 00:23:25,620

Australia right now uh to go check out

689

00:23:28,850 --> 00:23:27,240

your stand-up science comedy when they

690

00:23:30,230 --> 00:23:28,860

have a chance to

691

00:23:32,870 --> 00:23:30,240

um and so you know it's fun just that

692

00:23:34,850 --> 00:23:32,880

chance to really to share science in in

693

00:23:36,409 --> 00:23:34,860

a humorous manner

694

00:23:38,390 --> 00:23:36,419

um to find ways to make some punch lines

695

00:23:40,070 --> 00:23:38,400

too and one thing I personally found was

696

00:23:43,010 --> 00:23:40,080

that it forced me to really think about

697

00:23:45,649 --> 00:23:43,020

not just analogies not just stories

698

00:23:48,230 --> 00:23:45,659

about my science but also stories that

699

00:23:51,049 --> 00:23:48,240

were you know really seeking to elicit a

700

00:23:52,669 --> 00:23:51,059

very specific human emotional reaction

701
00:23:54,529 --> 00:23:52,679
um how do you feel about that like what

702
00:23:57,710 --> 00:23:54,539
was the the process for you in sculpting

703
00:23:59,510 --> 00:23:57,720
your comedy yeah um I think for me it

704
00:24:01,250 --> 00:23:59,520
was really around

705
00:24:03,409 --> 00:24:01,260
breaking down these barriers of what

706
00:24:04,850 --> 00:24:03,419
makes a scientist you know and um you

707
00:24:06,350 --> 00:24:04,860
know you saw my little

708
00:24:08,690 --> 00:24:06,360
um you know bit there it was all around

709
00:24:10,370 --> 00:24:08,700
the way that people perceive me as a

710
00:24:12,890 --> 00:24:10,380
scientist in different walks of my life

711
00:24:15,289 --> 00:24:12,900
but you know we had um six other amazing

712
00:24:17,330 --> 00:24:15,299
scientists join me and like they were

713
00:24:18,230 --> 00:24:17,340

talking about Tinder dates they would go

714

00:24:19,490 --> 00:24:18,240

on and then people would figure

715

00:24:20,870 --> 00:24:19,500

scientists and ask them all these

716

00:24:22,610 --> 00:24:20,880

questions on a way that their parents

717

00:24:24,289 --> 00:24:22,620

would interact with them or the way that

718

00:24:27,049 --> 00:24:24,299

supervisors would view them as

719

00:24:28,909 --> 00:24:27,059

undergrads and I think that if we had

720

00:24:30,289 --> 00:24:28,919

this very narrow idea of what a

721

00:24:32,330 --> 00:24:30,299

scientist is

722

00:24:34,310 --> 00:24:32,340

um it excludes people who don't fit into

723

00:24:35,630 --> 00:24:34,320

that category from joining science but

724

00:24:37,610 --> 00:24:35,640

it also makes people distrust you

725

00:24:40,250 --> 00:24:37,620

because like oh if you're like a boring

726

00:24:42,049 --> 00:24:40,260

nerd who you know doesn't you know live

727

00:24:43,370 --> 00:24:42,059

a normal life how can I trust you to

728

00:24:45,409 --> 00:24:43,380

make decisions about you know the

729

00:24:46,970 --> 00:24:45,419

science that impacts my life so I think

730

00:24:48,649 --> 00:24:46,980

it's a really important way to

731

00:24:50,330 --> 00:24:48,659

communicate science and to break down

732

00:24:54,350 --> 00:24:50,340

those barriers on um a lot of different

733

00:24:56,870 --> 00:24:54,360

levels which is really fun absolutely uh

734

00:24:58,370 --> 00:24:56,880

so many of our audience members or their

735

00:25:00,110 --> 00:24:58,380

young students and in you know High

736

00:25:02,090 --> 00:25:00,120

School Secondary School their their

737

00:25:04,310 --> 00:25:02,100

students in in their early Collegiate or

738

00:25:06,409 --> 00:25:04,320

even graduate school levels um and some

739

00:25:08,390 --> 00:25:06,419

are continuing education some are are

740

00:25:09,890 --> 00:25:08,400

people who've had a life and a career

741

00:25:11,990 --> 00:25:09,900

but now they're interested in exploring

742

00:25:13,190 --> 00:25:12,000

more about astrobiology and one thing

743

00:25:15,470 --> 00:25:13,200

you hear a lot that people feel like

744

00:25:17,630 --> 00:25:15,480

they can't be astrobiologists unless

745

00:25:20,270 --> 00:25:17,640

they have a PhD in astronomy or geology

746

00:25:21,770 --> 00:25:20,280

or biology and it's like Mary wojtek

747

00:25:24,529 --> 00:25:21,780

always says that you know everyone can

748

00:25:26,450 --> 00:25:24,539

be an astrobiologist it's just being you

749

00:25:28,130 --> 00:25:26,460

know interested in this and in this this

750

00:25:29,450 --> 00:25:28,140

Quest that we have to understand what

751
00:25:30,649 --> 00:25:29,460
life is

752
00:25:33,409 --> 00:25:30,659
um one thing that you had mentioned to

753
00:25:35,330 --> 00:25:33,419
me um before our show started was that

754
00:25:37,850 --> 00:25:35,340
you'd like acknowledging experts outside

755
00:25:39,590 --> 00:25:37,860
of our field and I I wonder if you can

756
00:25:41,870 --> 00:25:39,600
explain on that a little bit before our

757
00:25:44,750 --> 00:25:41,880
audience the importance of acknowledging

758
00:25:46,250 --> 00:25:44,760
expertise Beyond just astrobiology

759
00:25:48,950 --> 00:25:46,260
beyond just science

760
00:25:50,510 --> 00:25:48,960
yeah no definitely so um as I said I

761
00:25:52,130 --> 00:25:50,520
didn't think I was an originally funny

762
00:25:54,830 --> 00:25:52,140
person but I work with some great

763
00:25:56,810 --> 00:25:54,840

comedians um and great trainers who help

764

00:25:58,909 --> 00:25:56,820

me to think about you know comedy and

765

00:26:00,289 --> 00:25:58,919

joke writing in a really new light and

766

00:26:02,990 --> 00:26:00,299

they were the experts and as I said

767

00:26:04,789 --> 00:26:03,000

before you know um you go to a comedy

768

00:26:07,190 --> 00:26:04,799

show and these people on stage they've

769

00:26:08,990 --> 00:26:07,200

spent years honing this skill you know

770

00:26:11,210 --> 00:26:09,000

their their artists they're experts in

771

00:26:12,830 --> 00:26:11,220

their craft of communication and you

772

00:26:14,450 --> 00:26:12,840

know I love having a chat I love you

773

00:26:16,190 --> 00:26:14,460

know doing some kinds of science

774

00:26:17,870 --> 00:26:16,200

communication but working with them was

775

00:26:20,570 --> 00:26:17,880

the real beauty of it and it's the same

776

00:26:22,130 --> 00:26:20,580

way of bringing in artists to rethink a

777

00:26:24,049 --> 00:26:22,140

way that you see the world or bringing

778

00:26:26,029 --> 00:26:24,059

in you know philosophers are bringing in

779

00:26:28,070 --> 00:26:26,039

economists or anyone like there's so

780

00:26:29,510 --> 00:26:28,080

many intersections in the way that we

781

00:26:31,430 --> 00:26:29,520

have to

782

00:26:32,810 --> 00:26:31,440

um view astrobiology because it's such a

783

00:26:34,430 --> 00:26:32,820

huge question like you know one

784

00:26:36,649 --> 00:26:34,440

physicist isn't going to solve it you

785

00:26:38,690 --> 00:26:36,659

know we need all of humanity to come

786

00:26:41,450 --> 00:26:38,700

together so I think that's what you said

787

00:26:42,710 --> 00:26:41,460

anyone can be an astrobiologist and you

788

00:26:45,049 --> 00:26:42,720

know if you're out there and you've got

789

00:26:47,510 --> 00:26:45,059

skills or experiences in totally

790

00:26:49,370 --> 00:26:47,520

different areas um don't be shy to

791

00:26:52,310 --> 00:26:49,380

promote those skills and think about how

792

00:26:53,870 --> 00:26:52,320

can I engage in astrobiology with my own

793

00:26:54,769 --> 00:26:53,880

skill set you know I've got started in

794

00:26:56,090 --> 00:26:54,779

this because I was really good at

795

00:26:58,730 --> 00:26:56,100

setting up tents in the desert you know

796

00:27:00,710 --> 00:26:58,740

that was my intro and my little niche in

797

00:27:02,390 --> 00:27:00,720

astrobiology and now you know we're

798

00:27:04,190 --> 00:27:02,400

running camps where NASA visits to

799

00:27:07,190 --> 00:27:04,200

pilborough and for school kids out there

800

00:27:08,810 --> 00:27:07,200

and amazing stuff just from um you know

801
00:27:11,830 --> 00:27:08,820
just from my passion and my interests so

802
00:27:15,710 --> 00:27:11,840
yeah don't be shy just value your skills

803
00:27:17,029 --> 00:27:15,720
yeah it's so groovy I will say so I see

804
00:27:18,710 --> 00:27:17,039
you in the chat on YouTube some folks

805
00:27:20,090 --> 00:27:18,720
that said that was very funny

806
00:27:21,590 --> 00:27:20,100
um and a reminder for those watching on

807
00:27:23,750 --> 00:27:21,600
YouTube right now you can actually ask

808
00:27:25,310 --> 00:27:23,760
your questions in the chat for Luke

809
00:27:28,070 --> 00:27:25,320
um we'll get to those very soon I do

810
00:27:30,230 --> 00:27:28,080
promise that first we have our faster

811
00:27:31,970 --> 00:27:30,240
than light rapid fire segment questions

812
00:27:33,409 --> 00:27:31,980
or questions here

813
00:27:35,149 --> 00:27:33,419

um these are where I have a few simple

814

00:27:36,710 --> 00:27:35,159

questions and

815

00:27:38,510 --> 00:27:36,720

um I prefer a shorter answer if possible

816

00:27:39,649 --> 00:27:38,520

but I allow you to expound however you

817

00:27:41,570 --> 00:27:39,659

prefer

818

00:27:45,110 --> 00:27:41,580

um the first question is what is your

819

00:27:47,890 --> 00:27:45,120

favorite response or answer to fermi's

820

00:27:50,870 --> 00:27:47,900

famous question where are they

821

00:27:53,149 --> 00:27:50,880

I love the zoo Paradox I love that deer

822

00:27:54,350 --> 00:27:53,159

that we're kind of yeah some menageries

823

00:27:55,610 --> 00:27:54,360

somewhere and there's all these aliens

824

00:27:57,669 --> 00:27:55,620

looking on us I think that's pretty

825

00:28:00,529 --> 00:27:57,679

hilarious yeah

826

00:28:02,750 --> 00:28:00,539

I love that Rick and Morty episode where

827

00:28:05,029 --> 00:28:02,760

they go like they go to this this giant

828

00:28:06,529 --> 00:28:05,039

monster alien creatures Menagerie and

829

00:28:09,230 --> 00:28:06,539

they're stuck inside the glass box and

830

00:28:10,730 --> 00:28:09,240

they transmit a message back to Earth in

831

00:28:12,769 --> 00:28:10,740

the movie contact they have the Jody

832

00:28:15,470 --> 00:28:12,779

Foster character come to their time and

833

00:28:16,549 --> 00:28:15,480

replace Rick and Morty with these people

834

00:28:18,950 --> 00:28:16,559

um I mean it's kind of terrible too

835

00:28:20,450 --> 00:28:18,960

that's pretty funny it's hilarious yeah

836

00:28:22,549 --> 00:28:20,460

yeah

837

00:28:24,590 --> 00:28:22,559

um so when it comes to you know our

838

00:28:27,110 --> 00:28:24,600

science and astrobiology there's so much

839

00:28:30,350 --> 00:28:27,120

media out there in the world we humans

840

00:28:33,169 --> 00:28:30,360

are storytellers comic books magazines

841

00:28:35,450 --> 00:28:33,179

movies television shows there's so many

842

00:28:37,610 --> 00:28:35,460

stories that we tell and so I'm curious

843

00:28:40,250 --> 00:28:37,620

you know what stories have inspired you

844

00:28:41,750 --> 00:28:40,260

the most to want to explore more about

845

00:28:44,269 --> 00:28:41,760

life in the universe

846

00:28:45,830 --> 00:28:44,279

yeah um so I recently finished reading

847

00:28:47,029 --> 00:28:45,840

project Hail Mary

848

00:28:49,250 --> 00:28:47,039

um which is by the same over who wrote

849

00:28:51,769 --> 00:28:49,260

The Martian and um I just love the

850

00:28:53,750 --> 00:28:51,779

ability to weave like you know they're

851
00:28:56,870 --> 00:28:53,760
talking about maths equations they're

852
00:28:59,269 --> 00:28:56,880
weaving like real science into a fiction

853
00:29:01,250 --> 00:28:59,279
story um an astrology as well and a

854
00:29:02,870 --> 00:29:01,260
really captivating exciting way and I

855
00:29:05,090 --> 00:29:02,880
learned a lot of really cool science out

856
00:29:07,549 --> 00:29:05,100
of that as well so um that's a narrative

857
00:29:09,409 --> 00:29:07,559
that I really enjoyed recently yeah very

858
00:29:11,149 --> 00:29:09,419
cool yeah it's Andrew wrote The Martian

859
00:29:12,710 --> 00:29:11,159
like it was a great book I haven't read

860
00:29:13,549 --> 00:29:12,720
projectile Mary yet but I definitely

861
00:29:14,930 --> 00:29:13,559
should

862
00:29:16,490 --> 00:29:14,940
um it's on my list of things to read so

863
00:29:17,810 --> 00:29:16,500

that's very cool

864

00:29:18,769 --> 00:29:17,820

um so let's let's talk about your career

865

00:29:20,389 --> 00:29:18,779

a little bit

866

00:29:22,310 --> 00:29:20,399

um if you could go back in time to that

867

00:29:23,870 --> 00:29:22,320

that 20 year old Luke and talk to him

868

00:29:25,970 --> 00:29:23,880

and visit yourself

869

00:29:28,370 --> 00:29:25,980

um what advice would you give the young

870

00:29:30,889 --> 00:29:28,380

version of yourself

871

00:29:33,470 --> 00:29:30,899

yeah I think just follow your passion I

872

00:29:34,909 --> 00:29:33,480

think that passion sings so loudly and I

873

00:29:36,889 --> 00:29:34,919

think I can imagine for people like

874

00:29:38,990 --> 00:29:36,899

yourself and I know my supervisors

875

00:29:41,810 --> 00:29:39,000

always say this to me it's my passion

876

00:29:43,310 --> 00:29:41,820

it's my interest it's my excitement that

877

00:29:44,630 --> 00:29:43,320

um draws me into these projects and sort

878

00:29:46,730 --> 00:29:44,640

of lets me have all these amazing

879

00:29:48,590 --> 00:29:46,740

opportunities so I think that what

880

00:29:51,350 --> 00:29:48,600

you're excited by what interests you

881

00:29:52,789 --> 00:29:51,360

just like stick to that and um you know

882

00:29:54,230 --> 00:29:52,799

even if it's not the most you know

883

00:29:56,510 --> 00:29:54,240

prestigious career at least you're gonna

884

00:29:58,070 --> 00:29:56,520

be having fun but also it will end up

885

00:29:59,810 --> 00:29:58,080

being a great career because people will

886

00:30:02,510 --> 00:29:59,820

recognize that passion

887

00:30:04,130 --> 00:30:02,520

I love that yeah yeah I always I always

888

00:30:05,930 --> 00:30:04,140

I love this question because I have no

889

00:30:09,110 --> 00:30:05,940

idea what I would say to myself because

890

00:30:10,549 --> 00:30:09,120

you know I was I was I had no idea what

891

00:30:12,230 --> 00:30:10,559

I wanted to be when I grew up when I was

892

00:30:13,490 --> 00:30:12,240

20 and I'm almost 40 now and I still

893

00:30:15,110 --> 00:30:13,500

have no idea what I want to be when I

894

00:30:16,430 --> 00:30:15,120

grow up so it's kind of fun right

895

00:30:17,930 --> 00:30:16,440

there's a lot of things you can explore

896

00:30:19,549 --> 00:30:17,940

and adventure and yeah you can learn a

897

00:30:20,990 --> 00:30:19,559

lot along the way

898

00:30:22,310 --> 00:30:21,000

um so here's another one about asking

899

00:30:24,230 --> 00:30:22,320

questions

900

00:30:26,690 --> 00:30:24,240

um I personally I love thinking not just

901
00:30:28,789 --> 00:30:26,700
about where we are now and where we're

902
00:30:31,010 --> 00:30:28,799
going in the next you know one or two or

903
00:30:33,710 --> 00:30:31,020
ten years but you know in the next

904
00:30:37,070 --> 00:30:33,720
Century in the next millennium where our

905
00:30:39,409 --> 00:30:37,080
species or our biosphere might go to and

906
00:30:42,110 --> 00:30:39,419
so assuming humans are here in a hundred

907
00:30:44,389 --> 00:30:42,120
years if you could go to the Future and

908
00:30:48,710 --> 00:30:44,399
meet Human Society a century from now

909
00:30:53,269 --> 00:30:51,409
um I guess how did I do it basically you

910
00:30:55,730 --> 00:30:53,279
know like we're on such a trajectory of

911
00:30:58,250 --> 00:30:55,740
environmental destruction and a lot of

912
00:31:00,169 --> 00:30:58,260
social um upheaval at the moment and

913
00:31:01,730 --> 00:31:00,179

I'll be you know fascinated to see how

914

00:31:04,070 --> 00:31:01,740

we can weave through that and live

915

00:31:05,690 --> 00:31:04,080

sustainably and you know in harmony with

916

00:31:07,549 --> 00:31:05,700

Earth so yeah I'd really just be like

917

00:31:08,750 --> 00:31:07,559

hey how did you get over all these

918

00:31:10,970 --> 00:31:08,760

problems that we're facing at the moment

919

00:31:13,250 --> 00:31:10,980

that would really excite me yeah

920

00:31:15,529 --> 00:31:13,260

very cool

921

00:31:17,450 --> 00:31:15,539

um so right now you know not just NASA

922

00:31:19,970 --> 00:31:17,460

but many space agencies many scientists

923

00:31:24,669 --> 00:31:19,980

many Engineers around the world are

924

00:31:29,630 --> 00:31:27,830

to look for life out there in the

925

00:31:31,549 --> 00:31:29,640

universe on other worlds in our solar

926
00:31:33,529 --> 00:31:31,559
system and now we're looking at the

927
00:31:35,570 --> 00:31:33,539
atmospheres of exoplanets you know it's

928
00:31:38,570 --> 00:31:35,580
it's a kind of a mind-blowing moment in

929
00:31:40,310 --> 00:31:38,580
time but one question I I like posing

930
00:31:42,529 --> 00:31:40,320
and you know you can always say no if

931
00:31:45,409 --> 00:31:42,539
you don't have an answer for this but

932
00:31:47,090 --> 00:31:45,419
um if there is alien life out there do

933
00:31:50,090 --> 00:31:47,100
you think we're most likely to find it

934
00:31:52,010 --> 00:31:50,100
first in our solar system on another

935
00:31:54,470 --> 00:31:52,020
world or do you think we're more likely

936
00:31:56,090 --> 00:31:54,480
to find it on an exoplanet in another

937
00:31:59,029 --> 00:31:56,100
solar system

938
00:32:01,070 --> 00:31:59,039

yeah interesting I think that um

939

00:32:03,289 --> 00:32:01,080

as you saw with things like you know

940

00:32:04,789 --> 00:32:03,299

potentially detecting phosphate on Venus

941

00:32:06,649 --> 00:32:04,799

and that kind of stuff

942

00:32:08,690 --> 00:32:06,659

um what a biomarker is or what evidence

943

00:32:11,090 --> 00:32:08,700

for life is can be very varied you know

944

00:32:14,409 --> 00:32:11,100

and people disagree on that

945

00:32:17,090 --> 00:32:14,419

um I personally think that perhaps a

946

00:32:19,909 --> 00:32:17,100

sure answer might come from within our

947

00:32:22,430 --> 00:32:19,919

solar system where if we find a direct

948

00:32:24,110 --> 00:32:22,440

you know little bit of bacteria irking

949

00:32:25,310 --> 00:32:24,120

out its life on Mars under a rock or

950

00:32:27,350 --> 00:32:25,320

somewhere like that'd be pretty hard to

951
00:32:29,029 --> 00:32:27,360
argue with but you know if we detect

952
00:32:30,830 --> 00:32:29,039
some really distant technical signature

953
00:32:32,510 --> 00:32:30,840
or a bit of you know Alien made

954
00:32:35,090 --> 00:32:32,520
pollution in an atmosphere and some

955
00:32:36,409 --> 00:32:35,100
exoplanet I just imagine that arguments

956
00:32:38,210 --> 00:32:36,419
popping up about that and people just

957
00:32:39,830 --> 00:32:38,220
getting so into it I think it may take

958
00:32:41,630 --> 00:32:39,840
years before we actually agree on it

959
00:32:43,310 --> 00:32:41,640
which will kind of ruin the fun I want

960
00:32:45,710 --> 00:32:43,320
to have that headline being like aliens

961
00:32:47,750 --> 00:32:45,720
found you know coming out so yeah that's

962
00:32:49,490 --> 00:32:47,760
why I think it'll be easier to prove it

963
00:32:52,370 --> 00:32:49,500

here on Earth or here in our solar

964

00:32:54,289 --> 00:32:52,380

system a lot quicker very cool unless

965

00:32:56,389 --> 00:32:54,299

it's a techno signature if it's a ticket

966

00:32:58,490 --> 00:32:56,399

in our solar system or anywhere else

967

00:33:01,130 --> 00:32:58,500

then that's much easier that's much

968

00:33:01,730 --> 00:33:01,140

easier you know definitive sign right

969

00:33:04,090 --> 00:33:01,740

um

970

00:33:06,889 --> 00:33:04,100

so let's talk about the future again

971

00:33:08,870 --> 00:33:06,899

what is what is something or some group

972

00:33:11,090 --> 00:33:08,880

of things that that really excite you

973

00:33:12,649 --> 00:33:11,100

right now about the future

974

00:33:14,570 --> 00:33:12,659

yeah I'm

975

00:33:16,490 --> 00:33:14,580

I'm honestly really excited the way that

976

00:33:18,350 --> 00:33:16,500

astrology Community is growing and

977

00:33:20,750 --> 00:33:18,360

accepting more people into it you know I

978

00:33:22,850 --> 00:33:20,760

think that as I'm sure young many young

979

00:33:24,590 --> 00:33:22,860

scientists that are listening in um I

980

00:33:26,509 --> 00:33:24,600

know for myself I was like

981

00:33:27,950 --> 00:33:26,519

all science has been done you know

982

00:33:29,210 --> 00:33:27,960

they've discovered all the planets in

983

00:33:31,070 --> 00:33:29,220

the solar system they know all the

984

00:33:32,930 --> 00:33:31,080

elements who know physics is you know

985

00:33:35,029 --> 00:33:32,940

Dan and Einstein's done and all and I

986

00:33:36,830 --> 00:33:35,039

was like where where's the where's the

987

00:33:38,570 --> 00:33:36,840

new stuff that you know us as young

988

00:33:40,549 --> 00:33:38,580

scientists in this generation can

989

00:33:43,009 --> 00:33:40,559

explore and I really see it in

990

00:33:44,990 --> 00:33:43,019

astrobiology there's like no

991

00:33:47,149 --> 00:33:45,000

um we have no idea what's going on like

992

00:33:48,529 --> 00:33:47,159

it's really around origin of life in

993

00:33:50,509 --> 00:33:48,539

particular but all this kind of stuff

994

00:33:52,909 --> 00:33:50,519

they're finding tens of planets a day

995

00:33:56,630 --> 00:33:52,919

and they're just like you know exploding

996

00:33:58,190 --> 00:33:56,640

and I think astrology could be query

997

00:34:00,289 --> 00:33:58,200

um you know gatekeeping keeping people

998

00:34:01,549 --> 00:34:00,299

out but I see generally very open and

999

00:34:03,230 --> 00:34:01,559

they have these big conferences where

1000

00:34:06,950 --> 00:34:03,240

everyone's invited and that really

1001
00:34:09,889 --> 00:34:06,960
excites me so um yeah yeah I agree yeah

1002
00:34:12,190 --> 00:34:09,899
I will say like absaican it was so great

1003
00:34:13,790 --> 00:34:12,200
to see amongst the younger

1004
00:34:15,470 --> 00:34:13,800
astrobiologists coming to the meeting

1005
00:34:17,210 --> 00:34:15,480
there there's so much diversity so many

1006
00:34:19,129 --> 00:34:17,220
young people who are finding their way

1007
00:34:21,230 --> 00:34:19,139
into the field and finding that you know

1008
00:34:22,909 --> 00:34:21,240
that there are people who are willing to

1009
00:34:25,310 --> 00:34:22,919
open gates for them and help them along

1010
00:34:26,869 --> 00:34:25,320
the way and we certainly need more of

1011
00:34:29,990 --> 00:34:26,879
that we need more people to hold those

1012
00:34:31,369 --> 00:34:30,000
gates open to allow others to realize

1013
00:34:33,290 --> 00:34:31,379

that they belong in this field and the

1014

00:34:34,970 --> 00:34:33,300

field is very open for them

1015

00:34:36,470 --> 00:34:34,980

um some of those older models of what

1016

00:34:38,329 --> 00:34:36,480

science has to be and how it has to be

1017

00:34:40,490 --> 00:34:38,339

conducted it's nice to see some of that

1018

00:34:41,810 --> 00:34:40,500

that ideology kind of passing away a

1019

00:34:43,190 --> 00:34:41,820

little bit

1020

00:34:45,530 --> 00:34:43,200

um so let's let's think about your work

1021

00:34:47,690 --> 00:34:45,540

as a graduate student what is the best

1022

00:34:50,450 --> 00:34:47,700

part of your job

1023

00:34:53,030 --> 00:34:50,460

um honestly I Love Field work like

1024

00:34:55,129 --> 00:34:53,040

um I love getting out into Hot Springs I

1025

00:34:57,890 --> 00:34:55,139

love going to the desert and looking at

1026
00:34:59,210 --> 00:34:57,900
these ancient fossils you know and um it

1027
00:35:01,670 --> 00:34:59,220
really excites me because you know we

1028
00:35:03,470 --> 00:35:01,680
you know and we had the NASA and Esa

1029
00:35:06,170 --> 00:35:03,480
instrument science teens for

1030
00:35:09,410 --> 00:35:06,180
perseverance in the Mars 2020 Rovers um

1031
00:35:11,450 --> 00:35:09,420
out on site in 2019 and watching these

1032
00:35:14,390 --> 00:35:11,460
you know esteemed engineers and

1033
00:35:16,130 --> 00:35:14,400
scientists look at these fossils um

1034
00:35:18,109 --> 00:35:16,140
um you know like a move some of us to

1035
00:35:20,510 --> 00:35:18,119
tears you know it's amazing to see the

1036
00:35:22,130 --> 00:35:20,520
oldest evidence of life in the world you

1037
00:35:23,810 --> 00:35:22,140
know and obviously there's other more

1038
00:35:25,910 --> 00:35:23,820

contentious places like up in Greenland

1039

00:35:27,650 --> 00:35:25,920

and elsewhere but in the pilba in

1040

00:35:29,750 --> 00:35:27,660

Western Australia you can put your

1041

00:35:32,450 --> 00:35:29,760

finger on this rock and say this is as

1042

00:35:34,069 --> 00:35:32,460

far back as we can go uh and I think

1043

00:35:35,630 --> 00:35:34,079

that's that's incredible and being to be

1044

00:35:38,210 --> 00:35:35,640

able to share that with people is really

1045

00:35:39,290 --> 00:35:38,220

really amazing that was very cool and I

1046

00:35:41,329 --> 00:35:39,300

was very much in line with my next

1047

00:35:43,430 --> 00:35:41,339

question which is honestly my favorite

1048

00:35:45,829 --> 00:35:43,440

of this entire segment

1049

00:35:49,490 --> 00:35:45,839

um what is an unbelievable science fact

1050

00:35:51,950 --> 00:35:49,500

that still blows your mind

1051

00:35:54,770 --> 00:35:51,960

no definitely I think one that

1052

00:35:57,770 --> 00:35:54,780

um science coincidence I guess is the

1053

00:35:59,930 --> 00:35:57,780

relative sizes of the Moon to the Sun so

1054

00:36:01,670 --> 00:35:59,940

the moons you know sorry the Sun so much

1055

00:36:03,470 --> 00:36:01,680

further away than the moon but then you

1056

00:36:06,170 --> 00:36:03,480

can have a total eclipse where they end

1057

00:36:08,030 --> 00:36:06,180

up overlapping perfectly and it's just

1058

00:36:10,250 --> 00:36:08,040

this weird coincidence no one's

1059

00:36:12,770 --> 00:36:10,260

explained to me whether it was impacted

1060

00:36:14,630 --> 00:36:12,780

by any kind of um you know there's no

1061

00:36:16,069 --> 00:36:14,640

reason for that and as you know the

1062

00:36:18,349 --> 00:36:16,079

moon's slowly drifting away from Earth

1063

00:36:19,310 --> 00:36:18,359

because of the Collision so at one point

1064

00:36:20,750 --> 00:36:19,320

it's not going to happen but we're

1065

00:36:24,290 --> 00:36:20,760

living in a beautiful time in the world

1066

00:36:26,290 --> 00:36:24,300

where they line up perfectly and um that

1067

00:36:29,270 --> 00:36:26,300

just blows my mind it's insane yeah

1068

00:36:32,750 --> 00:36:29,280

absolutely it's it's striking like we

1069

00:36:34,849 --> 00:36:32,760

live in a very unique era in the age of

1070

00:36:36,950 --> 00:36:34,859

our Earth where we actually can have a

1071

00:36:38,810 --> 00:36:36,960

full solar eclipse

1072

00:36:40,430 --> 00:36:38,820

um you know and they have a short time

1073

00:36:42,589 --> 00:36:40,440

left you know geologically speaking that

1074

00:36:43,609 --> 00:36:42,599

that will be happening so and it's very

1075

00:36:45,230 --> 00:36:43,619

intriguing

1076

00:36:46,670 --> 00:36:45,240

um so thank you very much um I I will

1077

00:36:48,950 --> 00:36:46,680

open it up now to the audience questions

1078

00:36:50,329 --> 00:36:48,960

as well and I thank you so much for our

1079

00:36:51,530 --> 00:36:50,339

audience for asking asking questions if

1080

00:36:54,470 --> 00:36:51,540

you're watching on YouTube right now

1081

00:36:55,730 --> 00:36:54,480

please keep asking questions we're going

1082

00:37:00,849 --> 00:36:55,740

to start with a question from Twitter

1083

00:37:03,950 --> 00:37:00,859

from Ishida Verma at Virginia Verma O2

1084

00:37:06,230 --> 00:37:03,960

Ishida says hi my question is is it

1085

00:37:08,750 --> 00:37:06,240

possible for water in the hot springs to

1086

00:37:11,630 --> 00:37:08,760

get contaminated by pollutants from

1087

00:37:13,250 --> 00:37:11,640

human activities

1088

00:37:17,030 --> 00:37:13,260

um yeah that's a really good question

1089

00:37:19,310 --> 00:37:17,040

and that definitely can happen so in um

1090

00:37:21,349 --> 00:37:19,320

my long muzzled career I actually worked

1091

00:37:23,750 --> 00:37:21,359

as an environmental consultant so I

1092

00:37:26,329 --> 00:37:23,760

spent time looking at how pollution from

1093

00:37:28,370 --> 00:37:26,339

mainly like leaking petrol tanks from

1094

00:37:29,990 --> 00:37:28,380

pfas which is like a firefighting foam

1095

00:37:31,370 --> 00:37:30,000

used in airports can get into

1096

00:37:33,410 --> 00:37:31,380

groundwater

1097

00:37:34,910 --> 00:37:33,420

um it can be a big issue in a lot of

1098

00:37:37,069 --> 00:37:34,920

places

1099

00:37:38,390 --> 00:37:37,079

um definitely in Hot Springs as well one

1100

00:37:41,630 --> 00:37:38,400

interesting thing of Hot Springs as well

1101
00:37:43,370 --> 00:37:41,640
is that because the underground plumbing

1102
00:37:44,930 --> 00:37:43,380
of all these different veins in advance

1103
00:37:46,849 --> 00:37:44,940
getting it towards the surface can be

1104
00:37:49,849 --> 00:37:46,859
quite fragile it's not just you know

1105
00:37:52,490 --> 00:37:49,859
chemical pollution but also um Drilling

1106
00:37:54,710 --> 00:37:52,500
in that area if you remove the pressure

1107
00:37:56,930 --> 00:37:54,720
that's built up of all that water that's

1108
00:37:58,609 --> 00:37:56,940
thin that's water Surface by you know

1109
00:38:01,670 --> 00:37:58,619
extracting that water out somewhere else

1110
00:38:04,430 --> 00:38:01,680
entire Hot Springs shut down and die so

1111
00:38:06,109 --> 00:38:04,440
in New Zealand um they had one kind of

1112
00:38:07,910 --> 00:38:06,119
really sad case of this really early on

1113
00:38:09,470 --> 00:38:07,920

you know 40 50 years ago when they first

1114

00:38:11,630 --> 00:38:09,480

started trying to extract this hot water

1115

00:38:13,550 --> 00:38:11,640

but since then they've got really good

1116

00:38:14,930 --> 00:38:13,560

at figuring out just how much water can

1117

00:38:16,550 --> 00:38:14,940

they take off

1118

00:38:18,109 --> 00:38:16,560

um you know and use it for energy or use

1119

00:38:20,150 --> 00:38:18,119

that steam to do all the different kinds

1120

00:38:21,890 --> 00:38:20,160

of things or extract you know minerals

1121

00:38:23,329 --> 00:38:21,900

out of that water but still preserving

1122

00:38:25,130 --> 00:38:23,339

those hot springs I'm not saying that

1123

00:38:27,230 --> 00:38:25,140

all kinds of

1124

00:38:29,870 --> 00:38:27,240

um drilling or you know human

1125

00:38:31,609 --> 00:38:29,880

contamination can be bad just to be very

1126

00:38:33,349 --> 00:38:31,619

careful with it and be very

1127

00:38:34,910 --> 00:38:33,359

um particular about how you work in

1128

00:38:37,370 --> 00:38:34,920

those spaces because they are fragile

1129

00:38:39,230 --> 00:38:37,380

and really beautiful yeah absolutely and

1130

00:38:41,630 --> 00:38:39,240

honestly like you know a scientist we

1131

00:38:43,609 --> 00:38:41,640

have to be aware that you know it's not

1132

00:38:45,349 --> 00:38:43,619

just all of life on Earth I can tell you

1133

00:38:46,670 --> 00:38:45,359

my samples it's us too

1134

00:38:48,349 --> 00:38:46,680

um you know I was a graduate student I

1135

00:38:50,450 --> 00:38:48,359

pulled out my beard hairs and ran them

1136

00:38:52,670 --> 00:38:50,460

on every single instrument that I had in

1137

00:38:54,290 --> 00:38:52,680

the laboratory just to make sure that I

1138

00:38:55,370 --> 00:38:54,300

wasn't contaminating samples with beard

1139

00:38:57,710 --> 00:38:55,380

hair

1140

00:38:59,810 --> 00:38:57,720

um and then in the U.S like places like

1141

00:39:01,490 --> 00:38:59,820

up in Yellowstone National Park has some

1142

00:39:03,470 --> 00:39:01,500

of the most you know just amazing hot

1143

00:39:04,970 --> 00:39:03,480

springs on the planet and yet you know

1144

00:39:06,290 --> 00:39:04,980

you see garbage for you know from people

1145

00:39:07,849 --> 00:39:06,300

walking on these boardwalks and just

1146

00:39:09,410 --> 00:39:07,859

throwing their garbage off into these

1147

00:39:12,589 --> 00:39:09,420

hot springs and it's it's very

1148

00:39:13,910 --> 00:39:12,599

frustrating as a scientist happening but

1149

00:39:15,890 --> 00:39:13,920

we also have to know that we had it's

1150

00:39:17,930 --> 00:39:15,900

very difficult to disentangle sometimes

1151
00:39:20,030 --> 00:39:17,940
those signals from what we're looking at

1152
00:39:22,250 --> 00:39:20,040
and so it is good to collect some data

1153
00:39:25,190 --> 00:39:22,260
sometimes of those other things

1154
00:39:26,510 --> 00:39:25,200
um yeah so I agree entirely yeah it's a

1155
00:39:28,310 --> 00:39:26,520
great little anecdote on that and I

1156
00:39:29,270 --> 00:39:28,320
think this is great for anyone doing

1157
00:39:31,010 --> 00:39:29,280
science

1158
00:39:33,589 --> 00:39:31,020
um we had a geology Professor here at

1159
00:39:35,270 --> 00:39:33,599
Uni that was trying to sample gold in

1160
00:39:36,170 --> 00:39:35,280
Cyprus so this is like an island in you

1161
00:39:38,569 --> 00:39:36,180
know the

1162
00:39:40,609 --> 00:39:38,579
um Mediterranean and they had you're

1163
00:39:42,109 --> 00:39:40,619

collecting soil samples and rock samples

1164

00:39:43,849 --> 00:39:42,119

from all over the you know hundreds and

1165

00:39:45,770 --> 00:39:43,859

hundreds of samples and there was one

1166

00:39:48,109 --> 00:39:45,780

geologist who would always find the

1167

00:39:50,030 --> 00:39:48,119

mouse crazy amounts of gold in all of

1168

00:39:51,890 --> 00:39:50,040

their rocks and it ended up they didn't

1169

00:39:53,270 --> 00:39:51,900

take their gold wedding ring off and it

1170

00:39:55,069 --> 00:39:53,280

was rubbing on all the rocks that they

1171

00:39:57,050 --> 00:39:55,079

picked up and they just got these insane

1172

00:39:58,490 --> 00:39:57,060

amount of spikes and I think that's a

1173

00:40:00,829 --> 00:39:58,500

really nice anecdote I always tell

1174

00:40:02,510 --> 00:40:00,839

because you know the way the clothes you

1175

00:40:05,210 --> 00:40:02,520

wear the way you pick up a rock anything

1176
00:40:06,290 --> 00:40:05,220
like that can um bias your science and

1177
00:40:08,329 --> 00:40:06,300
you've got to be aware of that when

1178
00:40:09,829 --> 00:40:08,339
you're trying to you know figure out how

1179
00:40:13,010 --> 00:40:09,839
to do science without that kind of

1180
00:40:15,050 --> 00:40:13,020
contamination yeah absolutely it's true

1181
00:40:16,730 --> 00:40:15,060
for like Mars now for for collecting and

1182
00:40:18,170 --> 00:40:16,740
sending samples back from Mars right now

1183
00:40:20,450 --> 00:40:18,180
with perseverance it's an issue we have

1184
00:40:21,650 --> 00:40:20,460
to consider contamination if we find

1185
00:40:23,690 --> 00:40:21,660
things that look like they could be life

1186
00:40:24,890 --> 00:40:23,700
is it Earth life is it contamination

1187
00:40:27,589 --> 00:40:24,900
from the laboratory those are very

1188
00:40:29,569 --> 00:40:27,599

important questions as well

1189

00:40:32,150 --> 00:40:29,579

so our next question for you Luke comes

1190

00:40:35,750 --> 00:40:32,160

again from Twitter uh this from from Dr

1191

00:40:38,210 --> 00:40:35,760

Jim pass uh at astrosociology gym pass

1192

00:40:40,910 --> 00:40:38,220

is the the founder and director of the

1193

00:40:42,290 --> 00:40:40,920

Astro sociology Research Institute and

1194

00:40:44,329 --> 00:40:42,300

he loves to watch our show he usually

1195

00:40:47,810 --> 00:40:44,339

asks questions related to the humanities

1196

00:40:50,210 --> 00:40:47,820

and sociology of astrobiology so Jim's

1197

00:40:51,589 --> 00:40:50,220

question is this uh since scientists

1198

00:40:53,690 --> 00:40:51,599

still disagree about the definition of

1199

00:40:55,849 --> 00:40:53,700

life on Earth how does that increase the

1200

00:40:58,069 --> 00:40:55,859

difficulty of isolating extraterrestrial

1201
00:40:59,750 --> 00:40:58,079
life beyond Earth and how do the social

1202
00:41:01,730 --> 00:40:59,760
sciences and Humanities contribute to

1203
00:41:04,310 --> 00:41:01,740
this difficulty

1204
00:41:06,650 --> 00:41:04,320
um no definitely I think that's um a

1205
00:41:08,150 --> 00:41:06,660
great question I've been I follow Jim on

1206
00:41:08,990 --> 00:41:08,160
Twitter as well and I love the way they

1207
00:41:10,430 --> 00:41:09,000
view

1208
00:41:12,950 --> 00:41:10,440
um the importance of these Humanities

1209
00:41:15,069 --> 00:41:12,960
and sociology in the work we do

1210
00:41:17,630 --> 00:41:15,079
um so firstly on the definition for life

1211
00:41:19,190 --> 00:41:17,640
uh definitely you know NASA's got its

1212
00:41:20,930 --> 00:41:19,200
definition that they came up with but

1213
00:41:23,390 --> 00:41:20,940

there's obviously um issues with that

1214

00:41:25,310 --> 00:41:23,400

and it's always a fun part of any you

1215

00:41:27,770 --> 00:41:25,320

know intro to astrology course it's like

1216

00:41:29,630 --> 00:41:27,780

well if life has to be

1217

00:41:32,150 --> 00:41:29,640

um reproducing or you know being able to

1218

00:41:33,530 --> 00:41:32,160

replicate what about a sterile mule or

1219

00:41:35,510 --> 00:41:33,540

you know like what about this or that

1220

00:41:37,670 --> 00:41:35,520

like you can always have fun um ways

1221

00:41:39,950 --> 00:41:37,680

thinking about that kind of stuff

1222

00:41:42,470 --> 00:41:39,960

um I

1223

00:41:44,390 --> 00:41:42,480

think that the sociology and Humanities

1224

00:41:46,609 --> 00:41:44,400

can come into play with that because I

1225

00:41:47,870 --> 00:41:46,619

think artists and people working in

1226

00:41:51,470 --> 00:41:47,880

those social space they're a lot better

1227

00:41:53,750 --> 00:41:51,480

holding multiple and sometimes opposing

1228

00:41:55,250 --> 00:41:53,760

ideas you know you think you go to an

1229

00:41:58,370 --> 00:41:55,260

artist you go to someone studying

1230

00:42:00,170 --> 00:41:58,380

sociology or like philosophy and there's

1231

00:42:02,270 --> 00:42:00,180

all these different ideas and I have to

1232

00:42:04,370 --> 00:42:02,280

take them in and there's someone's more

1233

00:42:07,190 --> 00:42:04,380

than one answer or maybe the answers are

1234

00:42:08,510 --> 00:42:07,200

unsolvable and I think the way that they

1235

00:42:10,430 --> 00:42:08,520

can hold that information is very broad

1236

00:42:12,050 --> 00:42:10,440

whereas a scientist you know it's very

1237

00:42:13,310 --> 00:42:12,060

much reduction it's like what's the one

1238

00:42:14,990 --> 00:42:13,320

single answer like what is the

1239

00:42:17,390 --> 00:42:15,000

definition what can I write down in my

1240

00:42:18,950 --> 00:42:17,400

little book you know and I think that as

1241

00:42:20,690 --> 00:42:18,960

scientists we have a lot to learn from

1242

00:42:23,210 --> 00:42:20,700

sociologists and from other people

1243

00:42:25,970 --> 00:42:23,220

outside of our field and learning how to

1244

00:42:27,790 --> 00:42:25,980

hold that Nuance because you know we may

1245

00:42:30,589 --> 00:42:27,800

find life that is totally

1246

00:42:32,270 --> 00:42:30,599

uncomprehensible you know we may be

1247

00:42:34,910 --> 00:42:32,280

looking at it not even know what it is

1248

00:42:35,630 --> 00:42:34,920

you know and I think that

1249

00:42:40,010 --> 00:42:35,640

um

1250

00:42:42,109 --> 00:42:40,020

has to offer especially arts and social

1251

00:42:43,910 --> 00:42:42,119

sciences to get around those kind of

1252

00:42:45,950 --> 00:42:43,920

interesting problems

1253

00:42:48,010 --> 00:42:45,960

yeah absolutely

1254

00:42:50,990 --> 00:42:48,020

um our next question comes from aruniver

1255

00:42:52,370 --> 00:42:51,000

who's now watching on YouTube it's very

1256

00:42:54,109 --> 00:42:52,380

similar to our previous question so

1257

00:42:55,370 --> 00:42:54,119

aruniverse says uh different

1258

00:42:56,750 --> 00:42:55,380

contaminants have been found in

1259

00:42:59,569 --> 00:42:56,760

environments like in the Arctic and

1260

00:43:02,089 --> 00:42:59,579

Antarctic which also host analog sites

1261

00:43:04,010 --> 00:43:02,099

uh can these contaminants affect your

1262

00:43:05,809 --> 00:43:04,020

research on Hot Springs

1263

00:43:07,010 --> 00:43:05,819

um and so I'm going to extrapolate a bit

1264

00:43:08,950 --> 00:43:07,020

more from that too since we've already

1265

00:43:11,990 --> 00:43:08,960

discussed contamination from a human

1266

00:43:13,309 --> 00:43:12,000

behaviors I'm also curious you know for

1267

00:43:14,329 --> 00:43:13,319

the hot spring sites that you've studied

1268

00:43:17,390 --> 00:43:14,339

and maybe even those that you haven't

1269

00:43:18,470 --> 00:43:17,400

but you you kind of know of well not

1270

00:43:20,930 --> 00:43:18,480

just issues with like human

1271

00:43:23,329 --> 00:43:20,940

contamination but like geological change

1272

00:43:24,650 --> 00:43:23,339

through time do you think we're missing

1273

00:43:26,809 --> 00:43:24,660

anything when it comes to our

1274

00:43:28,910 --> 00:43:26,819

understanding of Hot Springs especially

1275

00:43:29,990 --> 00:43:28,920

ancient Hot Springs maybe you know maybe

1276

00:43:31,309 --> 00:43:30,000

they're under a different temperature

1277

00:43:33,770 --> 00:43:31,319

regime than we really can understand

1278

00:43:35,510 --> 00:43:33,780

because you know magmas were or hotter

1279

00:43:36,829 --> 00:43:35,520

in the early Earth history and things

1280

00:43:39,410 --> 00:43:36,839

like that is there anything you think

1281

00:43:41,030 --> 00:43:39,420

specifically in hot spring research that

1282

00:43:42,890 --> 00:43:41,040

we're missing out on

1283

00:43:46,190 --> 00:43:42,900

um yeah no that's a really good um

1284

00:43:48,170 --> 00:43:46,200

question yeah thanks to that so that's a

1285

00:43:50,630 --> 00:43:48,180

um a concept that we come up with a lot

1286

00:43:52,490 --> 00:43:50,640

because basically you know where I study

1287

00:43:54,230 --> 00:43:52,500

a modern hot spring and I think hey how

1288

00:43:55,849 --> 00:43:54,240

can we apply this to

1289

00:43:58,250 --> 00:43:55,859

um our understanding of how life formed

1290

00:43:59,990 --> 00:43:58,260

on Earth four billion years ago but Hot

1291

00:44:01,430 --> 00:44:00,000

Springs would have changed massively you

1292

00:44:03,589 --> 00:44:01,440

know and I think that's a lot of the

1293

00:44:05,150 --> 00:44:03,599

research we do is how would these Hot

1294

00:44:07,069 --> 00:44:05,160

Springs looked

1295

00:44:08,510 --> 00:44:07,079

um with early life so we can go back to

1296

00:44:10,609 --> 00:44:08,520

you know three and a half billion years

1297

00:44:11,630 --> 00:44:10,619

ago and see hot springs they did have

1298

00:44:13,370 --> 00:44:11,640

life in them but it was just

1299

00:44:15,589 --> 00:44:13,380

stromatolites are just very simple you

1300

00:44:17,270 --> 00:44:15,599

know a little microbial mats and that

1301
00:44:19,190 --> 00:44:17,280
kind of stuff and then going back from

1302
00:44:21,109 --> 00:44:19,200
there so that's some research that um

1303
00:44:23,030 --> 00:44:21,119
I'm about to publish at the moment is

1304
00:44:25,670 --> 00:44:23,040
all around looking at

1305
00:44:27,710 --> 00:44:25,680
how would Prebiotic Organics so that's

1306
00:44:30,170 --> 00:44:27,720
organic molecules before the Earth

1307
00:44:31,609 --> 00:44:30,180
formed life impacted these hot springs

1308
00:44:33,470 --> 00:44:31,619
and you know there would have been

1309
00:44:34,970 --> 00:44:33,480
meteorites dropping all kinds of

1310
00:44:36,410 --> 00:44:34,980
Organics down in Earth and all other

1311
00:44:38,510 --> 00:44:36,420
kinds of

1312
00:44:40,730 --> 00:44:38,520
um you know Fisher trough synthesis like

1313
00:44:42,650 --> 00:44:40,740

Organics being cooked Up From Below in

1314

00:44:44,690 --> 00:44:42,660

these Hot Springs how would that make

1315

00:44:46,910 --> 00:44:44,700

different minerals more or less soluble

1316

00:44:48,890 --> 00:44:46,920

how would that make different

1317

00:44:50,690 --> 00:44:48,900

um rocks form you know if there's all

1318

00:44:52,250 --> 00:44:50,700

these you know sugars of ribose or

1319

00:44:54,349 --> 00:44:52,260

carbohydrates or proteins floating

1320

00:44:56,690 --> 00:44:54,359

around and then again you know when you

1321

00:44:58,670 --> 00:44:56,700

look at these um great experiments like

1322

00:45:01,130 --> 00:44:58,680

um Dave Dima pouring a cup of Prebiotic

1323

00:45:02,510 --> 00:45:01,140

soup into a hot spring up in kamchako

1324

00:45:05,630 --> 00:45:02,520

and Russia and seeing what comes out

1325

00:45:08,030 --> 00:45:05,640

obviously there's all kinds of cells and

1326

00:45:10,250 --> 00:45:08,040

Organics and things in there as well and

1327

00:45:12,109 --> 00:45:10,260

um I they would definitely skew your

1328

00:45:13,309 --> 00:45:12,119

information you know how much so we

1329

00:45:15,470 --> 00:45:13,319

don't know yet that's definitely

1330

00:45:17,329 --> 00:45:15,480

something to consider so yeah the

1331

00:45:18,530 --> 00:45:17,339

impacts of Modern Life will definitely

1332

00:45:21,050 --> 00:45:18,540

change what we're looking at and it's

1333

00:45:22,010 --> 00:45:21,060

important to remember that interesting

1334

00:45:23,569 --> 00:45:22,020

yeah

1335

00:45:25,670 --> 00:45:23,579

um our next question comes from a

1336

00:45:28,309 --> 00:45:25,680

previous guest uh Bruce damer is

1337

00:45:30,950 --> 00:45:28,319

watching on YouTube right now and he has

1338

00:45:32,870 --> 00:45:30,960

a pretty funny question he says what do

1339

00:45:36,470 --> 00:45:32,880

you think about the idea of a protocell

1340

00:45:39,230 --> 00:45:36,480

superhero uh it asked the deepest common

1341

00:45:41,329 --> 00:45:39,240

ancestor as a comic book character maybe

1342

00:45:42,650 --> 00:45:41,339

fighting all forces of degradation and

1343

00:45:45,890 --> 00:45:42,660

the second law of Thermodynamics to

1344

00:45:48,829 --> 00:45:47,390

um I love that and I think that's you

1345

00:45:50,870 --> 00:45:48,839

know I've

1346

00:45:53,210 --> 00:45:50,880

um had the great privilege of working uh

1347

00:45:55,849 --> 00:45:53,220

with Bruce and Dave scientifically but I

1348

00:45:57,890 --> 00:45:55,859

also um when I was over at the um

1349

00:45:59,750 --> 00:45:57,900

University of California in Santa Cruz

1350

00:46:01,910 --> 00:45:59,760

doing my little you know placement there

1351
00:46:04,250 --> 00:46:01,920
for my PhD I got to stay with Bruce so

1352
00:46:06,710 --> 00:46:04,260
we had all these amazing fun

1353
00:46:08,809 --> 00:46:06,720
um wacky conversations about the world

1354
00:46:11,809 --> 00:46:08,819
and Science and everything so um always

1355
00:46:14,690 --> 00:46:11,819
great ideas like the um protocell

1356
00:46:16,790 --> 00:46:14,700
superhero I know NASA does a comic book

1357
00:46:18,829 --> 00:46:16,800
series um and it's really around the

1358
00:46:20,150 --> 00:46:18,839
formation of the science and the people

1359
00:46:21,770 --> 00:46:20,160
involved

1360
00:46:23,510 --> 00:46:21,780
um and actually I met I forget their

1361
00:46:25,790 --> 00:46:23,520
name but I met them at abscond they're

1362
00:46:26,930 --> 00:46:25,800
graphic artists who um draws them in

1363
00:46:29,030 --> 00:46:26,940

their brilliant artist and a really

1364

00:46:31,690 --> 00:46:29,040

interesting person maybe we can make

1365

00:46:33,650 --> 00:46:31,700

some yeah like hot spring

1366

00:46:35,930 --> 00:46:33,660

superheroes I don't know maybe there's

1367

00:46:39,410 --> 00:46:35,940

something there we can um get involved

1368

00:46:41,930 --> 00:46:39,420

in yeah I I have I have to grab one off

1369

00:46:44,690 --> 00:46:41,940

my wall here I happen to have the most

1370

00:46:48,950 --> 00:46:44,700

recent issue of the astrobiology graphic

1371

00:46:51,490 --> 00:46:48,960

histories from Dr Aaron gronstall so uh

1372

00:46:54,410 --> 00:46:51,500

Aaron is not just a comic book artist

1373

00:46:56,270 --> 00:46:54,420

he's also a PhD geochemist

1374

00:46:58,849 --> 00:46:56,280

um and so you know it's interesting that

1375

00:47:00,829 --> 00:46:58,859

you know Aaron also like many of us has

1376

00:47:02,329 --> 00:47:00,839

these other facets of his career not

1377

00:47:04,730 --> 00:47:02,339

just being in geochemistry and

1378

00:47:07,970 --> 00:47:04,740

astrobiology he's also an incredible

1379

00:47:09,109 --> 00:47:07,980

artist and so our next question comes

1380

00:47:11,569 --> 00:47:09,119

from one of our production assistants

1381

00:47:14,329 --> 00:47:11,579

and actually ties into this very well uh

1382

00:47:17,030 --> 00:47:14,339

honor of mahanti uh has asked that

1383

00:47:18,410 --> 00:47:17,040

connecting science with stand-up comedy

1384

00:47:20,030 --> 00:47:18,420

um sounds a lot like stepping out of

1385

00:47:21,410 --> 00:47:20,040

your comfort zone

1386

00:47:22,970 --> 00:47:21,420

um and you know maybe in some ways it's

1387

00:47:24,349 --> 00:47:22,980

like stepping from you know geochemistry

1388

00:47:26,690 --> 00:47:24,359

into artwork

1389

00:47:28,849 --> 00:47:26,700

um and things like that so honorrup asks

1390

00:47:30,710 --> 00:47:28,859

what are some other areas that you want

1391

00:47:31,790 --> 00:47:30,720

to explore

1392

00:47:34,690 --> 00:47:31,800

um and that you would recommend other

1393

00:47:36,290 --> 00:47:34,700

scientists maybe explore as well

1394

00:47:38,990 --> 00:47:36,300

interesting

1395

00:47:41,150 --> 00:47:39,000

um and so firstly yes it was the most

1396

00:47:44,270 --> 00:47:41,160

terrifying thing I've done in my entire

1397

00:47:46,069 --> 00:47:44,280

life like stand-up comedy was

1398

00:47:48,170 --> 00:47:46,079

um horrendously

1399

00:47:50,450 --> 00:47:48,180

um yeah just like the stage fright was

1400

00:47:52,190 --> 00:47:50,460

so real but also so exciting and having

1401
00:47:55,069 --> 00:47:52,200
all these people laugh at your jokes and

1402
00:47:56,750 --> 00:47:55,079
applaud and it was um yeah exhilarating

1403
00:47:58,309 --> 00:47:56,760
I guess is a way to describe it no but

1404
00:48:00,109 --> 00:47:58,319
definitely I had to step out of my

1405
00:48:01,490 --> 00:48:00,119
comfort zone for that

1406
00:48:03,770 --> 00:48:01,500
um I think that's quite a personal

1407
00:48:05,690 --> 00:48:03,780
question so I'd say firstly for other

1408
00:48:08,329 --> 00:48:05,700
scientists out there I don't want to

1409
00:48:10,370 --> 00:48:08,339
tell you what you know passion or hobby

1410
00:48:11,990 --> 00:48:10,380
to link up together that's up to you you

1411
00:48:14,870 --> 00:48:12,000
know like what excites you do you really

1412
00:48:16,370 --> 00:48:14,880
enjoy cooking do you really enjoy

1413
00:48:18,349 --> 00:48:16,380

um a sport do you really enjoy what

1414

00:48:20,390 --> 00:48:18,359

other hobbies that interests you

1415

00:48:23,270 --> 00:48:20,400

um I think that's where you should be

1416

00:48:24,710 --> 00:48:23,280

excited because I think the reason these

1417

00:48:25,849 --> 00:48:24,720

things work the reason that the Comedy

1418

00:48:28,010 --> 00:48:25,859

Works so well is because I was

1419

00:48:29,390 --> 00:48:28,020

passionate about it and I would get up

1420

00:48:30,589 --> 00:48:29,400

there and I would apply for funding and

1421

00:48:31,790 --> 00:48:30,599

I would convince people and I would

1422

00:48:33,890 --> 00:48:31,800

really I'll get on the phone and call

1423

00:48:35,329 --> 00:48:33,900

venues and I'm like hey you need us

1424

00:48:37,490 --> 00:48:35,339

there because we're gonna blow your

1425

00:48:39,410 --> 00:48:37,500

socks off you know like and I think if I

1426

00:48:40,910 --> 00:48:39,420

wasn't driven by it if I was just trying

1427

00:48:42,230 --> 00:48:40,920

to find

1428

00:48:43,970 --> 00:48:42,240

um practically just a way to do my

1429

00:48:45,349 --> 00:48:43,980

science communication better it wouldn't

1430

00:48:47,990 --> 00:48:45,359

have worked so I definitely think you

1431

00:48:48,890 --> 00:48:48,000

need that personal passion um for myself

1432

00:48:51,589 --> 00:48:48,900

I'm actually really interested in

1433

00:48:53,270 --> 00:48:51,599

exploring dance more I'm really um I

1434

00:48:55,250 --> 00:48:53,280

love dancing

1435

00:48:57,109 --> 00:48:55,260

um you know either at a club or you know

1436

00:48:58,970 --> 00:48:57,119

I do a little bit of like contemporary

1437

00:49:00,410 --> 00:48:58,980

dance and like kind of like very

1438

00:49:01,849 --> 00:49:00,420

embodied

1439

00:49:04,309 --> 00:49:01,859

um movement and kind of figuring out

1440

00:49:06,890 --> 00:49:04,319

what my body does and reacts to stuff

1441

00:49:08,630 --> 00:49:06,900

yoga all that kind of movement practices

1442

00:49:11,690 --> 00:49:08,640

um so yeah maybe when I've got more time

1443

00:49:13,910 --> 00:49:11,700

after my PhD I might um yeah look more

1444

00:49:15,290 --> 00:49:13,920

into dance and how that kind of infects

1445

00:49:18,109 --> 00:49:15,300

the way that I think about the world

1446

00:49:19,609 --> 00:49:18,119

that yeah who knows oh that's groovy

1447

00:49:21,290 --> 00:49:19,619

yeah I mean I love dancing myself who

1448

00:49:24,589 --> 00:49:21,300

knows maybe we'll create our own Dance

1449

00:49:26,569 --> 00:49:24,599

troupe the dancing astrobiologist

1450

00:49:27,710 --> 00:49:26,579

um so here's here's another fun joke for

1451
00:49:30,650 --> 00:49:27,720
our viewers

1452
00:49:32,809 --> 00:49:30,660
um so tell me why are geologists good at

1453
00:50:03,530 --> 00:49:32,819
stand-up comedy

1454
00:50:07,490 --> 00:50:05,450
yeah definitely so I think the best way

1455
00:50:09,829 --> 00:50:07,500
to track me down is on Twitter so if you

1456
00:50:11,329 --> 00:50:09,839
go to add Stellar underscore Luke I'll

1457
00:50:12,589 --> 00:50:11,339
pop up and I hope I'm being tagged in

1458
00:50:13,910 --> 00:50:12,599
all the stuff that Graham's doing as

1459
00:50:15,230 --> 00:50:13,920
well as you should see me on their

1460
00:50:17,030 --> 00:50:15,240
Twitter feed

1461
00:50:19,490 --> 00:50:17,040
um I've got a website as well Luke

1462
00:50:21,829 --> 00:50:19,500
stella.com if you want to check me out

1463
00:50:24,230 --> 00:50:21,839

um that's Stella with an ER I'm like one

1464

00:50:26,569 --> 00:50:24,240

Val off being a true uh Stellar

1465

00:50:29,390 --> 00:50:26,579

researcher but um I'm getting there that

1466

00:50:31,430 --> 00:50:29,400

yeah definitely um send me a message

1467

00:50:33,829 --> 00:50:31,440

um my you know academic emails out there

1468

00:50:35,750 --> 00:50:33,839

on the interweb somewhere so um hit me

1469

00:50:37,550 --> 00:50:35,760

up if you've got any questions or you'd

1470

00:50:38,750 --> 00:50:37,560

love to think about how to do comedy

1471

00:50:39,770 --> 00:50:38,760

where you live and what you're getting

1472

00:50:42,230 --> 00:50:39,780

into

1473

00:50:44,510 --> 00:50:42,240

um always Keen for a chat I love it so

1474

00:50:46,910 --> 00:50:44,520

much I will admit I'm a amongst those

1475

00:50:48,910 --> 00:50:46,920

who misspelled your name at first I

1476

00:50:51,290 --> 00:50:48,920

thought it was also the AR not the ER

1477

00:50:53,150 --> 00:50:51,300

but I say you are a very Stellar

1478

00:50:54,650 --> 00:50:53,160

scientist and science communicator and

1479

00:50:56,270 --> 00:50:54,660

comedian now

1480

00:50:58,190 --> 00:50:56,280

um and so you know it's been such a

1481

00:50:59,990 --> 00:50:58,200

pleasure having you on the show Luke I'm

1482

00:51:01,430 --> 00:51:00,000

so glad you could join us here

1483

00:51:03,290 --> 00:51:01,440

um and who knows what the future holds

1484

00:51:04,849 --> 00:51:03,300

maybe in the future we'll become the

1485

00:51:06,109 --> 00:51:04,859

dancing astrobiologist and then we'll

1486

00:51:08,170 --> 00:51:06,119

have to have an episode of the show just

1487

00:51:10,130 --> 00:51:08,180

to talk about that

1488

00:51:11,329 --> 00:51:10,140

that'd be brilliant yeah thank you so

1489

00:51:12,829 --> 00:51:11,339

much for having me and for all your

1490

00:51:14,930 --> 00:51:12,839

listeners out there it's been a lot of

1491

00:51:16,970 --> 00:51:14,940

fun awesome well for those of you who

1492

00:51:19,670 --> 00:51:16,980

want to stay in the loop on upcoming

1493

00:51:22,730 --> 00:51:19,680

episodes of our show or learn more about

1494

00:51:23,870 --> 00:51:22,740

opportunities from NASA astrobiology you

1495

00:51:25,609 --> 00:51:23,880

can use the link that we're going to

1496

00:51:27,770 --> 00:51:25,619

show on your screen to sign up for the

1497

00:51:29,270 --> 00:51:27,780

official mailing list for NASA

1498

00:51:31,089 --> 00:51:29,280

astrobiology

1499

00:51:33,470 --> 00:51:31,099

um you can always tune into the website

1500

00:51:35,030 --> 00:51:33,480

astrobiology.nasa.gov to learn more uh

1501

00:51:36,470 --> 00:51:35,040

thank you very much to Luke Stellar for

1502

00:51:38,809 --> 00:51:36,480

joining us thanks to the audience for

1503

00:51:40,609 --> 00:51:38,819

tuning in and watching and thanks

1504

00:51:43,630 --> 00:51:40,619

everyone uh everywhere in the world for

1505

00:51:49,130 --> 00:51:43,640

joining until next time stay curious

1506

00:51:50,310 --> 00:51:49,140

[Music]

1507

00:52:19,250 --> 00:51:50,320

foreign

1508

00:52:20,460 --> 00:52:19,260

[Music]