

**THE
SKEPTIC
ZONE
PODCAST**

www.skepticzone.tv

1
00:00:09,089 --> 00:00:06,180

[Music]

2
00:00:13,910 --> 00:00:09,099

welcome to the skeptic zone the podcast

3
00:00:16,840 --> 00:00:13,920

from Australia for science and reason

4
00:00:22,350 --> 00:00:16,850

[Applause]

5
00:00:25,440 --> 00:00:22,360

[Music]

6
00:00:30,460 --> 00:00:25,450

yes it's the skeptic zone episode number

7
00:00:32,050 --> 00:00:30,470

453 for the 25th of June 2017

8
00:00:35,950 --> 00:00:32,060

richardsaunders here with you from the

9
00:00:37,150 --> 00:00:35,960

Bay Area San Francisco where it's balmy

10
00:00:39,420 --> 00:00:37,160

weather Wow

11
00:00:41,470 --> 00:00:39,430

had a heat wave over the last few days

12
00:00:44,740 --> 00:00:41,480

yes it's a bit of a shock to the system

13
00:00:47,320 --> 00:00:44,750

to come out of a wintry cold rainy

14

00:00:49,720 --> 00:00:47,330

Sydney 2:00 a.m. heat wave California

15

00:00:52,960 --> 00:00:49,730

and thank you to those people who are

16

00:00:55,119 --> 00:00:52,970

worried about my health with my recent

17

00:00:56,500 --> 00:00:55,129

attack of shingles and then nasty chest

18

00:00:59,259 --> 00:00:56,510

infection

19

00:01:01,930 --> 00:00:59,269

it didn't make flying over the Pacific a

20

00:01:04,360 --> 00:01:01,940

lot of fun but thank goodness for good

21

00:01:06,070 --> 00:01:04,370

friends like dr. eugenie Scott who

22

00:01:09,730 --> 00:01:06,080

helped me out when I reach to the other

23

00:01:11,680 --> 00:01:09,740

end and speaking of dr. eugenie Scott

24

00:01:15,030 --> 00:01:11,690

this week a bit later on in the show

25

00:01:19,450 --> 00:01:15,040

we're going to be collecting honey

26
00:01:22,810 --> 00:01:19,460
collecting honey with Eugenie Scott this

27
00:01:25,270 --> 00:01:22,820
should be a book about it I was lucky

28
00:01:28,029 --> 00:01:25,280
enough to visit Jeanie in Berkeley in

29
00:01:29,800 --> 00:01:28,039
California and in her backyard there are

30
00:01:33,399 --> 00:01:29,810
a couple of bee hives and we collect

31
00:01:35,109 --> 00:01:33,409
honey it's a different I'll give you

32
00:01:38,620 --> 00:01:35,119
that it's a different report coming up a

33
00:01:40,749 --> 00:01:38,630
bit later on in the show but before we

34
00:01:44,469 --> 00:01:40,759
do that to kick off the show I go

35
00:01:46,840 --> 00:01:44,479
downtown here in San Francisco and visit

36
00:01:48,639 --> 00:01:46,850
the Exploratorium the science outreach

37
00:01:52,630 --> 00:01:48,649
museum well I don't know if you'd call

38
00:01:57,669 --> 00:01:52,640

it a museum exactly it's a yeah it's a

39

00:02:00,580 --> 00:01:57,679

vast interactive series of exhibits it's

40

00:02:04,599 --> 00:02:00,590

very famous and I have a chat and a

41

00:02:06,849 --> 00:02:04,609

private tour with Paul Doherty who you

42

00:02:09,580 --> 00:02:06,859

may remember some weeks ago I

43

00:02:11,980 --> 00:02:09,590

interviewed Paul about his book and then

44

00:02:14,860 --> 00:02:11,990

you did a scientific exploration of the

45

00:02:17,530 --> 00:02:14,870

world's most interesting ways to die and

46

00:02:21,240 --> 00:02:17,540

he co-authored that with Cody Cassidy I

47

00:02:24,700 --> 00:02:21,250

I have the book right here with me and

48

00:02:26,590 --> 00:02:24,710

it's now autographed and in fact we'll

49

00:02:28,900 --> 00:02:26,600

be having a competition soon or a prize

50

00:02:31,600 --> 00:02:28,910

or a giveaway where that book is

51
00:02:32,670 --> 00:02:31,610
the the prize more about that in the

52
00:02:35,220 --> 00:02:32,680
coming weeks when I think

53
00:02:39,149 --> 00:02:35,230
what to do anyway they kick off the show

54
00:02:41,910 --> 00:02:39,159
a tour of the Exploratorium and a chat

55
00:02:46,949 --> 00:02:41,920
to Paul about the important work they do

56
00:02:49,800 --> 00:02:46,959
there in educating science teachers also

57
00:02:52,770 --> 00:02:49,810
this week as usual it's brouhaha science

58
00:02:55,440 --> 00:02:52,780
from Australia science TV this week Ben

59
00:02:58,289 --> 00:02:55,450
Lewis talks to us about our flying

60
00:03:00,209 --> 00:02:58,299
carbon footprint our flying carbon

61
00:03:03,509 --> 00:03:00,219
footprint uh you'll understand a bit

62
00:03:05,580 --> 00:03:03,519
later on now there's not much more for

63
00:03:08,819 --> 00:03:05,590

me to say at the moment so I'm going to

64

00:03:11,879 --> 00:03:08,829

run upstairs I'm going to have a nice

65

00:03:15,899 --> 00:03:11,889

toasty bagel with some melted butter on

66

00:03:18,479 --> 00:03:15,909

top and I'm going to sprinkle that or

67

00:03:21,030 --> 00:03:18,489

drizzle that with a jar of honey well

68

00:03:24,149 --> 00:03:21,040

not the whole jar of some honey from a

69

00:03:26,599 --> 00:03:24,159

honey jar given to me by dr. eugenie

70

00:03:30,300 --> 00:03:26,609

Scott and you'll find out that adventure

71

00:03:32,250 --> 00:03:30,310

soon soon enough but while I munch that

72

00:03:33,930 --> 00:03:32,260

delicious bagel down I hope you enjoy

73

00:03:49,210 --> 00:03:33,940

the skeptic zone

74

00:04:04,730 --> 00:03:49,220

[Music]

75

00:04:21,210 --> 00:04:18,539

three one two three drink now listeners

76
00:04:22,460 --> 00:04:21,220
may be confused about this strange thing

77
00:04:24,990 --> 00:04:22,470
we're doing here were actually

78
00:04:26,909 --> 00:04:25,000
Exploratorium here in San Francisco and

79
00:04:28,680 --> 00:04:26,919
I'm with dr. Paul Doherty hello hello

80
00:04:30,000 --> 00:04:28,690
it's nice to be here Richard it's

81
00:04:32,040 --> 00:04:30,010
wonderful to be here in fact the

82
00:04:34,370 --> 00:04:32,050
listeners will remember we had a chat a

83
00:04:36,960 --> 00:04:34,380
few weeks ago when we're discussing your

84
00:04:39,210 --> 00:04:36,970
fascinating book about the ridiculous

85
00:04:41,070 --> 00:04:39,220
waste entire Hall that write the science

86
00:04:43,140 --> 00:04:41,080
behind the world's most interesting ways

87
00:04:45,450 --> 00:04:43,150
to die it's the one titled and then

88
00:04:47,370 --> 00:04:45,460

you're dead and then you did yeah which

89

00:04:49,409 --> 00:04:47,380

I have a copy with me but we'll get to

90

00:04:52,680 --> 00:04:49,419

that soon and we just buy this little

91

00:04:55,200 --> 00:04:52,690

display here let's give you a partner a

92

00:04:57,330 --> 00:04:55,210

sip or a squirt right and it's an

93

00:04:59,520 --> 00:04:57,340

interesting idea of adventure in the

94

00:05:01,620 --> 00:04:59,530

psyche psychology really that's right

95

00:05:04,560 --> 00:05:01,630

it's a social science experiment it's a

96

00:05:07,170 --> 00:05:04,570

classic and it turns out you can choose

97

00:05:09,330 --> 00:05:07,180

to give your partner a sip of water or a

98

00:05:12,210 --> 00:05:09,340

squirt in the face and they choose the

99

00:05:14,219 --> 00:05:12,220

same for you if you both choose sip you

100

00:05:17,550 --> 00:05:14,229

both get a sip of water if you both

101
00:05:20,640 --> 00:05:17,560
choose squirt you get nothing but if one

102
00:05:22,380 --> 00:05:20,650
chooses sip and one chooses squirt one

103
00:05:24,180 --> 00:05:22,390
of you gets a sip and the other one gets

104
00:05:26,219 --> 00:05:24,190
squirted in the face and just yet what

105
00:05:29,400 --> 00:05:26,229
you just heard was a couple of women and

106
00:05:30,630 --> 00:05:29,410
they chose sip and squirt and one woman

107
00:05:33,060 --> 00:05:30,640
got a drink and the other one got

108
00:05:35,730 --> 00:05:33,070
squirted in the face and she reacted by

109
00:05:37,560 --> 00:05:35,740
saying you just squirted me so who can

110
00:05:39,840 --> 00:05:37,570
you trust we got some more volunteers

111
00:05:40,740 --> 00:05:39,850
ready to give this a go try it now

112
00:05:43,590 --> 00:05:40,750
they're walking up now

113
00:05:44,940 --> 00:05:43,600

what our main friends so the two

114

00:05:46,749 --> 00:05:44,950

gentlemen are sitting down now they're

115

00:05:48,909 --> 00:05:46,759

going to choose so you can

116

00:05:50,950 --> 00:05:48,919

press any button sip or squirt and

117

00:05:52,510 --> 00:05:50,960

that's what they're going to get so go

118

00:05:55,390 --> 00:05:52,520

ahead and pick what you're going to give

119

00:05:57,899 --> 00:05:55,400

the other person please lower your head

120

00:06:06,309 --> 00:05:57,909

and take a drink on the count of three

121

00:06:08,559 --> 00:06:06,319

one two three three so you got the

122

00:06:09,369 --> 00:06:08,569

squirt and you got the sip there you go

123

00:06:14,679 --> 00:06:09,379

nice

124

00:06:17,769 --> 00:06:14,689

there a lesson in life here there could

125

00:06:19,779 --> 00:06:17,779

be what that's a fun display yes but the

126
00:06:22,989 --> 00:06:19,789
whole idea of the Exploratorium and and

127
00:06:24,279 --> 00:06:22,999
I came to this institution many years

128
00:06:27,189 --> 00:06:24,289
ago when it was over the Palace of Fine

129
00:06:29,260 --> 00:06:27,199
Arts yes so it's wonderful to see it

130
00:06:31,629 --> 00:06:29,270
close to the downtown San Francisco oh

131
00:06:34,540 --> 00:06:31,639
yes in fact so a three years ago we

132
00:06:36,879 --> 00:06:34,550
moved the city the other building needed

133
00:06:38,170 --> 00:06:36,889
a lot of repair and the city offered us

134
00:06:40,499 --> 00:06:38,180
this building which needed even more

135
00:06:43,989 --> 00:06:40,509
repair but it's in such a great location

136
00:06:46,659 --> 00:06:43,999
it's in a 70 year old pier and we

137
00:06:49,149 --> 00:06:46,669
essentially reinforced these pilings

138
00:06:51,879 --> 00:06:49,159

under the pier 1,800 pilings had to be

139

00:06:54,070 --> 00:06:51,889

reinforced and then we restructured the

140

00:06:55,929 --> 00:06:54,080

building and as you look around you

141

00:06:59,589 --> 00:06:55,939

you'll see it's this where it's this

142

00:07:01,959 --> 00:06:59,599

giant warehouse full of exhibits 600

143

00:07:03,249 --> 00:07:01,969

exhibits allowing people to interact

144

00:07:05,709 --> 00:07:03,259

with and learn a little bit about

145

00:07:08,439 --> 00:07:05,719

different concepts and science it's it's

146

00:07:11,079 --> 00:07:08,449

a dream come true for a science educator

147

00:07:15,219 --> 00:07:11,089

really is so what I'm doing here right

148

00:07:17,139 --> 00:07:15,229

now is I have twenty high school science

149

00:07:19,239 --> 00:07:17,149

teachers in a class that come here for

150

00:07:22,689 --> 00:07:19,249

three weeks and learn how to use

151

00:07:25,179 --> 00:07:22,699

exhibits to excite to get to make their

152

00:07:28,239 --> 00:07:25,189

science classes interesting relevant fun

153

00:07:30,159 --> 00:07:28,249

and correct it's a wonderland of

154

00:07:32,239 --> 00:07:30,169

interaction in this place I must say now

155

00:07:34,789 --> 00:07:32,249

like

156

00:07:36,979 --> 00:07:34,799

to wonder what is going on here oh hello

157

00:07:39,039 --> 00:07:36,989

there are people sitting down a little

158

00:07:42,139 --> 00:07:39,049

count little displays here beating away

159

00:07:43,909 --> 00:07:42,149

yes and some of them they have a red

160

00:07:46,669 --> 00:07:43,919

button and a blue button like the red

161

00:07:49,219 --> 00:07:46,679

pill on the blue pill of notorious movie

162

00:07:51,109 --> 00:07:49,229

and there's us counter up there on the

163

00:07:52,639 --> 00:07:51,119

wall telling how many times the red has

164

00:07:55,729 --> 00:07:52,649

been hit and how many times the blue has

165

00:07:59,689 --> 00:07:55,739

been hit and they can they can compete

166

00:08:01,569 --> 00:07:59,699

or cooperate and so in this section of

167

00:08:06,229 --> 00:08:01,579

the museum we do a lot of studies of

168

00:08:07,969 --> 00:08:06,239

cooperation versus competition the kids

169

00:08:09,159 --> 00:08:07,979

they're a couple of kids really doing at

170

00:08:11,299 --> 00:08:09,169

the moment they're having a great time

171

00:08:12,979 --> 00:08:11,309

having fun they're having fun and

172

00:08:16,039 --> 00:08:12,989

there's a big counter telling me telling

173

00:08:17,509 --> 00:08:16,049

how many times it's been struck and I'm

174

00:08:19,489 --> 00:08:17,519

really impressed about this place

175

00:08:22,100 --> 00:08:19,499

because there are many reasons but it

176

00:08:24,649 --> 00:08:22,110

just goes on and on on into the distance

177

00:08:26,659 --> 00:08:24,659

yeah about 300 meters long to get to the

178

00:08:30,799 --> 00:08:26,669

far end that's that's fantastic and

179

00:08:32,629 --> 00:08:30,809

there's not a square meter not really

180

00:08:35,299 --> 00:08:32,639

being used for something that's right

181

00:08:39,519 --> 00:08:35,309

look at this display that's fantastic

182

00:08:42,259 --> 00:08:39,529

yeah so this one we're studying bird

183

00:08:45,170 --> 00:08:42,269

gatherings so there's a word in English

184

00:08:46,579 --> 00:08:45,180

called a murmuration a wonderful ratio

185

00:08:48,470 --> 00:08:46,589

and that's when you look at the sky and

186

00:08:51,139 --> 00:08:48,480

you see birds come together in a big

187

00:08:54,199 --> 00:08:51,149

cluster that fly together like a flock

188

00:08:56,360 --> 00:08:54,209

and we give the visitors a chance to

189

00:08:58,460 --> 00:08:56,370

change three parameters and program

190

00:09:00,999 --> 00:08:58,470

their birds and how they flock what

191

00:09:03,829 --> 00:09:01,009

we're looking at folks is a giant

192

00:09:05,360 --> 00:09:03,839

flat-screen TV you know bigger than

193

00:09:07,600 --> 00:09:05,370

probably the biggest one you have in

194

00:09:10,610 --> 00:09:07,610

your house and it is covered with

195

00:09:12,530 --> 00:09:10,620

computer simulated birds all flocking

196

00:09:14,980 --> 00:09:12,540

together and the kids are down here

197

00:09:17,949 --> 00:09:14,990

using the controls here for grouping

198

00:09:21,670 --> 00:09:17,959

separation and alignment and as they

199

00:09:24,319 --> 00:09:21,680

alter the parameters they get different

200

00:09:26,090 --> 00:09:24,329

flocks of birds flowing across the

201
00:09:28,129 --> 00:09:26,100
screen that's just fascinating if they

202
00:09:30,590 --> 00:09:28,139
choose some parameters are a little

203
00:09:31,800 --> 00:09:30,600
quite kamar like this what they did

204
00:09:34,499 --> 00:09:31,810
there yeah

205
00:09:37,199 --> 00:09:34,509
and some more frenetic but they have

206
00:09:39,119 --> 00:09:37,209
just three controls and it's called in

207
00:09:42,389 --> 00:09:39,129
the world of mathematics it's called

208
00:09:44,730 --> 00:09:42,399
cellular automata you tell each bird the

209
00:09:47,009 --> 00:09:44,740
rules of making a flock of birds and

210
00:09:48,569 --> 00:09:47,019
then you turn the computer loose to

211
00:09:51,030 --> 00:09:48,579
simulate what happens that there are

212
00:09:53,790 --> 00:09:51,040
thousands of birds right now on the

213
00:09:55,499 --> 00:09:53,800

screen interacting at lightning pace

214

00:09:56,790 --> 00:09:55,509

that the calculations must be

215

00:09:59,189 --> 00:09:56,800

extraordinary yeah but they're very

216

00:10:02,730 --> 00:09:59,199

simple computers are very good at simple

217

00:10:04,980 --> 00:10:02,740

calculations right valid so wow that's

218

00:10:06,600 --> 00:10:04,990

pretty that's oh it's fantastic open

219

00:10:10,470 --> 00:10:06,610

hammer called this a museum of science

220

00:10:13,230 --> 00:10:10,480

art and human perception and that one I

221

00:10:17,069 --> 00:10:13,240

thought was a nice combination of art in

222

00:10:19,619 --> 00:10:17,079

science actually art in mathematics it's

223

00:10:22,619 --> 00:10:19,629

it's high summer here in California and

224

00:10:24,780 --> 00:10:22,629

this place is crowded I mean a lot of

225

00:10:27,929 --> 00:10:24,790

the school-age children on their

226

00:10:30,090 --> 00:10:27,939

vacation at the moment and everywhere I

227

00:10:33,059 --> 00:10:30,100

look there are children everywhere I

228

00:10:35,440 --> 00:10:33,069

look of all ages mostly younger though

229

00:10:37,810 --> 00:10:35,450

which is nice yeah

230

00:10:40,780 --> 00:10:37,820

with their with their families it's

231

00:10:41,110 --> 00:10:40,790

great to have a family together enjoying

232

00:10:42,730 --> 00:10:41,120

it

233

00:10:44,950 --> 00:10:42,740

let's go over to this one here we have a

234

00:10:49,990 --> 00:10:44,960

huge group and they found something that

235

00:10:52,240 --> 00:10:50,000

they're really interested in so there

236

00:10:54,220 --> 00:10:52,250

seems there seems to be a treadmill with

237

00:10:57,730 --> 00:10:54,230

a slinky uh-huh

238

00:10:59,080 --> 00:10:57,740

so maybe and there's no instructions so

239

00:11:00,880 --> 00:10:59,090

the kids are trying to figure out what

240

00:11:05,110 --> 00:11:00,890

to do with a treadmill and a slinky oh

241

00:11:07,840 --> 00:11:05,120

they figure it out no so the treadmill

242

00:11:09,250 --> 00:11:07,850

is going up at about a thirty five

243

00:11:10,330 --> 00:11:09,260

degree angle or something like that a

244

00:11:12,640 --> 00:11:10,340

30-degree angle

245

00:11:13,930 --> 00:11:12,650

yeah and if the slinky is at the top it

246

00:11:15,850 --> 00:11:13,940

starts to walk back down as the

247

00:11:18,280 --> 00:11:15,860

treadmill goes up that's right and they

248

00:11:20,050 --> 00:11:18,290

can control the speed and right now they

249

00:11:22,420 --> 00:11:20,060

have it at the highest speed right

250

00:11:24,280 --> 00:11:22,430

that's really hard to make work but if

251
00:11:26,770 --> 00:11:24,290
they but they get the choice to slow it

252
00:11:28,870 --> 00:11:26,780
down if they want which you just did oh

253
00:11:31,000 --> 00:11:28,880
I see yes there's a control they're

254
00:11:33,430 --> 00:11:31,010
young and and at one speed the slinky

255
00:11:35,410 --> 00:11:33,440
goes downhill at exactly the same rate

256
00:11:40,090 --> 00:11:35,420
that the treadmill is going uphill so

257
00:11:41,740 --> 00:11:40,100
it's a forever exhibit so if we're gonna

258
00:11:44,830 --> 00:11:41,750
be top that their energy and we get

259
00:11:46,300 --> 00:11:44,840
perpetual motion that's right it's

260
00:11:48,250 --> 00:11:46,310
really fun we don't give them any

261
00:11:51,090 --> 00:11:48,260
instructions of how to make the exhibit

262
00:11:54,430 --> 00:11:51,100
work they they have to go up there and

263
00:11:57,010 --> 00:11:54,440

cooperate or compete and work with each

264

00:11:58,870 --> 00:11:57,020

other it's over on the left here is

265

00:12:01,420 --> 00:11:58,880

something you hardly ever see in a

266

00:12:03,190 --> 00:12:01,430

museum as you walk through this is the

267

00:12:07,000 --> 00:12:03,200

exhibits actually being built

268

00:12:08,950 --> 00:12:07,010

it's a we can view the whole of the

269

00:12:11,770 --> 00:12:08,960

workshop area from here that's right and

270

00:12:15,190 --> 00:12:11,780

there are lots of milling machine yes

271

00:12:15,760 --> 00:12:15,200

routers and maybe how'd it work putting

272

00:12:17,770 --> 00:12:15,770

things together

273

00:12:21,960 --> 00:12:17,780

here's Diane over here coming out she's

274

00:12:24,930 --> 00:12:21,970

one of our best exhibit builders and so

275

00:12:27,150 --> 00:12:24,940

it's an exhibit in itself isn't it

276

00:12:28,650 --> 00:12:27,160

and it's unique and then over here is

277

00:12:31,950 --> 00:12:28,660

something we do only for the summit

278

00:12:35,430 --> 00:12:31,960

summer this is a small workshop just for

279

00:12:37,560 --> 00:12:35,440

teachers and so I have high school and

280

00:12:40,800 --> 00:12:37,570

middle school science teachers and we

281

00:12:43,530 --> 00:12:40,810

teach them machine shop skills using

282

00:12:44,850 --> 00:12:43,540

drill presses and band saws so these

283

00:12:46,800 --> 00:12:44,860

good people here are teachers here are

284

00:12:48,630 --> 00:12:46,810

all teachers oh well and here are the

285

00:12:51,690 --> 00:12:48,640

examples of the things they can build

286

00:12:54,600 --> 00:12:51,700

yeah and if they build it they can take

287

00:12:58,500 --> 00:12:54,610

it home as their own so we drive them to

288

00:13:01,590 --> 00:12:58,510

learn the skills of building by giving

289

00:13:03,120 --> 00:13:01,600

them hands-on experiments they can do in

290

00:13:05,280 --> 00:13:03,130

their classroom that's the one on the

291

00:13:08,850 --> 00:13:05,290

left over here is a a painters tray a

292

00:13:11,550 --> 00:13:08,860

long tray and in it you would put soapy

293

00:13:14,670 --> 00:13:11,560

water and then there's a rod that you

294

00:13:16,770 --> 00:13:14,680

pull up with a pulley that will pull the

295

00:13:18,870 --> 00:13:16,780

soapy water up into a film and so you'll

296

00:13:20,790 --> 00:13:18,880

have a planer bubble instead of a

297

00:13:23,220 --> 00:13:20,800

spherical bubble like you blow normally

298

00:13:25,710 --> 00:13:23,230

as a kid it'll be a flat plane a bubble

299

00:13:27,810 --> 00:13:25,720

and it makes incredible colors with the

300

00:13:30,450 --> 00:13:27,820

light reflecting off of it it's just a

301
00:13:32,370 --> 00:13:30,460
great lesson it's fantastic yeah and so

302
00:13:34,350 --> 00:13:32,380
and the teachers are now part of the

303
00:13:35,880 --> 00:13:34,360
exhibit themselves they are as people

304
00:13:37,470 --> 00:13:35,890
like you and me walking fast and just

305
00:13:39,450 --> 00:13:37,480
stand here and look at them and ask

306
00:13:41,250 --> 00:13:39,460
questions and they ant their teachers

307
00:13:44,340 --> 00:13:41,260
you ask them a question they will talk

308
00:13:46,990 --> 00:13:44,350
to you forever we might try that in fact

309
00:13:50,290 --> 00:13:47,000
we could try that we could hello

310
00:13:53,230 --> 00:13:50,300
hi hello I'm from the Sydney Australia

311
00:13:54,610 --> 00:13:53,240
doing a podcast a scientific podcast I

312
00:13:57,300 --> 00:13:54,620
thought I'm not your name's Colleen

313
00:14:00,130 --> 00:13:57,310

yes I guess that from your badge yeah

314

00:14:02,200 --> 00:14:00,140

and your science teacher I am yes I

315

00:14:04,690 --> 00:14:02,210

teach high school science biology we're

316

00:14:06,790 --> 00:14:04,700

at Archbishop Riordan it's a boys high

317

00:14:08,500 --> 00:14:06,800

school here in San Francisco okay you

318

00:14:10,090 --> 00:14:08,510

get the thumbs-up from pull over I Drive

319

00:14:12,040 --> 00:14:10,100

by it all the time over there on Sunset

320

00:14:14,050 --> 00:14:12,050

all right yeah and so what's it like

321

00:14:15,880 --> 00:14:14,060

being part of the exhibit but learning

322

00:14:18,190 --> 00:14:15,890

stuff at the same time it's outstanding

323

00:14:19,780 --> 00:14:18,200

I mean this is the sort of stuff that

324

00:14:21,160 --> 00:14:19,790

when I was a kid I used to come to

325

00:14:24,250 --> 00:14:21,170

science Uzis I used to go to the old

326

00:14:26,110 --> 00:14:24,260

location grew up in the area and I used

327

00:14:28,210 --> 00:14:26,120

to look up to people you know the adults

328

00:14:29,950 --> 00:14:28,220

doing you know actual science things so

329

00:14:31,750 --> 00:14:29,960

to be like I'm at the Science Museum

330

00:14:33,310 --> 00:14:31,760

doing science things and kids are like

331

00:14:35,110 --> 00:14:33,320

it's just mean at the full circle sort

332

00:14:38,410 --> 00:14:35,120

of thing and be able to come here with

333

00:14:40,600 --> 00:14:38,420

all these really creative outgoing like

334

00:14:42,670 --> 00:14:40,610

energetic people that have just amazing

335

00:14:44,080 --> 00:14:42,680

ideas like I just like talking to people

336

00:14:46,060 --> 00:14:44,090

and like that's a good idea that's a

337

00:14:47,680 --> 00:14:46,070

good idea and just a whole culture of

338

00:14:49,180 --> 00:14:47,690

learning in this building just for these

339

00:14:51,160 --> 00:14:49,190

three weeks I'm just like trying to soak

340

00:14:53,350 --> 00:14:51,170

up as much as I can while I'm here well

341

00:14:55,390 --> 00:14:53,360

I wish I was one of your students thank

342

00:14:57,790 --> 00:14:55,400

you thank you so much Hillary thank you

343

00:14:59,800 --> 00:14:57,800

thank you we have armed our staff

344

00:15:01,270 --> 00:14:59,810

machine shop where we build the exhibits

345

00:15:03,190 --> 00:15:01,280

for the public and the exhibits for the

346

00:15:05,890 --> 00:15:03,200

public have to be built to withstand the

347

00:15:08,050 --> 00:15:05,900

most destructive force known to man the

348

00:15:10,300 --> 00:15:08,060

seventh grade boy little children I

349

00:15:11,710 --> 00:15:10,310

shouldn't have to say yes yeah and but

350

00:15:14,920 --> 00:15:11,720

but the ones that the teachers are

351

00:15:16,840 --> 00:15:14,930

building are very flimsy and because

352

00:15:19,120 --> 00:15:16,850

they have to know how to build them and

353

00:15:20,860 --> 00:15:19,130

repair them and so if their class

354

00:15:22,660 --> 00:15:20,870

destroys them then the class has to

355

00:15:24,070 --> 00:15:22,670

rebuild it okay and that's that's a

356

00:15:26,829 --> 00:15:24,080

great lesson

357

00:15:29,769 --> 00:15:26,839

and as we were discussing earlier that

358

00:15:31,389 --> 00:15:29,779

the place is absolutely filled with

359

00:15:33,250 --> 00:15:31,399

children but it's just filled it's full

360

00:15:37,180 --> 00:15:33,260

it's got a great attendance here what we

361

00:15:39,610 --> 00:15:37,190

do yeah they'll be today we'll have four

362

00:15:40,840 --> 00:15:39,620

thousand people here Wow yeah and all

363

00:15:42,400 --> 00:15:40,850

through the summer pretty soon in the

364

00:15:44,949 --> 00:15:42,410

summer it'll be so crowded it will be

365

00:15:46,540 --> 00:15:44,959

hard to walk and and right now it's

366

00:15:47,860 --> 00:15:46,550

great that's great and that's four

367

00:15:50,079 --> 00:15:47,870

thousand during the day right now there

368

00:15:51,970 --> 00:15:50,089

are probably a thousand people in the

369

00:15:54,940 --> 00:15:51,980

museum that's two people for every

370

00:15:56,319 --> 00:15:54,950

exhibit in the place actually here's a

371

00:15:58,569 --> 00:15:56,329

very important thing about the museum

372

00:16:00,690 --> 00:15:58,579

behind you over here oh yeah our floor

373

00:16:03,940 --> 00:16:00,700

staff is composed of high school

374

00:16:06,130 --> 00:16:03,950

students we're the largest employer of

375

00:16:07,840 --> 00:16:06,140

high school students in the city we

376

00:16:09,639 --> 00:16:07,850

bring them in we teach them there

377

00:16:12,040 --> 00:16:09,649

they're teaching about the ear and sound

378

00:16:15,009 --> 00:16:12,050

right now with the demos so we'll go

379

00:16:17,310 --> 00:16:15,019

visit how to do it and then they do it

380

00:16:19,690 --> 00:16:17,320

for the public and answer questions and

381

00:16:21,310 --> 00:16:19,700

we get they get paid for it that's

382

00:16:22,660 --> 00:16:21,320

pretty cool so there are a couple of

383

00:16:23,769 --> 00:16:22,670

high school students there are a couple

384

00:16:26,290 --> 00:16:23,779

high school students there at the moment

385

00:16:28,090 --> 00:16:26,300

and you're reassembling an ear that we

386

00:16:32,680 --> 00:16:28,100

have this giant ear about it about about

387

00:16:34,329 --> 00:16:32,690

a third of a meter high yeah it's yeah

388

00:16:35,800 --> 00:16:34,339

it's a hole if folks if you can imagine

389

00:16:37,470 --> 00:16:35,810

the classic pictures you see of the

390

00:16:40,870 --> 00:16:37,480

outer ear going into the ear canal

391

00:16:44,130 --> 00:16:40,880

eardrum that's a big model of that and

392

00:16:47,139 --> 00:16:44,140

one of the young students here is

393

00:16:49,900 --> 00:16:47,149

teaching a small group in front of her

394

00:16:51,040 --> 00:16:49,910

all about the inner ear let's listen in

395

00:16:55,560 --> 00:16:51,050

yet

396

00:17:00,750 --> 00:16:58,680

so basically when you do that it's just

397

00:17:04,020 --> 00:17:00,760

your offsetting your balance this is

398

00:17:07,920 --> 00:17:04,030

what makes you kind of Center and in a

399

00:17:09,780 --> 00:17:07,930

way whenever you she's discussing the

400

00:17:11,460 --> 00:17:09,790

balance in her ear the inner admits that

401
00:17:12,600 --> 00:17:11,470
she was just talking about it and and

402
00:17:17,220 --> 00:17:12,610
they have in front of them an array of

403
00:17:19,260 --> 00:17:17,230
spoons and tongs metal and strings and

404
00:17:21,900 --> 00:17:19,270
they put the string in near their ear

405
00:17:24,360 --> 00:17:21,910
and then bang the spoon and they hear on

406
00:17:26,160 --> 00:17:24,370
May it sounds like Big Ben it's just

407
00:17:27,990 --> 00:17:26,170
amazing that that spoon can make that

408
00:17:30,660 --> 00:17:28,000
sound and series of student tuning folks

409
00:17:32,940 --> 00:17:30,670
there too right exactly well let's just

410
00:17:34,590 --> 00:17:32,950
make it real as our key in fact we are

411
00:17:37,230 --> 00:17:34,600
for your listeners I'm going to take

412
00:17:39,990 --> 00:17:37,240
them to a very rare thing we very often

413
00:17:41,910 --> 00:17:40,000

see visual illusions I'm going to give

414

00:17:43,380 --> 00:17:41,920

them an audio illusion it sounds

415

00:17:45,690 --> 00:17:43,390

interesting so yeah this is this is a

416

00:17:49,020 --> 00:17:45,700

break so it's called it's called Shepard

417

00:17:51,870 --> 00:17:49,030

tones and johann sebastian bach almost

418

00:17:55,290 --> 00:17:51,880

discovered it almost but he didn't but

419

00:17:57,030 --> 00:17:55,300

shepard did and so let's go I have a

420

00:17:58,920 --> 00:17:57,040

very simple question for you probably

421

00:18:01,590 --> 00:17:58,930

can tell a high-pitched sound from a low

422

00:18:04,860 --> 00:18:01,600

pitch sound I hope so yes I hope so

423

00:18:08,400 --> 00:18:04,870

let's see how you do right so we have

424

00:18:10,890 --> 00:18:08,410

this some display over here and you'll

425

00:18:12,960 --> 00:18:10,900

notice it's one octave of a piano

426

00:18:15,120 --> 00:18:12,970

keyboard but it's been wrapped in a

427

00:18:16,740 --> 00:18:15,130

circle we took a piano and wrapped it in

428

00:18:19,080 --> 00:18:16,750

a circuit it's a keyboard a circular

429

00:18:20,340 --> 00:18:19,090

keyboard yeah so I'm gonna I'm gonna

430

00:18:22,380 --> 00:18:20,350

play around all right

431

00:18:24,240 --> 00:18:22,390

series of notes yeah and you just find

432

00:18:26,520 --> 00:18:24,250

the highest one the name of the exhibit

433

00:18:39,720 --> 00:18:26,530

is fine the highest note all right could

434

00:18:40,590 --> 00:18:39,730

it be stop you when we get ringing wait

435

00:18:42,270 --> 00:18:40,600

a minute

436

00:18:46,730 --> 00:18:42,280

you've gone around once you hitting the

437

00:18:50,280 --> 00:18:46,740

same notes yeah yeah the same same time

438

00:18:52,380 --> 00:18:50,290

all right so if I say stop at any one

439

00:18:54,210 --> 00:18:52,390

yeah it's theoretically the highest note

440

00:18:55,680 --> 00:18:54,220

oh heavens no no no it matter which one

441

00:18:57,019 --> 00:18:55,690

I stopped at say you start me at this

442

00:19:10,669 --> 00:18:57,029

one

443

00:19:12,949 --> 00:19:10,679

go around counterclockwise oh that's

444

00:19:15,919 --> 00:19:12,959

that's very golden this is my playing

445

00:19:17,989 --> 00:19:15,929

one note it's actually playing about

446

00:19:21,289 --> 00:19:17,999

seven different notes when you press the

447

00:19:24,439 --> 00:19:21,299

a C on the piano it'll play seven

448

00:19:29,209 --> 00:19:24,449

octaves of C and then when you play a D

449

00:19:34,909 --> 00:19:29,219

it plays seven octaves of D and so on

450

00:19:36,319 --> 00:19:34,919

and so each one each sub note has gone

451
00:19:39,019 --> 00:19:36,329
up a little bit and you're here said

452
00:19:41,599 --> 00:19:39,029
okay every subcomponent has gone up but

453
00:19:45,619 --> 00:19:41,609
at some point you're playing a note

454
00:19:47,389 --> 00:19:45,629
that's exactly in the middle and what

455
00:19:49,939 --> 00:19:47,399
we're doing is with the low frequency

456
00:19:51,619 --> 00:19:49,949
ones were fading in and we're increasing

457
00:19:53,679 --> 00:19:51,629
them in frequency as we go around making

458
00:19:56,869 --> 00:19:53,689
them louder and so it's a well-known

459
00:19:58,489 --> 00:19:56,879
illusion that is fantastic on this is

460
00:20:01,489 --> 00:19:58,499
I'm going to play two notes black and

461
00:20:04,930 --> 00:20:01,499
white black white ah

462
00:20:07,209 --> 00:20:04,940
black white ah the white is higher pitch

463
00:20:09,649 --> 00:20:07,219

[Music]

464

00:20:16,789 --> 00:20:09,659

okay yeah now I'm going to play black

465

00:20:22,159 --> 00:20:16,799

and white across yes one opposite yeah

466

00:20:23,689 --> 00:20:22,169

this one is lower in pitch to me but it

467

00:20:24,109 --> 00:20:23,699

might be higher in pitch to you you know

468

00:20:29,139 --> 00:20:24,119

what

469

00:20:32,089 --> 00:20:29,149

no I'm chuckling to about this exhibit I

470

00:20:34,819 --> 00:20:32,099

can show you what I'm hearing

471

00:20:37,339 --> 00:20:34,829

this exhibit lets me turn me and B you

472

00:20:38,599 --> 00:20:37,349

into me so listen to this I'm going to

473

00:20:46,639 --> 00:20:38,609

play the black one and I'm going to go

474

00:20:48,559 --> 00:20:46,649

around to the white one and now you

475

00:20:51,019 --> 00:20:48,569

heard the white one second one is lower

476

00:20:57,200 --> 00:20:51,029

yes yes yeah yes but now if I go the

477

00:21:01,170 --> 00:20:59,220

now you hear it as higher that's

478

00:21:03,720 --> 00:21:01,180

fantastic oh this is not only a

479

00:21:06,600 --> 00:21:03,730

wonderful acoustic illusion it's one

480

00:21:09,600 --> 00:21:06,610

that no matter what you hear I can show

481

00:21:11,790 --> 00:21:09,610

you what I hear by guiding you slowly

482

00:21:14,220 --> 00:21:11,800

around so if you want to look it up it's

483

00:21:17,310 --> 00:21:14,230

called a Shepard tone Shepard tone okay

484

00:21:20,430 --> 00:21:17,320

and it's a great acoustic illusion it's

485

00:21:24,060 --> 00:21:20,440

that's yeah and we use illusions here to

486

00:21:25,530 --> 00:21:24,070

to show people why you can't directly

487

00:21:27,060 --> 00:21:25,540

trust your senses you've got to do

488

00:21:28,800 --> 00:21:27,070

measure you have to understand your

489

00:21:30,480 --> 00:21:28,810

senses before you trust them and you

490

00:21:34,200 --> 00:21:30,490

have to do measurements if you're a

491

00:21:36,120 --> 00:21:34,210

scientist yes a message the skeptic zone

492

00:21:37,980 --> 00:21:36,130

fans know very well that's right don't

493

00:21:40,200 --> 00:21:37,990

trust your senses your senses

494

00:21:43,380 --> 00:21:40,210

let me then take you to one which is my

495

00:21:45,600 --> 00:21:43,390

latest creation at the Museum so and

496

00:21:48,390 --> 00:21:45,610

this one's got to be video visual so you

497

00:21:51,660 --> 00:21:48,400

ought to describe it to people but over

498

00:21:53,840 --> 00:21:51,670

here we have quite a large about a four

499

00:21:56,520 --> 00:21:53,850

meter wide and three meter high

500

00:21:59,100 --> 00:21:56,530

parabolic mirror a beautiful thing

501
00:22:00,570 --> 00:21:59,110
Wow it's fascinating and if you stand in

502
00:22:02,520 --> 00:22:00,580
front of it right all right I'm standing

503
00:22:05,640 --> 00:22:02,530
in front of the mirror and you see

504
00:22:07,920 --> 00:22:05,650
yourself now folks it's it's almost

505
00:22:11,280 --> 00:22:07,930
impossible to describe I am looking at

506
00:22:13,290 --> 00:22:11,290
myself in three dimensions a reflection

507
00:22:15,270 --> 00:22:13,300
upside down right like I'm hanging from

508
00:22:17,130 --> 00:22:15,280
the ceiling reach your hand up there it

509
00:22:19,290 --> 00:22:17,140
is right there okay you are touching

510
00:22:21,060 --> 00:22:19,300
your hand right I was my front of the

511
00:22:22,860 --> 00:22:21,070
mirror like like eight feet in front of

512
00:22:25,230 --> 00:22:22,870
the mirror your hand reached out for you

513
00:22:30,390 --> 00:22:25,240

to touch it's bizarre I'm looking at

514

00:22:33,360 --> 00:22:30,400

myself I'm reaching out and I'm now I've

515

00:22:35,430 --> 00:22:33,370

got my hand in my own hand yeah and I

516

00:22:37,770 --> 00:22:35,440

guess you just have to come here to

517

00:22:40,080 --> 00:22:37,780

really understand what we're talking but

518

00:22:42,030 --> 00:22:40,090

now this is this is a little weird

519

00:22:44,640 --> 00:22:42,040

because you're upside down but I

520

00:22:47,580 --> 00:22:44,650

discovered I'm a big fan of Lewis

521

00:22:49,500 --> 00:22:47,590

Carroll oh yeah and so Alice Through the

522

00:22:51,300 --> 00:22:49,510

Looking Glass yes so I thought about

523

00:22:52,860 --> 00:22:51,310

that and I made a new part of this

524

00:22:54,870 --> 00:22:52,870

exhibit I'm going to let you walk

525

00:22:55,950 --> 00:22:54,880

through a looking-glass I'm going to

526

00:22:57,900 --> 00:22:55,960

have you walk through a mirror you're

527

00:23:01,650 --> 00:22:57,910

going to become Alice sound let me do

528

00:23:02,910 --> 00:23:01,660

that good to me this giant mirror here I

529

00:23:03,660 --> 00:23:02,920

need to pull out the looking-glass

530

00:23:05,550 --> 00:23:03,670

itself

531

00:23:08,240 --> 00:23:05,560

oh here oh you're bringing this round

532

00:23:10,490 --> 00:23:08,250

it's a it's like a mirror

533

00:23:12,740 --> 00:23:10,500

I understand and Paul's pulling it out

534

00:23:15,740 --> 00:23:12,750

in front of everybody here like it looks

535

00:23:17,870 --> 00:23:15,750

like I might be a guinea pig and he's

536

00:23:21,110 --> 00:23:17,880

angling it so the mirror is now facing

537

00:23:22,820 --> 00:23:21,120

the giant mirror yeah I'm coming around

538

00:23:27,020 --> 00:23:22,830

the back now so there's a mirror right

539

00:23:29,480 --> 00:23:27,030

there oh and now it's very confusing

540

00:23:31,669 --> 00:23:29,490

yeah now you can walk through that

541

00:23:32,990 --> 00:23:31,679

mirror now as you walk through as you go

542

00:23:35,810 --> 00:23:33,000

through the mirror your head's going to

543

00:23:37,669 --> 00:23:35,820

explode and then reassemble upside down

544

00:23:39,409 --> 00:23:37,679

do I want to do this yes you want to do

545

00:23:41,840 --> 00:23:39,419

this so just walk right now right here

546

00:23:43,370 --> 00:23:41,850

I'm gonna be next so what I'm doing is

547

00:23:44,840 --> 00:23:43,380

I'm walking towards a reflection of a

548

00:23:46,399 --> 00:23:44,850

mirror which is upside down but I'm the

549

00:23:48,260 --> 00:23:46,409

right-side up in the upside down mirror

550

00:23:53,810 --> 00:23:48,270

yes okay here we go

551
00:23:56,390 --> 00:23:53,820
and I it's indescribable that is

552
00:23:59,720 --> 00:23:56,400
incredible well it's all done with

553
00:24:01,760 --> 00:23:59,730
mirrors and people trying was a little

554
00:24:06,490 --> 00:24:01,770
boy trying it now he's walking straight

555
00:24:12,080 --> 00:24:09,320
expression on their face becomes an AC

556
00:24:14,630 --> 00:24:12,090
lady going through

557
00:24:16,220 --> 00:24:14,640
it's like it's like nothing I've done

558
00:24:21,440 --> 00:24:16,230
and now everyone's lined up to try it

559
00:24:23,240 --> 00:24:21,450
for themselves that's it's bizarre and

560
00:24:24,920 --> 00:24:23,250
what you see as you actually walk

561
00:24:27,470 --> 00:24:24,930
through it is different that what people

562
00:24:29,390 --> 00:24:27,480
see when they're watching you absolutely

563
00:24:31,820 --> 00:24:29,400

as you walk through the mirror your head

564

00:24:33,710 --> 00:24:31,830

explodes and fills the entire space of

565

00:24:36,200 --> 00:24:33,720

the giant mirror and then comes back

566

00:24:38,630 --> 00:24:36,210

together upside down and it is mazhab

567

00:24:40,490 --> 00:24:38,640

because as you approach a mirror and if

568

00:24:42,260 --> 00:24:40,500

your brain is telling you you're walking

569

00:24:44,330 --> 00:24:42,270

into a solid mirror yeah it just

570

00:24:46,670 --> 00:24:44,340

evaporates yeah and then you walk right

571

00:24:48,950 --> 00:24:46,680

through it yeah so this one I really

572

00:24:51,530 --> 00:24:48,960

like because it really blows people's

573

00:24:52,790 --> 00:24:51,540

minds in many ways yeah and here we have

574

00:24:54,350 --> 00:24:52,800

something I'm really enjoying it

575

00:24:55,940 --> 00:24:54,360

everyone's enjoying it now they've been

576

00:24:59,890 --> 00:24:55,950

lined up to do it one thing you can do

577

00:25:03,740 --> 00:24:59,900

is mirrors work in sound as well as

578

00:25:05,810 --> 00:25:03,750

vision so as you walk up to the flat

579

00:25:08,090 --> 00:25:05,820

mirror if you stop just a little bit in

580

00:25:10,010 --> 00:25:08,100

front of the flat mirror and speak it

581

00:25:12,770 --> 00:25:10,020

it'll it'll make your voice louder ish

582

00:25:14,900 --> 00:25:12,780

it the microphone might pick up your

583

00:25:16,280 --> 00:25:14,910

voice reflecting off the mirror alright

584

00:25:18,170 --> 00:25:16,290

let's give that a go the trouble is of

585

00:25:20,680 --> 00:25:18,180

course now you brought out this other

586

00:25:22,730 --> 00:25:20,690

mirror we've got a line of people that's

587

00:25:24,470 --> 00:25:22,740

willing to give it a glitch is what

588

00:25:26,660 --> 00:25:24,480

exactly what you want it's really great

589

00:25:30,650 --> 00:25:26,670

to see yeah so we'll wait for a moment

590

00:25:32,120 --> 00:25:30,660

and see what we can do okay now I'm

591

00:25:35,300 --> 00:25:32,130

walking back towards the mirror again

592

00:25:36,890 --> 00:25:35,310

which I walked through before and hello

593

00:25:40,400 --> 00:25:36,900

yes I could hear my voice

594

00:25:42,380 --> 00:25:40,410

that's strange it's echoing back I hope

595

00:25:44,390 --> 00:25:42,390

you can hear that on the microphone and

596

00:25:47,750 --> 00:25:44,400

of course my head's exploding at the

597

00:25:50,780 --> 00:25:47,760

same time so wow that's that's something

598

00:25:53,180 --> 00:25:50,790

else and I had a bunch of high school

599

00:25:55,010 --> 00:25:53,190

physics teachers here today and they

600

00:25:57,440 --> 00:25:55,020

know about mirrors and they know about

601
00:26:01,190 --> 00:25:57,450
curved mirrors but this one blew their

602
00:26:03,590 --> 00:26:01,200
minds and made them really passionately

603
00:26:06,440 --> 00:26:03,600
want to know how to jab that how did

604
00:26:08,870 --> 00:26:06,450
that work and I had to actually go and

605
00:26:12,230 --> 00:26:08,880
we had to work through it slowly so they

606
00:26:13,970 --> 00:26:12,240
understood it now look at this we're

607
00:26:15,080 --> 00:26:13,980
back now from the mirror maybe about

608
00:26:17,060 --> 00:26:15,090
three meters right

609
00:26:20,030 --> 00:26:17,070
and we're looking at the reflections of

610
00:26:21,530 --> 00:26:20,040
other people sort of to our left but not

611
00:26:22,890 --> 00:26:21,540
only are they upside down in three

612
00:26:26,549 --> 00:26:22,900
dimensions but they're

613
00:26:28,560 --> 00:26:26,559

one and a half times sighs yeah that's

614

00:26:30,930 --> 00:26:28,570

right yeah it gets curiouser and

615

00:26:33,960 --> 00:26:30,940

curiouser said Alice that's right

616

00:26:36,270 --> 00:26:33,970

welcome to the Alice's World yeah yeah

617

00:26:38,690 --> 00:26:36,280

it much curiouser and that's the key of

618

00:26:41,760 --> 00:26:38,700

the Exploratorium is curiosity and

619

00:26:45,750 --> 00:26:41,770

inspiring people to ask questions and

620

00:26:47,910 --> 00:26:45,760

and find the answers themselves you

621

00:26:52,640 --> 00:26:47,920

notice there's no explanation here right

622

00:26:55,680 --> 00:26:52,650

right this is just okay have fun enjoy

623

00:26:57,480 --> 00:26:55,690

well without snuck into the the

624

00:27:00,000 --> 00:26:57,490

behind-the-scenes area here the

625

00:27:01,650 --> 00:27:00,010

Exploratorium misses a teachers room or

626

00:27:03,690 --> 00:27:01,660

something like that yeah this sort it's

627

00:27:06,780 --> 00:27:03,700

adjacent to a classroom and it's full of

628

00:27:07,770 --> 00:27:06,790

teaching supplies ah yes yeah it looks

629

00:27:09,299 --> 00:27:07,780

like it yeah

630

00:27:12,450 --> 00:27:09,309

but it's just a nice quiet place so we

631

00:27:15,510 --> 00:27:12,460

can have a brief talk now just for our

632

00:27:17,310 --> 00:27:15,520

listeners segment can you give a the The

633

00:27:19,860 --> 00:27:17,320

Reader's Digest version of the history

634

00:27:21,600 --> 00:27:19,870

of the Exploratorium so a Franko

635

00:27:24,240 --> 00:27:21,610

bernheimer was on the Manhattan Project

636

00:27:25,620 --> 00:27:24,250

and then after the Manhattan Project he

637

00:27:29,970 --> 00:27:25,630

went and became a high school teacher in

638

00:27:32,790 --> 00:27:29,980

Colorado and pretty soon the scientists

639

00:27:36,230 --> 00:27:32,800

in Colorado noted that these students

640

00:27:40,530 --> 00:27:36,240

from this remote district very rural

641

00:27:41,970 --> 00:27:40,540

farming district in Colorado State were

642

00:27:43,710 --> 00:27:41,980

winning all the science fair

643

00:27:46,500 --> 00:27:43,720

competitions uh-huh so they looked into

644

00:27:49,260 --> 00:27:46,510

it and they found that this this teacher

645

00:27:51,630 --> 00:27:49,270

Frank Oppenheim er was teaching the

646

00:27:53,250 --> 00:27:51,640

students better than anybody else so the

647

00:27:54,900 --> 00:27:53,260

local university the University of

648

00:27:57,120 --> 00:27:54,910

Colorado at Boulder hired him away to

649

00:28:00,240 --> 00:27:57,130

come and help them teach their students

650

00:28:03,270 --> 00:28:00,250

and Frank made the Junior Physics

651

00:28:04,980 --> 00:28:03,280

Laboratory 17 exhibits the students

652

00:28:06,510 --> 00:28:04,990

would go to one exhibit a week and then

653

00:28:09,510 --> 00:28:06,520

move to the next one in the next one

654

00:28:13,320 --> 00:28:09,520

that taught basic physics ideas but then

655

00:28:15,030 --> 00:28:13,330

Frank noted that people would would the

656

00:28:17,310 --> 00:28:15,040

students would return on the weekend and

657

00:28:20,460 --> 00:28:17,320

bring their friends to play with the

658

00:28:22,169 --> 00:28:20,470

physics experiment and he realized he

659

00:28:24,720 --> 00:28:22,179

was onto something yeah so when he

660

00:28:29,130 --> 00:28:24,730

toured the great museums of Europe the

661

00:28:32,080 --> 00:28:29,140

deutsches museum the palais des Kuvera

662

00:28:34,299 --> 00:28:32,090

and he took their best

663

00:28:36,370 --> 00:28:34,309

ideas and and then looked around the

664

00:28:38,320 --> 00:28:36,380

United States for a big building that he

665

00:28:40,360 --> 00:28:38,330

could rent and the city of San Francisco

666

00:28:43,779 --> 00:28:40,370

had this big empty building that was

667

00:28:46,990 --> 00:28:43,789

built for the World's Fair of 1916 hmm

668

00:28:49,330 --> 00:28:47,000

the Pan Pacific Exhibition had stood

669

00:28:52,930 --> 00:28:49,340

empty most of the time since then so in

670

00:28:55,750 --> 00:28:52,940

1969 he rented that building 10,000

671

00:28:58,029 --> 00:28:55,760

square meters for \$1 a year with

672

00:28:58,510 --> 00:28:58,039

electricity for free wow that's pretty

673

00:29:00,760 --> 00:28:58,520

good

674

00:29:02,620 --> 00:29:00,770

and then he he started building the

675

00:29:05,620 --> 00:29:02,630

Exploratorium and he brought in local

676
00:29:08,350 --> 00:29:05,630
artists and builders and then they

677
00:29:10,389 --> 00:29:08,360
created these things we call exhibits

678
00:29:12,340 --> 00:29:10,399
simple physics experiments that you

679
00:29:14,409 --> 00:29:12,350
could interact with but he also brought

680
00:29:17,289 --> 00:29:14,419
in local artists who had one big idea

681
00:29:20,049 --> 00:29:17,299
they always wanted to make and he would

682
00:29:22,779 --> 00:29:20,059
turn them loose with programmers and

683
00:29:24,850 --> 00:29:22,789
machinists to make their idea real and

684
00:29:27,370 --> 00:29:24,860
some of the best exhibits in this place

685
00:29:29,470 --> 00:29:27,380
to this day came from local artists who

686
00:29:32,049 --> 00:29:29,480
were passionate about one thing and

687
00:29:35,230 --> 00:29:32,059
built it at the Exploratorium

688
00:29:41,200 --> 00:29:35,240

well that was 1969 and we grew since

689

00:29:42,970 --> 00:29:41,210

then until about 2014 when this building

690

00:29:45,490 --> 00:29:42,980

we were in needed tremendous amounts of

691

00:29:47,710 --> 00:29:45,500

repairs it was a hundred years old

692

00:29:50,019 --> 00:29:47,720

mmm just about and it was in need of

693

00:29:51,639 --> 00:29:50,029

repairs so the city offered us a

694

00:29:54,490 --> 00:29:51,649

different building also in need of

695

00:29:57,789 --> 00:29:54,500

repairs but the new building was Pier 15

696

00:30:01,029 --> 00:29:57,799

in San Francisco which is which one is

697

00:30:03,669 --> 00:30:01,039

this is pier 15 that's Lucy here 15 and

698

00:30:07,269 --> 00:30:03,679

it needed a lot of repairs we fixed it

699

00:30:09,909 --> 00:30:07,279

up and now in return for us repairing it

700

00:30:11,049 --> 00:30:09,919

we have free rent for the next 60 years

701
00:30:13,120 --> 00:30:11,059

Wow

702
00:30:14,860 --> 00:30:13,130

yeah and so we'll be here now with free

703
00:30:16,480 --> 00:30:14,870

rent but we saved the building the city

704
00:30:18,789 --> 00:30:16,490

owns the building we saved it for it

705
00:30:22,480 --> 00:30:18,799

what a good situation rate situation not

706
00:30:25,860 --> 00:30:22,490

only do you do well by the city yes

707
00:30:27,750 --> 00:30:25,870

in that respect the city did too

708
00:30:29,430 --> 00:30:27,760

is gaining by the the fact that it's

709
00:30:31,980 --> 00:30:29,440

here that's right and we have huge

710
00:30:33,780 --> 00:30:31,990

retraction and we do a really good job

711
00:30:36,600 --> 00:30:33,790

of working with local teachers and

712
00:30:38,850 --> 00:30:36,610

students as we saw the students we

713
00:30:42,000 --> 00:30:38,860

employ them they come here and learn

714

00:30:43,320 --> 00:30:42,010

that science learning can be fun and

715

00:30:46,470 --> 00:30:43,330

that's the best lesson we could possibly

716

00:30:49,320 --> 00:30:46,480

and and we're doing really well right

717

00:30:51,810 --> 00:30:49,330

now we're the state of California funds

718

00:30:54,390 --> 00:30:51,820

us to train teachers and how to make

719

00:30:57,420 --> 00:30:54,400

science class more interesting and we do

720

00:30:59,430 --> 00:30:57,430

it we spend many many hours well just on

721

00:31:01,980 --> 00:30:59,440

our way here this back room we passed a

722

00:31:03,090 --> 00:31:01,990

whole B classroom full of science

723

00:31:04,320 --> 00:31:03,100

teachers I see that's right those are

724

00:31:06,840 --> 00:31:04,330

all middle and high school science

725

00:31:08,370 --> 00:31:06,850

teachers in the morning they choose

726

00:31:09,900 --> 00:31:08,380

which class they're going to go to we

727

00:31:13,049 --> 00:31:09,910

have high school biology high school

728

00:31:14,430 --> 00:31:13,059

physics and middle school science those

729

00:31:16,080 --> 00:31:14,440

are the three classes were teaching

730

00:31:19,350 --> 00:31:16,090

right now but in the afternoon we have

731

00:31:20,720 --> 00:31:19,360

specialty classes and I believe Zeke as

732

00:31:23,820 --> 00:31:20,730

we walked by was teaching a lesson on

733

00:31:26,850 --> 00:31:23,830

ultraviolet light and the teachers can

734

00:31:30,480 --> 00:31:26,860

then pick from three classes every

735

00:31:32,820 --> 00:31:30,490

afternoon with a specific topic yeah so

736

00:31:34,710 --> 00:31:32,830

yesterday I did how to measure

737

00:31:36,480 --> 00:31:34,720

electrical circuits I taught teachers

738

00:31:39,060 --> 00:31:36,490

how to measure voltage and current and

739

00:31:43,080 --> 00:31:39,070

not kill themselves very important

740

00:31:44,730 --> 00:31:43,090

lesson and and they choose to come now

741

00:31:47,370 --> 00:31:44,740

the teachers come and they come every

742

00:31:49,919 --> 00:31:47,380

day all day long for three weeks and

743

00:31:51,720 --> 00:31:49,929

then at the end of the summer we paid

744

00:31:56,950 --> 00:31:51,730

them two thousand five hundred dollars

745

00:32:03,940 --> 00:32:00,009

private donors essentially charities

746

00:32:05,889 --> 00:32:03,950

philanthropies the the Hewlett

747

00:32:08,440 --> 00:32:05,899

Foundation the Packard Foundation the

748

00:32:13,320 --> 00:32:08,450

noise foundation and by the state of

749

00:32:17,529 --> 00:32:15,909

politicians realize the value of science

750

00:32:19,659 --> 00:32:17,539

education and support it with money

751
00:32:21,070 --> 00:32:19,669
that's good they pay my salary and we

752
00:32:22,869 --> 00:32:21,080
give some of that money to the teachers

753
00:32:24,310 --> 00:32:22,879
because the teachers don't get paid so

754
00:32:26,229 --> 00:32:24,320
much that they can take off in the

755
00:32:28,149 --> 00:32:26,239
summer they would normally have to work

756
00:32:29,919 --> 00:32:28,159
in the summer uh-huh so this allows them

757
00:32:32,649 --> 00:32:29,929
to take three weeks of their summer and

758
00:32:34,570 --> 00:32:32,659
get better at being a science teacher so

759
00:32:36,310 --> 00:32:34,580
we think that's also a win-win that's

760
00:32:37,839 --> 00:32:36,320
that they can take off and I don't have

761
00:32:39,999 --> 00:32:37,849
to work at other things they just work

762
00:32:41,529 --> 00:32:40,009
at being a wonderful science teacher

763
00:32:43,180 --> 00:32:41,539

well here's the word folks if you're

764

00:32:45,099 --> 00:32:43,190

going to come to San Francisco don't

765

00:32:47,799 --> 00:32:45,109

worry about the flowers in your hair and

766

00:32:50,589 --> 00:32:47,809

worry about coming down here to Pier 15

767

00:32:52,959 --> 00:32:50,599

to visit the Exploratorium it's it's a

768

00:32:55,029 --> 00:32:52,969

wonderland of science and interaction

769

00:32:56,769 --> 00:32:55,039

that's right and all the things we were

770

00:32:58,269 --> 00:32:56,779

doing earlier playing with the tones and

771

00:33:00,639 --> 00:32:58,279

the mirrors in it I think yeah it's

772

00:33:03,459 --> 00:33:00,649

absolutely enthralling but before I go

773

00:33:05,529 --> 00:33:03,469

oh yeah oh yeah I love that the

774

00:33:07,450 --> 00:33:05,539

Australian version there oh that you

775

00:33:09,579 --> 00:33:07,460

it's different from the American birds

776

00:33:11,829 --> 00:33:09,589

right because I did not know I liked the

777

00:33:12,310 --> 00:33:11,839

Australian covered much better oh that's

778

00:33:13,690 --> 00:33:12,320

interesting

779

00:33:16,509 --> 00:33:13,700

what I'll get you to do if you could

780

00:33:19,570 --> 00:33:16,519

sign that to the skeptic zone and pretty

781

00:33:21,579 --> 00:33:19,580

soon we shall have a competition for our

782

00:33:23,289 --> 00:33:21,589

listeners oh wow to win a copy of this

783

00:33:26,200 --> 00:33:23,299

book which we've chatted about a few

784

00:33:29,829 --> 00:33:26,210

episodes ago so it's being autographed

785

00:33:32,829 --> 00:33:29,839

as we speak it says and then you're dead

786

00:33:36,039 --> 00:33:32,839

skeptic zone enjoy exploring science

787

00:33:38,349 --> 00:33:36,049

ould already nice well that's just one

788

00:33:41,950 --> 00:33:38,359

4-pull thank you again for the tour

789

00:33:46,089 --> 00:33:41,960

oh yeah the obvious enthusiasm you have

790

00:33:47,829 --> 00:33:46,099

I don't know I can tell and if people

791

00:33:50,589 --> 00:33:47,839

want to come and visit the Exploratorium

792

00:33:52,629 --> 00:33:50,599

it's easy to find it's easy to home yeah

793

00:33:55,029 --> 00:33:52,639

you come to Texas currency downtown San

794

00:33:58,450 --> 00:33:55,039

Francisco we're open in the summer we're

795

00:34:00,729 --> 00:33:58,460

open every day nine to five and five so

796

00:34:01,820 --> 00:34:00,739

ten to five yeah and what's the the

797

00:34:06,690 --> 00:34:01,830

website

798

00:34:08,099 --> 00:34:06,700

WWWE explore Ettore Amedeo if you get

799

00:34:10,720 --> 00:34:08,109

anywhere close it'll take you to us

800

00:34:22,640 --> 00:34:10,730

thanks again you are thank you

801
00:34:29,099 --> 00:34:25,520
[Music]

802
00:34:31,079 --> 00:34:29,109
and now direct from the cafe at

803
00:34:38,399 --> 00:34:31,089
Australia's Science Channel

804
00:34:40,139 --> 00:34:38,409
it's brouhaha with Ben Lewis when you

805
00:34:41,849 --> 00:34:40,149
buy a plane ticket there's that prompt

806
00:34:44,220 --> 00:34:41,859
to offset your carbon emissions by

807
00:34:46,500 --> 00:34:44,230
planting trees you click the box add

808
00:34:49,440 --> 00:34:46,510
your two bucks and you're done punching

809
00:34:50,960 --> 00:34:49,450
is cleared right unfortunately it turns

810
00:34:53,970 --> 00:34:50,970
out that's just not good enough

811
00:34:56,010 --> 00:34:53,980
according to new calculations if we keep

812
00:34:58,530 --> 00:34:56,020
steadily burning fossil fuels but later

813
00:35:00,359 --> 00:34:58,540

on get buyer's remorse it would take so

814

00:35:02,609 --> 00:35:00,369

many trees to keep climate change below

815

00:35:05,040 --> 00:35:02,619

two degrees Celsius they'll wipe out

816

00:35:07,560 --> 00:35:05,050

most natural ecosystems and wouldn't

817

00:35:09,180 --> 00:35:07,570

leave enough room for food crops it's

818

00:35:11,550 --> 00:35:09,190

about time that someone did the maths

819

00:35:13,440 --> 00:35:11,560

and worked out how much space all those

820

00:35:16,200 --> 00:35:13,450

plants would need just to offset our

821

00:35:17,849 --> 00:35:16,210

emissions even if we reduce our carbon

822

00:35:19,829 --> 00:35:17,859

emissions in line with the Paris

823

00:35:21,720 --> 00:35:19,839

agreement the calculations show that

824

00:35:23,910 --> 00:35:21,730

planting enough trees to offset this

825

00:35:26,760 --> 00:35:23,920

carbon would take over a quarter of our

826

00:35:29,670 --> 00:35:26,770

food crops the conclusion is a pretty

827

00:35:31,230 --> 00:35:29,680

obvious one we need to use every tool in

828

00:35:35,730 --> 00:35:31,240

our Arsenal to reduce the effects of

829

00:35:46,520 --> 00:35:38,760

for more brouhaha and australian science

830

00:35:51,990 --> 00:35:49,770

it never ends a friend starts talking

831

00:35:53,580 --> 00:35:52,000

about his new Reiki Master and someone

832

00:35:56,310 --> 00:35:53,590

else just posted about another

833

00:35:58,800 --> 00:35:56,320

all-natural cancer cure that they don't

834

00:36:01,020 --> 00:35:58,810

want you to know about a sceptics we

835

00:36:03,180 --> 00:36:01,030

dedicate a lot of time trying to protect

836

00:36:05,370 --> 00:36:03,190

those around us but there's a way that

837

00:36:07,980 --> 00:36:05,380

you can reach millions guerrilla

838

00:36:09,870 --> 00:36:07,990

skepticism on Wikipedia is a group that

839

00:36:12,300 --> 00:36:09,880

is working to keep the best skeptical

840

00:36:15,390 --> 00:36:12,310

information at everyone's fingertips in

841

00:36:18,090 --> 00:36:15,400

all languages join us training is

842

00:36:20,880 --> 00:36:18,100

self-paced and fun and we have our very

843

00:36:23,340 --> 00:36:20,890

own super secret Facebook group you will

844

00:36:27,620 --> 00:36:23,350

be educating the world in your sleep to

845

00:36:31,710 --> 00:36:27,630

find out more email us at GS o w team at

846

00:36:36,440 --> 00:36:31,720

gmail.com guerrilla skepticism the time

847

00:36:48,660 --> 00:36:36,450

is now music by bensound.com

848

00:36:54,809 --> 00:36:52,559

I'm in the backyard of the house of dr.

849

00:36:57,750 --> 00:36:54,819

eugenie Scott here in Berkeley

850

00:37:08,180 --> 00:36:57,760

California where I'm delighted to see

851
00:37:12,420 --> 00:37:08,190
that there are 1 1 2 active beehives and

852
00:37:15,029 --> 00:37:12,430
today Jeanie and I are going to liberate

853
00:37:17,789 --> 00:37:15,039
some of the delicious honey from the bee

854
00:37:19,440 --> 00:37:17,799
hives and I thought it might make an

855
00:37:22,410 --> 00:37:19,450
interesting and different report for the

856
00:37:24,299 --> 00:37:22,420
skeptical zone and we can chat about some

857
00:37:27,029 --> 00:37:24,309
science along the way it's a bright

858
00:37:28,710 --> 00:37:27,039
sunny day it's the summer solstice and

859
00:37:31,890 --> 00:37:28,720
what a great day it is for collecting

860
00:37:34,799 --> 00:37:31,900
honey Eugenie Scott what is that you've

861
00:37:37,349 --> 00:37:34,809
got there that is a box of empty frames

862
00:37:40,289 --> 00:37:37,359
just in case when we get into the hive

863
00:37:42,029 --> 00:37:40,299

we discover that that there's just tons

864

00:37:45,660 --> 00:37:42,039

and tons and tons of honey and that the

865

00:37:47,789 --> 00:37:45,670

bees need more room to expand we can

866

00:37:50,099 --> 00:37:47,799

just pop it on and I've got two

867

00:37:52,140 --> 00:37:50,109

different kinds of frames in here one is

868

00:37:54,839 --> 00:37:52,150

an open frame and the other is a frame

869

00:37:59,609 --> 00:37:54,849

that has I guess you could call it

870

00:38:01,920 --> 00:37:59,619

prefab comb yeah this is a it's called

871

00:38:04,009 --> 00:38:01,930

Foundation and you can see that it's

872

00:38:08,490 --> 00:38:04,019

consists of these little kind of

873

00:38:11,160 --> 00:38:08,500

hexagonal prints again shape B honeycomb

874

00:38:13,829 --> 00:38:11,170

and it's but it's not a full drawn out

875

00:38:18,269 --> 00:38:13,839

comb but the bees will use this little

876

00:38:21,539 --> 00:38:18,279

wax template to form new comb and it'll

877

00:38:23,910 --> 00:38:21,549

be very regular the open one the open

878

00:38:26,670 --> 00:38:23,920

frame doesn't have any comb any

879

00:38:28,799 --> 00:38:26,680

foundation in it and what I'm doing is

880

00:38:31,200 --> 00:38:28,809

I'm alternating yeah when you have an

881

00:38:34,950 --> 00:38:31,210

open frame you give them the freedom to

882

00:38:37,829 --> 00:38:34,960

build a larger or a smaller cell if they

883

00:38:39,839 --> 00:38:37,839

want to and drone cells for example are

884

00:38:41,789 --> 00:38:39,849

larger than the cells that are used for

885

00:38:44,670 --> 00:38:41,799

regular workers so I'm just giving them

886

00:38:47,249 --> 00:38:44,680

some AMA okay so that's in front of us

887

00:38:48,870 --> 00:38:47,259

now and we're going to be what's the

888

00:38:51,720 --> 00:38:48,880

what do you call it do you call it

889

00:38:53,130 --> 00:38:51,730

harvesting the honey yeah it's hard it's

890

00:38:55,559 --> 00:38:53,140

a type of harvester yes

891

00:38:58,739 --> 00:38:55,569

so this hive over here

892

00:39:01,259 --> 00:38:58,749

to the right with the blue lid now

893

00:39:03,449 --> 00:39:01,269

yesterday we put a special layer in

894

00:39:05,579 --> 00:39:03,459

there so the bees would would leave a

895

00:39:08,430 --> 00:39:05,589

certain section and it's sort of like a

896

00:39:09,870 --> 00:39:08,440

one-way part for them what we wanted

897

00:39:13,739 --> 00:39:09,880

what we're going to do is we're going to

898

00:39:15,870 --> 00:39:13,749

look at the top box which is full of I

899

00:39:17,549 --> 00:39:15,880

suspect it's full of honey once we get

900

00:39:19,859 --> 00:39:17,559

in there we'll get a better idea but I'm

901
00:39:22,019 --> 00:39:19,869
pretty suspicious that it's got lots and

902
00:39:24,329 --> 00:39:22,029
lots of honey this is my chance to take

903
00:39:27,630 --> 00:39:24,339
a little bit and the bees will still

904
00:39:29,999 --> 00:39:27,640
have time between now and the fall

905
00:39:31,709 --> 00:39:30,009
winter when things slow down and they're

906
00:39:33,239 --> 00:39:31,719
going to need to you know there is not

907
00:39:35,130 --> 00:39:33,249
going to be as much nectar and pollen

908
00:39:36,930 --> 00:39:35,140
around they'll still have time to build

909
00:39:41,459 --> 00:39:36,940
up their stock so this is my chance to

910
00:39:44,509 --> 00:39:41,469
grab a little for me and yesterday we

911
00:39:48,269 --> 00:39:44,519
put a little device in between that top

912
00:39:52,380 --> 00:39:48,279
box and the lower boxes because we

913
00:39:55,140 --> 00:39:52,390

wanted to get all of the bees off of the

914

00:39:57,989 --> 00:39:55,150

frames in that top box it makes it a

915

00:40:00,689 --> 00:39:57,999

whole lot easier for us to harvest the

916

00:40:02,699 --> 00:40:00,699

honey if the frames aren't full of bees

917

00:40:04,469 --> 00:40:02,709

because that doesn't work as well so

918

00:40:05,999 --> 00:40:04,479

they're all in the bottom section now

919

00:40:07,620 --> 00:40:06,009

busily making honey and doing what they

920

00:40:09,359 --> 00:40:07,630

do and they're lying you to know

921

00:40:11,910 --> 00:40:09,369

hopefully since it's the middle of the

922

00:40:14,130 --> 00:40:11,920

afternoon on a warm and sunny day the

923

00:40:16,109 --> 00:40:14,140

majority of them will be out foraging so

924

00:40:17,219 --> 00:40:16,119

that when we start fooling around with

925

00:40:19,529 --> 00:40:17,229

the hive we're not going to be

926

00:40:21,719 --> 00:40:19,539

disturbing to many of them I think

927

00:40:24,599 --> 00:40:21,729

something that is a real surprise to

928

00:40:30,209 --> 00:40:24,609

people is how short the lifespan of a

929

00:40:32,579 --> 00:40:30,219

bee is a bee spends about 21 days round

930

00:40:36,599 --> 00:40:32,589

numbers developing from an end from an

931

00:40:40,319 --> 00:40:36,609

egg to a hatch eat they hatch in about

932

00:40:42,449 --> 00:40:40,329

21 days spends roughly 2 to 3 weeks to

933

00:40:44,969 --> 00:40:42,459

three weeks right and they progress in

934

00:40:47,640 --> 00:40:44,979

the rest of their and then one day a

935

00:40:51,209 --> 00:40:47,650

month and a half is spent out foraging

936

00:40:53,969 --> 00:40:51,219

for pollen and nectar and trying not to

937

00:40:55,920 --> 00:40:53,979

get picked off by birds and trying not

938

00:40:59,849 --> 00:40:55,930

to have other things happen to

939

00:41:02,099 --> 00:40:59,859

themselves but what happens is they

940

00:41:04,380 --> 00:41:02,109

basically just work themselves to death

941

00:41:06,620 --> 00:41:04,390

if they don't get predated upon by some

942

00:41:08,250 --> 00:41:06,630

birds or some other predator that's the

943

00:41:10,800 --> 00:41:08,260

existence yeah

944

00:41:12,720 --> 00:41:10,810

yeah you'll see older bees coming back

945

00:41:15,810 --> 00:41:12,730

and their wings will be kind of tattered

946

00:41:18,000 --> 00:41:15,820

and heavy yeah it's kind of yeah you did

947

00:41:21,120 --> 00:41:18,010

you try not to anthropomorphize because

948

00:41:22,590 --> 00:41:21,130

there's probably a hive like the one

949

00:41:26,460 --> 00:41:22,600

we're going to go into now that'll have

950

00:41:28,650 --> 00:41:26,470

probably 40 to 50,000 bees in it most of

951
00:41:30,300 --> 00:41:28,660
whom are not going to be home right now

952
00:41:34,470 --> 00:41:30,310
we hope we hope that they're out flying

953
00:41:36,240 --> 00:41:34,480
around but so a lot of you can edit off

954
00:41:38,010 --> 00:41:36,250
it control whatever look at them all

955
00:41:40,230 --> 00:41:38,020
coming in and going on coming in and

956
00:41:42,780 --> 00:41:40,240
going out it's it's constant yeah it is

957
00:41:45,030 --> 00:41:42,790
yeah we're both dressed in in our long

958
00:41:47,700 --> 00:41:45,040
trousers and long shirts with the

959
00:41:50,820 --> 00:41:47,710
sleeves done up and you're just about to

960
00:41:52,620 --> 00:41:50,830
put on your classic beekeeper hat yes

961
00:41:54,990 --> 00:41:52,630
would you like the yellow one or the

962
00:41:56,670 --> 00:41:55,000
white one oh it doesn't matter I do you

963
00:41:58,440 --> 00:41:56,680

can have that we can have the white one

964

00:42:00,780 --> 00:41:58,450

you can doesn't matter a whole lot

965

00:42:03,180 --> 00:42:00,790

no the nice thing goes over the head and

966

00:42:07,260 --> 00:42:03,190

nice thing about beekeeping with someone

967

00:42:08,760 --> 00:42:07,270

to help like you is that we can kind of

968

00:42:13,110 --> 00:42:08,770

keep an eye on each other's equipment

969

00:42:19,470 --> 00:42:13,120

and if I see a bee that's sort of nosing

970

00:42:22,590 --> 00:42:19,480

around the bottom of your hood then I

971

00:42:24,450 --> 00:42:22,600

can you know gently push it away or and

972

00:42:26,520 --> 00:42:24,460

discourage in some way and you keep an

973

00:42:29,280 --> 00:42:26,530

eye out for me as well whether the hat

974

00:42:31,110 --> 00:42:29,290

of course I'll get mine it's it's the

975

00:42:34,320 --> 00:42:31,120

Hat and it's the classic netting that

976

00:42:37,050 --> 00:42:34,330

comes down over the neck area does

977

00:42:38,400 --> 00:42:37,060

indeed if you hold that and I will now

978

00:42:40,470 --> 00:42:38,410

stick mine down and that's the front

979

00:42:42,540 --> 00:42:40,480

isn't it so I slip that on over my oops

980

00:42:43,980 --> 00:42:42,550

did like that shot for that for the

981

00:42:46,680 --> 00:42:43,990

clothesline you go to the quote an old

982

00:42:49,230 --> 00:42:46,690

fashioned around here we hang up it was

983

00:42:51,540 --> 00:42:49,240

on a day like this I'll cut my color is

984

00:42:53,940 --> 00:42:51,550

up so I can touch the knit I'll put the

985

00:42:55,620 --> 00:42:53,950

net back on my shirt and this these

986

00:42:57,900 --> 00:42:55,630

ropes come down this string comes down

987

00:43:00,210 --> 00:42:57,910

goes around my just put it around your

988

00:43:02,820 --> 00:43:00,220

waist yeah just to kind of hold you your

989

00:43:05,610 --> 00:43:02,830

your shirt is is fitted so it's probably

990

00:43:07,410 --> 00:43:05,620

not going to be what I do that is to

991

00:43:12,060 --> 00:43:07,420

kind of discourage any of these little

992

00:43:14,670 --> 00:43:12,070

guys from hmm so I'm I'm covered head to

993

00:43:16,380 --> 00:43:14,680

foot except except for our hands our

994

00:43:18,420 --> 00:43:16,390

hands are not covered about to be

995

00:43:22,530 --> 00:43:18,430

covered about to be covered

996

00:43:26,819 --> 00:43:22,540

our gloves and I got these special Thank

997

00:43:29,250 --> 00:43:26,829

You long gloves the gloves go up to your

998

00:43:32,120 --> 00:43:29,260

elbow or even longer you're getting on

999

00:43:35,970 --> 00:43:32,130

your social radius and on the length on

1000

00:43:37,410 --> 00:43:35,980

this glove now and here we go courtesy

1001
00:43:41,400 --> 00:43:37,420
of my neighbor who is kind enough to

1002
00:43:45,359 --> 00:43:41,410
have a material large men's gloves and

1003
00:43:49,799 --> 00:43:45,369
the next one so I really am now covered

1004
00:43:53,210 --> 00:43:49,809
head to foot and I'm putting my beef

1005
00:43:55,980 --> 00:43:53,220
just flexing the glove there that's it

1006
00:43:57,359 --> 00:43:55,990
these gloves are I feel quite safe now

1007
00:44:01,589 --> 00:43:57,369
what we're going to do is we're going to

1008
00:44:05,339 --> 00:44:01,599
take the box of the topmost box the box

1009
00:44:08,010 --> 00:44:05,349
of honey yep and we're going to take

1010
00:44:11,089 --> 00:44:08,020
away that little separator that we put

1011
00:44:14,609 --> 00:44:11,099
in last night and then we're going to

1012
00:44:16,710 --> 00:44:14,619
cover up the hive so are you ready to do

1013
00:44:19,040 --> 00:44:16,720

your strongman axe okay so the lid comes

1014

00:44:25,110 --> 00:44:22,830

okay just set it down gently and of

1015

00:44:27,240 --> 00:44:25,120

course it is really urgently

1016

00:44:29,130 --> 00:44:27,250

it's full of bees and honey so you

1017

00:44:33,870 --> 00:44:29,140

shouldn't take them rising out one of

1018

00:44:36,270 --> 00:44:33,880

the trays here okay that one is doesn't

1019

00:44:37,890 --> 00:44:36,280

doesn't hey it's not very it's not a lot

1020

00:44:40,560 --> 00:44:37,900

of capped honey in that too

1021

00:44:43,980 --> 00:44:40,570

so let me take a look here this one is a

1022

00:44:47,610 --> 00:44:43,990

little bitter now out comes this tray

1023

00:44:49,500 --> 00:44:47,620

very slowly okay pick it up now we can

1024

00:44:51,390 --> 00:44:49,510

introduce a lot of heat this is a lotta

1025

00:44:51,780 --> 00:44:51,400

honey that's a lot of honey hold on

1026

00:44:54,180 --> 00:44:51,790

honey

1027

00:44:56,280 --> 00:44:54,190

yeah now the one right next to it though

1028

00:44:59,790 --> 00:44:56,290

it doesn't have very much I'm going to

1029

00:45:03,360 --> 00:44:59,800

set this I'm going to set this just

1030

00:45:05,490 --> 00:45:03,370

vertically here no why is that open then

1031

00:45:07,020 --> 00:45:05,500

they're not as many bees as I hear but

1032

00:45:09,090 --> 00:45:07,030

yeah I'm quite a lot still more than I

1033

00:45:09,900 --> 00:45:09,100

would have predicted hand me that bowl

1034

00:45:16,080 --> 00:45:09,910

yep

1035

00:45:17,610 --> 00:45:16,090

and hold my hive tool today this is real

1036

00:45:22,680 --> 00:45:17,620

Aussie this is an absolutely gorgeous

1037

00:45:24,420 --> 00:45:22,690

piece of of here we go look at this

1038

00:45:26,280 --> 00:45:24,430

frame here Richard let's have a look at

1039

00:45:29,550 --> 00:45:26,290

this isn't this gorgeous gorgeous frame

1040

00:45:31,830 --> 00:45:29,560

look at that now that is that

1041

00:45:33,870 --> 00:45:31,840

magnificent look at the shape yeah this

1042

00:45:36,870 --> 00:45:33,880

one is a real this one is a real keeper

1043

00:45:38,940 --> 00:45:36,880

and again look not an overly crowded

1044

00:45:43,620 --> 00:45:38,950

well it's more than more than I'd like

1045

00:45:46,140 --> 00:45:43,630

to see this one is much less much less

1046

00:45:49,110 --> 00:45:46,150

full but then again they tend to fill up

1047

00:45:51,450 --> 00:45:49,120

the ones in the middle this is still

1048

00:45:53,160 --> 00:45:51,460

this is this is God open this see

1049

00:45:54,840 --> 00:45:53,170

there's liquid in each of those yeah

1050

00:45:57,150 --> 00:45:54,850

and they haven't put the caps on yet

1051
00:45:59,070 --> 00:45:57,160
look at the top of the frame you can see

1052
00:46:00,990 --> 00:45:59,080
the kind of waxy like things that's kept

1053
00:46:03,960 --> 00:46:01,000
right that's what they'll that's what

1054
00:46:06,960 --> 00:46:03,970
you're seeing in the ones that are down

1055
00:46:07,830 --> 00:46:06,970
below so so just inspecting frame by

1056
00:46:10,650 --> 00:46:07,840
frame of the moat

1057
00:46:12,960 --> 00:46:10,660
yeah I'm going to take a look and when I

1058
00:46:16,680 --> 00:46:12,970
just move these guys over here come on

1059
00:46:19,920 --> 00:46:16,690
girls and this one is also very full of

1060
00:46:21,990 --> 00:46:19,930
honey looks very nice so I'm not feeling

1061
00:46:23,790 --> 00:46:22,000
too bad about leaving these girls

1062
00:46:26,460 --> 00:46:23,800
without enough to eat so they go to

1063
00:46:28,650 --> 00:46:26,470

upset at the moon they have to very full

1064

00:46:31,550 --> 00:46:28,660

no I'm going being very gentle here they

1065

00:46:36,050 --> 00:46:31,560

have two very full

1066

00:46:39,140 --> 00:46:36,060

capped honey and one two three yeah I I

1067

00:46:41,930 --> 00:46:39,150

don't feel bad about taking the two full

1068

00:46:43,610 --> 00:46:41,940

frames no even guys enough so this piece

1069

00:46:45,920 --> 00:46:43,620

of I'll just take that upstairs with us

1070

00:46:47,600 --> 00:46:45,930

in Luke's Fanta yeah you can it you can

1071

00:46:50,660 --> 00:46:47,610

eat it why don't you just set it with

1072

00:46:55,310 --> 00:46:50,670

the other one and what we're going to do

1073

00:47:00,620 --> 00:46:55,320

is we'll take this off don't animal this

1074

00:47:03,290 --> 00:47:00,630

one off yeah and absolutely just chock

1075

00:47:05,060 --> 00:47:03,300

full of beans B's and what we're going

1076

00:47:06,770 --> 00:47:05,070

to do 100gb is there see they're all

1077

00:47:09,260 --> 00:47:06,780

trying to get up to the upper frame yeah

1078

00:47:14,630 --> 00:47:09,270

and so we'll just set that there for the

1079

00:47:17,630 --> 00:47:14,640

moment position of the - at this point V

1080

00:47:21,290 --> 00:47:17,640

central I really want to put what's

1081

00:47:24,740 --> 00:47:21,300

called a queen excluder which we took

1082

00:47:29,300 --> 00:47:24,750

off the green excluder is going on now

1083

00:47:31,160 --> 00:47:29,310

which is like like a wireframe sort of

1084

00:47:34,700 --> 00:47:31,170

thing but it's big enough for the

1085

00:47:37,160 --> 00:47:34,710

workers to to wiggle through yes they

1086

00:47:39,440 --> 00:47:37,170

can remodel yeah but the Queen does not

1087

00:47:43,460 --> 00:47:39,450

go through the Queen excluder the reason

1088

00:47:46,310 --> 00:47:43,470

you do that is that that is why that box

1089

00:47:47,450 --> 00:47:46,320

that we just looked at is so chock full

1090

00:47:54,890 --> 00:47:47,460

of honey

1091

00:47:56,900 --> 00:47:54,900

and brood which is not as good now we're

1092

00:47:58,940 --> 00:47:56,910

not really being worked to worried the

1093

00:48:00,440 --> 00:47:58,950

bees aren't that upset what we're doing

1094

00:48:03,170 --> 00:48:00,450

no they're not and I didn't smoke them

1095

00:48:08,150 --> 00:48:03,180

remember so the reason why you smoke by

1096

00:48:11,150 --> 00:48:08,160

the way is because when bees do get

1097

00:48:14,030 --> 00:48:11,160

alarmed they start sending out alarm

1098

00:48:16,580 --> 00:48:14,040

pheromones and the smoke basically kind

1099

00:48:18,530 --> 00:48:16,590

of confuses them for a while they might

1100

00:48:20,990 --> 00:48:18,540

feel like putting out an alarm pheromone

1101
00:48:23,180 --> 00:48:21,000
but then they smell the smoke and that

1102
00:48:25,610 --> 00:48:23,190
kind of so they don't really notice that

1103
00:48:29,170 --> 00:48:25,620
their sisters are putting out warnings

1104
00:48:34,930 --> 00:48:29,180
okay although not exactly

1105
00:48:43,109 --> 00:48:34,940
whoa all right so I'll let these guys go

1106
00:48:49,859 --> 00:48:45,479
so this is hard for me to do because I'm

1107
00:48:52,950 --> 00:48:49,869
not really tall enough for up for how

1108
00:48:54,209 --> 00:48:52,960
give me my five - oh you want to scrape

1109
00:48:55,680 --> 00:48:54,219
off some of this pro kleh now I just

1110
00:48:58,579 --> 00:48:55,690
leave those guys alone we'll just let

1111
00:49:03,839 --> 00:48:58,589
them now notice that there is a B that's

1112
00:49:05,519 --> 00:49:03,849
buzzing around my my veil and you

1113
00:49:07,529 --> 00:49:05,529

probably have some that are kind of one

1114

00:49:10,440 --> 00:49:07,539

on your hand I know that Sam yeah yeah

1115

00:49:13,380 --> 00:49:10,450

but uh particularly they're kind of

1116

00:49:16,499 --> 00:49:13,390

coming up to challenge my look it look

1117

00:49:17,969 --> 00:49:16,509

me in the face so just yeah yeah oh yes

1118

00:49:21,180 --> 00:49:17,979

I'm noticing in the other yeah but

1119

00:49:21,569 --> 00:49:21,190

you're back I'm like no I can feel my

1120

00:49:25,680 --> 00:49:21,579

legs

1121

00:49:28,049 --> 00:49:25,690

okay let's put this up yep okay so

1122

00:49:30,390 --> 00:49:28,059

they're listed okay right now here take

1123

00:49:32,819 --> 00:49:30,400

a look at this guy here girl here you

1124

00:49:35,219 --> 00:49:32,829

notice that she's she's elevating her

1125

00:49:37,709 --> 00:49:35,229

abdomen and just flapping her wings like

1126

00:49:40,799 --> 00:49:37,719

crazy she is sending out an alarm

1127

00:49:43,769 --> 00:49:40,809

pheromone huh so this is a good time

1128

00:49:48,239 --> 00:49:43,779

since we haven't smoked to just bid our

1129

00:49:56,759 --> 00:49:48,249

little friends goodbye close them up let

1130

00:49:59,910 --> 00:49:56,769

them figure out the way home there we go

1131

00:50:02,759 --> 00:49:59,920

Luke going back on now this is the

1132

00:50:04,680 --> 00:50:02,769

telescoping lid as they're called you do

1133

00:50:08,210 --> 00:50:04,690

end up killing a few bees in this

1134

00:50:15,260 --> 00:50:08,220

activity here I'm sorry to say

1135

00:50:17,599 --> 00:50:15,270

don't like to kill bees but ya know I

1136

00:50:20,359 --> 00:50:17,609

can say they live that one they live a

1137

00:50:23,030 --> 00:50:20,369

very short life so we'll put these guys

1138

00:50:24,380 --> 00:50:23,040

over here oh yeah they'll figure and

1139

00:50:26,359 --> 00:50:24,390

they will figure out where to go from

1140

00:50:28,160 --> 00:50:26,369

there real let's see I think this is

1141

00:50:31,660 --> 00:50:28,170

probably going to be steady enough good

1142

00:50:34,940 --> 00:50:31,670

all right let's take let's take these uh

1143

00:50:36,730 --> 00:50:34,950

want to take that like the hype tool and

1144

00:50:39,200 --> 00:50:36,740

you take the two bowls

1145

00:50:42,069 --> 00:50:39,210

I'll bring I actually give me the big

1146

00:50:44,690 --> 00:50:42,079

bowl because once I shake off these bees

1147

00:50:46,520 --> 00:50:44,700

I'm going to want to have something to

1148

00:50:51,500 --> 00:50:46,530

put this is one of the trays we removed

1149

00:50:53,930 --> 00:50:51,510

earlier just whacking it out to shake

1150

00:50:56,510 --> 00:50:53,940

the bees loose we're going to take this

1151

00:50:58,280 --> 00:50:56,520

into the house as soon as we can buy

1152

00:50:58,760 --> 00:50:58,290

these everybody so you kind of hold that

1153

00:51:02,030 --> 00:50:58,770

there

1154

00:51:04,000 --> 00:51:02,040

yep now help you once a yep shake off

1155

00:51:06,170 --> 00:51:04,010

these bees oh it's a beautiful comb

1156

00:51:13,309 --> 00:51:06,180

we'll take some pictures when we get

1157

00:51:15,620 --> 00:51:13,319

inside alright let's go in and the

1158

00:51:19,280 --> 00:51:15,630

sooner the better because we are being

1159

00:51:22,339 --> 00:51:19,290

followed we are being followed by some

1160

00:51:26,359 --> 00:51:22,349

bees and the quicker we do this the

1161

00:51:30,349 --> 00:51:26,369

fewer bees will get inside the house can

1162

00:51:33,020 --> 00:51:30,359

you open the door yeah we're good I

1163

00:51:37,550 --> 00:51:33,030

don't think I'm bringing any bees in let

1164

00:51:40,280 --> 00:51:37,560

me start little okay and we'll take

1165

00:51:47,640 --> 00:51:40,290

these upstairs then we can get out of

1166

00:51:58,410 --> 00:51:52,289

so this device we've retrieved now a

1167

00:52:01,870 --> 00:51:58,420

large metal cylinder and it's called a

1168

00:52:05,170 --> 00:52:01,880

honey extract honey extractor we've got

1169

00:52:07,390 --> 00:52:05,180

the two frames now from the hive which

1170

00:52:09,880 --> 00:52:07,400

we collected a little earlier now

1171

00:52:12,339 --> 00:52:09,890

Jeannie is just using a device now to

1172

00:52:14,679 --> 00:52:12,349

break open all the little cells

1173

00:52:20,109 --> 00:52:14,689

it looks like the device that I'm using

1174

00:52:22,390 --> 00:52:20,119

is a honeycomb d capper and it sort of

1175

00:52:24,789 --> 00:52:22,400

looks like the most uncomfortable comb

1176

00:52:26,920 --> 00:52:24,799

in the world it's a bunch of little

1177

00:52:30,039 --> 00:52:26,930

metal teeth that are close together but

1178

00:52:34,449 --> 00:52:30,049

it works like a real champ to break open

1179

00:52:36,519 --> 00:52:34,459

the caps of the capped honey so we take

1180

00:52:39,009 --> 00:52:36,529

a little shot here and just honey

1181

00:52:41,109 --> 00:52:39,019

streaming down at the moment so hold

1182

00:52:58,920 --> 00:52:41,119

that one I all that and the first one

1183

00:53:04,120 --> 00:53:02,200

see how that goes now I think there's

1184

00:53:05,500 --> 00:53:04,130

more to spend from this side but since

1185

00:53:07,780 --> 00:53:05,510

I'm in the mood for turning them around

1186

00:53:20,780 --> 00:53:07,790

I'll do that we'll spin the other side

1187

00:53:25,530 --> 00:53:23,450

all right now we've been spinning our

1188

00:53:30,330 --> 00:53:25,540

trays yep

1189

00:53:31,740 --> 00:53:30,340

we centrifuge the frames and got pretty

1190

00:53:34,410 --> 00:53:31,750

much all the honey out I mean I think

1191

00:53:36,030 --> 00:53:34,420

it's you take a there's there's a

1192

00:53:39,210 --> 00:53:36,040

there's a little bit of honey left but

1193

00:53:42,600 --> 00:53:39,220

it's not worth obsessing about I always

1194

00:53:46,320 --> 00:53:42,610

really try to preserve as much comb as

1195

00:53:48,180 --> 00:53:46,330

possible because it takes this is hard

1196

00:53:52,470 --> 00:53:48,190

to believe but it takes several pounds

1197

00:53:54,330 --> 00:53:52,480

of honey to produce a comb like this so

1198

00:53:58,740 --> 00:53:54,340

you know these are expensive in terms of

1199

00:54:01,500 --> 00:53:58,750

be time and effort and calories and so

1200

00:54:03,060 --> 00:54:01,510

the more you can preserve comb through

1201
00:54:05,280 --> 00:54:03,070
for your bees the better off your bees

1202
00:54:08,970 --> 00:54:05,290
are they don't have to invest as much

1203
00:54:11,670 --> 00:54:08,980
energy in building comb they can in this

1204
00:54:13,470 --> 00:54:11,680
situation then this one's sort of yeah

1205
00:54:15,810 --> 00:54:13,480
this had a structural failure this one

1206
00:54:19,460 --> 00:54:15,820
kind of got trashed yeah and it is also

1207
00:54:21,900 --> 00:54:19,470
looking into looking into this yeah

1208
00:54:25,170 --> 00:54:21,910
cylinder again let me look down the

1209
00:54:27,540 --> 00:54:25,180
bottom oh yeah I can see all the honey

1210
00:54:29,370 --> 00:54:27,550
and the colour and some of the Condit

1211
00:54:31,140 --> 00:54:29,380
which has been spun off is down the

1212
00:54:32,790 --> 00:54:31,150
bottom there so we're going to let that

1213
00:54:40,380 --> 00:54:32,800

drain off the walls for a little while

1214

00:54:46,839 --> 00:54:43,539

it's much later on in the day now in

1215

00:54:50,349 --> 00:54:46,849

fact after dinner time and the honey has

1216

00:54:54,099 --> 00:54:50,359

had a chance to soak out of the

1217

00:54:56,490 --> 00:54:54,109

extractor descend through the sieve

1218

00:54:59,559 --> 00:54:56,500

so the sieve is collected all the

1219

00:55:01,450 --> 00:54:59,569

leftover honeycomb you can take a munch

1220

00:55:03,009 --> 00:55:01,460

it's okay it's pretty tasty that's

1221

00:55:05,259 --> 00:55:03,019

pretty tasty well then be hard for you

1222

00:55:08,079 --> 00:55:05,269

to talk so it would I better not so

1223

00:55:11,920 --> 00:55:08,089

Jeanie is now just going to unscrew the

1224

00:55:14,950 --> 00:55:11,930

oh there it goes opening up the spigot

1225

00:55:19,269 --> 00:55:14,960

at the bottom of this tub and out pours

1226

00:55:21,910 --> 00:55:19,279

the strained honey and out pours the

1227

00:55:24,759 --> 00:55:21,920

honey and out pours the honey yes well

1228

00:55:26,950 --> 00:55:24,769

it's taking its time this this is the

1229

00:55:28,870 --> 00:55:26,960

watch watching paint dry kind of credit

1230

00:55:30,789 --> 00:55:28,880

yeah yeah it's not coming out quickly

1231

00:55:31,539 --> 00:55:30,799

it's not very fast is it I wonder I

1232

00:55:34,000 --> 00:55:31,549

can't imagine

1233

00:55:35,769 --> 00:55:34,010

well it's I'm looking inside the top now

1234

00:55:38,620 --> 00:55:35,779

and it's slowing it's coming out it's

1235

00:55:41,079 --> 00:55:38,630

moving it's just it's it's an Essex it's

1236

00:55:43,539 --> 00:55:41,089

yes yes and you're filling up your first

1237

00:55:45,009 --> 00:55:43,549

job well not your first job ever but for

1238

00:55:52,180 --> 00:55:45,019

this Mass Effect yes

1239

00:55:56,079 --> 00:55:52,190

yeah why not hmm really glue we're just

1240

00:56:00,400 --> 00:55:56,089

um munching some of the honeycomb we've

1241

00:56:07,680 --> 00:56:00,410

left in the sieve mm-hmm and of course

1242

00:56:12,779 --> 00:56:09,900

it's the next morning now and we're

1243

00:56:15,839 --> 00:56:12,789

around the table and I'm looking at a

1244

00:56:16,500 --> 00:56:15,849

glorious batch of cookies out fresh out

1245

00:56:19,710 --> 00:56:16,510

of the oven

1246

00:56:21,690 --> 00:56:19,720

you know biscuits yeah it's going to be

1247

00:56:23,549 --> 00:56:21,700

yeah you can transfer gets something I

1248

00:56:25,380 --> 00:56:23,559

think the listeners can contract this

1249

00:56:26,880 --> 00:56:25,390

biscuits so that okay we're sitting down

1250

00:56:29,039 --> 00:56:26,890

in front of a pile of cookies there's

1251

00:56:32,779 --> 00:56:29,049

nothing like that no that's right and a

1252

00:56:35,640 --> 00:56:32,789

jar of the very honey we just harvested

1253

00:56:37,829 --> 00:56:35,650

yesterday our time is matter-of-fact and

1254

00:56:40,309 --> 00:56:37,839

we're about to give it the rigorous

1255

00:56:42,809 --> 00:56:40,319

scientific test that's right

1256

00:56:47,099 --> 00:56:42,819

double-blind I must say but never I know

1257

00:56:51,900 --> 00:56:47,109

this is a I is wide open so and now I'm

1258

00:56:54,299 --> 00:56:51,910

going to put a spoon of honey and each

1259

00:56:58,440 --> 00:56:54,309

side honey's being drizzle the leaves I

1260

00:57:01,579 --> 00:56:58,450

know it's nice it's night it's gotten

1261

00:57:05,549 --> 00:57:01,589

let's say I think it's it got a good

1262

00:57:09,960 --> 00:57:05,559

texture to it it's a little thin but

1263

00:57:13,620 --> 00:57:09,970

there you go and just kind of move a

1264

00:57:17,220 --> 00:57:13,630

dude so we'll get your own by side here

1265

00:57:21,990 --> 00:57:17,230

we go you know the taste and look for me

1266

00:57:23,970 --> 00:57:22,000

oh that would be okay yes no mmm you

1267

00:57:26,910 --> 00:57:23,980

should pick that up you should pick that

1268

00:57:31,420 --> 00:57:26,920

up and taste you know I'm the guinea pig

1269

00:57:42,110 --> 00:57:36,940

hmm what a classic honey tasted is too

1270

00:57:44,570 --> 00:57:42,120

and then is like the scum absolutely

1271

00:57:47,470 --> 00:57:44,580

delicious I think this the science test

1272

00:57:50,000 --> 00:57:47,480

is possible with flying colors

1273

00:57:53,000 --> 00:57:50,010

science bats last think of it that way

1274

00:57:54,950 --> 00:57:53,010

we science always wins and we have

1275

00:57:57,050 --> 00:57:54,960

performed the proper we haven't had a

1276

00:57:58,850 --> 00:57:57,060

control we didn't have a control

1277

00:58:03,200 --> 00:57:58,860

I guess the control would be you have to

1278

00:58:05,060 --> 00:58:03,210

eat the next biscuit without honey but

1279

00:58:07,520 --> 00:58:05,070

yes thank you so much for all your help

1280

00:58:10,310 --> 00:58:07,530

yesterday I could not have done it

1281

00:58:12,080 --> 00:58:10,320

nearly as efficiently and quickly

1282

00:58:12,650 --> 00:58:12,090

without your help and I sure appreciate

1283

00:58:20,300 --> 00:58:12,660

it

1284

00:58:22,160 --> 00:58:20,310

better of a two people job that lifting

1285

00:58:24,350 --> 00:58:22,170

up the hives and replacing things and

1286

00:58:26,960 --> 00:58:24,360

and all the rest of it but in the

1287

00:58:31,380 --> 00:58:26,970

meantime I think I will enjoy the rest

1288

00:58:35,980 --> 00:58:33,790

tune in next week for part two of this

1289

00:58:37,810 --> 00:58:35,990

story with Eugenie Scott where she

1290

00:58:40,870 --> 00:58:37,820

discusses some of the science behind

1291

00:58:43,930 --> 00:58:40,880

beekeeping and some of the very real

1292

00:58:53,600 --> 00:58:43,940

problems faced by beekeepers including

1293

00:58:53,610 --> 00:59:03,840

[Music]

1294

00:59:08,980 --> 00:59:06,070

thank you for listening to the skeptic

1295

00:59:10,900 --> 00:59:08,990

zone of different episode this week I do

1296

00:59:13,570 --> 00:59:10,910

like doing those field reports and what

1297

00:59:15,730 --> 00:59:13,580

a pleasure it was to spend time with the

1298

00:59:19,470 --> 00:59:15,740

Eugenie Scott and Paul Doherty at the

1299

00:59:22,060 --> 00:59:19,480

Exploratorium as the as I hope you

1300

00:59:23,200 --> 00:59:22,070

gathered by listening to those reports I

1301

00:59:25,000 --> 00:59:23,210

had a wonderful time

1302

00:59:27,190 --> 00:59:25,010

I was certainly getting my head together

1303

00:59:29,560 --> 00:59:27,200

with jet lag and just getting over the

1304

00:59:31,510 --> 00:59:29,570

the infection in the cough and all the

1305

00:59:34,180 --> 00:59:31,520

rest of it but nevertheless what a

1306

00:59:38,890 --> 00:59:34,190

wonderful couple of days I've had so far

1307

00:59:41,080 --> 00:59:38,900

and pretty soon I'll be getting getting

1308

00:59:44,740 --> 00:59:41,090

down to San Francisco Airport to catch a

1309

00:59:47,650 --> 00:59:44,750

red-eye / - let me see Dulles then

1310

00:59:51,010 --> 00:59:47,660

change up to New Jersey then I catch a

1311

00:59:53,410 --> 00:59:51,020

series of transports and Airport Express

1312

00:59:55,660 --> 00:59:53,420

and then I catch a metro line or

1313

00:59:57,820 --> 00:59:55,670

something up to Connecticut wow that's

1314

00:59:59,140 --> 00:59:57,830

going to be an adventure - and finally

1315

01:00:01,180 --> 00:59:59,150

I'm going to end up of course back in

1316

01:00:03,490 --> 01:00:01,190

New York for the Northeast Conference of

1317

01:00:04,720 --> 01:00:03,500

science and skepticism certainly looking

1318

01:00:06,100 --> 01:00:04,730

forward to that and I'll be running

1319

01:00:09,760 --> 01:00:06,110

around trying to get you as many

1320

01:00:12,490 --> 01:00:09,770

interviews and behind-the-scenes maybe

1321

01:00:14,500 --> 01:00:12,500

as I can thank you to those people who

1322

01:00:18,850 --> 01:00:14,510

continue to support the skeptic zone in

1323

01:00:20,290 --> 01:00:18,860

fact the roving roving raving microphone

1324

01:00:23,050 --> 01:00:20,300

I'm using at the moment which is an

1325

01:00:25,270 --> 01:00:23,060

attachment to my iPhone was paid for

1326
01:00:27,490 --> 01:00:25,280
through the generous support of skeptic

1327
01:00:30,370 --> 01:00:27,500
zone listeners and it's this microphone

1328
01:00:33,010 --> 01:00:30,380
it's a zoom microphone which I for those

1329
01:00:35,710 --> 01:00:33,020
who want to know iq5 which I used to

1330
01:00:37,390 --> 01:00:35,720
interview Paul and Eugenie Scott this

1331
01:00:39,700 --> 01:00:37,400
week so I'm pretty impressed by the

1332
01:00:41,770 --> 01:00:39,710
quality and this is not your a paid

1333
01:00:44,200 --> 01:00:41,780
endorsement for zoom microphones but I

1334
01:00:47,110 --> 01:00:44,210
do like to use them a big shout out to

1335
01:00:48,700 --> 01:00:47,120
Maynard still there in Australia I mean

1336
01:00:51,940 --> 01:00:48,710
hello to all my reporters around the

1337
01:00:54,010 --> 01:00:51,950
world especially in Australia in fact I

1338
01:00:55,540 --> 01:00:54,020

know our reporter Heidi has been very

1339

01:00:58,570 --> 01:00:55,550

busy she went to the starstuff

1340

01:01:00,280 --> 01:00:58,580

conference in Byron Bay attended by dr.

1341

01:01:01,870 --> 01:01:00,290

Karl in fact she I think she gave dr.

1342

01:01:04,150 --> 01:01:01,880

Carol a lift in her car that's pretty

1343

01:01:05,860 --> 01:01:04,160

cool anyway she says some interviews are

1344

01:01:08,260 --> 01:01:05,870

on the way so I'm looking forward to

1345

01:01:12,760 --> 01:01:08,270

hearing those and then bringing those to

1346

01:01:14,299 --> 01:01:12,770

you very soon but for this week from the

1347

01:01:21,339 --> 01:01:14,309

San Francisco Bay

1348

01:01:27,559 --> 01:01:23,749

you've been listening to the skeptic

1349

01:01:30,469 --> 01:01:27,569

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1350

01:01:34,370 --> 01:01:30,479

tech zone TV for contacts an archive of

1351

01:01:37,039 --> 01:01:34,380

all episodes since 2008 and our online

1352

01:01:39,759 --> 01:01:37,049

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1353

01:01:42,769 --> 01:01:39,769

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1354

01:01:45,799 --> 01:01:42,779

liking us on Facebook and leaving a

1355

01:01:48,679 --> 01:01:45,809

review on iTunes you can also show your

1356

01:01:52,160 --> 01:01:48,689

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1357

01:01:54,499 --> 01:01:52,170

little as 99 cents a week the skeptic

1358

01:01:56,299 --> 01:01:54,509

zone is an independent production the

1359

01:01:58,429 --> 01:01:56,309

views and opinions expressed on the

1360

01:02:00,999 --> 01:01:58,439

skeptic zone and not necessarily those