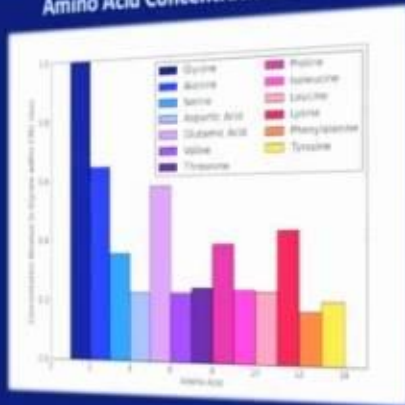


Amino Acid Concentrations Relative to Glycine



Cobb & Paulitz, 1 (in prep.)

1
00:00:10,390 --> 00:00:08,629
um so i know a lot of you were at

2
00:00:12,709 --> 00:00:10,400
abradcon last year and a lot of you

3
00:00:14,310 --> 00:00:12,719
weren't anyone who wasn't um my name's

4
00:00:15,749 --> 00:00:14,320
alyssa i work with ralph padres who's

5
00:00:17,349 --> 00:00:15,759
the director of the origins institute at

6
00:00:18,870 --> 00:00:17,359
mcmaster university

7
00:00:21,029 --> 00:00:18,880
and he started this institute

8
00:00:23,910 --> 00:00:21,039
specifically to look at the origins of

9
00:00:25,349 --> 00:00:23,920
life um on planets and origins of stars

10
00:00:26,310 --> 00:00:25,359
on the universe and origins of stellar

11
00:00:29,269 --> 00:00:26,320
systems

12
00:00:30,950 --> 00:00:29,279
all things sorry thank you

13
00:00:32,870 --> 00:00:30,960

they're gonna go away okay

14

00:00:34,389 --> 00:00:32,880

um so it's a really big deal just in

15

00:00:36,950 --> 00:00:34,399

terms of origins of life so my work

16

00:00:39,990 --> 00:00:36,960

specifically has to do with seeding life

17

00:00:41,430 --> 00:00:40,000

on exoplanets so i look um mostly at

18

00:00:43,670 --> 00:00:41,440

amino acid

19

00:00:45,430 --> 00:00:43,680

concentrations on meteorites and how

20

00:00:46,790 --> 00:00:45,440

those might be produced within

21

00:00:48,470 --> 00:00:46,800

meteoritic parent bodies and then

22

00:00:51,190 --> 00:00:48,480

transferred to exoplanets by these

23

00:00:52,950 --> 00:00:51,200

meteoritic impacts

24

00:00:56,630 --> 00:00:52,960

i did not include

25

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

a plot of what i did last year

26

00:01:00,150 --> 00:00:58,800

i will just describe it in just a second

27

00:01:01,990 --> 00:01:00,160

just for for background knowledge so

28

00:01:03,670 --> 00:01:02,000

anyway the point of what i do

29

00:01:05,429 --> 00:01:03,680

um i'm looking at the synthesis of the

30

00:01:07,750 --> 00:01:05,439

amino acids in the parent bodies

31

00:01:10,070 --> 00:01:07,760

meteoritic parent bodies um i look at

32

00:01:13,350 --> 00:01:10,080

the concentrations and study the theory

33

00:01:14,870 --> 00:01:13,360

behind how those amino acids got there

34

00:01:16,630 --> 00:01:14,880

and the whole point of why we even

35

00:01:18,870 --> 00:01:16,640

started doing this research is because

36

00:01:21,350 --> 00:01:18,880

we know that there are biomolecules

37

00:01:23,109 --> 00:01:21,360

present in meteorites and that you know

38

00:01:24,710 --> 00:01:23,119

when we go to antarctica or wherever and

39

00:01:26,950 --> 00:01:24,720

pick up those meteorites we have all the

40

00:01:28,469 --> 00:01:26,960

biomolecules in them but there are also

41

00:01:30,630 --> 00:01:28,479

i mean there's evidence for some of

42

00:01:31,910 --> 00:01:30,640

those amino acids being extraterrestrial

43

00:01:34,069 --> 00:01:31,920

in origin so it's not that their

44

00:01:36,789 --> 00:01:34,079

terrestrial contamination they really

45

00:01:38,950 --> 00:01:36,799

were created in space and brought to

46

00:01:40,710 --> 00:01:38,960

earth by these meteorites

47

00:01:41,910 --> 00:01:40,720

and again this is just the theory for

48

00:01:43,590 --> 00:01:41,920

how life

49

00:01:45,030 --> 00:01:43,600

starts on planets

50

00:01:45,749 --> 00:01:45,040

so the big picture of what i'm trying to

51
00:01:48,389 --> 00:01:45,759
do

52
00:01:50,550 --> 00:01:48,399
um is actually model the synthesis so

53
00:01:52,630 --> 00:01:50,560
i'm using some theoretical amino acid

54
00:01:54,230 --> 00:01:52,640
synthesis equations and being like look

55
00:01:56,469 --> 00:01:54,240
let's use the computer and if we put in

56
00:01:58,469 --> 00:01:56,479
this amino acid equation let's see if we

57
00:02:00,069 --> 00:01:58,479
can match the amino acid concentrations

58
00:02:01,990 --> 00:02:00,079
that we see in observed meteorites that

59
00:02:03,590 --> 00:02:02,000
we pick up off the ground

60
00:02:05,510 --> 00:02:03,600
so the first part of my project which is

61
00:02:07,830 --> 00:02:05,520
what i was doing last year was just

62
00:02:09,510 --> 00:02:07,840
trying to find all of the meteoritic

63
00:02:11,510 --> 00:02:09,520

abundance data because there's a lot of

64

00:02:12,550 --> 00:02:11,520

it out there i mean we've known for ages

65

00:02:14,790 --> 00:02:12,560

there are amino acids in these

66

00:02:17,350 --> 00:02:14,800

meteorites but there's a lot of data to

67

00:02:18,869 --> 00:02:17,360

collate to be able to to verify that

68

00:02:20,390 --> 00:02:18,879

when i'm modeling my amino acid

69

00:02:22,790 --> 00:02:20,400

abundances i'm actually matching what

70

00:02:24,390 --> 00:02:22,800

we're really seeing so the second second

71

00:02:26,229 --> 00:02:24,400

part which is what i've started just

72

00:02:28,229 --> 00:02:26,239

recently is actually doing the modeling

73

00:02:29,670 --> 00:02:28,239

so now i have something to aim for i

74

00:02:31,910 --> 00:02:29,680

have my concentrations that i know and

75

00:02:34,710 --> 00:02:31,920

now i'm changing the dials on my model

76
00:02:37,589 --> 00:02:34,720
to try to recreate those abundances that

77
00:02:39,190 --> 00:02:37,599
we get out

78
00:02:41,990 --> 00:02:39,200
i wish i had brought it yeah i didn't

79
00:02:43,509 --> 00:02:42,000
bring it um

80
00:02:45,509 --> 00:02:43,519
so last year what i was doing was

81
00:02:47,910 --> 00:02:45,519
looking at how the concentrations of

82
00:02:49,990 --> 00:02:47,920
these amino acids change with gibbs free

83
00:02:51,670 --> 00:02:50,000
energy so gibbs free energy is just a

84
00:02:54,229 --> 00:02:51,680
measure of

85
00:02:56,630 --> 00:02:54,239
how how spontaneous a reaction is it's

86
00:02:58,869 --> 00:02:56,640
how much the reaction wants to occur and

87
00:03:01,030 --> 00:02:58,879
what happened last year pretend on this

88
00:03:04,229 --> 00:03:01,040

screen that i have a

89

00:03:06,550 --> 00:03:04,239

um just like an exponential decrease on

90

00:03:09,030 --> 00:03:06,560

a graph and this side is concentration

91

00:03:11,110 --> 00:03:09,040

of amino acid and this side is gibbs

92

00:03:12,550 --> 00:03:11,120

free energy increasing gibbs free energy

93

00:03:15,830 --> 00:03:12,560

and the relationship that i got out of

94

00:03:18,390 --> 00:03:15,840

my data last year was that you have

95

00:03:19,910 --> 00:03:18,400

more amino acids being created with an

96

00:03:21,190 --> 00:03:19,920

increase in gibbs free energy which is

97

00:03:22,070 --> 00:03:21,200

exactly the pattern that we would expect

98

00:03:24,149 --> 00:03:22,080

to see

99

00:03:26,790 --> 00:03:24,159

but now given that relationship

100

00:03:27,830 --> 00:03:26,800

i've come back through all my data

101
00:03:29,030 --> 00:03:27,840
um

102
00:03:30,550 --> 00:03:29,040
oh i was going to talk about meteorites

103
00:03:32,710 --> 00:03:30,560
i kind of just skipped a slide let's

104
00:03:34,550 --> 00:03:32,720
pretend that didn't happen meteorites

105
00:03:36,229 --> 00:03:34,560
which have been mentioned um there's a

106
00:03:38,149 --> 00:03:36,239
whole lot of meteorites i don't look at

107
00:03:39,990 --> 00:03:38,159
most of them about four percent of

108
00:03:41,990 --> 00:03:40,000
meteorite falls or something called um

109
00:03:45,270 --> 00:03:42,000
these carbonaceous chondrites that i

110
00:03:49,350 --> 00:03:45,280
look at that's this green column here on

111
00:03:51,190 --> 00:03:49,360
the left and these the cmci cr cvs also

112
00:03:52,470 --> 00:03:51,200
the cos

113
00:03:54,949 --> 00:03:52,480

and

114

00:03:57,509 --> 00:03:54,959
working on new data the the cbs

115

00:03:58,789 --> 00:03:57,519
um have an extremely high content of for

116

00:04:00,789 --> 00:03:58,799
all meteorites they have an extremely

117

00:04:02,630 --> 00:04:00,799
high content of biomolecules and of

118

00:04:03,910 --> 00:04:02,640
water so these are really the meteorite

119

00:04:06,550 --> 00:04:03,920
classes that we want to look at when

120

00:04:08,550 --> 00:04:06,560
we're looking for amino acids

121

00:04:11,190 --> 00:04:08,560
and in addition to these letters which

122

00:04:14,070 --> 00:04:11,200
describe the different meteorite types

123

00:04:16,469 --> 00:04:14,080
they also fall into a petrologic class

124

00:04:19,270 --> 00:04:16,479
and this this the chart down here on the

125

00:04:21,430 --> 00:04:19,280
bottom just tells you roughly how

126

00:04:22,950 --> 00:04:21,440

altered these meteorites are so in the

127

00:04:26,150 --> 00:04:22,960

temperature range which i look at is

128

00:04:27,749 --> 00:04:26,160

between about 150 and 200 degrees c

129

00:04:29,909 --> 00:04:27,759

which is right in here and that

130

00:04:32,230 --> 00:04:29,919

corresponds to the meteorite classes

131

00:04:36,310 --> 00:04:32,240

mostly cm and c2 so i tend to stay

132

00:04:37,909 --> 00:04:36,320

within the cmc2 class of meteorites

133

00:04:40,790 --> 00:04:37,919

this goes back to the data so this is

134

00:04:42,310 --> 00:04:40,800

what i have spent an entire year doing

135

00:04:44,710 --> 00:04:42,320

no one likes looking at tables i have a

136

00:04:46,870 --> 00:04:44,720

table that takes 12 pages to print just

137

00:04:48,469 --> 00:04:46,880

full of amino acid abundance data didn't

138

00:04:51,270 --> 00:04:48,479

want to show you that so instead here's

139

00:04:53,830 --> 00:04:51,280

at least a graph with colors on it

140

00:04:55,430 --> 00:04:53,840

these are just the cm meteorites

141

00:04:57,830 --> 00:04:55,440

everything along the x-axis is a

142

00:04:59,510 --> 00:04:57,840

different sample of meteorites and along

143

00:05:01,110 --> 00:04:59,520

the y-axis is just concentration so

144

00:05:02,870 --> 00:05:01,120

that's parts per billion of amino acid

145

00:05:04,550 --> 00:05:02,880

in whatever meteorite and then all the

146

00:05:05,749 --> 00:05:04,560

different lines are the different amino

147

00:05:08,950 --> 00:05:05,759

acid types

148

00:05:11,270 --> 00:05:08,960

so generically glycine is one of the

149

00:05:13,430 --> 00:05:11,280

most common and easiest to form amino

150

00:05:14,950 --> 00:05:13,440

acids that we see

151

00:05:16,310 --> 00:05:14,960

so it's this dark blue line that's

152

00:05:18,310 --> 00:05:16,320

mostly towards the top and then you get

153

00:05:20,070 --> 00:05:18,320

some variation but in general kind of

154

00:05:21,590 --> 00:05:20,080

the the pattern to see from the cms is

155

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

that you have fairly high concentrations

156

00:05:25,110 --> 00:05:23,520

in here you know you have 10 to the 3

157

00:05:27,430 --> 00:05:25,120

and 10 to the four concentrations of all

158

00:05:29,350 --> 00:05:27,440

these amino acids

159

00:05:31,350 --> 00:05:29,360

as opposed to something like this we

160

00:05:33,510 --> 00:05:31,360

have fewer fewer ci meteorites but you

161

00:05:35,590 --> 00:05:33,520

know now we're down you know 10 to the 3

162

00:05:37,110 --> 00:05:35,600

10 to the two range for the ci type

163

00:05:38,710 --> 00:05:37,120

meteorites

164

00:05:42,790 --> 00:05:38,720

cos again

165

00:05:47,110 --> 00:05:45,749

crs are interesting classically cms are

166

00:05:49,189 --> 00:05:47,120

supposed to be the meteorites that have

167

00:05:51,350 --> 00:05:49,199

the the greatest biomolecule

168

00:05:52,710 --> 00:05:51,360

concentrations in there but there are a

169

00:05:54,870 --> 00:05:52,720

couple of exceptions and those

170

00:05:57,430 --> 00:05:54,880

exceptions all are within the cr class

171

00:05:59,350 --> 00:05:57,440

of meteorites you see these guys

172

00:06:01,029 --> 00:05:59,360

these guys here have up into the 10 to

173

00:06:03,590 --> 00:06:01,039

the 5 10 to the 6 parts per billion

174

00:06:05,590 --> 00:06:03,600

concentrations of amino acids

175

00:06:06,629 --> 00:06:05,600

and that doesn't mean anything well i'm

176

00:06:08,309 --> 00:06:06,639

sorry that's not what i meant it means

177

00:06:09,590 --> 00:06:08,319

stuff on its own not to me it's

178

00:06:11,909 --> 00:06:09,600

important to me because that means when

179

00:06:13,749 --> 00:06:11,919

i try to do my modeling i can't just

180

00:06:15,590 --> 00:06:13,759

match something according to an order of

181

00:06:17,510 --> 00:06:15,600

magnitude now i have it gets into

182

00:06:19,590 --> 00:06:17,520

variation you know over multiple orders

183

00:06:21,350 --> 00:06:19,600

of magnitude which is just hard to do

184

00:06:23,430 --> 00:06:21,360

computationally

185

00:06:24,710 --> 00:06:23,440

oh and cvs more meteorites lots of

186

00:06:25,670 --> 00:06:24,720

meteorites

187

00:06:27,990 --> 00:06:25,680

this is

188

00:06:30,469 --> 00:06:28,000

probably um

189

00:06:32,390 --> 00:06:30,479

this is my baby this is a year's worth

190

00:06:34,390 --> 00:06:32,400

of work in one plot

191

00:06:35,189 --> 00:06:34,400

i don't get pretty pictures like a lot

192

00:06:39,990 --> 00:06:35,199

of

193

00:06:41,749 --> 00:06:40,000

total average amino acid concentration

194

00:06:43,430 --> 00:06:41,759

so each different color each column is a

195

00:06:45,670 --> 00:06:43,440

different amino acid and they've been

196

00:06:48,390 --> 00:06:45,680

averaged and totaled over the different

197

00:06:51,510 --> 00:06:48,400

meteorite classes and petrologic types

198

00:06:52,629 --> 00:06:51,520

so this is very broken down according to

199

00:06:54,070 --> 00:06:52,639

the pressure and the temperature

200

00:06:55,590 --> 00:06:54,080

involved in making these meteorites and

201
00:06:57,990 --> 00:06:55,600
what you see is exactly what we saw in

202
00:07:01,589 --> 00:06:58,000
the earlier pattern you have the cm2 and

203
00:07:03,510 --> 00:07:01,599
the cr2s that have orders of magnitude

204
00:07:05,270 --> 00:07:03,520
more concentration of amino acids than

205
00:07:07,909 --> 00:07:05,280
something like the ci's you know the

206
00:07:09,189 --> 00:07:07,919
petrologic type ones and the cvs and the

207
00:07:11,189 --> 00:07:09,199
cos

208
00:07:13,110 --> 00:07:11,199
so that's just reassuring

209
00:07:14,870 --> 00:07:13,120
um after we have that data what we need

210
00:07:17,350 --> 00:07:14,880
to do is convert it because parts per

211
00:07:19,670 --> 00:07:17,360
billion is useful to the observers

212
00:07:21,350 --> 00:07:19,680
um but when it comes out of my computer

213
00:07:23,430 --> 00:07:21,360

it doesn't happen in parts per billion i

214

00:07:25,110 --> 00:07:23,440

get data that um

215

00:07:26,469 --> 00:07:25,120

doesn't look like that so this graph is

216

00:07:28,550 --> 00:07:26,479

just showing you

217

00:07:30,629 --> 00:07:28,560

specifically i'm relating all of the

218

00:07:32,870 --> 00:07:30,639

concentrations in this graph i'm now

219

00:07:34,790 --> 00:07:32,880

just dividing them by the concentration

220

00:07:37,029 --> 00:07:34,800

of glycine so that we have a plot

221

00:07:38,870 --> 00:07:37,039

relative to glycine in this image

222

00:07:41,589 --> 00:07:38,880

this is specifically for the cm type

223

00:07:43,430 --> 00:07:41,599

meteorites and this for the crs

224

00:07:44,629 --> 00:07:43,440

and again the takeaway message for here

225

00:07:46,710 --> 00:07:44,639

is that

226

00:07:49,110 --> 00:07:46,720

with some exceptions you classically

227

00:07:51,350 --> 00:07:49,120

have like six or so amino acids that

228

00:07:53,110 --> 00:07:51,360

really are the amino acids that stand

229

00:07:54,869 --> 00:07:53,120

out for being present in uh in

230

00:07:56,950 --> 00:07:54,879

meteorites so we have a lot of a lot of

231

00:07:59,589 --> 00:07:56,960

glycine a lot of alanine usually we have

232

00:08:01,670 --> 00:07:59,599

more serine aspartic acid glutamic acid

233

00:08:03,830 --> 00:08:01,680

and valine are kind of the main

234

00:08:05,029 --> 00:08:03,840

things

235

00:08:06,230 --> 00:08:05,039

um

236

00:08:07,510 --> 00:08:06,240

it doesn't look like it i know they're

237

00:08:09,430 --> 00:08:07,520

not really exciting pictures but that

238

00:08:11,589 --> 00:08:09,440

was a lot of work it was a lot of work

239

00:08:13,670 --> 00:08:11,599

so the point is now i have

240

00:08:15,909 --> 00:08:13,680

concentrations and i know what i'm

241

00:08:17,270 --> 00:08:15,919

looking for um so now we come back and

242

00:08:18,390 --> 00:08:17,280

do this which is what i'm working on

243

00:08:19,350 --> 00:08:18,400

just now

244

00:08:20,869 --> 00:08:19,360

um

245

00:08:22,469 --> 00:08:20,879

this is done with a program called chem

246

00:08:24,309 --> 00:08:22,479

app chem app

247

00:08:30,230 --> 00:08:24,319

is

248

00:08:32,949 --> 00:08:30,240

gibbs free energy of a system that you

249

00:08:34,949 --> 00:08:32,959

input so i can take chemap and i say hey

250

00:08:36,709 --> 00:08:34,959

i want you to consider all of these

251

00:08:38,630 --> 00:08:36,719

reactants so we use something called

252

00:08:40,709 --> 00:08:38,640

strecker synthesis to model the reaction

253

00:08:43,509 --> 00:08:40,719

of or the the synthesis amino acid so we

254

00:08:46,310 --> 00:08:43,519

input hcn and ammonia and water and some

255

00:08:47,110 --> 00:08:46,320

aldehydes and what we hope to get out

256

00:08:49,030 --> 00:08:47,120

are

257

00:08:51,670 --> 00:08:49,040

relative concentrations of these six

258

00:08:54,310 --> 00:08:51,680

amino acids uh relative to the glycine

259

00:08:55,430 --> 00:08:54,320

that match the observed abundances

260

00:08:56,630 --> 00:08:55,440

and you can see that's actually working

261

00:08:58,470 --> 00:08:56,640

pretty well

262

00:09:01,509 --> 00:08:58,480

yay um

263

00:09:03,910 --> 00:09:01,519

so sorry observed is in the red on the

264

00:09:05,990 --> 00:09:03,920

the left side of each of these bars

265

00:09:08,150 --> 00:09:06,000

the red is observed abundances of some

266

00:09:10,630 --> 00:09:08,160

amino acid and the green on the right

267

00:09:12,470 --> 00:09:10,640

side is simulated so that's what's

268

00:09:15,030 --> 00:09:12,480

coming out of my of my model and you can

269

00:09:16,870 --> 00:09:15,040

see that easily to within

270

00:09:18,389 --> 00:09:16,880

roughly an order of magnitude i'm

271

00:09:20,310 --> 00:09:18,399

actually getting out concentrations that

272

00:09:22,630 --> 00:09:20,320

agree with observed values of amino

273

00:09:24,550 --> 00:09:22,640

acids for um

274

00:09:25,670 --> 00:09:24,560

for

275

00:09:27,190 --> 00:09:25,680

yeah

276

00:09:29,750 --> 00:09:27,200

i totally just lost my train of thought

277

00:09:31,430 --> 00:09:29,760

sorry where it's working it's working

278

00:09:32,470 --> 00:09:31,440

yay is the point

279

00:09:33,910 --> 00:09:32,480

um

280

00:09:35,590 --> 00:09:33,920

so matching matching amino acid

281

00:09:38,949 --> 00:09:35,600

abundances yay and i'm done and i'm

282

00:09:41,190 --> 00:09:38,959

actually on time um ralph my supervisor

283

00:09:42,550 --> 00:09:41,200

undergraduate help darren yay

284

00:09:49,190 --> 00:09:42,560

thanks i'm done

285

00:09:53,670 --> 00:09:51,910

over here sure just a quick one um why

286

00:09:56,710 --> 00:09:53,680

are you normalizing it to like why

287

00:09:58,389 --> 00:09:56,720

glycine um i couldn't give you an exact

288

00:10:00,310 --> 00:09:58,399

answer because classically people who

289

00:10:02,150 --> 00:10:00,320

have looked at amino acids on meteorites

290

00:10:04,710 --> 00:10:02,160

normalize everything to glycine it's

291

00:10:06,310 --> 00:10:04,720

just kind of historical yeah it's just

292

00:10:08,389 --> 00:10:06,320

people have done that for

293

00:10:11,670 --> 00:10:08,399

as long as i like standard mean ocean

294

00:10:13,110 --> 00:10:11,680

water yeah okay that's just what um

295

00:10:15,910 --> 00:10:13,120

convention is the word that i want it's

296

00:10:17,030 --> 00:10:15,920

just convention by now

297

00:10:18,389 --> 00:10:17,040

good question though i wondered the same

298

00:10:21,990 --> 00:10:18,399

thing i never found out

299

00:10:25,670 --> 00:10:24,230

uh if i could i'd like to add to that

300

00:10:27,590 --> 00:10:25,680

comment um

301
00:10:30,150 --> 00:10:27,600
normalization to glycine occurs because

302
00:10:32,150 --> 00:10:30,160
it's the simplest amino acid so it makes

303
00:10:34,870 --> 00:10:32,160
sense to normalize to the one that's

304
00:10:37,509 --> 00:10:34,880
easiest to make

305
00:10:41,030 --> 00:10:37,519
i have a question about

306
00:10:42,509 --> 00:10:41,040
your striker synthesis simulation so

307
00:10:44,470 --> 00:10:42,519
i want to make sure i didn't

308
00:10:45,430 --> 00:10:44,480
misinterpret what you said did you say

309
00:10:47,670 --> 00:10:45,440
that you

310
00:10:50,150 --> 00:10:47,680
put aldehydes into your

311
00:10:51,910 --> 00:10:50,160
strecker model synthesis

312
00:10:53,990 --> 00:10:51,920
that should be formed by the striker

313
00:10:55,670 --> 00:10:54,000

synthesis yes we are only considering

314

00:10:57,430 --> 00:10:55,680

striker synthesis that begins with the

315

00:10:58,790 --> 00:10:57,440

aldehydes we are not doing formation of

316

00:11:00,470 --> 00:10:58,800

aldehydes in our model because it gets

317

00:11:02,230 --> 00:11:00,480

too complicated we have too many

318

00:11:04,389 --> 00:11:02,240

variables if we include everything that

319

00:11:07,110 --> 00:11:04,399

also is needed to make the aldehydes but

320

00:11:09,030 --> 00:11:07,120

because we have detected aldehydes in

321

00:11:10,949 --> 00:11:09,040

comets and meteorites and stuff like

322

00:11:13,509 --> 00:11:10,959

this we're assuming that they're there

323

00:11:16,230 --> 00:11:13,519

so in our model it is very much assuming

324

00:11:17,590 --> 00:11:16,240

an unnecessary amount of

325

00:11:19,110 --> 00:11:17,600

of aldehydes that are already in the

326

00:11:20,550 --> 00:11:19,120

system these are the amino acids we

327

00:11:23,030 --> 00:11:20,560

would produce

328

00:11:25,350 --> 00:11:23,040

okay so

329

00:11:27,670 --> 00:11:25,360

you're considering strecker synthesis

330

00:11:29,110 --> 00:11:27,680

starting from the aldehyde yes

331

00:11:30,949 --> 00:11:29,120

but strecker synthesis makes the

332

00:11:32,630 --> 00:11:30,959

aldehyde strecker synthesis makes the

333

00:11:34,949 --> 00:11:32,640

amino acids

334

00:11:36,470 --> 00:11:34,959

right so the the aldehydes form first

335

00:11:37,829 --> 00:11:36,480

then that's protonated and you get the

336

00:11:41,030 --> 00:11:37,839

amino acid

337

00:11:43,750 --> 00:11:41,040

but the aldehyde is formed with in the

338

00:11:46,069 --> 00:11:43,760

presence of ammonia and hcn like you

339

00:11:48,310 --> 00:11:46,079

mentioned yes so that's the precursor

340

00:11:51,110 --> 00:11:48,320

that's formed during striker synthesis

341

00:11:53,430 --> 00:11:51,120

yes so are you're simulating the latter

342

00:11:54,870 --> 00:11:53,440

half of the strike so not the entire

343

00:11:56,069 --> 00:11:54,880

striker synthesis process no we're not

344

00:11:57,750 --> 00:11:56,079

doing formation valve heights we're

345

00:11:59,269 --> 00:11:57,760

saying given aldehydes because once you

346

00:12:00,630 --> 00:11:59,279

have an aldehyde you react again with

347

00:12:02,069 --> 00:12:00,640

the hcn and the ammonia and the other

348

00:12:05,030 --> 00:12:02,079

things and what comes out the far end is

349

00:12:06,710 --> 00:12:05,040

an amino acid that's it's very no one's

350

00:12:08,230 --> 00:12:06,720

ever done this before and you i can't

351
00:12:09,910 --> 00:12:08,240
include all the parameters in this model

352
00:12:11,990 --> 00:12:09,920
right off the bat it's impossible so

353
00:12:13,509 --> 00:12:12,000
we're for now looking specifically at

354
00:12:22,870 --> 00:12:13,519
amino acid concentrations and trying to

355
00:12:27,750 --> 00:12:24,629
all right so also in your synthetic

356
00:12:28,870 --> 00:12:27,760
model you're only using like a normal um

357
00:12:30,389 --> 00:12:28,880
well

358
00:12:31,750 --> 00:12:30,399
aldehydes and those sort of things do

359
00:12:33,269 --> 00:12:31,760
you have any of the exotic charge

360
00:12:35,110 --> 00:12:33,279
species that you see in dusk screen

361
00:12:37,350 --> 00:12:35,120
formations or the meteorites to take

362
00:12:40,230 --> 00:12:37,360
into account some of those or is it just

363
00:12:42,550 --> 00:12:40,240

the basic striker synthesis model it's

364

00:12:44,790 --> 00:12:42,560

again mostly basic because this research

365

00:12:46,550 --> 00:12:44,800

is so new we have another summer student

366

00:12:48,550 --> 00:12:46,560

right now who's looking at ketones and

367

00:12:49,910 --> 00:12:48,560

carboxylic acids and we're trying to get

368

00:12:51,590 --> 00:12:49,920

other data outside of just the

369

00:12:53,269 --> 00:12:51,600

meteorites that we have but from my

370

00:12:55,269 --> 00:12:53,279

project which because no one's done this

371

00:12:57,509 --> 00:12:55,279

before it's very much limited to this

372

00:12:59,350 --> 00:12:57,519

set of meteorites and just like half a

373

00:13:01,350 --> 00:12:59,360

dozen aldehydes

374

00:13:02,629 --> 00:13:01,360

all right yeah it's it both of your

375

00:13:03,990 --> 00:13:02,639

points are very valid and that's future

376

00:13:05,829 --> 00:13:04,000

work that we would like to do it's just

377

00:13:08,470 --> 00:13:05,839

because we haven't had

378

00:13:10,069 --> 00:13:08,480

a chance yet

379

00:13:12,310 --> 00:13:10,079

hi alyssa thank you that was very nice

380

00:13:13,590 --> 00:13:12,320

talk um i wanted to comment on the one

381

00:13:16,710 --> 00:13:13,600

slide that you showed the different

382

00:13:17,990 --> 00:13:16,720

classes of meteorites it looked like

383

00:13:19,829 --> 00:13:18,000

two of the classes that were in the

384

00:13:21,269 --> 00:13:19,839

center that had more the red orangey

385

00:13:22,470 --> 00:13:21,279

colors oh go back

386

00:13:25,110 --> 00:13:22,480

whoa back

387

00:13:28,069 --> 00:13:25,120

sorry you just passed it oh this one yes

388

00:13:29,750 --> 00:13:28,079

that one so cm2 and cr2 it looks like

389

00:13:32,069 --> 00:13:29,760

the the orange and reds are more

390

00:13:33,910 --> 00:13:32,079

hydrophobic amino acids i was wondering

391

00:13:36,790 --> 00:13:33,920

if you could comment on the significance

392

00:13:38,629 --> 00:13:36,800

of that compared to the other classes

393

00:13:41,030 --> 00:13:38,639

is there one

394

00:13:44,150 --> 00:13:41,040

um i am not a chemist

395

00:13:45,829 --> 00:13:44,160

um i'm sure there is we've had um some

396

00:13:47,750 --> 00:13:45,839

other people that are interested in this

397

00:13:49,509 --> 00:13:47,760

work that want to look more at some

398

00:13:52,150 --> 00:13:49,519

specific chemical

399

00:13:54,470 --> 00:13:52,160

behaviors of these amino acids

400

00:13:56,389 --> 00:13:54,480

i can absolutely not comment on that

401

00:13:58,550 --> 00:13:56,399

sorry um people are looking at you know

402

00:14:01,829 --> 00:13:58,560

hydrophobicity and

403

00:14:03,189 --> 00:14:01,839

electron stuff stuff and how conductive

404

00:14:04,870 --> 00:14:03,199

they are and all these other things and

405

00:14:07,670 --> 00:14:04,880

i'm like yeah sure you know

406

00:14:10,310 --> 00:14:07,680

so they do that i have no idea