
Yoko Kebukawa

# *Formation of amino acid precursors with insoluble organic matter in early Solar System small bodies*

1
00:00:00,160 --> 00:00:12,669
[Music]

2
00:00:22,220 --> 00:00:18,590
and the protoplanetary disk and then in

3
00:00:28,519 --> 00:00:22,230
the protocol and planetary disc sisters

4
00:00:32,269 --> 00:00:28,529
are treated to make planets Mars which

5
00:00:37,970 --> 00:00:32,279
is actually nowadays asteroid is the

6
00:00:43,310 --> 00:00:37,980
remaining of punishment and most of the

7
00:00:47,319 --> 00:00:43,320
meteorite came from asteroids so that's

8
00:00:50,240 --> 00:00:47,329
why the meteorite containing in much

9
00:00:55,180 --> 00:00:50,250
information about the Allosaurus system

10
00:00:59,930 --> 00:00:55,190
evolution so some meteorites containing

11
00:01:02,630 --> 00:00:59,940
organic matter and these organic matter

12
00:01:06,289 --> 00:01:02,640
also important to understand chemistry

13
00:01:09,679 --> 00:01:06,299

in our solar system and also important

14
00:01:13,850 --> 00:01:09,689
in respect of origin of life because

15
00:01:21,070 --> 00:01:13,860
it's organic matter can be brought to

16
00:01:24,020 --> 00:01:21,080
the Arias in meteorites and also

17
00:01:31,280 --> 00:01:24,030
interplanetary dust particles they are

18
00:01:33,260 --> 00:01:31,290
kind of small meteorite so this right is

19
00:01:39,460 --> 00:01:33,270
actually kind of similar to the first

20
00:01:50,060 --> 00:01:47,649
so this I see that evaporated and the

21
00:01:53,600 --> 00:01:50,070
condensation in the inside of a sub

22
00:01:58,760 --> 00:01:53,610
photo parentally disk and some eyes are

23
00:02:05,980 --> 00:01:58,770
survived or to form I see Frank

24
00:02:13,370 --> 00:02:10,999
unsung contains the industrial chemistry

25
00:02:19,550 --> 00:02:13,380
and some wha also

26
00:02:22,850 --> 00:02:19,560
mix and the condensate ice and the

27
00:02:25,910 --> 00:02:22,860
prongs Schimmel's containing ice then

28
00:02:30,590 --> 00:02:25,920
they are heated by mostly by the decay

29
00:02:35,170 --> 00:02:30,600
of aluminum 26 and then the wicket

30
00:02:41,000 --> 00:02:35,180
water-saturated inja in a photocell

31
00:02:44,000 --> 00:02:41,010
afterwards so Cherokee totally activists

32
00:02:48,610 --> 00:02:44,010
and hydras minerals to form secondary

33
00:02:54,640 --> 00:02:48,620
minerals such as hydrated circuit

34
00:02:58,670 --> 00:02:54,650
philosophically how 18 and so on and

35
00:03:03,260 --> 00:02:58,680
further heating cause summer

36
00:03:08,590 --> 00:03:03,270
metamorphism as well all these prophets

37
00:03:11,810 --> 00:03:08,600
profits are caused by bus in the

38
00:03:16,550 --> 00:03:11,820

meteorites so actually there is some

39
00:03:19,970 --> 00:03:16,560
flash I busty in meteorites the most

40
00:03:23,600 --> 00:03:19,980
primitive class of meteorites called

41
00:03:29,060 --> 00:03:23,610
so-called carbonaceous chondrites which

42
00:03:31,720 --> 00:03:29,070
is known to contain organic matter so

43
00:03:35,770 --> 00:03:31,730
carbonaceous chondrite actually has

44
00:03:39,170 --> 00:03:35,780
several groups actually I shame

45
00:03:43,730 --> 00:03:39,180
something like that so most primitive

46
00:03:50,480 --> 00:03:43,740
kind of a carbonaceous chondrite GI GM

47
00:03:53,240 --> 00:03:50,490
and she are hundreds and so I put some

48
00:04:01,280 --> 00:03:53,250
numbers in here these so-called

49
00:04:04,250 --> 00:04:01,290
datalogic types it this is a degree of

50
00:04:07,430 --> 00:04:04,260
aqueous alteration and degree of summer

51
00:04:11,510 --> 00:04:07,440
metamorphism so talking a little bit

52
00:04:16,660 --> 00:04:11,520
more about cäcilie so for example the

53
00:04:20,510 --> 00:04:16,670
micro meteorites are called GM food

54
00:04:23,530 --> 00:04:20,520
carbonaceous chondrites a group GM group

55
00:04:27,790 --> 00:04:23,540
with pathologic types

56
00:04:32,740 --> 00:04:27,800
to conduct so I talked about a little

57
00:04:35,260 --> 00:04:32,750
bit more about Pedro logic types so if

58
00:04:38,050 --> 00:04:35,270
we will have experienced up the

59
00:04:42,910 --> 00:04:38,060
adulteration the epidural click type

60
00:04:47,230 --> 00:04:42,920
will be one or two so one is much

61
00:04:51,670 --> 00:04:47,240
altered compared to number two aside to

62
00:04:55,560 --> 00:04:51,680
so step 3 considered as a primitive one

63
00:04:59,200 --> 00:04:55,570

but actually some most of the type 3

64
00:05:05,800 --> 00:04:59,210
conducts I experienced some are

65
00:05:09,450 --> 00:05:05,810
metamorphism and type 4 or more heavily

66
00:05:13,930 --> 00:05:09,460
summary metamorphose convent so

67
00:05:26,680 --> 00:05:13,940
basically organic matter only images in

68
00:05:28,510 --> 00:05:26,690
type 1 2 3 types from guys so most

69
00:05:30,910 --> 00:05:28,520
primitive type of carbonaceous

70
00:05:35,290 --> 00:05:30,920
chondrites contain up to a few eight

71
00:05:38,440 --> 00:05:35,300
percent of organic matter sunspot

72
00:05:42,460 --> 00:05:38,450
so-called solvent soluble organic matter

73
00:05:44,830 --> 00:05:42,470
which is ethics extractable with solvent

74
00:05:47,740 --> 00:05:44,840
in methanol awards hours and single

75
00:05:51,700 --> 00:05:47,750
cells including carboxylic acids and

76
00:05:55,600 --> 00:05:51,710
amino acids and so on the majority is

77
00:06:00,690 --> 00:05:55,610
actually desist as in silver on organic

78
00:06:06,180 --> 00:06:00,700
matter so-called IOM which is is

79
00:06:13,420 --> 00:06:10,900
so these are very complex in molecular

80
00:06:21,000 --> 00:06:13,430
structure this is a modern structure of

81
00:06:25,210 --> 00:06:21,010
IOM from much vomit right so containing

82
00:06:28,690 --> 00:06:25,220
aromatic squads with bunch of functional

83
00:06:31,150 --> 00:06:28,700
good like aliphatic or carboxyl

84
00:06:37,130 --> 00:06:31,160
something like that

85
00:06:43,580 --> 00:06:37,140
so looking at more 40 this is tem image

86
00:06:47,090 --> 00:06:43,590
of iom its containing fluffy kind of iom

87
00:06:51,200 --> 00:06:47,100
this is shelly muscles iom conscious

88
00:06:58,760 --> 00:06:51,210

with fluffy type and some global global

89
00:07:04,120 --> 00:06:58,770
shapes one concept but global only con

90
00:07:12,740 --> 00:07:04,130
only about ten percent of the volume of

91
00:07:15,980 --> 00:07:12,750
the iom but fluffy one only detectable

92
00:07:20,330 --> 00:07:15,990
after acid demineralization you cannot

93
00:07:24,770 --> 00:07:20,340
observe even in p.m. because they are

94
00:07:33,800 --> 00:07:24,780
very fine and split into the mineral

95
00:07:40,600 --> 00:07:33,810
matrix mostly for escape so the

96
00:07:43,520 --> 00:07:40,610
molecular structure of his iom coming is

97
00:07:45,620 --> 00:07:43,530
very sensitive to the parent of Allah

98
00:07:50,540 --> 00:07:45,630
process like summer process or

99
00:07:59,180 --> 00:07:50,550
alterations so this the structure change

100
00:08:02,450 --> 00:07:59,190
as heating at by heating for example the

101
00:08:06,670 --> 00:08:02,460
aliphatic more more aliphatic

102
00:08:12,530 --> 00:08:06,680
particulates with heating and also

103
00:08:19,100 --> 00:08:12,540
carbonyl path decrease with heating so

104
00:08:22,310 --> 00:08:19,110
this is this basically deflects the arm

105
00:08:27,980 --> 00:08:22,320
oxidation loss of branching aliphatic

106
00:08:32,969 --> 00:08:27,990
crunching or this angel I will kill

107
00:08:45,310 --> 00:08:40,060
so looking at soy boricua toss there are

108
00:08:47,680 --> 00:08:45,320
very diverse in structure and the recent

109
00:08:51,190 --> 00:08:47,690
results show that tens of thousands of

110
00:08:53,610 --> 00:08:51,200
different worker compositions exist in a

111
00:08:57,190 --> 00:08:53,620
single meter right much for me tonight

112
00:09:01,540 --> 00:08:57,200
so this is only molecular composition so

113
00:09:05,500 --> 00:09:01,550

if you consider the work you structure

114
00:09:10,750 --> 00:09:05,510
it will be millions of diapers molecular

115
00:09:17,280 --> 00:09:10,760
structure exists in increments right so

116
00:09:21,660 --> 00:09:17,290
now we were focusing on amino acids and

117
00:09:24,990 --> 00:09:21,670
this is a comparison of amino acids

118
00:09:28,840 --> 00:09:25,000
abundance and the relative abundance of

119
00:09:33,580 --> 00:09:28,850
value I mean amino acid species in

120
00:09:36,700 --> 00:09:33,590
various meteoroids so the moderately

121
00:09:45,010 --> 00:09:36,710
aqueous or third type of nicorette

122
00:09:51,480 --> 00:09:45,020
extreme to shear to see our 300 they

123
00:09:54,670 --> 00:09:51,490
have most amino acid abundance and

124
00:10:01,150 --> 00:09:54,680
mostly in the form of alpha type am

125
00:10:03,940 --> 00:10:01,160
agnostic but if if you experience more

126
00:10:07,810 --> 00:10:03,950
of the association's amino acids

127
00:10:09,910 --> 00:10:07,820
advantage securities and also the

128
00:10:13,960 --> 00:10:09,920
portion of our farm in our society

129
00:10:19,720 --> 00:10:13,970
decreased and deductive abundance of

130
00:10:22,390 --> 00:10:19,730
gamma under deterministic increase so

131
00:10:28,750 --> 00:10:22,400
this is this very same thing if we

132
00:10:31,290 --> 00:10:28,760
experienced some are metamorphism so in

133
00:10:34,440 --> 00:10:31,300
the case of summer maximo feels the

134
00:10:39,910 --> 00:10:34,450
amino acid abundance also decrease and

135
00:10:42,039 --> 00:10:39,920
the amino alpha amino acid portion is

136
00:10:48,619 --> 00:10:42,049
decreased

137
00:10:53,439 --> 00:10:48,629
as well and so that's the basic idea of

138
00:10:58,549 --> 00:10:53,449

what caused parent Abadi promise to our

139
00:11:02,869 --> 00:10:58,559
organic muscle endurance so next what's

140
00:11:06,769 --> 00:11:02,879
the origin of the organic matter there

141
00:11:12,109 --> 00:11:06,779
are several hypotheses to make for arias

142
00:11:15,859 --> 00:11:12,119
oven Marcus so fast in the molecular

143
00:11:20,659 --> 00:11:15,869
clouds we are usually and cosmic ray is

144
00:11:26,059 --> 00:11:20,669
a realization of in subsidized can be

145
00:11:30,589 --> 00:11:26,069
produced various organic species and

146
00:11:35,469 --> 00:11:30,599
also in the protostar a nebula so-called

147
00:11:40,329 --> 00:11:35,479
digital type reaction in kaskus and the

148
00:11:44,839 --> 00:11:40,339
test solid stats like shitty case or

149
00:11:50,259 --> 00:11:44,849
metal dust can also produce complex

150
00:11:57,169 --> 00:11:53,029
finally in the Frank Flying Dutchman

151
00:12:02,749 --> 00:11:57,179
face and especially in tutoring aqueous

152
00:12:04,849 --> 00:12:02,759
alteration also various oh and metal

153
00:12:12,460 --> 00:12:04,859
complex oh and motor can be produced

154
00:12:16,839 --> 00:12:12,470
some simple monkey molecules so I think

155
00:12:20,960 --> 00:12:16,849
and every project each process

156
00:12:24,529 --> 00:12:20,970
contributes to make very diverse suite

157
00:12:27,979 --> 00:12:24,539
of organic matter in meteorites and but

158
00:12:34,819 --> 00:12:27,989
now we focusing on the process in crunch

159
00:12:38,419 --> 00:12:34,829
mode so the especially in the aqueous

160
00:12:42,469 --> 00:12:38,429
authorization process is good to make

161
00:12:46,729 --> 00:12:42,479
chemical reactions of the exist of the

162
00:12:51,369 --> 00:12:46,739
vaquita water is very good to dominicks

163
00:12:54,720 --> 00:12:51,379

chemical reactions and also there are

164
00:13:02,160 --> 00:12:54,730
various small molecules from our

165
00:13:07,920 --> 00:13:02,170
la frontera for him and minerals

166
00:13:17,120 --> 00:13:07,930
found in mirrors only also act as a

167
00:13:25,800 --> 00:13:21,860
the Cody it was supposed to form

168
00:13:29,939 --> 00:13:25,810
macromolecular organic solid similar to

169
00:13:34,439 --> 00:13:29,949
ponder it IRL from whole most reactions

170
00:13:38,670 --> 00:13:34,449
using homework ID and also we further

171
00:13:42,900 --> 00:13:38,680
studied this reaction acting nitrogen

172
00:13:47,250 --> 00:13:42,910
I'm cutting ammonium and sherry ammonium

173
00:13:49,949 --> 00:13:47,260
a hafsa how a solid production and also

174
00:13:57,030 --> 00:13:49,959
there are significant incorporation of

175
00:14:00,120 --> 00:13:57,040
nitrogen in products that so whole

176
00:14:03,559 --> 00:14:00,130
aldehyde and ammonia is very common

177
00:14:06,780 --> 00:14:03,569
molecules in interstellar medium and the

178
00:14:09,290 --> 00:14:06,790
comet will so we can expect the

179
00:14:15,629 --> 00:14:09,300
abundance in the early stage of

180
00:14:19,050 --> 00:14:15,639
transitional formation with this simple

181
00:14:23,809 --> 00:14:19,060
heating experiments using formaldehyde

182
00:14:29,670 --> 00:14:23,819
and critical height which is actually a

183
00:14:35,780 --> 00:14:29,680
time of formaldehyde and ammonium with

184
00:14:42,600 --> 00:14:35,790
calcium hydroxide witches attacked so

185
00:14:48,480 --> 00:14:42,610
after heating up the simple just 19 to

186
00:14:55,920 --> 00:14:48,490
250 degree C solutions colors are

187
00:14:57,809 --> 00:14:55,930
changed into that ground there and we

188
00:15:02,519 --> 00:14:57,819

can make soil

189
00:15:06,910 --> 00:15:02,529
we did several different analysis for

190
00:15:12,519 --> 00:15:06,920
solids and liquids as well so I

191
00:15:16,030 --> 00:15:12,529
introduced some part of result so far

192
00:15:20,259 --> 00:15:16,040
looking at the yield of the organic soil

193
00:15:24,670 --> 00:15:20,269
and they increase absent ledger and time

194
00:15:28,960 --> 00:15:24,680
so actually is active like our new

195
00:15:35,889 --> 00:15:28,970
stripes behavior so with its kinetic

196
00:15:39,660 --> 00:15:35,899
analysis of the field of organic soil so

197
00:15:46,989 --> 00:15:39,670
this is a time temperature diagram for

198
00:15:49,540 --> 00:15:46,999
organic soil formation so assuming that

199
00:15:53,799 --> 00:15:49,550
reaction mechanism sudden change in

200
00:16:00,670 --> 00:15:53,809
these temperatures and so even at still

201
00:16:08,970 --> 00:16:00,680
zero degree Celsius the oxox can it can

202
00:16:11,980 --> 00:16:08,980
be formed in the hundred-yard Russell so

203
00:16:17,290 --> 00:16:11,990
considering the apreas alteration period

204
00:16:22,600 --> 00:16:17,300
is about 10 to seven years 13 10 million

205
00:16:26,559 --> 00:16:22,610
years in up Delta H still a CD with

206
00:16:30,429 --> 00:16:26,569
researchers it is fair enough it's

207
00:16:34,720 --> 00:16:30,439
enough time and temperature for makes

208
00:16:38,650 --> 00:16:34,730
enough Oh hypotonic soil and even at the

209
00:16:46,480 --> 00:16:38,660
comic some comments could have biggest

210
00:16:50,079 --> 00:16:46,490
water in at 10 to five years or so so in

211
00:16:54,700 --> 00:16:50,089
that case even in comic maybe you can

212
00:17:03,010 --> 00:16:57,190
and then looking at the multi a

213
00:17:10,380 --> 00:17:03,020

structure of the organic soil the album

214
00:17:15,030 --> 00:17:10,390
13 NMR and ftir black rocks pixel shows

215
00:17:18,310 --> 00:17:15,040
iom and the red one and the guru on our

216
00:17:24,010 --> 00:17:18,320
experimental product i want with

217
00:17:32,670 --> 00:17:24,020
angle without ammonia so generally they

218
00:17:35,650 --> 00:17:32,680
are very similar citra to the iom and

219
00:17:40,060 --> 00:17:35,660
then looking at some all 40 of the

220
00:17:45,660 --> 00:17:40,070
organic soil so some shows physical

221
00:17:50,290 --> 00:17:45,670
shape like fuel micrometer in diameter

222
00:17:55,990 --> 00:17:50,300
so comparing this kind of special shapes

223
00:18:01,270 --> 00:17:56,000
is indicate hydrophobic formation of

224
00:18:08,410 --> 00:18:01,280
these ionic solid and also compared to

225
00:18:11,200 --> 00:18:08,420
the iom in meteorites they also contain

226
00:18:13,480 --> 00:18:11,210
globules kind of moment matter but much

227
00:18:22,140 --> 00:18:13,490
more advanced I experimental product

228
00:18:27,460 --> 00:18:22,150
actually so also we can make fluffy

229
00:18:31,390 --> 00:18:27,470
organic solid as well but so far we we

230
00:18:40,660 --> 00:18:31,400
don't know how we can control morphology

231
00:18:46,350 --> 00:18:40,670
rafi or vehicles for okay so next we are

232
00:19:01,640 --> 00:18:50,340
us we these amino acid analysis in the

233
00:19:06,870 --> 00:19:01,650
liquid phase hplc result of refraction

234
00:19:10,200 --> 00:19:06,880
made by 150 degree field experience so

235
00:19:14,010 --> 00:19:10,210
they have some good icing learning and

236
00:19:16,890 --> 00:19:14,020
returning and some other amino is of

237
00:19:24,090 --> 00:19:16,900
witchery classics and a monologist ashes

238
00:19:28,250 --> 00:19:24,100

also produce so they are the results

239
00:19:38,060 --> 00:19:28,260
from various temperature experiments so

240
00:19:43,440 --> 00:19:38,070
basically the product of the products

241
00:19:47,850 --> 00:19:43,450
about your fame in 90 and 150 and 20

242
00:19:53,190 --> 00:19:47,860
degree Celsius but much less in 250

243
00:19:57,240 --> 00:19:53,200
degrees Celsius and learning are larger

244
00:20:01,530 --> 00:19:57,250
and rising but other one is less than

245
00:20:05,810 --> 00:20:01,540
gracious and they are mostly after a

246
00:20:09,300 --> 00:20:05,820
ship's hide illicit but with this

247
00:20:13,860 --> 00:20:09,310
without us with this analysis with love

248
00:20:17,000 --> 00:20:13,870
acid hydrolysis for 150 sample and we

249
00:20:21,330 --> 00:20:17,010
get some amino acids running and

250
00:20:26,250 --> 00:20:21,340
revitalizing some special earnings but

251
00:20:33,920 --> 00:20:26,260
less than the product of the amino after

252
00:20:41,300 --> 00:20:33,930
a sh ty delicious we did also deal

253
00:20:47,160 --> 00:20:41,310
analysis for some amino acid and they

254
00:20:51,120 --> 00:20:47,170
mostly d and a ratio are same so this is

255
00:20:55,770 --> 00:20:51,130
not contamination from territorial am

256
00:21:03,070 --> 00:20:59,080
looking at the effects of minerals this

257
00:21:07,270 --> 00:21:03,080
is very preliminary results from one of

258
00:21:10,000 --> 00:21:07,280
my students and this is a little bit

259
00:21:16,710 --> 00:21:10,010
different starting material from Libya

260
00:21:22,299 --> 00:21:16,720
Flom not January if you add me as a

261
00:21:24,779 --> 00:21:22,309
colonize or even enhance is of better

262
00:21:34,200 --> 00:21:24,789
learning but not Simon is fun

263
00:21:38,830 --> 00:21:34,210

significant for rising so going back to

264
00:21:44,980 --> 00:21:38,840
a menage abundance this is La Mina

265
00:21:51,070 --> 00:21:44,990
abundance relative to racing without

266
00:21:57,039 --> 00:21:51,080
meals so generally as carbon number

267
00:22:01,750 --> 00:21:57,049
increase the abundance is decreased but

268
00:22:07,510 --> 00:22:01,760
earning our lodges and rising and look

269
00:22:13,110 --> 00:22:07,520
at the gamma amino butyric acid so they

270
00:22:24,070 --> 00:22:17,970
compared to the condo atif amin ah

271
00:22:28,390 --> 00:22:24,080
so compared to the Shiar hundreds they

272
00:22:32,700 --> 00:22:28,400
show generally similar trend and also

273
00:22:38,110 --> 00:22:32,710
compared to the shameful right which is

274
00:22:41,649 --> 00:22:38,120
one ugly f3 or test and shias and this

275
00:22:48,010 --> 00:22:41,659
is also under similar trend access

276
00:22:50,680 --> 00:22:48,020
except this one and the computers or

277
00:22:55,299 --> 00:22:50,690
gaming right wicked more acquiesce be

278
00:22:57,909 --> 00:22:55,309
altered meteorite so they show a little

279
00:23:03,340 --> 00:22:57,919
bit increase of better learning and the

280
00:23:05,760 --> 00:23:03,350
degrees of alpha amino fatal crash it so

281
00:23:10,490 --> 00:23:05,770
in general Joffre samira

282
00:23:13,950 --> 00:23:10,500
and with earthly assorted hundreds and

283
00:23:19,200 --> 00:23:13,960
now compared to the summary metamorphose

284
00:23:22,010 --> 00:23:19,210
chondrites xeo our shivery carbonaceous

285
00:23:24,780 --> 00:23:22,020
chondrite they show some parish

286
00:23:30,080 --> 00:23:24,790
difference between experimental products

287
00:23:36,510 --> 00:23:30,090
and do some illimitable for hundreds so

288
00:23:40,340 --> 00:23:36,520

the beta in input larger much larger and

289
00:23:47,120 --> 00:23:40,350
the alpha amino virtual classes are

290
00:23:52,350 --> 00:23:47,130
smaller and also gamma-aminobutyric acid

291
00:23:55,650 --> 00:23:52,360
our graduation though our temperature

292
00:24:00,330 --> 00:23:55,660
products so this is conscious with the

293
00:24:06,150 --> 00:24:00,340
increase of gamma-aminobutyric acid with

294
00:24:09,330 --> 00:24:06,160
temperature increase so this is probably

295
00:24:15,500 --> 00:24:09,340
due to the thermodynamic thermodynamic

296
00:24:19,950 --> 00:24:15,510
stability of each amino acids so

297
00:24:22,620 --> 00:24:19,960
sometimes nominal stability is a comma

298
00:24:25,500 --> 00:24:22,630
me know which weak acid sometime Islamic

299
00:24:29,610 --> 00:24:25,510
instability is such as a beta learning

300
00:24:35,220 --> 00:24:29,620
and returning is more stable than alpha

301
00:24:37,560 --> 00:24:35,230
amino butyric worship so Amina she could

302
00:24:41,690 --> 00:24:37,570
have been introduced in aqueous

303
00:24:45,360 --> 00:24:41,700
environment in French Emil's and then

304
00:24:50,270 --> 00:24:45,370
extend acquiesce alteration and or

305
00:24:56,220 --> 00:24:50,280
summer metamorphism may destroy revived

306
00:25:00,320 --> 00:24:56,230
amina sheikh and then the deductive

307
00:25:06,540 --> 00:25:00,330
advantage of as strong a molasses have

308
00:25:09,750 --> 00:25:06,550
increased okay so in summary there are

309
00:25:12,980 --> 00:25:09,760
very wide variety of omens mata it was

310
00:25:16,590 --> 00:25:12,990
just in meteorites mostly in primitive

311
00:25:18,600 --> 00:25:16,600
carbonaceous chondrite mainly in the

312
00:25:23,669 --> 00:25:18,610
form of in silver or

313
00:25:27,260 --> 00:25:23,679

mata and some are some also contains

314
00:25:30,890 --> 00:25:27,270
amino acids as well so all technologies

315
00:25:34,380 --> 00:25:30,900
conclusive geez organic matter can be

316
00:25:36,780 --> 00:25:34,390
various and we are focusing on the

317
00:25:39,990 --> 00:25:36,790
process in the Flemish month and widget

318
00:25:43,110 --> 00:25:40,000
experiments simulated acquiesce

319
00:25:48,390 --> 00:25:43,120
alteration using formaldehyde and

320
00:25:52,380 --> 00:25:48,400
ammonia and water so they can we can

321
00:25:55,409 --> 00:25:52,390
form IOM like orange solid as well as

322
00:26:00,060 --> 00:25:55,419
various amino acid species increase in

323
00:26:05,750 --> 00:26:00,070
alpha beta gamma amino acid and do this

324
00:26:17,549 --> 00:26:09,419
aqueous altered chondrites thank you for

325
00:26:27,530 --> 00:26:17,559
your attention okay we are up for

326
00:26:36,780 --> 00:26:34,050
thank you hey Yoko oh very nice talk

327
00:26:38,850 --> 00:26:36,790
thank you and good to see you again the

328
00:26:41,790 --> 00:26:38,860
ddl ratios you measures are actually

329
00:26:45,840 --> 00:26:41,800
pretty high this is that reproducible

330
00:26:50,520 --> 00:26:45,850
and do you have Terry we own weekend we

331
00:26:55,440 --> 00:26:50,530
could only this once this deal analysis

332
00:27:00,090 --> 00:26:55,450
so it's not that so precise so I cannot

333
00:27:03,870 --> 00:27:00,100
say this is this high value is the arrow

334
00:27:15,330 --> 00:27:03,880
or not so we need more experience to do

335
00:27:17,250 --> 00:27:15,340
that to show that yeah there's some

336
00:27:20,220 --> 00:27:17,260
theoretical work that tries to predict

337
00:27:22,320 --> 00:27:20,230
what the original amino acids were in

338
00:27:25,680 --> 00:27:22,330

life not the 20 we have now but maybe

339
00:27:27,990 --> 00:27:25,690
some smaller set 16 or eight or ten and

340
00:27:31,620 --> 00:27:28,000
I'm wondering to what extent your

341
00:27:34,710 --> 00:27:31,630
analyses of amino acids can talk about

342
00:27:36,000 --> 00:27:34,720
is there any I don't know way in which

343
00:27:38,580 --> 00:27:36,010
there's a connection between the

344
00:27:41,190 --> 00:27:38,590
relative abundances of amino acids in us

345
00:27:47,580 --> 00:27:41,200
here today or more earlier life and

346
00:27:50,490 --> 00:27:47,590
these meteor you mean for example

347
00:27:52,170 --> 00:27:50,500
glycine is probably is that it made very

348
00:27:54,840 --> 00:27:52,180
easily it's a their abundance of glycine

349
00:27:58,230 --> 00:27:54,850
is very high is abundance of a glycine

350
00:28:00,180 --> 00:27:58,240
in life very high or the relative

351
00:28:03,030 --> 00:28:00,190
abundances is there anything that can be

352
00:28:11,270 --> 00:28:03,040
correlated between these two examples of

353
00:28:15,510 --> 00:28:11,280
amino acids actually in meteorites yea

354
00:28:19,370 --> 00:28:15,520
Raj among dash part of the meteoritic I

355
00:28:23,550 --> 00:28:19,380
mean a shitty is non protein amino acid

356
00:28:24,870 --> 00:28:23,560
so not actually excited to related I

357
00:28:26,520 --> 00:28:24,880
heard in virtuous incentive I thought

358
00:28:28,710 --> 00:28:26,530
that there were eight of all the many

359
00:28:31,380 --> 00:28:28,720
many like 80 United or eight of them

360
00:28:33,750 --> 00:28:31,390
were yeah yeah why exactly now are those

361
00:28:35,520 --> 00:28:33,760
eight that were in murcheson are they

362
00:28:39,960 --> 00:28:35,530
some of the more abundant ones in life

363
00:28:40,450 --> 00:28:39,970

on Earth absolutely are those eight that

364
00:28:42,400 --> 00:28:40,460
was emerged

365
00:28:45,240 --> 00:28:42,410
for example are they some of the ones

366
00:28:52,060 --> 00:28:45,250
that are most abundant in life on Earth

367
00:28:55,030 --> 00:28:52,070
I think it's most of one jumping my

368
00:28:59,350 --> 00:28:55,040
tongue how about what's most abundant

369
00:29:02,110 --> 00:28:59,360
amino acid in in you ah well my

370
00:29:06,580 --> 00:29:02,120
experiments Alan you know your your body

371
00:29:09,940 --> 00:29:06,590
my body why ah Australia I don't know

372
00:29:33,830 --> 00:29:09,950
much other thing I want to ask for it

373
00:29:38,940 --> 00:29:35,850
long enough it doesn't matter but

374
00:29:41,430 --> 00:29:38,950
alright the the synthesis you do are in

375
00:29:43,620 --> 00:29:41,440
water obviously and they're our

376
00:29:45,390 --> 00:29:43,630
materials that are certainly made

377
00:29:47,580 --> 00:29:45,400
outside the snow line so that you get

378
00:29:49,530 --> 00:29:47,590
plenty of water in the asteroidal

379
00:29:52,260 --> 00:29:49,540
material and there are materials that

380
00:29:54,210 --> 00:29:52,270
are made inside the snow line where you

381
00:29:58,080 --> 00:29:54,220
would expect very little water in that

382
00:30:00,330 --> 00:29:58,090
case would you expect the fundamental

383
00:30:02,310 --> 00:30:00,340
differences a difference in the amino

384
00:30:04,830 --> 00:30:02,320
acids that you produced outside by the

385
00:30:07,410 --> 00:30:04,840
aqueous processes versus inside where

386
00:30:09,990 --> 00:30:07,420
they might be remnants of things or

387
00:30:11,760 --> 00:30:10,000
whatever I I'm not sure that there is

388
00:30:19,350 --> 00:30:11,770

something like that detected but I'd

389
00:30:24,150 --> 00:30:19,360
like to know the stone so most of the

390
00:30:27,330 --> 00:30:24,160
oven mata only found in aqueous we all

391
00:30:30,450 --> 00:30:27,340
that meteorites so like ordinary

392
00:30:35,250 --> 00:30:30,460
chondrites doesn't much doesn't contain

393
00:30:39,090 --> 00:30:35,260
much of omens mata yes that does have

394
00:30:43,169 --> 00:30:39,100
some and this kind of primitive ordinary

395
00:30:49,380 --> 00:30:43,179
chondrites actually experienced aqueous

396
00:30:52,919 --> 00:30:49,390
alteration and and also just another

397
00:30:55,830 --> 00:30:52,929
possibility to produce this organic

398
00:31:00,870 --> 00:30:55,840
matter in ordinary chondrites in it

399
00:31:03,419 --> 00:31:00,880
could be totally different projects it

400
00:31:06,240 --> 00:31:03,429
can be totally different processing no I

401
00:31:08,490 --> 00:31:06,250
agree but I would in that case you would

402
00:31:10,080 --> 00:31:08,500
expect a different distribution for

403
00:31:11,730 --> 00:31:10,090
instance of the amino acids and I was

404
00:31:14,030 --> 00:31:11,740
just curious whether or not that

405
00:31:16,919 --> 00:31:14,040
comparison had been made I don't know ah

406
00:31:20,850 --> 00:31:16,929
jelly ordinary chondrites have kind of

407
00:31:24,210 --> 00:31:20,860
different distribution of Avinash like

408
00:31:31,700 --> 00:31:24,220
gamma what is diminish its are higher

409
00:31:35,220 --> 00:31:31,710
compared to just one it can be like

410
00:31:38,220 --> 00:31:35,230
percocet it could be because of the

411
00:31:42,720 --> 00:31:38,230
science motorman amical stability but

412
00:31:47,230 --> 00:31:42,730
also it could be the formation process

413
00:31:58,760 --> 00:31:51,520

there are many possibility to produce

414
00:32:02,060 --> 00:31:58,770
this kind of defiance so I i cannot say

415
00:32:14,390 --> 00:32:02,070
this is the sixth single answer it could

416
00:32:17,330 --> 00:32:14,400
be just as well okay I have one you

417
00:32:18,950 --> 00:32:17,340
should groups of meteorites right how

418
00:32:20,540 --> 00:32:18,960
accurate are these groups which came out

419
00:32:23,510 --> 00:32:20,550
is because you have some meteorite which

420
00:32:25,460 --> 00:32:23,520
are unclassified so how can you you know

421
00:32:29,210 --> 00:32:25,470
do experiments or you have any

422
00:32:31,850 --> 00:32:29,220
suggestions yeah I think it's good point

423
00:32:35,510 --> 00:32:31,860
because most of the grouping is based on

424
00:32:39,320 --> 00:32:35,520
mineralogy or like isotope voix not

425
00:32:42,320 --> 00:32:39,330
based on organic matter so this is not

426
00:32:47,180 --> 00:32:42,330
always consist with observation with

427
00:32:50,260 --> 00:32:47,190
organic matter so I think like corner

428
00:32:56,060 --> 00:32:50,270
Alexander try to classified using

429
00:32:58,610 --> 00:32:56,070
organic matter also so it should be more

430
00:33:13,269 --> 00:32:58,620
work to be done using momentum attack I

431
00:33:18,229 --> 00:33:15,680
sorry me if I'm wrong but it seems like

432
00:33:21,019 --> 00:33:18,239
you're using a system that could work on

433
00:33:23,629 --> 00:33:21,029
us so why do we need to link it to

434
00:33:25,129 --> 00:33:23,639
meteorites so ah in terms of the origin

435
00:33:26,869 --> 00:33:25,139
of life I mean double chemistry is

436
00:33:29,419 --> 00:33:26,879
brilliant but in terms of the origin of

437
00:33:30,590 --> 00:33:29,429
life is it possible we just doing

438
00:33:32,720 --> 00:33:30,600

everything on earth and don't need to

439
00:33:34,039 --> 00:33:32,730
worry with me try to talk or do you

440
00:33:35,570 --> 00:33:34,049
think meteorites were crucial for the

441
00:33:38,799 --> 00:33:35,580
origin of life in terms of delivery of

442
00:33:45,950 --> 00:33:38,809
substance this kind of reaction can be

443
00:33:51,590 --> 00:33:45,960
occurring like ocean but the muscles in

444
00:33:56,419 --> 00:33:51,600
ocean the precursor speed is what i use

445
00:34:00,879 --> 00:33:56,429
it so in in the case of asteroids you

446
00:34:04,190 --> 00:34:00,889
can have condensed formaldehyde or

447
00:34:13,220 --> 00:34:04,200
ammonium so that's why I think it's

448
00:34:19,129 --> 00:34:13,230
theta down re ocean for this reaction do

449
00:34:22,030 --> 00:34:19,139
you have any last questions all right

450
00:34:22,750 --> 00:34:22,040
let's thank the speaker

451
00:34:32,940 --> 00:34:22,760
[Applause]

452
00:34:47,250 --> 00:34:35,180
and

453
00:34:47,260 --> 00:34:49,760
you