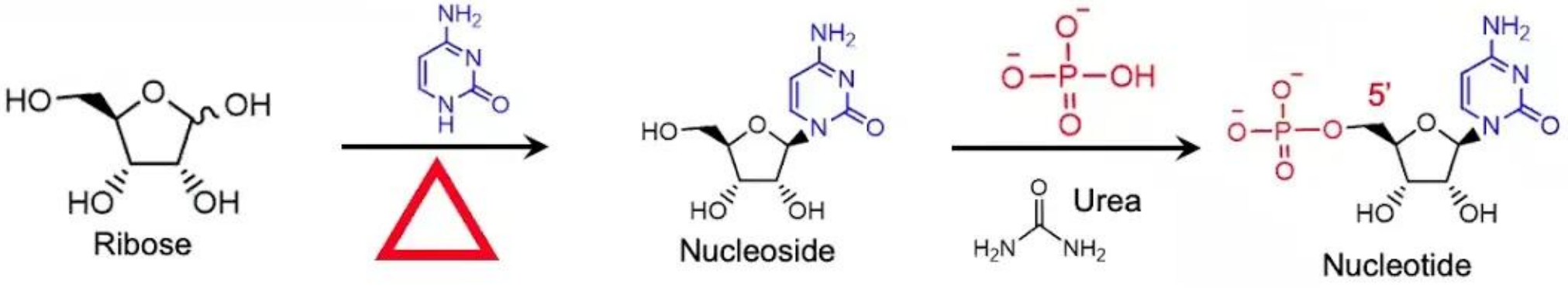
Potential nucleotide formation on the early Earth

Borate-rich evaporitic environment



The nucleotide formation has not completely succeeded.

1
00:00:08,150 --> 00:00:05,110
hello everyone

2
00:00:09,910 --> 00:00:08,160
i am yuta hiragawa a doctoral student at

3
00:00:12,789 --> 00:00:09,920
stoke university

4
00:00:14,230 --> 00:00:12,799
today i will talk about abiotic

5
00:00:16,790 --> 00:00:14,240
selective synthesis

6
00:00:19,510 --> 00:00:16,800
of ribose 5-prime phosphate in

7
00:00:21,910 --> 00:00:19,520
bullet-rich environment

8
00:00:22,710 --> 00:00:21,920
my research interest is the origin of

9
00:00:26,550 --> 00:00:22,720
life and

10
00:00:30,470 --> 00:00:28,870
the current drive uses two types of

11
00:00:33,510 --> 00:00:30,480
nucleic acid

12
00:00:36,630 --> 00:00:33,520
dna and rna

13
00:00:40,630 --> 00:00:36,640

a dna holds gene information

14
00:00:43,990 --> 00:00:40,640
rna catalyzes reaction to make protein

15
00:00:47,110 --> 00:00:44,000
and protein works as biocatalysts in our

16
00:00:49,510 --> 00:00:47,120
body rna can store

17
00:00:50,790 --> 00:00:49,520
genetic information and catalyze the

18
00:00:53,110 --> 00:00:50,800
reaction

19
00:00:54,229 --> 00:00:53,120
so some researchers think that

20
00:00:57,590 --> 00:00:54,239
primordial life

21
00:01:00,950 --> 00:00:57,600
used rna at gene information store

22
00:01:04,390 --> 00:01:00,960
and as a bio catalyst to do

23
00:01:08,149 --> 00:01:04,400
to duplicate themselves this thought

24
00:01:12,230 --> 00:01:08,159
is called rna world hypothesis

25
00:01:14,310 --> 00:01:12,240
based on this hypothesis rna formation

26
00:01:18,230 --> 00:01:14,320
is one of the essential steps for the

27
00:01:25,429 --> 00:01:22,149
rna is a polymer of nucleotides

28
00:01:28,390 --> 00:01:25,439
so we need to make nucleotide fast

29
00:01:29,429 --> 00:01:28,400
the nucleotide is consists of three

30
00:01:32,469 --> 00:01:29,439
components

31
00:01:36,230 --> 00:01:32,479
ribose nucleobase and

32
00:01:40,230 --> 00:01:39,030
the component of a nucleotide probably

33
00:01:43,749 --> 00:01:40,240
existed

34
00:01:46,789 --> 00:01:43,759
on the areas particularly in hypopolitic

35
00:01:49,670 --> 00:01:46,799
environments ribose

36
00:01:51,190 --> 00:01:49,680
and nuclear base will have formed by

37
00:01:54,870 --> 00:01:51,200
condensation reactions

38
00:01:58,709 --> 00:01:54,880

of small molecules such as formaldehyde

39
00:01:59,270 --> 00:01:58,719
and former mite some researchers also

40
00:02:01,990 --> 00:01:59,280
found

41
00:02:04,069 --> 00:02:02,000
these molecules in carbonaceous

42
00:02:06,069 --> 00:02:04,079
chondrite

43
00:02:07,429 --> 00:02:06,079
phosphate will have contained in

44
00:02:11,190 --> 00:02:07,439
phosphate minerals

45
00:02:14,390 --> 00:02:11,200
such as appetite and evaporation

46
00:02:16,550 --> 00:02:14,400
could condense these molecules

47
00:02:17,510 --> 00:02:16,560
so the bullet-rich aeropolitic

48
00:02:19,430 --> 00:02:17,520
environments

49
00:02:20,830 --> 00:02:19,440
could have accumulated the building

50
00:02:24,150 --> 00:02:20,840
blocks of

51
00:02:27,350 --> 00:02:26,470
the nucleotide formation from this small

52
00:02:30,869 --> 00:02:27,360
component

53
00:02:33,350 --> 00:02:30,879
is also investigated previous research

54
00:02:33,990 --> 00:02:33,360
reported that nucleotide could have

55
00:02:37,030 --> 00:02:34,000
found

56
00:02:39,750 --> 00:02:37,040
the nucleoside formation and

57
00:02:41,350 --> 00:02:39,760
following phosphorylation the

58
00:02:45,270 --> 00:02:41,360
phosphorylation reaction

59
00:02:48,390 --> 00:02:45,280
goes well using urea as a catalyst

60
00:02:49,670 --> 00:02:48,400
the nuclear site nucleotide synthesis is

61
00:02:52,070 --> 00:02:49,680
chemically possible

62
00:02:52,710 --> 00:02:52,080
but the possibility on the probiotic

63
00:02:56,070 --> 00:02:52,720

earth

64
00:02:58,070 --> 00:02:56,080
is questionable so the nucleus

65
00:03:01,589 --> 00:02:58,080
in a nucleotide formation has not

66
00:03:05,030 --> 00:03:04,229
nucleoside synthesis needs step-by-step

67
00:03:08,710 --> 00:03:05,040
reactions

68
00:03:11,190 --> 00:03:08,720
of small molecules it is unclear

69
00:03:13,670 --> 00:03:11,200
how geological events made such

70
00:03:17,030 --> 00:03:13,680
complicated reactions possible

71
00:03:19,509 --> 00:03:17,040
on the other hand phosphorylation is a

72
00:03:21,750 --> 00:03:19,519
port reaction we do not need a

73
00:03:24,470 --> 00:03:21,760
complicated procedure

74
00:03:26,229 --> 00:03:24,480
these results mean that phosphorylation

75
00:03:29,509 --> 00:03:26,239
is a simpler reaction

76
00:03:30,830 --> 00:03:29,519
than nucleoside formation it is

77
00:03:33,750 --> 00:03:30,840
difficult to assume

78
00:03:35,589 --> 00:03:33,760
that a complicated reaction occurred

79
00:03:38,149 --> 00:03:35,599
before a simple reaction

80
00:03:39,350 --> 00:03:38,159
so phosphorylation should have should

81
00:03:42,229 --> 00:03:39,360
have occurred

82
00:03:45,670 --> 00:03:42,239
before the nucleus had formation on the

83
00:03:53,509 --> 00:03:49,430
in addition traditional phosphates

84
00:03:56,869 --> 00:03:53,519
are different from biosynthesis

85
00:03:58,789 --> 00:03:56,879
current life makes nucleotide maybe a

86
00:04:01,350 --> 00:03:58,799
ribose phosphate formation

87
00:04:03,190 --> 00:04:01,360
and following nuclear based addition or

88
00:04:05,990 --> 00:04:03,200

nuclear based construction

89
00:04:07,910 --> 00:04:06,000
however the traditional pathway makes

90
00:04:12,830 --> 00:04:07,920
nucleotide for a nucleotide

91
00:04:14,149 --> 00:04:12,840
from nucleoside formation and its

92
00:04:18,870 --> 00:04:14,159
phosphorylation

93
00:04:21,430 --> 00:04:18,880
before the nucleotide formation

94
00:04:22,790 --> 00:04:21,440
is more reasonable for the nucleotide

95
00:04:25,590 --> 00:04:22,800
formation

96
00:04:27,350 --> 00:04:25,600
this bioanalysis pathway has partially

97
00:04:30,790 --> 00:04:27,360
succeeded

98
00:04:33,189 --> 00:04:30,800
previous research reported that

99
00:04:33,909 --> 00:04:33,199
nucleotide formation from sugar

100
00:04:37,189 --> 00:04:33,919
phosphate

101
00:04:41,909 --> 00:04:37,199
using small reactive molecules and

102
00:04:44,150 --> 00:04:41,919
uv right however no one reported the

103
00:04:45,909 --> 00:04:44,160
ribose fiber and phosphate formation

104
00:04:47,830 --> 00:04:45,919
and the probiotically plausible

105
00:04:50,070 --> 00:04:47,840
condition so

106
00:04:53,270 --> 00:04:50,080
this alternative pathway has not got

107
00:04:59,510 --> 00:04:56,310
we think that there are two difficulties

108
00:05:00,629 --> 00:04:59,520
to make arrivals vibrant phosphate low

109
00:05:03,670 --> 00:05:00,639
stability

110
00:05:06,950 --> 00:05:03,680
and low selectivity ribose

111
00:05:10,230 --> 00:05:06,960
is very unstable in heat condition and

112
00:05:13,270 --> 00:05:10,240
quickly turn to brown tile

113
00:05:14,870 --> 00:05:13,280

even if ribose can react with right area

114
00:05:17,189 --> 00:05:14,880
with phosphate

115
00:05:18,710 --> 00:05:17,199
ribose form a one prime phosphate

116
00:05:22,830 --> 00:05:18,720
selectively forms

117
00:05:25,110 --> 00:05:22,840
and ribose fibrin phosphate does not

118
00:05:28,310 --> 00:05:25,120
form

119
00:05:31,670 --> 00:05:28,320
to solve these problems we focused on

120
00:05:33,749 --> 00:05:31,680
bullet bullets have existed

121
00:05:35,670 --> 00:05:33,759
in the biopolitic environment on the

122
00:05:39,029 --> 00:05:35,680
areas

123
00:05:41,590 --> 00:05:39,039
board can stabilize sugar and

124
00:05:43,189 --> 00:05:41,600
ribose preferentially forms among all

125
00:05:47,189 --> 00:05:43,199
other pentoses

126
00:05:50,710 --> 00:05:49,749
birth-rich environment can contribute to

127
00:05:54,550 --> 00:05:50,720
the accumulation

128
00:05:57,749 --> 00:05:54,560
of rivals birds can stabilize

129
00:06:00,790 --> 00:05:57,759
ribose by forming this

130
00:06:01,909 --> 00:06:00,800
ribose bullet complex and control the

131
00:06:06,150 --> 00:06:01,919
phosphorylation

132
00:06:09,029 --> 00:06:06,160
site we thought that

133
00:06:10,390 --> 00:06:09,039
five prime hydroxyl arrivals could be

134
00:06:13,029 --> 00:06:10,400
phosphorylated

135
00:06:13,990 --> 00:06:13,039
in the presence of borate so we

136
00:06:17,189 --> 00:06:14,000
simulated

137
00:06:18,790 --> 00:06:17,199
the bullet-rich environment bullet-rich

138
00:06:21,590 --> 00:06:18,800

evaporative environment

139
00:06:22,870 --> 00:06:21,600
and conducted ribose phosphorylation

140
00:06:26,070 --> 00:06:22,880
experiment

141
00:06:29,189 --> 00:06:26,080
under the condition so the objective

142
00:06:30,790 --> 00:06:29,199
of this research is to investigate the

143
00:06:32,790 --> 00:06:30,800
effects of bullet

144
00:06:34,309 --> 00:06:32,800
point rich environment on the

145
00:06:37,110 --> 00:06:34,319
phosphorylation of ribose

146
00:06:41,510 --> 00:06:37,120
to find the new root new bio narrow

147
00:06:44,710 --> 00:06:44,070
here is the method for the experiment

148
00:06:47,830 --> 00:06:44,720
first

149
00:06:49,029 --> 00:06:47,840
we prepared the question containing

150
00:06:52,390 --> 00:06:49,039
ribose

151
00:06:56,790 --> 00:06:52,400
disording monophosphate boric acid

152
00:07:00,309 --> 00:06:56,800
and urea as a phosphorylation catalyst

153
00:07:03,430 --> 00:07:00,319
the sample was heated for 24 hours

154
00:07:06,870 --> 00:07:03,440
at 80 degree celsius

155
00:07:09,670 --> 00:07:06,880
the roots of microtubes were were opened

156
00:07:12,150 --> 00:07:09,680
to evaporate the solution

157
00:07:13,830 --> 00:07:12,160
after the experiment we added the

158
00:07:17,029 --> 00:07:13,840
sulfuric acid solution

159
00:07:18,150 --> 00:07:17,039
to the sample residue and the sample was

160
00:07:21,270 --> 00:07:18,160
heated again

161
00:07:25,110 --> 00:07:21,280
for one hour at 90 degree celsius

162
00:07:28,150 --> 00:07:25,120
to remove bullet and urea from the lipos

163
00:07:32,950 --> 00:07:28,160

and then we analyzed the sample by

164
00:07:36,230 --> 00:07:35,909
here is the result of the experiment the

165
00:07:43,430 --> 00:07:36,240
top

166
00:07:44,950 --> 00:07:43,440
of ribose phosphate the black line is 5

167
00:07:48,390 --> 00:07:44,960
brain phosphate

168
00:07:51,270 --> 00:07:48,400
the blue line is liposuction phosphate

169
00:07:52,629 --> 00:07:51,280
and the yellow line is ribose 3 prime

170
00:07:55,670 --> 00:07:52,639
phosphate

171
00:07:58,629 --> 00:07:55,680
the middle figure is the standard uh

172
00:07:59,749 --> 00:07:58,639
sorry the middle figure is the sample

173
00:08:01,749 --> 00:07:59,759
with bullet

174
00:08:04,309 --> 00:08:01,759
and the bottom figure is the sample

175
00:08:06,950 --> 00:08:04,319
reserved bullet

176
00:08:07,830 --> 00:08:06,960
the x-axis is the retention time and the

177
00:08:11,670 --> 00:08:07,840
y-axis

178
00:08:14,869 --> 00:08:11,680
is the intensity this shows that

179
00:08:16,150 --> 00:08:14,879
the sample peak sample peaks have the

180
00:08:18,629 --> 00:08:16,160
same retention time

181
00:08:20,710 --> 00:08:18,639
as the standard of lipos fibrin

182
00:08:22,950 --> 00:08:20,720
phosphate

183
00:08:25,029 --> 00:08:22,960
and have the different retention time as

184
00:08:27,189 --> 00:08:25,039
a standard of two prime and three prime

185
00:08:30,790 --> 00:08:27,199
phosphate

186
00:08:34,469 --> 00:08:30,800
formed

187
00:08:35,670 --> 00:08:34,479
in the reaction the yields were 22

188
00:08:40,630 --> 00:08:35,680

percent

189
00:08:45,670 --> 00:08:40,640
bullet

190
00:08:47,110 --> 00:08:45,680
is very high as the phosphorylation

191
00:08:49,670 --> 00:08:47,120
yield

192
00:08:51,670 --> 00:08:49,680
this result shows that bullets

193
00:08:56,949 --> 00:08:51,680
contribute to the

194
00:09:00,550 --> 00:08:59,190
we also evaluated the use of

195
00:09:03,430 --> 00:09:00,560
phosphorylated product

196
00:09:04,710 --> 00:09:03,440
of pentoses other than ribose here is

197
00:09:07,829 --> 00:09:04,720
the result

198
00:09:08,870 --> 00:09:07,839
the upper red figure is the israel's

199
00:09:12,470 --> 00:09:08,880
experiment

200
00:09:15,750 --> 00:09:12,480
the upper right is a rabinos and

201
00:09:19,750 --> 00:09:15,760
lower left is dyros and roar right

202
00:09:23,110 --> 00:09:19,760
is rich source the yields are

203
00:09:24,790 --> 00:09:23,120
22 percent in ribose eight percent in

204
00:09:27,910 --> 00:09:24,800
arabinose

205
00:09:29,750 --> 00:09:27,920
five percent in xyros and eleven percent

206
00:09:32,870 --> 00:09:29,760
in radicals

207
00:09:35,190 --> 00:09:32,880
so surprisingly the ribose phosphate

208
00:09:36,070 --> 00:09:35,200
have the highest yield among all of the

209
00:09:40,470 --> 00:09:36,080
penthouses

210
00:09:43,750 --> 00:09:42,630
here is the result in the sense of

211
00:09:46,790 --> 00:09:43,760
bullet

212
00:09:49,990 --> 00:09:46,800
the yields were four percent in rivals

213
00:09:50,790 --> 00:09:50,000

four percent in arabinose 2 percent in

214
00:09:54,310 --> 00:09:50,800
xylose

215
00:09:56,790 --> 00:09:54,320
and 2 by 17 resource

216
00:09:59,590 --> 00:09:56,800
so there was no apparent difference in

217
00:10:02,069 --> 00:09:59,600
the use in their sensor bullet

218
00:10:04,949 --> 00:10:02,079
these results show that bullets

219
00:10:07,509 --> 00:10:04,959
contribute to the preferential formation

220
00:10:10,550 --> 00:10:07,519
of ribose phosphates among all other

221
00:10:16,710 --> 00:10:13,670
ribose is very unstable sugar and

222
00:10:19,430 --> 00:10:16,720
other sugars must have existed

223
00:10:20,630 --> 00:10:19,440
on the probiotic earth so it has

224
00:10:24,470 --> 00:10:20,640
remained unclear

225
00:10:27,829 --> 00:10:24,480
five primordial life selected ribose

226
00:10:28,389 --> 00:10:27,839
as a nucleic acid component previous

227
00:10:31,590 --> 00:10:28,399
research

228
00:10:34,550 --> 00:10:31,600
found that bullet can contribute to the

229
00:10:37,350 --> 00:10:34,560
preferential formation of ribose

230
00:10:39,430 --> 00:10:37,360
we found that bullet can also contribute

231
00:10:42,949 --> 00:10:39,440
to the preferential phosphorylation

232
00:10:45,750 --> 00:10:42,959
of ribose this finding shows that

233
00:10:46,389 --> 00:10:45,760
bullet can increase the sensitivity of

234
00:10:49,670 --> 00:10:46,399
ribose

235
00:10:53,430 --> 00:10:49,680
in not only sugar formation but also

236
00:10:57,509 --> 00:10:55,750
ribose fibrin phosphate could be

237
00:11:01,190 --> 00:10:57,519
preferentially formed

238
00:11:03,750 --> 00:11:01,200

in the presence of bullet these findings

239
00:11:05,269 --> 00:11:03,760
open the new biologists route for

240
00:11:07,670 --> 00:11:05,279
nucleotide

241
00:11:08,550 --> 00:11:07,680
in this root phosphorylation of garlic

242
00:11:11,750 --> 00:11:08,560
fast

243
00:11:13,430 --> 00:11:11,760
and nuclear based combined weight this

244
00:11:16,389 --> 00:11:13,440
root is closer to

245
00:11:17,350 --> 00:11:16,399
biosynthesis in contrast to the

246
00:11:20,550 --> 00:11:17,360
traditional

247
00:11:24,949 --> 00:11:20,560
roots nucleoside formation and

248
00:11:29,110 --> 00:11:27,750
in this study we found that a

249
00:11:31,430 --> 00:11:29,120
bullet-rich

250
00:11:32,870 --> 00:11:31,440
environment could contribute to the

251
00:11:36,230 --> 00:11:32,880
preferential formation

252
00:11:37,509 --> 00:11:36,240
of labor's fibrillar phosphate a further

253
00:11:40,069 --> 00:11:37,519
chemical evolution for

254
00:11:41,430 --> 00:11:40,079
rna will have occurred in the same

255
00:11:44,150 --> 00:11:41,440
environment

256
00:11:45,670 --> 00:11:44,160
so this result indicates that the

257
00:11:47,430 --> 00:11:45,680
bullet-rich environment

258
00:11:49,990 --> 00:11:47,440
could have been could have been a

259
00:11:54,389 --> 00:11:50,000
probable place for the origin

260
00:11:56,550 --> 00:11:54,399
of nucleotides and rna