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Using Digital Life Simulations to Examine the Evolutionary Origin of Cellularity and Metabolism

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Keywords

Origin of Life, Digital Life, Ancient Life, Early Evolution,
Coevolution, Evolution of Cellularity, Darwinian Transition



1
00:00:04,630 --> 00:00:02,629
my team conducted artificial life

2
00:00:07,749 --> 00:00:04,640
simulations to examine the origins of

3
00:00:09,990 --> 00:00:07,759
cellularity and metabolism

4
00:00:12,709 --> 00:00:10,000
organisms consistently evolved towards

5
00:00:15,110 --> 00:00:12,719
low cellularity and metabolic complexity

6
00:00:16,550 --> 00:00:15,120
when easy to use resources were abundant

7
00:00:19,830 --> 00:00:16,560
and towards high cellularity and

8
00:00:22,070 --> 00:00:19,840
metabolic complexity when they were not

9
00:00:24,150 --> 00:00:22,080
it makes evolutionary sense to be open

10
00:00:26,470 --> 00:00:24,160
when simple resources are abundant

11
00:00:28,150 --> 00:00:26,480
complex metabolism is unnecessary and

12
00:00:30,630 --> 00:00:28,160
horizontal gene transfer hinders

13
00:00:32,069 --> 00:00:30,640

darwinian evolution in deep leaded

14

00:00:34,630 --> 00:00:32,079

environments there is selection for

15

00:00:36,069 --> 00:00:34,640

complex metabolisms capable of utilizing

16

00:00:38,310 --> 00:00:36,079

complex resources

17

00:00:41,750 --> 00:00:38,320

and cellularity in order to retain both

18

00:00:43,830 --> 00:00:41,760

metabolic products and genetic fidelity

19

00:00:45,110 --> 00:00:43,840

any geochemically rich origin of life

20

00:00:47,029 --> 00:00:45,120

setting would have prevented the

21

00:00:49,350 --> 00:00:47,039

selection of cellular life

22

00:00:51,189 --> 00:00:49,360

cellularity and metabolism co-evolved

23

00:00:53,590 --> 00:00:51,199

likely in response to a change in the

24

00:00:55,590 --> 00:00:53,600

geochemical setting of life's origin

25

00:00:58,310 --> 00:00:55,600

and this may have facilitated a greater

26

00:01:00,950 --> 00:00:58,320

ability for darwinian evolution

27

00:01:03,270 --> 00:01:00,960

here are additional resources and my