WEBVTT

NOTE duration:"01:02:43.3570000"

NOTE language:en-us

NOTE Confidence: 0.798342764377594

00:00:08.490 --> 00:00:11.435 biology and medicine podcast.

NOTE Confidence: 0.798342764377594

00:00:11.435 --> 00:00:17.329 YJBM is a pub Med index quarterly

NOTE Confidence: 0.798342764377594

00:00:17.330 --> 00:00:22.979 Journal edited by Yale medical graduate and

NOTE Confidence: 0.798342764377594

00:00:22.979 --> 00:00:26.820 professional students and peer reviewed

NOTE Confidence: 0.798342764377594

00:00:26.820 --> 00:00:31.370 by experts in the fields of biology.

NOTE Confidence: 0.798342764377594

00:00:31.370 --> 00:00:33.344 medicine. Each issue of the Journal

NOTE Confidence: 0.798342764377594

00:00:33.344 --> 00:00:35.544 is devoted to a focus topic

NOTE Confidence: 0.798342764377594

00:00:35.544 --> 00:00:37.569 and through the YJBM podcast.

NOTE Confidence: 0.798342764377594

00:00:37.570 --> 00:00:40.083 We will take you through the past, present,

NOTE Confidence: 0.798342764377594

00:00:40.083 --> 00:00:42.274 and future of the issues subject matter.

NOTE Confidence: 0.798342764377594

00:00:42.280 --> 00:00:44.616 This episode is part of our series devoted

NOTE Confidence: 0.798342764377594

00:00:44.616 --> 00:00:46.986 to our December 2019 issue on Death.

NOTE Confidence: 0.798342764377594

00:00:46.990 --> 00:00:47.818 I'm your cohost.

NOTE Confidence: 0.798342764377594

00:00:47.818 --> 00:00:49.474 Emma, a second year in the

NOTE Confidence: 0.798342764377594

00:00:49.474 --> 00:00:51.079 Cell Biology Department and

NOTE Confidence: 0.915301978588104

00:00:51.080 --> 00:00:53.278 I'm Elizabeth, a second year in the

NOTE Confidence: 0.915301978588104

00:00:53.278 --> 00:00:54.220 Microbial Pathogenesis Department.

NOTE Confidence: 0.915301978588104

00:00:54.220 --> 00:00:56.724 Today we are excited to talk to doctor.

NOTE Confidence: 0.915301978588104

00:00:56.730 --> 00:00:58.355 Lidya Tarhan, an assistant professor

NOTE Confidence: 0.915301978588104

00:00:58.355 --> 00:01:00.317 in the Department of geology and

NOTE Confidence: 0.915301978588104

00:01:00.317 --> 00:01:02.066 geophysics here at Yale, she studies.

NOTE Confidence: 0.915301978588104

00:01:02.066 --> 00:01:04.142 The Ediacaran period, which occured.

NOTE Confidence: 0.915301978588104

00:01:04.142 --> 00:01:06.608 653 to 541 million years ago.

NOTE Confidence: 0.915301978588104

00:01:06.610 --> 00:01:10.570 For context as to just how long that is.

NOTE Confidence: 0.915301978588104

00:01:10.570 --> 00:01:12.710 600 million seconds is

NOTE Confidence: 0.915301978588104

00:01:12.710 --> 00:01:14.315 approximately 19 years.

NOTE Confidence: 0.915301978588104

00:01:14.320 --> 00:01:15.340 Today we will.

NOTE Confidence: 0.915301978588104

00:01:15.340 --> 00:01:17.720 We will be discussing doctor Lidya Tarhan's

NOTE Confidence: 0.915301978588104

00:01:17.778 --> 00:01:19.828 research about the Ediacaran Biota.

NOTE Confidence: 0.915301978588104

00:01:19.830 --> 00:01:21.294 The living organisms present

NOTE Confidence: 0.915301978588104

00:01:21.294 --> 00:01:22.758 during this time period,

NOTE Confidence: 0.915301978588104

00:01:22.760 --> 00:01:24.800 and their mysterious disappearance from

NOTE Confidence: 0.915301978588104

00:01:24.800 --> 00:01:27.320 the fossil record High Doctor Tarhan.

NOTE Confidence: 0.915301978588104

00:01:27.320 --> 00:01:28.140

NOTE Confidence: 0.857514023780823

00:01:28.140 --> 00:01:31.017 Thanks for having me here today.

NOTE Confidence: 0.94797819852829

00:01:32.480 --> 00:01:34.886 Thanks for joining us. To start,

NOTE Confidence: 0.94797819852829

00:01:34.890 --> 00:01:37.710 we were curious how did you become

NOTE Confidence: 0.94797819852829

00:01:37.710 --> 00:01:39.314 interested in studying earths

NOTE Confidence: 0.94797819852829

00:01:39.314 --> 00:01:41.319 geological history and that's a

NOTE Confidence: 0.94797819852829

00:01:41.320 --> 00:01:43.990 great question. I've always been interested

NOTE Confidence: 0.94797819852829

00:01:43.990 --> 00:01:46.588 in sort of various environments that

NOTE Confidence: 0.94797819852829

00:01:46.588 --> 00:01:50.020 we see on Earth today and what are the

NOTE Confidence: 0.94797819852829

00:01:50.020 --> 00:01:52.631 process is responsible for them and how

NOTE Confidence: 0.94797819852829

00:01:52.631 --> 00:01:55.380 far back in our planet's history they

NOTE Confidence: 0.94797819852829

00:01:55.380 --> 00:01:57.853 extend an I've always been interested

NOTE Confidence: 0.94797819852829

00:01:57.853 --> 00:02:00.653 in some of the more enigmatic aspects

NOTE Confidence: 0.94797819852829

00:02:00.653 --> 00:02:03.486 of the fossil record of past life.

NOTE Confidence: 0.94797819852829

00:02:03.490 --> 00:02:06.378 Not only is this sort of weird wonders

NOTE Confidence: 0.94797819852829

00:02:06.378 --> 00:02:08.777 that enigmatics fossils that we still

NOTE Confidence: 0.94797819852829

00:02:08.777 --> 00:02:10.782 don't entirely understand a man,

NOTE Confidence: 0.94797819852829

00:02:10.790 --> 00:02:13.196 the exceptionally preserved fossils that give

NOTE Confidence: 0.94797819852829

00:02:13.196 --> 00:02:15.389 us extraordinary insights into past life,

NOTE Confidence: 0.94797819852829

00:02:15.390 --> 00:02:17.720 but also questions of origins

NOTE Confidence: 0.94797819852829

00:02:17.720 --> 00:02:20.549 and questions of how did complex

NOTE Confidence: 0.94797819852829

00:02:20.549 --> 00:02:23.419 life come to be on our planet?

NOTE Confidence: 0.94797819852829

00:02:23.420 --> 00:02:24.936 And the Ediacaran Biota,

NOTE Confidence: 0.94797819852829

00:02:24.936 --> 00:02:26.452 which will be talking

NOTE Confidence: 0.94797819852829

00:02:26.452 --> 00:02:28.529 about in more detail today,

NOTE Confidence: 0.94797819852829

00:02:28.530 --> 00:02:31.365 really occupies a critical place in our

NOTE Confidence: 0.94797819852829

00:02:31.365 --> 00:02:33.767 attempts to reconstruct not only the

NOTE Confidence: 0.94797819852829

00:02:33.767 --> 00:02:35.999 history of environments on our planets,

NOTE Confidence: 0.94797819852829

00:02:36.000 --> 00:02:38.346 but also the history of life.

NOTE Confidence: 0.94797819852829

00:02:38.350 --> 00:02:40.648 And these fossils really occur at

NOTE Confidence: 0.94797819852829

00:02:40.648 --> 00:02:43.079 a critical juncture in the geologic

NOTE Confidence: 0.94797819852829

00:02:43.079 --> 00:02:45.545 record on between the interval of

NOTE Confidence: 0.94797819852829

00:02:45.545 --> 00:02:47.918 Earth History where we had much

NOTE Confidence: 0.94797819852829

00:02:47.918 --> 00:02:49.768 simpler in microbial life during

NOTE Confidence: 0.94797819852829

00:02:49.768 --> 00:02:52.088 the Precambrian and the emergence

NOTE Confidence: 0.94797819852829

00:02:52.088 --> 00:02:54.523 of complex animal life during

NOTE Confidence: 0.94797819852829

00:02:54.523 --> 00:02:57.019 the Phanerozoic Armador Neon.

NOTE Confidence: 0.94797819852829

00:02:57.020 --> 00:02:57.350 So

NOTE Confidence: 0.9339479804039

00:02:57.350 --> 00:02:59.588 you really went back to the

NOTE Confidence: 0.9339479804039

00:02:59.588 --> 00:03:01.860 origin of origins in all this.

NOTE Confidence: 0.9339479804039

00:03:01.860 --> 00:03:07.170 Both geologically and end with animals.

NOTE Confidence: 0.9339479804039

00:03:07.170 --> 00:03:09.378 So to kind of ground us,

NOTE Confidence: 0.9339479804039

00:03:09.380 --> 00:03:11.576 can you first explain to us

NOTE Confidence: 0.9339479804039

00:03:11.576 --> 00:03:13.809 what actually is the Ed Akron?

NOTE Confidence: 0.924748182296753

00:03:15.360 --> 00:03:18.591 Sure, so the Ed Akron period is the is

NOTE Confidence: 0.924748182296753

00:03:18.591 --> 00:03:21.856 the last geologic period or interval of

NOTE Confidence: 0.924748182296753

00:03:21.856 --> 00:03:25.618 this time period we call the precambrian,

NOTE Confidence: 0.924748182296753

00:03:25.620 --> 00:03:28.882 which is an incredibly expansive stretch of

NOTE Confidence: 0.924748182296753

00:03:28.882 --> 00:03:32.306 time that includes the first 4 billion years,

NOTE Confidence: 0.924748182296753

00:03:32.310 --> 00:03:34.782 or nearly 90% of our planet's

NOTE Confidence: 0.924748182296753

00:03:34.782 --> 00:03:37.210 4 1/2 billion year history,

NOTE Confidence: 0.924748182296753

00:03:37.210 --> 00:03:39.886 and it immediately precedes the Phanerozoic,

NOTE Confidence: 0.924748182296753

00:03:39.890 --> 00:03:42.718 which is the name for our current

NOTE Confidence: 0.924748182296753

00:03:42.718 --> 00:03:46.446 our present day eon and the Ed Akron

NOTE Confidence: 0.924748182296753

00:03:46.446 --> 00:03:48.390 period also immediately follows.

NOTE Confidence: 0.924748182296753

00:03:48.390 --> 00:03:50.568 The penultimate geologic period of the

NOTE Confidence: 0.924748182296753

00:03:50.568 --> 00:03:52.929 precambrian which we call the cryogenian,

NOTE Confidence: 0.924748182296753

00:03:52.930 --> 00:03:54.820 and it's called the cryogenian.

NOTE Confidence: 0.924748182296753

00:03:54.820 --> 00:03:57.564 Because this was at the time of of

NOTE Confidence: 0.924748182296753

00:03:57.564 --> 00:03:59.202 really extreme climatic perturbations

NOTE Confidence: 0.924748182296753

00:03:59.202 --> 00:04:01.848 known as snowball earth and the

NOTE Confidence: 0.924748182296753

00:04:01.848 --> 00:04:04.480 entire T of Earth surface froze over

NOTE Confidence: 0.924748182296753

00:04:04.480 --> 00:04:06.536 at least a couple of times.

NOTE Confidence: 0.924748182296753

00:04:06.536 --> 00:04:08.416 So the Ed Akron period,

NOTE Confidence: 0.924748182296753

00:04:08.420 --> 00:04:10.320 which stretches from 635 million

NOTE Confidence: 0.924748182296753

00:04:10.320 --> 00:04:12.960 years ago to 542 million years ago,

NOTE Confidence: 0.924748182296753

00:04:12.960 --> 00:04:14.468 is really book ended.

NOTE Confidence: 0.924748182296753

00:04:14.468 --> 00:04:15.976 On the one hand,

NOTE Confidence: 0.924748182296753

00:04:15.980 --> 00:04:18.908 by not only this world that was dominated

NOTE Confidence: 0.924748182296753

00:04:18.908 --> 00:04:21.909 by small and simple and microbial life.

NOTE Confidence: 0.924748182296753

00:04:21.910 --> 00:04:24.532 But also by these really extreme

NOTE Confidence: 0.924748182296753

00:04:24.532 --> 00:04:27.032 climatic perturbations and on the other

NOTE Confidence: 0.924748182296753

00:04:27.032 --> 00:04:29.736 end it spoke ended by the emergence of

NOTE Confidence: 0.924748182296753

00:04:29.815 --> 00:04:32.395 complex and more animal dominated life

NOTE Confidence: 0.924748182296753

00:04:32.395 --> 00:04:34.974 and the development of ecological and

NOTE Confidence: 0.924748182296753

00:04:34.974 --> 00:04:36.682 environmental and climatic conditions

NOTE Confidence: 0.924748182296753

00:04:36.682 --> 00:04:38.822 that are much more recognizable

NOTE Confidence: 0.924748182296753

00:04:38.822 --> 00:04:41.036 like those of the present day.

NOTE Confidence: 0.924942910671234

00:04:43.650 --> 00:04:45.972 Awesome, I'm so can you tell us

NOTE Confidence: 0.924942910671234

00:04:45.972 --> 00:04:48.296 a little bit about what sorts of

NOTE Confidence: 0.924942910671234

00:04:48.296 --> 00:04:50.597 organisms you see during the D Akron?

NOTE Confidence: 0.924942910671234

00:04:50.600 --> 00:04:52.917 What are sort of their defining features?

NOTE Confidence: 0.924942910671234

00:04:52.920 --> 00:04:55.650 If they have any? So

NOTE Confidence: 0.922612905502319

00:04:55.650 --> 00:04:57.858 YD Akron ecosystems included a variety

NOTE Confidence: 0.922612905502319

00:04:57.858 --> 00:05:00.010 of different types of organisms.

NOTE Confidence: 0.922612905502319

00:05:00.010 --> 00:05:02.000 Microbes were still extremely abundant,

NOTE Confidence: 0.922612905502319

00:05:02.000 --> 00:05:03.985 so the origins of microbial

NOTE Confidence: 0.922612905502319

00:05:03.985 --> 00:05:05.970 life long predate the D,

NOTE Confidence: 0.922612905502319

00:05:05.970 --> 00:05:08.728 Akron period and microbes are of course

NOTE Confidence: 0.922612905502319

00:05:08.728 --> 00:05:10.340 still enormously abundant today,

NOTE Confidence: 0.922612905502319

00:05:10.340 --> 00:05:13.316 but the fossil record of the late Ed

NOTE Confidence: 0.922612905502319

00:05:13.316 --> 00:05:15.367 Acronym period is really anomalous

NOTE Confidence: 0.922612905502319

00:05:15.367 --> 00:05:17.821 with respect to the vast interval

NOTE Confidence: 0.922612905502319

00:05:17.821 --> 00:05:19.880 of geologic time that precedes

NOTE Confidence: 0.922612905502319

00:05:19.880 --> 00:05:22.651 it because it's in the for the

NOTE Confidence: 0.922612905502319

00:05:22.651 --> 00:05:25.458 first time in the Ed Akron period.

NOTE Confidence: 0.922612905502319

00:05:25.460 --> 00:05:28.421 That we see evidence of anomalously large

NOTE Confidence: 0.922612905502319

00:05:28.421 --> 00:05:31.399 relative to the life that came before.

NOTE Confidence: 0.922612905502319

00:05:31.400 --> 00:05:33.812 So Edie Accra organisms were commonly

NOTE Confidence: 0.922612905502319

00:05:33.812 --> 00:05:36.479 millimeter to centimeter to decimeter scale,

NOTE Confidence: 0.922612905502319

00:05:36.480 --> 00:05:38.982 but we actually have some organisms

NOTE Confidence: 0.922612905502319

00:05:38.982 --> 00:05:41.998 which were over a meter in length,

NOTE Confidence: 0.922612905502319

00:05:42.000 --> 00:05:44.658 so these are truly large organisms

NOTE Confidence: 0.922612905502319

00:05:44.658 --> 00:05:47.285 relative to microbial life and also

NOTE Confidence: 0.922612905502319

00:05:47.285 --> 00:05:49.625 a number of various complex forms.

NOTE Confidence: 0.922612905502319

00:05:49.630 --> 00:05:52.168 And it's this aggregate of complex,

NOTE Confidence: 0.922612905502319

00:05:52.170 --> 00:05:52.633 macroscopic,

NOTE Confidence: 0.922612905502319

00:05:52.633 --> 00:05:54.948 multicellular life that we call

NOTE Confidence: 0.922612905502319

00:05:54.948 --> 00:05:56.800 the Edie Accra Biota.

NOTE Confidence: 0.922612905502319

00:05:56.800 --> 00:05:59.691 So YD Accra fossil deposits include a

NOTE Confidence: 0.922612905502319

00:05:59.691 --> 00:06:02.969 few things that we might recognize today.

NOTE Confidence: 0.922612905502319

00:06:02.970 --> 00:06:03.870 For instance,

NOTE Confidence: 0.922612905502319

00:06:03.870 --> 00:06:06.120 very simple Burroughs and trails

NOTE Confidence: 0.922612905502319

00:06:06.120 --> 00:06:08.795 that were formed in the ancient

NOTE Confidence: 0.922612905502319

00:06:08.795 --> 00:06:10.467 sand by brewing organisms.

NOTE Confidence: 0.922612905502319

00:06:10.470 --> 00:06:14.014 So similar to some of the wormlike burrowing

NOTE Confidence: 0.922612905502319

00:06:14.014 --> 00:06:17.089 organisms that we see forming trails today.

NOTE Confidence: 0.922612905502319

00:06:17.090 --> 00:06:19.110 We presume that similar organisms

NOTE Confidence: 0.922612905502319

00:06:19.110 --> 00:06:21.940 were present in Edie Accra ecosystems,

NOTE Confidence: 0.922612905502319

00:06:21.940 --> 00:06:24.140 forming these very similar structures,

NOTE Confidence: 0.922612905502319

00:06:24.140 --> 00:06:26.350 but many of the Ed.

NOTE Confidence: 0.922612905502319

00:06:26.350 --> 00:06:27.310 Accra Biota.

NOTE Confidence: 0.922612905502319

00:06:27.310 --> 00:06:29.710 Fossils or more strictly speaking,

NOTE Confidence: 0.922612905502319

00:06:29.710 --> 00:06:32.405 body fossils which are fossilized

NOTE Confidence: 0.922612905502319

00:06:32.405 --> 00:06:35.610 carcasses and what most people think

NOTE Confidence: 0.922612905502319

00:06:35.610 --> 00:06:38.557 of when they hear the term fossil

NOTE Confidence: 0.922612905502319

00:06:38.557 --> 00:06:41.090 are really just plain bizarre.

NOTE Confidence: 0.922612905502319

00:06:41.090 --> 00:06:43.838 There are from like organisms that

NOTE Confidence: 0.922612905502319

00:06:43.838 --> 00:06:46.307 are not entirely unlike modern

NOTE Confidence: 0.922612905502319

00:06:46.307 --> 00:06:48.519 pin adulations orastie pens,

NOTE Confidence: 0.922612905502319

00:06:48.520 --> 00:06:51.677 but some of them have iterative or

NOTE Confidence: 0.922612905502319

00:06:51.677 --> 00:06:54.195 fractal self iterative are fractal

NOTE Confidence: 0.922612905502319

00:06:54.195 --> 00:06:57.453 patterning throughout their bodies and the.

NOTE Confidence: 0.922612905502319

00:06:57.460 --> 00:07:00.574 Image I like to call to mind for that.

NOTE Confidence: 0.922612905502319

00:07:00.580 --> 00:07:02.464 For something that more people will

NOTE Confidence: 0.922612905502319

00:07:02.464 --> 00:07:05.293 will have a have a good search image

NOTE Confidence: 0.922612905502319

00:07:05.293 --> 00:07:07.173 for something like Chinese broccoli,

NOTE Confidence: 0.922612905502319

00:07:07.180 --> 00:07:09.256 it's a very unusual style of

NOTE Confidence: 0.922612905502319

00:07:09.256 --> 00:07:11.043 bodily construction that we don't

NOTE Confidence: 0.922612905502319

00:07:11.043 --> 00:07:12.379 see in animals today,

NOTE Confidence: 0.922612905502319

00:07:12.380 --> 00:07:14.456 at least not on that scale.

NOTE Confidence: 0.922612905502319

00:07:14.460 --> 00:07:16.110 And then other other organisms

NOTE Confidence: 0.922612905502319

00:07:16.110 --> 00:07:18.182 that look like lobes of garlic

NOTE Confidence: 0.922612905502319

00:07:18.182 --> 00:07:20.342 and others that appear to have

NOTE Confidence: 0.922612905502319

00:07:20.342 --> 00:07:22.099 been very intricately Ridge sax.

NOTE Confidence: 0.922612905502319

00:07:22.100 --> 00:07:24.852 And there are some that appear to have

NOTE Confidence: 0.922612905502319

00:07:24.852 --> 00:07:27.647 three fold symmetry or to be Tri Radial,

NOTE Confidence: 0.922612905502319

00:07:27.650 --> 00:07:29.430 which again is another body

NOTE Confidence: 0.922612905502319

00:07:29.430 --> 00:07:31.210 form that is really unusual.

NOTE Confidence: 0.922612905502319

00:07:31.210 --> 00:07:33.802 Today and these organisms were almost

NOTE Confidence: 0.922612905502319

00:07:33.802 --> 00:07:36.040 without exception entirely soft bodied.

NOTE Confidence: 0.922612905502319

00:07:36.040 --> 00:07:38.230 They didn't have any biominerals,

NOTE Confidence: 0.922612905502319

00:07:38.230 --> 00:07:41.750 so teeth or scales or bones or shells,

NOTE Confidence: 0.922612905502319

00:07:41.750 --> 00:07:44.240 which are usually the only things

NOTE Confidence: 0.922612905502319

00:07:44.240 --> 00:07:47.448 that make it into the fossil record.

NOTE Confidence: 0.922612905502319

00:07:47.450 --> 00:07:49.838 So they eacker organisms are very

NOTE Confidence: 0.922612905502319

00:07:49.838 --> 00:07:52.936 unusual in the shapes in the structural

NOTE Confidence: 0.922612905502319

00:07:52.936 --> 00:07:55.786 arrangements of their bodies and tissues.

NOTE Confidence: 0.922612905502319

00:07:55.790 --> 00:07:57.990 What we call their morphology,

NOTE Confidence: 0.922612905502319

00:07:57.990 --> 00:08:00.470 and they're also very unusual

NOTE Confidence: 0.922612905502319

00:08:00.470 --> 00:08:01.958 in their fossilization.

NOTE Confidence: 0.922612905502319

00:08:01.960 --> 00:08:03.820 And in large part because of

NOTE Confidence: 0.922612905502319

00:08:03.820 --> 00:08:06.186 these two enigmas of their bodily

NOTE Confidence: 0.922612905502319

00:08:06.186 --> 00:08:08.298 construction and their fossilization,

NOTE Confidence: 0.922612905502319

00:08:08.300 --> 00:08:10.646 the classification of most Edie Accra

NOTE Confidence: 0.922612905502319

00:08:10.646 --> 00:08:13.439 biota organisms has for decades eluded us.

NOTE Confidence: 0.922612905502319

00:08:13.440 --> 00:08:15.939 And in many cases we still don't

NOTE Confidence: 0.922612905502319

00:08:15.939 --> 00:08:18.200 know what these organisms were,

NOTE Confidence: 0.922612905502319

00:08:18.200 --> 00:08:19.660 and to what extent.

NOTE Confidence: 0.922612905502319

00:08:19.660 --> 00:08:22.355 Living groups to which living groups of

NOTE Confidence: 0.922612905502319

00:08:22.355 --> 00:08:24.530 organisms there most closely related,

NOTE Confidence: 0.930551886558533

00:08:24.530 --> 00:08:27.106 and in fact, the history of their

NOTE Confidence: 0.930551886558533

00:08:27.106 --> 00:08:29.280 study really reflects this confusion.

NOTE Confidence: 0.930551886558533

00:08:29.280 --> 00:08:30.892 They've been described as

NOTE Confidence: 0.930551886558533

00:08:30.892 --> 00:08:32.504 just about everything from.

NOTE Confidence: 0.930551886558533

00:08:32.510 --> 00:08:35.492 An entirely from truly modern what we

NOTE Confidence: 0.930551886558533

00:08:35.492 --> 00:08:38.269 call Crown group animals too funky.

NOTE Confidence: 0.930551886558533

00:08:38.270 --> 00:08:40.058 Lykins bacterial colonies giant

NOTE Confidence: 0.930551886558533

00:08:40.058 --> 00:08:43.140 prokaryotes to a separate Kingdom of life,

NOTE Confidence: 0.930551886558533

00:08:43.140 --> 00:08:45.600 not only the physical features and

NOTE Confidence: 0.930551886558533

00:08:45.600 --> 00:08:48.020 likely anatomy of these organisms,

NOTE Confidence: 0.930551886558533

00:08:48.020 --> 00:08:50.666 but also evidence of their ecologies,

NOTE Confidence: 0.930551886558533

00:08:50.670 --> 00:08:52.890 whether they moved or not.

NOTE Confidence: 0.930551886558533

00:08:52.890 --> 00:08:55.100 If so, how they moved?

NOTE Confidence: 0.930551886558533

00:08:55.100 --> 00:08:58.439 How they fed has begun to chip away at

NOTE Confidence: 0.930551886558533

00:08:58.439 --> 00:09:01.750 some of these long standing mysteries,

NOTE Confidence: 0.930551886558533

00:09:01.750 --> 00:09:04.432 at least for a small handful

NOTE Confidence: 0.930551886558533

00:09:04.432 --> 00:09:05.773 of individual organisms.

NOTE Confidence: 0.930551886558533

00:09:05.780 --> 00:09:07.790 Such that we're now reasonably

NOTE Confidence: 0.930551886558533

00:09:07.790 --> 00:09:09.398 certain that the Ed.

NOTE Confidence: 0.930551886558533

00:09:09.400 --> 00:09:11.455 Accra biota included at least

NOTE Confidence: 0.930551886558533

00:09:11.455 --> 00:09:13.510 some animals our into animal

NOTE Confidence: 0.930551886558533

00:09:13.586 --> 00:09:15.426 relatives as well as algy.

NOTE Confidence: 0.930551886558533

00:09:15.430 --> 00:09:17.685 But even these interpretations have

NOTE Confidence: 0.930551886558533

00:09:17.685 --> 00:09:19.940 been controversial and we still

NOTE Confidence: 0.930551886558533

00:09:20.016 --> 00:09:22.326 don't have a good sense of the

NOTE Confidence: 0.930551886558533

00:09:22.326 --> 00:09:24.670 affinity's of most Edie Accra species.

NOTE Confidence: 0.943868100643158

00:09:27.080 --> 00:09:28.370 That's so interesting.

NOTE Confidence: 0.943868100643158

00:09:28.370 --> 00:09:31.961 Like I had no idea that there was

NOTE Confidence: 0.943868100643158

00:09:31.961 --> 00:09:34.578 this entire complex. World that.

NOTE Confidence: 0.943868100643158

00:09:34.578 --> 00:09:37.398 Doesn't exist today that we're

NOTE Confidence: 0.943868100643158

00:09:37.398 --> 00:09:40.839 still trying to understand about,

NOTE Confidence: 0.943868100643158

00:09:40.840 --> 00:09:43.115 um, that's that's so interesting

NOTE Confidence: 0.943868100643158

00:09:43.115 --> 00:09:44.935 that there was this.

NOTE Confidence: 0.943868100643158

00:09:44.940 --> 00:09:48.748 It sounds like it was so complicated.

NOTE Confidence: 0.943868100643158

00:09:48.750 --> 00:09:51.744 And. Like similar to like how

NOTE Confidence: 0.943868100643158

00:09:51.744 --> 00:09:53.740 complicated everything is today,

NOTE Confidence: 0.943868100643158

00:09:53.740 --> 00:09:55.804 it's just it's so interesting that

NOTE Confidence: 0.943868100643158

00:09:55.804 --> 00:09:58.198 we still don't know that much about

NOTE Confidence: 0.914981305599213

00:09:58.200 --> 00:10:01.175 it. Yeah, it's fascinating to me that.

NOTE Confidence: 0.914981305599213

00:10:01.180 --> 00:10:02.570 I love reading those stories

NOTE Confidence: 0.914981305599213

00:10:02.570 --> 00:10:03.960 about What is this thing.

NOTE Confidence: 0.914981305599213

00:10:03.960 --> 00:10:05.068 Is it an animal?

NOTE Confidence: 0.914981305599213

00:10:05.068 --> 00:10:07.014 Is it a plant? We don't know.

NOTE Confidence: 0.914981305599213

00:10:07.014 --> 00:10:08.960 How are we going to find out?

NOTE Confidence: 0.914981305599213

00:10:08.960 --> 00:10:10.628 It looks like a blob then.

NOTE Confidence: 0.914981305599213

00:10:10.630 --> 00:10:11.738 We know it's organized,

NOTE Confidence: 0.914981305599213

00:10:11.738 --> 00:10:13.123 so it was probably alive,

NOTE Confidence: 0.914981305599213

00:10:13.130 --> 00:10:15.686 but we have no idea what it is or

NOTE Confidence: 0.914981305599213

00:10:15.686 --> 00:10:18.134 what it was or how it came to be.

NOTE Confidence: 0.914981305599213

00:10:18.140 --> 00:10:20.520 I love those stories.

NOTE Confidence: 0.927554666996002

00:10:20.520 --> 00:10:22.070 Yeah, me too. I mean,

NOTE Confidence: 0.927554666996002

00:10:22.070 --> 00:10:23.960 that's one of the things that

NOTE Confidence: 0.927554666996002

00:10:23.960 --> 00:10:25.770 first drew me to the Ed.

NOTE Confidence: 0.927554666996002

00:10:25.770 --> 00:10:27.940 Accra biota was the sense of mystery.

NOTE Confidence: 0.927554666996002

00:10:27.940 --> 00:10:29.052 The sense of weight?

NOTE Confidence: 0.927554666996002

00:10:29.052 --> 00:10:31.950 How can we not know if these are animals,

NOTE Confidence: 0.927554666996002

00:10:31.950 --> 00:10:32.880 plants, bacteria, funky,

NOTE Confidence: 0.927554666996002

00:10:32.880 --> 00:10:34.120 or something else entirely?

NOTE Confidence: 0.927554666996002

00:10:34.120 --> 00:10:35.734 How can, how can we actually

NOTE Confidence: 0.927554666996002

00:10:35.734 --> 00:10:37.819 not be able to determine that?

NOTE Confidence: 0.927554666996002

00:10:37.820 --> 00:10:38.951 Why is that?

NOTE Confidence: 0.927554666996002

00:10:38.951 --> 00:10:40.836 And that's really what one

NOTE Confidence: 0.927554666996002

00:10:40.836 --> 00:10:43.317 of the questions that got me

NOTE Confidence: 0.927554666996002

00:10:43.317 --> 00:10:45.780 to dig into this issue. So

NOTE Confidence: 0.891657054424286

00:10:45.780 --> 00:10:48.167 I guess this is such a fascinating

NOTE Confidence: 0.891657054424286

00:10:48.167 --> 00:10:50.730 period with such fascinating organisms.

NOTE Confidence: 0.891657054424286

00:10:50.730 --> 00:10:52.790 But what happened to them?

NOTE Confidence: 0.891657054424286

00:10:52.790 --> 00:10:54.850 What happened to the Ed

NOTE Confidence: 0.908699524402618

00:10:54.850 --> 00:10:57.903 Akron Biota? That is, yeah, no.

NOTE Confidence: 0.908699524402618

00:10:57.903 --> 00:11:00.665 That's been one of the most long

NOTE Confidence: 0.908699524402618

00:11:00.665 --> 00:11:01.850 standing questions concerning.

NOTE Confidence: 0.908699524402618

00:11:01.850 --> 00:11:03.820 Certainly the Edie Accra Biota,

NOTE Confidence: 0.908699524402618

00:11:03.820 --> 00:11:06.524 and I would say sort of in the

NOTE Confidence: 0.908699524402618

00:11:06.524 --> 00:11:09.327 evolution of complex life more broadly,

NOTE Confidence: 0.908699524402618

00:11:09.330 --> 00:11:12.474 just to spend a moment on this question.

NOTE Confidence: 0.908699524402618

00:11:12.480 --> 00:11:14.450 It's really a critical one,

NOTE Confidence: 0.908699524402618

00:11:14.450 --> 00:11:16.874 because at the broadest scale were

NOTE Confidence: 0.908699524402618

00:11:16.874 --> 00:11:18.928 asking about the evolutionary trajectory

NOTE Confidence: 0.908699524402618

00:11:18.928 --> 00:11:21.148 of complex life on our planet.

NOTE Confidence: 0.908699524402618

00:11:21.150 --> 00:11:24.500 And is there a sort of a single path towards

NOTE Confidence: 0.908699524402618

00:11:24.581 --> 00:11:27.857 the emergence of complex animal grade life?

NOTE Confidence: 0.908699524402618

00:11:27.860 --> 00:11:29.670 Or have there been multiple

NOTE Confidence: 0.908699524402618

00:11:29.670 --> 00:11:31.118 experiments along the way?

NOTE Confidence: 0.908699524402618

00:11:31.120 --> 00:11:32.956 And perhaps the Edie Accra Biota

NOTE Confidence: 0.908699524402618

00:11:32.956 --> 00:11:35.459 is one of those failed experiments,

NOTE Confidence: 0.908699524402618

00:11:35.460 --> 00:11:37.626 and if we're considering, you know,

NOTE Confidence: 0.908699524402618

00:11:37.630 --> 00:11:40.164 at a scale even beyond our planet,

NOTE Confidence: 0.908699524402618

00:11:40.170 --> 00:11:43.058 if we're searching for life on exo planets,

NOTE Confidence: 0.908699524402618

00:11:43.060 --> 00:11:45.956 you know what should we be looking for?

NOTE Confidence: 0.908699524402618

00:11:45.960 --> 00:11:48.018 Should we expect that that there's

NOTE Confidence: 0.908699524402618

00:11:48.018 --> 00:11:50.593 just been there is at best a

NOTE Confidence: 0.908699524402618

00:11:50.593 --> 00:11:52.109 single path towards complexity,

NOTE Confidence: 0.908699524402618

00:11:52.110 --> 00:11:54.357 or there are a number of potentially

NOTE Confidence: 0.908699524402618

00:11:54.357 --> 00:11:56.246 very different paths towards towards

NOTE Confidence: 0.908699524402618

00:11:56.246 --> 00:11:58.416 complex lifelike the diacre organisms?

NOTE Confidence: 0.908699524402618

00:11:58.420 --> 00:12:01.248 So what exactly happened to the Ed?

NOTE Confidence: 0.908699524402618

00:12:01.250 --> 00:12:03.668 Accra Biota is really a very

NOTE Confidence: 0.908699524402618

00:12:03.668 --> 00:12:04.474 pressing question.

NOTE Confidence: 0.908699524402618

00:12:04.480 --> 00:12:07.204 They appear relatively suddenly in the

NOTE Confidence: 0.908699524402618

00:12:07.204 --> 00:12:09.789 geologic record around about the middle

NOTE Confidence: 0.908699524402618

00:12:09.789 --> 00:12:12.557 to late portions of the Ed Akron period,

NOTE Confidence: 0.908699524402618

00:12:12.560 --> 00:12:15.388 and then they have roughly 30 million

NOTE Confidence: 0.908699524402618

00:12:15.388 --> 00:12:18.220 years of duration in the fossil record,

NOTE Confidence: 0.908699524402618

00:12:18.220 --> 00:12:21.721 but they disappear at the end of the Ed

NOTE Confidence: 0.908699524402618

00:12:21.721 --> 00:12:25.489 Akron period at the end of the pre Cambrian,

NOTE Confidence: 0.908699524402618

00:12:25.490 --> 00:12:28.786 in the beginning of the Phanerozoic Eon and.

NOTE Confidence: 0.908699524402618

00:12:28.790 --> 00:12:31.894 Why that is is really a critical question

NOTE Confidence: 0.908699524402618

00:12:31.894 --> 00:12:34.472 because we're still trying to understand

NOTE Confidence: 0.908699524402618

00:12:34.472 --> 00:12:37.058 to what extent these organisms are

NOTE Confidence: 0.908699524402618

00:12:37.130 --> 00:12:39.632 allied with living groups of animals

NOTE Confidence: 0.908699524402618

00:12:39.632 --> 00:12:42.136 or other living groups of organisms.

NOTE Confidence: 0.908699524402618

00:12:42.136 --> 00:12:43.390 Do, for instance,

NOTE Confidence: 0.908699524402618

00:12:43.390 --> 00:12:46.309 the roots of the what we call

NOTE Confidence: 0.908699524402618

00:12:46.309 --> 00:12:47.560 the Cambrian explosion,

NOTE Confidence: 0.908699524402618

00:12:47.560 --> 00:12:49.444 the radiation of complex,

NOTE Confidence: 0.908699524402618

00:12:49.444 --> 00:12:52.760 animal life and ecologies that really marks

NOTE Confidence: 0.908699524402618

00:12:52.760 --> 00:12:55.637 the beginning of the Phanerozoic Eon back

NOTE Confidence: 0.908699524402618

00:12:55.637 --> 00:12:58.857 all the way back to the days of Darwin?

NOTE Confidence: 0.908699524402618

00:12:58.860 --> 00:13:01.326 Are the roots to that explosion

NOTE Confidence: 0.908699524402618

00:13:01.326 --> 00:13:04.150 actually in the D Akron period?

NOTE Confidence: 0.908699524402618

00:13:04.150 --> 00:13:06.424 Are these the ancestors of those

NOTE Confidence: 0.908699524402618

00:13:06.424 --> 00:13:08.558 more recognizable E animal dominated

NOTE Confidence: 0.908699524402618

00:13:08.558 --> 00:13:10.766 groups that radiate subsequently,

NOTE Confidence: 0.908699524402618

00:13:10.770 --> 00:13:12.975 or are they entirely distinct

NOTE Confidence: 0.908699524402618

00:13:12.975 --> 00:13:14.298 from one another?

NOTE Confidence: 0.908699524402618

00:13:14.300 --> 00:13:17.506 So whether or not the Edie Accra

NOTE Confidence: 0.908699524402618

00:13:17.506 --> 00:13:19.792 Biota actually went extinct at

NOTE Confidence: 0.908699524402618

00:13:19.792 --> 00:13:22.669 the end of the Ed Akron period?

NOTE Confidence: 0.908699524402618

00:13:22.670 --> 00:13:23.530 Or whether,

NOTE Confidence: 0.908699524402618

00:13:23.530 --> 00:13:24.820 perhaps other circumstances

NOTE Confidence: 0.908699524402618

00:13:24.820 --> 00:13:26.970 might be responsible for their

NOTE Confidence: 0.908699524402618

00:13:27.035 --> 00:13:29.310 disappearance from the fossil record.

NOTE Confidence: 0.908699524402618

00:13:29.310 --> 00:13:30.534 Um is really,

NOTE Confidence: 0.908699524402618

00:13:30.534 --> 00:13:32.166 really a critical question,

NOTE Confidence: 0.908699524402618

00:13:32.170 --> 00:13:34.220 and in the latter scenario,

NOTE Confidence: 0.908699524402618

00:13:34.220 --> 00:13:36.668 one of the most common models,

NOTE Confidence: 0.908699524402618

00:13:36.670 --> 00:13:39.540 which has historically been proposed is that,

NOTE Confidence: 0.908699524402618

00:13:39.540 --> 00:13:41.585 uh, the ZD hacker organisms

NOTE Confidence: 0.908699524402618

00:13:41.585 --> 00:13:43.630 again were entirely soft body.

NOTE Confidence: 0.908699524402618

00:13:43.630 --> 00:13:46.078 They consisted only of soft tissues.

NOTE Confidence: 0.908699524402618

00:13:46.080 --> 00:13:48.936 They didn't have bio mineralized hard parts,

NOTE Confidence: 0.908699524402618

00:13:48.940 --> 00:13:51.985 which are typically the only thing that

NOTE Confidence: 0.908699524402618

00:13:51.985 --> 00:13:55.267 ever makes it into the fossil record.

NOTE Confidence: 0.908699524402618

00:13:55.270 --> 00:13:57.270 So a fossils are, or,

NOTE Confidence: 0.908699524402618

00:13:57.270 --> 00:13:58.070 you know.

NOTE Confidence: 0.908699524402618

00:13:58.070 --> 00:13:58.470 Again,

NOTE Confidence: 0.908699524402618

00:13:58.470 --> 00:13:59.270 strictly speaking,

NOTE Confidence: 0.908699524402618

00:13:59.270 --> 00:14:01.811 body fossils are the remains of the

NOTE Confidence: 0.908699524402618

00:14:01.811 --> 00:14:04.216 bodies or the tissues of organisms

NOTE Confidence: 0.908699524402618

00:14:04.216 --> 00:14:06.700 that are preserved in Rock and

NOTE Confidence: 0.908699524402618

00:14:06.700 --> 00:14:09.266 make it into the geologic record.

NOTE Confidence: 0.908699524402618

00:14:09.270 --> 00:14:12.492 But in order to make it into the geologic

NOTE Confidence: 0.908699524402618

00:14:12.492 --> 00:14:14.869 record organisms have to survive.

NOTE Confidence: 0.908699524402618

00:14:14.870 --> 00:14:16.470 Abundant process is detrimental

NOTE Confidence: 0.908699524402618

00:14:16.470 --> 00:14:17.270 to fossilization.

NOTE Confidence: 0.908699524402618

00:14:17.270 --> 00:14:19.270 They go through decay there,

NOTE Confidence: 0.919428884983063

00:14:19.270 --> 00:14:21.784 scavenge their, their broken up or

NOTE Confidence: 0.919428884983063

00:14:21.784 --> 00:14:24.469 abraded by waves or by wind all.

NOTE Confidence: 0.919428884983063

00:14:24.470 --> 00:14:26.500 And once they make it.

NOTE Confidence: 0.919428884983063

00:14:26.500 --> 00:14:28.560 Into the rock record initially,

NOTE Confidence: 0.919428884983063

00:14:28.560 --> 00:14:30.204 once they actually become

NOTE Confidence: 0.919428884983063

00:14:30.204 --> 00:14:31.437 buried in settlements.

NOTE Confidence: 0.919428884983063

00:14:31.440 --> 00:14:32.679 In those sediments,

NOTE Confidence: 0.919428884983063

00:14:32.679 --> 00:14:33.918 turn into rocks.

NOTE Confidence: 0.919428884983063

00:14:33.920 --> 00:14:35.980 Those rocks have to survive.

NOTE Confidence: 0.919428884983063

00:14:35.980 --> 00:14:37.628 Things like mountain building

NOTE Confidence: 0.919428884983063

00:14:37.628 --> 00:14:40.100 processes or the subduction of the

NOTE Confidence: 0.919428884983063

00:14:40.164 --> 00:14:42.254 sea floor underneath the continental

NOTE Confidence: 0.919428884983063

00:14:42.254 --> 00:14:44.805 plates on which are likewise agents

NOTE Confidence: 0.919428884983063

00:14:44.805 --> 00:14:47.157 of destruction of fossils or can

NOTE Confidence: 0.919428884983063

00:14:47.157 --> 00:14:48.751 disfigure them beyond recognition.

NOTE Confidence: 0.919428884983063

00:14:48.751 --> 00:14:50.395 So exceptional fossilization the

NOTE Confidence: 0.919428884983063

00:14:50.395 --> 00:14:52.039 fossilization of soft tissues,

NOTE Confidence: 0.919428884983063

00:14:52.040 --> 00:14:54.100 which is what we know.

NOTE Confidence: 0.919428884983063

00:14:54.100 --> 00:14:56.656 The Edie Accra biota were entirely

NOTE Confidence: 0.919428884983063

00:14:56.656 --> 00:14:59.907 comprised of and didn't have any hard parts.

NOTE Confidence: 0.919428884983063

00:14:59.910 --> 00:15:02.255 Is really an extraordinary thing

NOTE Confidence: 0.919428884983063

00:15:02.255 --> 00:15:04.131 and it requires extraordinary

NOTE Confidence: 0.919428884983063

00:15:04.131 --> 00:15:05.629 conditions and some cases.

NOTE Confidence: 0.919428884983063

00:15:05.630 --> 00:15:07.815 Those conditions can be prevalent

NOTE Confidence: 0.919428884983063

00:15:07.815 --> 00:15:10.000 for certain periods of time

NOTE Confidence: 0.919428884983063

00:15:10.078 --> 00:15:12.228 on which we call preservation.

NOTE Confidence: 0.919428884983063

00:15:12.230 --> 00:15:14.870 All windows and those windows can

NOTE Confidence: 0.919428884983063

00:15:14.870 --> 00:15:17.510 open an those windows can close.

NOTE Confidence: 0.919428884983063

00:15:17.510 --> 00:15:20.054 So one of the major questions

NOTE Confidence: 0.919428884983063

00:15:20.054 --> 00:15:22.350 about the Edie Accra Biota.

NOTE Confidence: 0.919428884983063

00:15:22.350 --> 00:15:24.384 Given that these organisms were soft

NOTE Confidence: 0.919428884983063

00:15:24.384 --> 00:15:26.361 bodied and that their preservation

NOTE Confidence: 0.919428884983063

00:15:26.361 --> 00:15:28.609 is therefore exceptional and

NOTE Confidence: 0.919428884983063

00:15:28.609 --> 00:15:30.295 required exceptional circumstances.

NOTE Confidence: 0.919428884983063

00:15:30.300 --> 00:15:33.422 Is it possible at the Y diacre

NOTE Confidence: 0.919428884983063

00:15:33.422 --> 00:15:34.760 organisms actually survived

NOTE Confidence: 0.919428884983063

00:15:34.842 --> 00:15:36.918 the end of the pre cambran,

NOTE Confidence: 0.919428884983063

00:15:36.920 --> 00:15:39.410 at least for a little while,

NOTE Confidence: 0.919428884983063

00:15:39.410 --> 00:15:41.774 but we're no longer being fossilized

NOTE Confidence: 0.919428884983063

00:15:41.774 --> 00:15:44.209 and that that boundary in time

NOTE Confidence: 0.919428884983063

00:15:44.209 --> 00:15:46.179 rather than marking the extinction

NOTE Confidence: 0.919428884983063

00:15:46.179 --> 00:15:48.100 of these ancient organisms,

NOTE Confidence: 0.919428884983063

00:15:48.100 --> 00:15:49.985 actually was simply the closing

NOTE Confidence: 0.919428884983063

00:15:49.985 --> 00:15:52.427 of a fossilization window of the

NOTE Confidence: 0.919428884983063

00:15:52.427 --> 00:15:53.882 extraordinary circumstances that

NOTE Confidence: 0.919428884983063

00:15:53.882 --> 00:15:55.822 permitted those soft tissues

NOTE Confidence: 0.919428884983063

00:15:55.822 --> 00:15:58.271 to actually make it into the

NOTE Confidence: 0.919428884983063

00:15:58.271 --> 00:15:59.687 fossil and Geologic Records.

NOTE Confidence: 0.863564610481262

00:16:01.720 --> 00:16:04.972 Fascinating, yeah, it's it's so

NOTE Confidence: 0.863564610481262

00:16:04.972 --> 00:16:09.900 crazy to me that this entire complex.

NOTE Confidence: 0.926166117191315

00:16:09.900 --> 00:16:11.400 You know world of life.

NOTE Confidence: 0.926166117191315

00:16:11.400 --> 00:16:13.353 We might have not even know about

NOTE Confidence: 0.926166117191315

00:16:13.353 --> 00:16:15.825 known about it had it not been that

NOTE Confidence: 0.926166117191315

00:16:15.825 --> 00:16:17.395 there was the right circumstances

NOTE Confidence: 0.926166117191315

00:16:17.460 --> 00:16:19.497 at the right time to preserve them.

NOTE Confidence: 0.926166117191315

00:16:19.500 --> 00:16:21.894 And it makes me wonder, like you know,

NOTE Confidence: 0.926166117191315

00:16:21.894 --> 00:16:23.682 are we missing other things that

NOTE Confidence: 0.926166117191315

00:16:23.682 --> 00:16:25.800 might have existed on the world? Just

NOTE Confidence: 0.926166117191315

00:16:25.800 --> 00:16:27.900 because you know they couldn't be fossil?

NOTE Confidence: 0.926166117191315

00:16:27.900 --> 00:16:29.601 No, I worry about that all the

NOTE Confidence: 0.926166117191315

00:16:29.601 --> 00:16:31.845 time and it extends to not only

NOTE Confidence: 0.926166117191315

00:16:31.845 --> 00:16:33.293 you know individual organisms,

NOTE Confidence: 0.926166117191315

00:16:33.300 --> 00:16:34.760 but also thinking about things

NOTE Confidence: 0.926166117191315

00:16:34.760 --> 00:16:36.600 at the at the ecosystem scale.

NOTE Confidence: 0.926166117191315

00:16:36.600 --> 00:16:38.502 So when we look at exceptionally

NOTE Confidence: 0.926166117191315

00:16:38.502 --> 00:16:40.616 preserved fossils and first of all, it's.

NOTE Confidence: 0.926166117191315

00:16:40.616 --> 00:16:43.944 It's important to to note that not all

NOTE Confidence: 0.926166117191315

00:16:43.944 --> 00:16:46.660 exceptionally preserved fossils are the same,

NOTE Confidence: 0.926166117191315

00:16:46.660 --> 00:16:49.264 so there are different modes or

NOTE Confidence: 0.926166117191315

00:16:49.264 --> 00:16:51.000 styles of exceptional fossilisation.

NOTE Confidence: 0.926166117191315

00:16:51.000 --> 00:16:54.231 One of the more common forms is that the

NOTE Confidence: 0.926166117191315

00:16:54.231 --> 00:16:56.039 more chemically resistant components

NOTE Confidence: 0.926166117191315

00:16:56.039 --> 00:17:00.720 of of a carcass of a body or of soft

NOTE Confidence: 0.926166117191315

00:17:00.720 --> 00:17:03.546 tissues can survive degradation and be

NOTE Confidence: 0.926166117191315

00:17:03.546 --> 00:17:06.190 preserved as thin carbon rich films.

NOTE Confidence: 0.926166117191315

00:17:06.190 --> 00:17:08.830 But you can also replicate soft

NOTE Confidence: 0.926166117191315

00:17:08.830 --> 00:17:10.590 tissues or replace them.

NOTE Confidence: 0.926166117191315

00:17:10.590 --> 00:17:13.572 My minerals that form during decay on

NOTE Confidence: 0.926166117191315

00:17:13.572 --> 00:17:16.489 in common minerals involved in this

NOTE Confidence: 0.926166117191315

00:17:16.489 --> 00:17:18.561 type of exceptional fossilization

NOTE Confidence: 0.926166117191315

00:17:18.561 --> 00:17:21.109 include pyrite or fool's gold,

NOTE Confidence: 0.926166117191315

00:17:21.110 --> 00:17:23.500 appetite, calcium phosphate or silica,

NOTE Confidence: 0.926166117191315

00:17:23.500 --> 00:17:26.368 and then there are rare instances

NOTE Confidence: 0.926166117191315

00:17:26.368 --> 00:17:28.280 like entrapment in Amber,

NOTE Confidence: 0.926166117191315

00:17:28.280 --> 00:17:30.815 but even the most extraordinary

NOTE Confidence: 0.926166117191315

00:17:30.815 --> 00:17:32.843 preservation of soft tissues

NOTE Confidence: 0.926166117191315

00:17:32.843 --> 00:17:34.970 involved some amount of decay,

NOTE Confidence: 0.926166117191315

00:17:34.970 --> 00:17:37.820 so there's always some amount of

NOTE Confidence: 0.926166117191315

00:17:37.820 --> 00:17:40.739 information loss and in fact decay.

NOTE Confidence: 0.926166117191315

00:17:40.740 --> 00:17:43.044 Is often an integral component in

NOTE Confidence: 0.926166117191315

00:17:43.044 --> 00:17:45.597 the precipitation of some of these

NOTE Confidence: 0.926166117191315

00:17:45.597 --> 00:17:47.972 very minerals that are responsible

NOTE Confidence: 0.926166117191315

00:17:47.972 --> 00:17:49.397 for exceptional preservation.

NOTE Confidence: 0.926166117191315

00:17:49.400 --> 00:17:50.699 So actually counterintuitively,

NOTE Confidence: 0.926166117191315

00:17:50.699 --> 00:17:52.864 decay is essential for exceptional

NOTE Confidence: 0.926166117191315

00:17:52.864 --> 00:17:53.297 fossilization,

NOTE Confidence: 0.926166117191315

00:17:53.300 --> 00:17:56.324 but obviously it's a question of scale.

NOTE Confidence: 0.926166117191315

00:17:56.330 --> 00:17:58.928 If you have too much decay,

NOTE Confidence: 0.926166117191315

00:17:58.930 --> 00:18:01.516 or if it occurs to quickly,

NOTE Confidence: 0.926166117191315

00:18:01.520 --> 00:18:03.872 you're not able to actually capture

NOTE Confidence: 0.926166117191315

00:18:03.872 --> 00:18:06.024 that anatomical detail and create

NOTE Confidence: 0.926166117191315

00:18:06.024 --> 00:18:07.587 that extraordinary fossil,

NOTE Confidence: 0.926166117191315

00:18:07.590 --> 00:18:10.176 but because decay and information loss,

NOTE Confidence: 0.926166117191315

00:18:10.180 --> 00:18:12.390 or sometimes the introduction of.

NOTE Confidence: 0.926166117191315

00:18:12.390 --> 00:18:14.660 Secondary an artificial features that

NOTE Confidence: 0.926166117191315

00:18:14.660 --> 00:18:18.469 are a byproduct of decay are are unavoidable,

NOTE Confidence: 0.926166117191315

00:18:18.470 --> 00:18:21.000 but also differ between different

NOTE Confidence: 0.926166117191315

00:18:21.000 --> 00:18:23.530 styles of fossilization and different

NOTE Confidence: 0.926166117191315

00:18:23.601 --> 00:18:26.056 styles of fossilization have different

NOTE Confidence: 0.926166117191315

00:18:26.056 --> 00:18:28.982 levels of bias associated with them

NOTE Confidence: 0.926166117191315

00:18:28.982 --> 00:18:31.334 in terms of what typically gets

NOTE Confidence: 0.926166117191315

00:18:31.334 --> 00:18:33.659 preserved and what typically gets lost.

NOTE Confidence: 0.926166117191315

00:18:33.659 --> 00:18:35.574 It's really important that we

NOTE Confidence: 0.926166117191315

00:18:35.574 --> 00:18:37.653 understand the mechanisms responsible

NOTE Confidence: 0.926166117191315

00:18:37.653 --> 00:18:39.528 for exceptional fossilization.

NOTE Confidence: 0.926166117191315

00:18:39.530 --> 00:18:42.260 So In other words it's tempting when

NOTE Confidence: 0.926166117191315

00:18:42.260 --> 00:18:44.740 we have really extraordinarily.

NOTE Confidence: 0.926166117191315

00:18:44.740 --> 00:18:47.068 Well preserved fossils such as fossils

NOTE Confidence: 0.926166117191315

00:18:47.068 --> 00:18:49.089 of soft tissues are softbodied

NOTE Confidence: 0.926166117191315

00:18:49.089 --> 00:18:51.854 organisms like the Edie Accra biota to

NOTE Confidence: 0.926166117191315

00:18:51.854 --> 00:18:54.389 take them at face value and say OK,

NOTE Confidence: 0.926166117191315

00:18:54.390 --> 00:18:55.497 this is I'm.

NOTE Confidence: 0.926166117191315

00:18:55.497 --> 00:18:56.973 This is extraordinarily fortunate

NOTE Confidence: 0.926166117191315

00:18:56.973 --> 00:18:58.870 for our ability to reconstruct

NOTE Confidence: 0.926166117191315

00:18:58.870 --> 00:19:01.054 past life from this time interval.

NOTE Confidence: 0.926166117191315

00:19:01.060 --> 00:19:03.256 I'm going to take this wonderful

NOTE Confidence: 0.926166117191315

00:19:03.256 --> 00:19:05.891 fossil deposit as a snapshot as a

NOTE Confidence: 0.926166117191315

00:19:05.891 --> 00:19:08.087 census population of what was life

NOTE Confidence: 0.926166117191315

00:19:08.087 --> 00:19:10.723 was like on the ancient sea floor

NOTE Confidence: 0.926166117191315

00:19:10.723 --> 00:19:12.465 some 560 million years ago.

NOTE Confidence: 0.926166117191315

00:19:12.465 --> 00:19:14.940 But the reality is is that and less we

NOTE Confidence: 0.926166117191315

00:19:15.012 --> 00:19:17.767 understand what mechanisms are responsible.

NOTE Confidence: 0.926166117191315

00:19:17.770 --> 00:19:20.122 For fossilisation we you don't know

NOTE Confidence: 0.926166117191315

00:19:20.122 --> 00:19:22.465 what information has been lost and

NOTE Confidence: 0.926166117191315

00:19:22.465 --> 00:19:24.583 how much information has been lost.

NOTE Confidence: 0.926166117191315

00:19:24.590 --> 00:19:27.033 So if we're going to attempt to

NOTE Confidence: 0.926166117191315

00:19:27.033 --> 00:19:29.026 reconstruct not only what these

NOTE Confidence: 0.926166117191315

00:19:29.026 --> 00:19:29.900 organisms were,

NOTE Confidence: 0.926166117191315

00:19:29.900 --> 00:19:32.156 but also what did the structure

NOTE Confidence: 0.926166117191315

00:19:32.156 --> 00:19:34.070 of these ecosystems look like,

NOTE Confidence: 0.926166117191315

00:19:34.070 --> 00:19:37.094 if we're going to be able to infer,

NOTE Confidence: 0.926166117191315

00:19:37.100 --> 00:19:39.224 you know what sort of interactions

NOTE Confidence: 0.926166117191315

00:19:39.224 --> 00:19:41.115 took place between different members

NOTE Confidence: 0.926166117191315

00:19:41.115 --> 00:19:42.779 of these ancient communities.

NOTE Confidence: 0.926166117191315

00:19:42.780 --> 00:19:45.606 But also if we want to make very broad

NOTE Confidence: 0.926166117191315

00:19:45.606 --> 00:19:47.779 statements about evolutionary patterns.

NOTE Confidence: 0.926166117191315

00:19:47.780 --> 00:19:49.920 When we observe apparent appearances

NOTE Confidence: 0.926166117191315

00:19:49.920 --> 00:19:52.060 and disappearances of these fossils

NOTE Confidence: 0.936454951763153

00:19:52.122 --> 00:19:53.490 in the geologic record,

NOTE Confidence: 0.936454951763153

00:19:53.490 --> 00:19:55.932 we really need to understand what

NOTE Confidence: 0.936454951763153

00:19:55.932 --> 00:19:58.033 factors are responsible for their

NOTE Confidence: 0.936454951763153

00:19:58.033 --> 00:20:00.833 fossilization so that we can better judge.

NOTE Confidence: 0.936454951763153

00:20:00.840 --> 00:20:03.899 Is this an accurate look at ancient

NOTE Confidence: 0.936454951763153

00:20:03.899 --> 00:20:06.655 sea floor diversity and do we have

NOTE Confidence: 0.936454951763153

00:20:06.655 --> 00:20:09.217 grounds to say that this was a

NOTE Confidence: 0.936454951763153

00:20:09.217 --> 00:20:11.791 true extinction event or a true

NOTE Confidence: 0.936454951763153

00:20:11.791 --> 00:20:14.349 origination event or not a man?

NOTE Confidence: 0.936454951763153

00:20:14.349 --> 00:20:16.041 What sort of environmental

NOTE Confidence: 0.936454951763153

00:20:16.041 --> 00:20:17.969 conditions were responsible for this?

NOTE Confidence: 0.936454951763153

00:20:17.970 --> 00:20:18.796 Fossilization, Anne,

NOTE Confidence: 0.936454951763153

00:20:18.796 --> 00:20:20.448 how did those change?

NOTE Confidence: 0.936454951763153

00:20:20.450 --> 00:20:22.580 So how did that environmental change

NOTE Confidence: 0.936454951763153

00:20:22.580 --> 00:20:24.731 against as the backdrop of this

NOTE Confidence: 0.936454951763153

00:20:24.731 --> 00:20:26.723 biological change affect not only the

NOTE Confidence: 0.936454951763153

00:20:26.723 --> 00:20:28.869 ecology of these ancient organisms,

NOTE Confidence: 0.936454951763153

00:20:28.870 --> 00:20:31.066 but also their chances of making

NOTE Confidence: 0.936454951763153

00:20:31.066 --> 00:20:34.790 it into the fossil record?

NOTE Confidence: 0.935759961605072

00:20:34.790 --> 00:20:36.746 So it sounds like this whole

NOTE Confidence: 0.935759961605072

00:20:36.746 --> 00:20:38.050 process is very nuanced.

NOTE Confidence: 0.935759961605072

00:20:38.050 --> 00:20:40.658 I feel like most people when they hear

NOTE Confidence: 0.935759961605072

00:20:40.658 --> 00:20:42.649 extinction event what they think of

NOTE Confidence: 0.935759961605072

00:20:42.649 --> 00:20:44.569 is the extinction of the dinosaurs.

NOTE Confidence: 0.935759961605072

00:20:44.570 --> 00:20:46.796 They think asteroid everything died and we

NOTE Confidence: 0.935759961605072

00:20:46.796 --> 00:20:49.128 know that because we stopped seeing things,

NOTE Confidence: 0.935759961605072

00:20:49.130 --> 00:20:51.368 but it sounds like it's actually

NOTE Confidence: 0.935759961605072

00:20:51.368 --> 00:20:53.472 much more complicated that you have

NOTE Confidence: 0.935759961605072

00:20:53.472 --> 00:20:55.648 to look on both sides of the coin.

NOTE Confidence: 0.935759961605072

00:20:55.650 --> 00:20:58.332 You kind of have to look at not only

NOTE Confidence: 0.935759961605072

00:20:58.332 --> 00:21:01.120 the fossils but also the environment so

NOTE Confidence: 0.935759961605072

00:21:01.120 --> 00:21:04.749 that kind of leads us into the next point of.

NOTE Confidence: 0.935759961605072

00:21:04.750 --> 00:21:07.816 You your research has been focusing on

NOTE Confidence: 0.935759961605072

00:21:07.816 --> 00:21:10.309 these many hypothesis for how or why,

NOTE Confidence: 0.935759961605072

00:21:10.310 --> 00:21:12.185 or the explanations for what

NOTE Confidence: 0.935759961605072

00:21:12.185 --> 00:21:14.680 we see in the fossil record.

NOTE Confidence: 0.935759961605072

00:21:14.680 --> 00:21:17.086 So can you elaborate on these

NOTE Confidence: 0.935759961605072

00:21:17.086 --> 00:21:19.467 hypothesis as to what happened at

NOTE Confidence: 0.935759961605072

00:21:19.467 --> 00:21:22.757 the end of the D Akron from both the

NOTE Confidence: 0.935759961605072

00:21:22.757 --> 00:21:25.385 geology and the environment and the

NOTE Confidence: 0.921276241540908

00:21:25.390 --> 00:21:26.563 animals themselves organisms?

NOTE Confidence: 0.921276241540908

00:21:26.563 --> 00:21:28.516 Yes, uh yeah, there's been.

NOTE Confidence: 0.921276241540908

00:21:28.516 --> 00:21:30.844 You know, any number of hypothesis

NOTE Confidence: 0.921276241540908

00:21:30.844 --> 00:21:32.937 about what happened to the Ed.

NOTE Confidence: 0.921276241540908

00:21:32.940 --> 00:21:35.369 Accra Biota, and these are wrapped up

NOTE Confidence: 0.921276241540908

00:21:35.369 --> 00:21:38.042 in the other questions of what the

NOTE Confidence: 0.921276241540908

00:21:38.042 --> 00:21:40.376 Edie Accra organisms were as well.

NOTE Confidence: 0.921276241540908

00:21:40.380 --> 00:21:42.781 But I would say this three chief

NOTE Confidence: 0.921276241540908

00:21:42.781 --> 00:21:44.850 hypothesis fall into two categories.

NOTE Confidence: 0.921276241540908

00:21:44.850 --> 00:21:46.222 One is that yes,

NOTE Confidence: 0.921276241540908

00:21:46.222 --> 00:21:48.280 there was truly an extinction event

NOTE Confidence: 0.921276241540908

00:21:48.346 --> 00:21:50.440 and they disappeared and the other

NOTE Confidence: 0.921276241540908

00:21:50.440 --> 00:21:53.029 is that maybe they didn't disappear.

NOTE Confidence: 0.921276241540908

00:21:53.030 --> 00:21:54.890 Or maybe they eventually disappeared,

NOTE Confidence: 0.921276241540908

00:21:54.890 --> 00:21:57.193 but maybe not as a true extinction

NOTE Confidence: 0.921276241540908

00:21:57.193 --> 00:21:59.010 event or mass extinction.

NOTE Confidence: 0.921276241540908

00:21:59.010 --> 00:22:02.018 And it was a question of preservation and

NOTE Confidence: 0.921276241540908

00:22:02.018 --> 00:22:04.390 the preservation TLE window closed Amman,

NOTE Confidence: 0.921276241540908

00:22:04.390 --> 00:22:06.497 in terms of if we assume that

NOTE Confidence: 0.921276241540908

00:22:06.497 --> 00:22:08.989 it was a true disappearance.

NOTE Confidence: 0.921276241540908

00:22:08.990 --> 00:22:11.678 And it wasn't just changes and fossilization.

NOTE Confidence: 0.921276241540908

00:22:11.680 --> 00:22:14.002 There are two hypothesis for why

NOTE Confidence: 0.921276241540908

00:22:14.002 --> 00:22:16.289 that might have been the case,

NOTE Confidence: 0.921276241540908

00:22:16.290 --> 00:22:18.796 and one is that there was environmental

NOTE Confidence: 0.921276241540908

00:22:18.796 --> 00:22:21.006 change on which is something that's

NOTE Confidence: 0.921276241540908

00:22:21.006 --> 00:22:23.505 been implicated in many of the mass

NOTE Confidence: 0.921276241540908

00:22:23.579 --> 00:22:25.694 extinctions that we have recorded

NOTE Confidence: 0.921276241540908

00:22:25.694 --> 00:22:27.809 in Earth's more recent history,

NOTE Confidence: 0.921276241540908

00:22:27.810 --> 00:22:29.350 like the Cretaceous Paleogene

NOTE Confidence: 0.921276241540908

00:22:29.350 --> 00:22:30.120 Mass extinction.

NOTE Confidence: 0.921276241540908

00:22:30.120 --> 00:22:32.600 In which the dinosaurs disappeared,

NOTE Confidence: 0.921276241540908

00:22:32.600 --> 00:22:35.354 but the other possibility that's been

NOTE Confidence: 0.921276241540908

00:22:35.354 --> 00:22:39.379 that's been mooted is that change is an

NOTE Confidence: 0.921276241540908

00:22:39.379 --> 00:22:42.014 ecological interactions between Edie Accra,

NOTE Confidence: 0.921276241540908

00:22:42.020 --> 00:22:43.012 biota organisms,

NOTE Confidence: 0.921276241540908

00:22:43.012 --> 00:22:44.500 and other organisms,

NOTE Confidence: 0.921276241540908

00:22:44.500 --> 00:22:47.290 and potentially early complex animals

NOTE Confidence: 0.921276241540908

00:22:47.290 --> 00:22:50.562 emerging around the same time may

NOTE Confidence: 0.921276241540908

00:22:50.562 --> 00:22:53.355 have played a role in driving the

NOTE Confidence: 0.921276241540908

00:22:53.355 --> 00:22:55.909 Edie Accra biota to extinction,

NOTE Confidence: 0.921276241540908

00:22:55.910 --> 00:22:57.894 either very directly by,

NOTE Confidence: 0.921276241540908

00:22:57.894 --> 00:23:00.348 for example, praying upon them.

NOTE Confidence: 0.921276241540908

00:23:00.348 --> 00:23:01.806 Or more indirectly,

NOTE Confidence: 0.921276241540908

00:23:01.810 --> 00:23:04.180 for instance through competition for

NOTE Confidence: 0.921276241540908

00:23:04.180 --> 00:23:07.469 shared resources that may have been scarce,

NOTE Confidence: 0.921276241540908

00:23:07.470 --> 00:23:10.690 so those are the sort of three

NOTE Confidence: 0.921276241540908

00:23:10.690 --> 00:23:14.077 models for what happened to the Ed.

NOTE Confidence: 0.921276241540908

00:23:14.080 --> 00:23:16.435 Accra biota changes and fossilization

NOTE Confidence: 0.921276241540908

00:23:16.435 --> 00:23:17.848 or true extinction,

NOTE Confidence: 0.921276241540908

00:23:17.850 --> 00:23:19.880 mediated either by environmental change

NOTE Confidence: 0.921276241540908

00:23:19.880 --> 00:23:23.520 or by some sort of ecological escalation,

NOTE Confidence: 0.921276241540908

00:23:23.520 --> 00:23:25.880 which was ultimately detrimental to.

NOTE Confidence: 0.921276241540908

00:23:25.880 --> 00:23:27.077 Edie Accra organisms.

NOTE Confidence: 0.921276241540908

00:23:27.077 --> 00:23:29.870 So I'm I've long been interested in

NOTE Confidence: 0.921276241540908

00:23:29.946 --> 00:23:32.466 this question of what happened to

NOTE Confidence: 0.921276241540908

00:23:32.466 --> 00:23:34.657 the diacre organisms again because

NOTE Confidence: 0.921276241540908

00:23:34.657 --> 00:23:37.695 of the role they potentially play in

NOTE Confidence: 0.921276241540908

00:23:37.695 --> 00:23:39.761 our understanding of the emergence

NOTE Confidence: 0.921276241540908

00:23:39.761 --> 00:23:41.349 of complex animal life,

NOTE Confidence: 0.921276241540908

00:23:41.350 --> 00:23:43.720 and to what extent there really

NOTE Confidence: 0.921276241540908

00:23:43.720 --> 00:23:46.110 a stepping stone along that path,

NOTE Confidence: 0.921276241540908

00:23:46.110 --> 00:23:48.390 and I've really focused apon sort

NOTE Confidence: 0.921276241540908

00:23:48.390 --> 00:23:50.880 of both angles in my research,

NOTE Confidence: 0.921276241540908

00:23:50.880 --> 00:23:52.512 both the fossilization question

NOTE Confidence: 0.921276241540908

00:23:52.512 --> 00:23:54.960 and the extinction question I can

NOTE Confidence: 0.921276241540908

00:23:55.027 --> 00:23:57.289 talk a little bit about the

NOTE Confidence: 0.921276241540908

00:23:57.289 --> 00:23:58.420 fossilization angle first.

NOTE Confidence: 0.921276241540908

00:23:58.420 --> 00:24:01.066 So as we were just discussing,

NOTE Confidence: 0.921276241540908

00:24:01.070 --> 00:24:03.320 there are a number of different

NOTE Confidence: 0.921276241540908

00:24:03.320 --> 00:24:05.864 ways that you can have exceptional

NOTE Confidence: 0.921276241540908

00:24:05.864 --> 00:24:08.274 preservation of soft tissues or

NOTE Confidence: 0.921276241540908

00:24:08.274 --> 00:24:11.179 of soft bodied organisms like the

NOTE Confidence: 0.921276241540908

00:24:11.179 --> 00:24:12.556 Edie Accra Biota.

NOTE Confidence: 0.921276241540908

00:24:12.560 --> 00:24:15.218 But we really need to understand

NOTE Confidence: 0.921276241540908

00:24:15.218 --> 00:24:17.736 what the underlying mechanisms are to

NOTE Confidence: 0.921276241540908

00:24:17.736 --> 00:24:19.758 gauge to what extent those fossils

NOTE Confidence: 0.921276241540908

00:24:19.758 --> 00:24:22.168 are an accurate representation of

NOTE Confidence: 0.921276241540908

00:24:22.168 --> 00:24:24.933 ancient sea floor diversity antenna.

NOTE Confidence: 0.921276241540908

00:24:24.940 --> 00:24:26.344 Understand appearances and

NOTE Confidence: 0.921276241540908

00:24:26.344 --> 00:24:27.748 disappearances actually reflect

NOTE Confidence: 0.921276241540908

00:24:27.748 --> 00:24:29.830 evolutionary trends as opposed to.

NOTE Confidence: 0.921276241540908

00:24:29.830 --> 00:24:31.805 Other factors such as environmentally

NOTE Confidence: 0.921276241540908

00:24:31.805 --> 00:24:34.182 mediated changes in fossilization, so did

NOTE Confidence: 0.921276241540908

00:24:34.182 --> 00:24:36.954 the window for fossilisation of the Ed.

NOTE Confidence: 0.921276241540908

00:24:36.960 --> 00:24:39.536 Accra bio to close at the end

NOTE Confidence: 0.921276241540908

00:24:39.536 --> 00:24:41.310 of the Ed Akron,

NOTE Confidence: 0.921276241540908

00:24:41.310 --> 00:24:43.686 and is that why they disappear?

NOTE Confidence: 0.921276241540908

00:24:43.690 --> 00:24:46.066 So the Edie Accra biota are,

NOTE Confidence: 0.921276241540908

00:24:46.070 --> 00:24:46.822 by definition,

NOTE Confidence: 0.921276241540908

00:24:46.822 --> 00:24:48.326 exceptional fossils because they

NOTE Confidence: 0.921276241540908

00:24:48.326 --> 00:24:50.420 were entirely soft bite organisms.

NOTE Confidence: 0.921276241540908

00:24:50.420 --> 00:24:52.400 The nonetheless made it into

NOTE Confidence: 0.921276241540908

00:24:52.400 --> 00:24:53.588 the fossil record,

NOTE Confidence: 0.921276241540908

00:24:53.590 --> 00:24:55.966 which is really not the rule.

NOTE Confidence: 0.913572788238525

00:24:55.970 --> 00:24:59.130 It is the exception in the fossil record,

NOTE Confidence: 0.913572788238525

00:24:59.130 --> 00:25:01.958 but their preserved in a very distinctive.

NOTE Confidence: 0.913572788238525

00:25:01.960 --> 00:25:04.976 An unusual style in most Edie Accra biota.

NOTE Confidence: 0.913572788238525

00:25:04.980 --> 00:25:06.745 Fossil deposits these organisms are

NOTE Confidence: 0.913572788238525

00:25:06.745 --> 00:25:08.980 preserved as what we call cason

NOTE Confidence: 0.913572788238525

00:25:08.980 --> 00:25:11.005 molds or impressions and sandstones.

NOTE Confidence: 0.913572788238525

00:25:11.010 --> 00:25:13.726 So if you were to imagining oppressing

NOTE Confidence: 0.913572788238525

00:25:13.726 --> 00:25:16.290 your hand into sand at the beach,

NOTE Confidence: 0.913572788238525

00:25:16.290 --> 00:25:19.338 for example, of We were so fortunate to

NOTE Confidence: 0.913572788238525

00:25:19.338 --> 00:25:22.698 be able to go to the beach this summer,

NOTE Confidence: 0.913572788238525

00:25:22.700 --> 00:25:24.938 the impressions of not only the

NOTE Confidence: 0.913572788238525

00:25:24.938 --> 00:25:26.840 overall features of your hand,

NOTE Confidence: 0.913572788238525

00:25:26.840 --> 00:25:28.055 but features like,

NOTE Confidence: 0.913572788238525

00:25:28.055 --> 00:25:30.890 maybe you're the edges of your fingernails

NOTE Confidence: 0.913572788238525

00:25:30.960 --> 00:25:33.018 or the wrinkles with your skin.

NOTE Confidence: 0.913572788238525

00:25:33.020 --> 00:25:35.294 That replication of the anatomy of

NOTE Confidence: 0.913572788238525

00:25:35.294 --> 00:25:37.857 your hand in those sand grains that

NOTE Confidence: 0.913572788238525

00:25:37.857 --> 00:25:40.576 mold of your hand is sort of analogous

NOTE Confidence: 0.913572788238525

00:25:40.576 --> 00:25:43.285 to what we're talking about here in

NOTE Confidence: 0.913572788238525

00:25:43.285 --> 00:25:45.900 terms of the fossilization of the Ed.

NOTE Confidence: 0.913572788238525

00:25:45.900 --> 00:25:46.720 Accra, firewood,

NOTE Confidence: 0.913572788238525

00:25:46.720 --> 00:25:49.590 and we call this Edie Acura style

NOTE Confidence: 0.913572788238525

00:25:49.590 --> 00:25:51.149 fossilisation because it's a

NOTE Confidence: 0.913572788238525

00:25:51.149 --> 00:25:52.944 particularly well known in the

NOTE Confidence: 0.913572788238525

00:25:52.944 --> 00:25:55.331 Edie Accra Biota and in the diac

NOTE Confidence: 0.913572788238525

00:25:55.331 --> 00:25:57.411 remember this unit where the Edie

NOTE Confidence: 0.913572788238525

00:25:57.411 --> 00:25:59.766 Accra biota were first described.

NOTE Confidence: 0.913572788238525

00:25:59.770 --> 00:26:01.996 So no portion of the original

NOTE Confidence: 0.913572788238525

00:26:01.996 --> 00:26:04.250 tissues remain in these instances,

NOTE Confidence: 0.913572788238525

00:26:04.250 --> 00:26:06.854 but all of the detailed anatomy of

NOTE Confidence: 0.913572788238525

00:26:06.854 --> 00:26:09.267 their soft tissues is replicated in

NOTE Confidence: 0.913572788238525

00:26:09.267 --> 00:26:11.709 the arrangement of those sand grains

NOTE Confidence: 0.913572788238525

00:26:11.709 --> 00:26:14.017 that were pressed against them.

NOTE Confidence: 0.913572788238525

00:26:14.020 --> 00:26:15.130 Once they died,

NOTE Confidence: 0.913572788238525

00:26:15.130 --> 00:26:17.720 and once they were buried an because

NOTE Confidence: 0.913572788238525

00:26:17.793 --> 00:26:20.265 these were soft tissues an would

NOTE Confidence: 0.913572788238525

00:26:20.265 --> 00:26:22.847 therefore have been prone to pretty

NOTE Confidence: 0.913572788238525

00:26:22.847 --> 00:26:25.409 rapid decay once these organisms died,

NOTE Confidence: 0.913572788238525

00:26:25.410 --> 00:26:27.816 we know that this process of

NOTE Confidence: 0.913572788238525

00:26:27.816 --> 00:26:29.930 replication via these Sandy molds.

NOTE Confidence: 0.913572788238525

00:26:29.930 --> 00:26:31.458 Must have started immediately

NOTE Confidence: 0.913572788238525

00:26:31.458 --> 00:26:33.750 after they died and before their

NOTE Confidence: 0.913572788238525

00:26:33.817 --> 00:26:35.729 carcasses entirely rotted away.

NOTE Confidence: 0.913572788238525

00:26:35.730 --> 00:26:38.530 But how exactly they were fossilized has

NOTE Confidence: 0.913572788238525

00:26:38.530 --> 00:26:41.109 long been mysterious on previous studies.

NOTE Confidence: 0.913572788238525

00:26:41.110 --> 00:26:43.462 Have suggested that this was facilitated

NOTE Confidence: 0.913572788238525

00:26:43.462 --> 00:26:46.080 by the precipitation of pyrite minerals,

NOTE Confidence: 0.913572788238525

00:26:46.080 --> 00:26:49.248 or fool's gold as a veneer or mask along

NOTE Confidence: 0.913572788238525

00:26:49.248 --> 00:26:52.518 the upper surface is of these organisms

NOTE Confidence: 0.913572788238525

00:26:52.518 --> 00:26:55.694 after their their death and and this

NOTE Confidence: 0.913572788238525

00:26:55.694 --> 00:26:58.494 has been called the death mask model,

NOTE Confidence: 0.913572788238525

00:26:58.500 --> 00:27:00.580 which is sort of A.

NOTE Confidence: 0.913572788238525

00:27:00.580 --> 00:27:03.373 Reminiscent of things like the Gold Leaf

NOTE Confidence: 0.913572788238525

00:27:03.373 --> 00:27:06.013 Death Mass that were that were used

NOTE Confidence: 0.913572788238525

00:27:06.013 --> 00:27:08.710 by by the ancient Greeks for example.

NOTE Confidence: 0.913572788238525

00:27:08.710 --> 00:27:11.350 I'm another model for how

NOTE Confidence: 0.913572788238525

00:27:11.350 --> 00:27:13.462 these organisms were preserved,

NOTE Confidence: 0.913572788238525

00:27:13.470 --> 00:27:16.650 has focused upon the tissues themselves,

NOTE Confidence: 0.913572788238525

00:27:16.650 --> 00:27:19.295 and suggested that they actually

NOTE Confidence: 0.913572788238525

00:27:19.295 --> 00:27:21.940 must have been incredibly sturdy,

NOTE Confidence: 0.913572788238525

00:27:21.940 --> 00:27:24.052 something more like Lignin

NOTE Confidence: 0.913572788238525

00:27:24.052 --> 00:27:26.692 in modern plants and funky.

NOTE Confidence: 0.913572788238525

00:27:26.700 --> 00:27:27.159 However,

NOTE Confidence: 0.913572788238525

00:27:27.159 --> 00:27:30.372 I personally never never found either of

NOTE Confidence: 0.913572788238525

00:27:30.372 --> 00:27:33.040 these hypothesis particularly convincing.

NOTE Confidence: 0.913572788238525

00:27:33.040 --> 00:27:35.974 We know from very detailed preservation

NOTE Confidence: 0.913572788238525

00:27:35.974 --> 00:27:38.900 of some of these organisms.

NOTE Confidence: 0.913572788238525

00:27:38.900 --> 00:27:40.325 In some cases,

NOTE Confidence: 0.913572788238525

00:27:40.325 --> 00:27:42.700 examples of these organisms that

NOTE Confidence: 0.913572788238525

00:27:42.700 --> 00:27:45.496 were fossilized in the act of being

NOTE Confidence: 0.913572788238525

00:27:45.496 --> 00:27:48.249 uprooted from the sea floor by currents,

NOTE Confidence: 0.913572788238525

00:27:48.250 --> 00:27:51.057 or tumbled along the sea floor as

NOTE Confidence: 0.913572788238525

00:27:51.057 --> 00:27:53.349 part of underwater storm events.

NOTE Confidence: 0.913572788238525

00:27:53.350 --> 00:27:56.310 We know that the tissues of many of

NOTE Confidence: 0.913572788238525

00:27:56.310 --> 00:27:58.755 these organisms could be plastically

NOTE Confidence: 0.913572788238525

00:27:58.755 --> 00:27:59.299 deformed,

NOTE Confidence: 0.913572788238525

00:27:59.300 --> 00:28:02.275 so I think they're truly soft issues.

NOTE Confidence: 0.913572788238525

00:28:02.280 --> 00:28:04.734 We don't need to invoke something

NOTE Confidence: 0.913572788238525

00:28:04.734 --> 00:28:06.370 extraordinary in the composition

NOTE Confidence: 0.913572788238525

00:28:06.437 --> 00:28:09.095 of these organisms to explain their

NOTE Confidence: 0.913572788238525

00:28:09.095 --> 00:28:09.538 fossilization.

NOTE Confidence: 0.913572788238525

00:28:09.540 --> 00:28:12.102 And there are also very few instances

NOTE Confidence: 0.913572788238525

00:28:12.102 --> 00:28:14.772 of Pyrite or fool's gold associated

NOTE Confidence: 0.913572788238525

00:28:14.772 --> 00:28:17.322 with these. Mold eccle preserve DD.

NOTE Confidence: 0.913572788238525

00:28:17.322 --> 00:28:20.463 Accra fossils so so I had reason to

NOTE Confidence: 0.913572788238525

00:28:20.463 --> 00:28:23.375 be a little bit dubious of either of

NOTE Confidence: 0.902481615543365

00:28:23.462 --> 00:28:25.362 these two prevailing models

NOTE Confidence: 0.902481615543365

00:28:25.362 --> 00:28:27.737 for fossilization and I had

NOTE Confidence: 0.902481615543365

00:28:27.737 --> 00:28:30.290 been already working on the Ed.

NOTE Confidence: 0.902481615543365

00:28:30.290 --> 00:28:32.780 Accra biota more from an organismal.

NOTE Confidence: 0.902481615543365

00:28:32.780 --> 00:28:34.775 An ecological perspective and one

NOTE Confidence: 0.902481615543365

00:28:34.775 --> 00:28:37.714 of the things that I noticed was

NOTE Confidence: 0.902481615543365

00:28:37.714 --> 00:28:39.879 that these are really silica.

NOTE Confidence: 0.902481615543365

00:28:39.880 --> 00:28:42.664 Rich rocks not only is there

NOTE Confidence: 0.902481615543365

00:28:42.664 --> 00:28:45.270 not good evidence for Pyrite,

NOTE Confidence: 0.902481615543365

00:28:45.270 --> 00:28:48.700 but there's an awful lot of silica.

NOTE Confidence: 0.902481615543365

00:28:48.700 --> 00:28:51.110 The grains themselves arcilla cut

NOTE Confidence: 0.902481615543365

00:28:51.110 --> 00:28:53.520 their quartz crystals and the

NOTE Confidence: 0.902481615543365

00:28:53.600 --> 00:28:56.078 cements that hold those sand grains

NOTE Confidence: 0.902481615543365

00:28:56.078 --> 00:28:58.927 in place that were responsible for

NOTE Confidence: 0.902481615543365

00:28:58.927 --> 00:29:01.159 transforming those Sandy loose

NOTE Confidence: 0.902481615543365

00:29:01.159 --> 00:29:03.890 sediments to sandstone the Brock.

NOTE Confidence: 0.902481615543365

00:29:03.890 --> 00:29:06.340 Those cements are themselves silica,

NOTE Confidence: 0.902481615543365

00:29:06.340 --> 00:29:08.790 so I started to wonder,

NOTE Confidence: 0.902481615543365

00:29:08.790 --> 00:29:11.265 could silica have somehow been

NOTE Confidence: 0.902481615543365

00:29:11.265 --> 00:29:13.245 involved in the fossilization?

NOTE Confidence: 0.902481615543365

00:29:13.250 --> 00:29:15.620 Of these Edie Accra organisms,

NOTE Confidence: 0.902481615543365

00:29:15.620 --> 00:29:18.206 and that was really a thought

NOTE Confidence: 0.902481615543365

00:29:18.206 --> 00:29:20.820 that got the wheels spinning.

NOTE Confidence: 0.902481615543365

00:29:20.820 --> 00:29:23.418 Because this is an interval in

NOTE Confidence: 0.902481615543365

00:29:23.418 --> 00:29:26.286 earths history when we think that

NOTE Confidence: 0.902481615543365

00:29:26.286 --> 00:29:28.901 the oceans were actually remarkably

NOTE Confidence: 0.902481615543365

00:29:28.901 --> 00:29:31.425 rich in dissolved silica much

NOTE Confidence: 0.902481615543365

00:29:31.425 --> 00:29:33.585 more than they are today.

NOTE Confidence: 0.902481615543365

00:29:33.590 --> 00:29:36.642 And that difference is because today we

NOTE Confidence: 0.902481615543365

00:29:36.642 --> 00:29:40.210 have all sorts of organisms that drawdown,

NOTE Confidence: 0.902481615543365

00:29:40.210 --> 00:29:42.754 ocean reserves of silica to make

NOTE Confidence: 0.902481615543365

00:29:42.754 --> 00:29:45.440 shells and test for themselves.

NOTE Confidence: 0.902481615543365

00:29:45.440 --> 00:29:48.772 So sponges make spicules for themselves or

NOTE Confidence: 0.902481615543365

00:29:48.772 --> 00:29:51.248 their structural supports out of silica.

NOTE Confidence: 0.902481615543365

00:29:51.250 --> 00:29:54.379 Also there are many groups of plankton,

NOTE Confidence: 0.902481615543365

00:29:54.380 --> 00:29:55.324 particularly diatoms,

NOTE Confidence: 0.902481615543365

00:29:55.324 --> 00:29:58.628 which are some of our most abundant

NOTE Confidence: 0.902481615543365

00:29:58.628 --> 00:30:01.142 plankton in the oceans today that

NOTE Confidence: 0.902481615543365

00:30:01.142 --> 00:30:03.107 make shells for themselves out

NOTE Confidence: 0.902481615543365

00:30:03.187 --> 00:30:05.492 of silica hanzo plankton groups

NOTE Confidence: 0.902481615543365

00:30:05.492 --> 00:30:07.336 like radiolarians as well.

NOTE Confidence: 0.902481615543365

00:30:07.340 --> 00:30:09.902 So today there is remarkably little

NOTE Confidence: 0.902481615543365

00:30:09.902 --> 00:30:13.089 silica in the oceans dissolved in the

NOTE Confidence: 0.902481615543365

00:30:13.089 --> 00:30:15.885 oceans because all of these organisms.

NOTE Confidence: 0.902481615543365

00:30:15.890 --> 00:30:18.164 Are responsible for up taking that

NOTE Confidence: 0.902481615543365

00:30:18.164 --> 00:30:20.967 silica in order to to make their

NOTE Confidence: 0.902481615543365

00:30:20.967 --> 00:30:23.397 biominerals to make their hard parts,

NOTE Confidence: 0.902481615543365

00:30:23.400 --> 00:30:25.794 but prior to the evolution and radiation

NOTE Confidence: 0.902481615543365

00:30:25.794 --> 00:30:28.528 of these silica bio mineralizing organisms,

NOTE Confidence: 0.902481615543365

00:30:28.530 --> 00:30:31.176 the oceans would have been a lot

NOTE Confidence: 0.902481615543365

00:30:31.176 --> 00:30:32.880 richer and dissolved silica,

NOTE Confidence: 0.902481615543365

00:30:32.880 --> 00:30:35.768 and in fact there are all sorts of

NOTE Confidence: 0.902481615543365

00:30:35.768 --> 00:30:38.420 very silica rich deposits in the

NOTE Confidence: 0.902481615543365

00:30:38.420 --> 00:30:40.735 geologic record of the precambrian

NOTE Confidence: 0.902481615543365

00:30:40.735 --> 00:30:43.692 hum that appear to have formed an all

NOTE Confidence: 0.902481615543365

00:30:43.692 --> 00:30:47.537 in the sea floor or just below the sea floor.

NOTE Confidence: 0.902481615543365

00:30:47.540 --> 00:30:50.074 There are also other examples from fossil

NOTE Confidence: 0.902481615543365

00:30:50.074 --> 00:30:51.737 archives of really extraordinarily

NOTE Confidence: 0.902481615543365

00:30:51.737 --> 00:30:53.789 preserved assemblages of microbes

NOTE Confidence: 0.902481615543365

00:30:53.789 --> 00:30:56.354 that have been essentially entombed

NOTE Confidence: 0.902481615543365

00:30:56.418 --> 00:30:58.288 in silica during this interval.

NOTE Confidence: 0.902481615543365

00:30:58.290 --> 00:31:00.845 So all of these lines of evidence

NOTE Confidence: 0.902481615543365

00:31:00.845 --> 00:31:03.965 suggests that the oceans were much richer

NOTE Confidence: 0.902481615543365

00:31:03.965 --> 00:31:06.887 and dissolved silica during the precambrian,

NOTE Confidence: 0.902481615543365

00:31:06.890 --> 00:31:09.040 which is also the time

NOTE Confidence: 0.902481615543365

00:31:09.040 --> 00:31:11.190 of the EAC or organisms.

NOTE Confidence: 0.902481615543365

00:31:11.190 --> 00:31:14.367 So I sort of set out on an attempt

NOTE Confidence: 0.902481615543365

00:31:14.367 --> 00:31:17.687 to test this hypothesis of could.

NOTE Confidence: 0.902481615543365

00:31:17.690 --> 00:31:20.048 Silica precipitation have played some role

NOTE Confidence: 0.902481615543365

00:31:20.048 --> 00:31:22.650 in the preservation of these organisms.

NOTE Confidence: 0.902481615543365

00:31:22.650 --> 00:31:24.298 Then this extraordinary style

NOTE Confidence: 0.902481615543365

00:31:24.298 --> 00:31:25.534 of preservation on,

NOTE Confidence: 0.902481615543365

00:31:25.540 --> 00:31:28.388 and I did a fair amount of field

NOTE Confidence: 0.902481615543365

00:31:28.388 --> 00:31:30.080 work in Australia,

NOTE Confidence: 0.902481615543365

00:31:30.080 --> 00:31:32.564 that the type locality of the

NOTE Confidence: 0.902481615543365

00:31:32.564 --> 00:31:35.918 Ed Accra Biota in the in the D

NOTE Confidence: 0.902481615543365

00:31:35.918 --> 00:31:37.923 Accra Hills in the Flinders,

NOTE Confidence: 0.902481615543365

00:31:37.930 --> 00:31:40.674 and I looked at the various aspects

NOTE Confidence: 0.902481615543365

00:31:40.674 --> 00:31:42.796 of their paleontology of the

NOTE Confidence: 0.902481615543365

00:31:42.796 --> 00:31:44.540 distribution of different taxa.

NOTE Confidence: 0.902481615543365

00:31:44.540 --> 00:31:46.620 I also did some microscopic

NOTE Confidence: 0.902481615543365

00:31:46.620 --> 00:31:48.700 work where I took very.

NOTE Confidence: 0.902481615543365

00:31:48.700 --> 00:31:50.780 Since slivers of the rock,

NOTE Confidence: 0.902481615543365

00:31:50.780 --> 00:31:52.844 then enough that you can actually

NOTE Confidence: 0.902481615543365

00:31:52.844 --> 00:31:55.254 shine a light through them under

NOTE Confidence: 0.902481615543365

00:31:55.254 --> 00:31:57.684 the microscope and examine their

NOTE Confidence: 0.902481615543365

00:31:57.684 --> 00:31:58.656 mineralogical composition,

NOTE Confidence: 0.902481615543365

00:31:58.660 --> 00:32:01.208 and I also did some Geo chemical

NOTE Confidence: 0.902481615543365

00:32:01.208 --> 00:32:02.300 analysis of differences

NOTE Confidence: 0.91597318649292

00:32:02.371 --> 00:32:05.299 in trace element concentrations across these.

NOTE Confidence: 0.91597318649292

00:32:05.300 --> 00:32:07.415 These thin slivers of these

NOTE Confidence: 0.91597318649292

00:32:07.415 --> 00:32:09.870 slices of these of the ZD.

NOTE Confidence: 0.91597318649292

00:32:09.870 --> 00:32:12.132 Accra fossils, an all of all

NOTE Confidence: 0.91597318649292

00:32:12.132 --> 00:32:14.430 the features that I observed,

NOTE Confidence: 0.91597318649292

00:32:14.430 --> 00:32:16.455 those different scales from the

NOTE Confidence: 0.91597318649292

00:32:16.455 --> 00:32:19.030 scale of the fossil deposit itself.

NOTE Confidence: 0.91597318649292

00:32:19.030 --> 00:32:21.585 In what organisms were in it to

NOTE Confidence: 0.91597318649292

00:32:21.585 --> 00:32:24.237 the scale up to the microscopic

NOTE Confidence: 0.91597318649292

00:32:24.237 --> 00:32:26.687 scale indicated that not only

NOTE Confidence: 0.91597318649292

00:32:26.687 --> 00:32:29.658 were these very silica rich rocks,

NOTE Confidence: 0.91597318649292

00:32:29.660 --> 00:32:31.880 where not only the grains,

NOTE Confidence: 0.91597318649292

00:32:31.880 --> 00:32:34.090 but the cement Sarah silica,

NOTE Confidence: 0.91597318649292

00:32:34.090 --> 00:32:36.305 but those silica cements actually

NOTE Confidence: 0.91597318649292

00:32:36.305 --> 00:32:38.520 precipitated really early in the

NOTE Confidence: 0.91597318649292

00:32:38.591 --> 00:32:40.736 geologic history of these rocks,

NOTE Confidence: 0.91597318649292

00:32:40.740 --> 00:32:42.745 and potentially early enough to

NOTE Confidence: 0.91597318649292

00:32:42.745 --> 00:32:45.291 have formed the glue that held

NOTE Confidence: 0.91597318649292

00:32:45.291 --> 00:32:47.616 together the scaffolding of those

NOTE Confidence: 0.91597318649292

00:32:47.616 --> 00:32:50.040 sand grains that replicated though.

NOTE Confidence: 0.91597318649292

00:32:50.040 --> 00:32:52.495 All of that detailed anatomy

NOTE Confidence: 0.91597318649292

00:32:52.495 --> 00:32:54.950 of the Zodiac or organisms,

NOTE Confidence: 0.91597318649292

00:32:54.950 --> 00:32:57.962 so those analysis bore out that

NOTE Confidence: 0.91597318649292

00:32:57.962 --> 00:33:00.515 early precipitation of these silica

NOTE Confidence: 0.91597318649292

00:33:00.515 --> 00:33:03.735 cements prior to the total decay and

NOTE Confidence: 0.91597318649292

00:33:03.735 --> 00:33:06.714 collapse of the carcasses of these

NOTE Confidence: 0.91597318649292

00:33:06.714 --> 00:33:09.672 very diacre organisms on the ancient

NOTE Confidence: 0.91597318649292

00:33:09.680 --> 00:33:12.599 sea floor could indeed have played a

NOTE Confidence: 0.91597318649292

00:33:12.599 --> 00:33:15.570 strong role in their fossilization.

NOTE Confidence: 0.91597318649292

00:33:15.570 --> 00:33:17.554 And another really intriguing

NOTE Confidence: 0.91597318649292

00:33:17.554 --> 00:33:20.530 door that this opened was that.

NOTE Confidence: 0.91597318649292

00:33:20.530 --> 00:33:22.948 We don't think that the decline

NOTE Confidence: 0.91597318649292

00:33:22.948 --> 00:33:25.742 and dissolved silica in the ancient

NOTE Confidence: 0.91597318649292

00:33:25.742 --> 00:33:28.492 oceans happened at the precambrian

NOTE Confidence: 0.91597318649292

00:33:28.492 --> 00:33:30.142 phanerozoic boundary itself,

NOTE Confidence: 0.91597318649292

00:33:30.150 --> 00:33:33.998 which is when the Edie Accra biota disappear.

NOTE Confidence: 0.91597318649292

00:33:34.000 --> 00:33:34.960 In fact,

NOTE Confidence: 0.91597318649292

00:33:34.960 --> 00:33:37.840 it seems as though that persisted

NOTE Confidence: 0.91597318649292

00:33:37.840 --> 00:33:40.882 actually a few 10s of millions of

NOTE Confidence: 0.91597318649292

00:33:40.882 --> 00:33:44.074 years at least if not hundreds of

NOTE Confidence: 0.91597318649292

00:33:44.074 --> 00:33:47.945 millions of years into the Phanerozoic Eon.

NOTE Confidence: 0.91597318649292

00:33:47.950 --> 00:33:50.668 So In other words, if early

NOTE Confidence: 0.91597318649292

00:33:50.668 --> 00:33:53.280 precipitation of these silica minerals.

NOTE Confidence: 0.91597318649292

00:33:53.280 --> 00:33:55.764 Was really vital to the fossilization

NOTE Confidence: 0.91597318649292

00:33:55.764 --> 00:33:57.006 of the Ed.

NOTE Confidence: 0.91597318649292

00:33:57.010 --> 00:33:57.836 Accra biota.

NOTE Confidence: 0.91597318649292

00:33:57.836 --> 00:33:59.488 If this is our,

NOTE Confidence: 0.91597318649292

00:33:59.490 --> 00:34:02.388 if this is our window for fossilization,

NOTE Confidence: 0.91597318649292

00:34:02.390 --> 00:34:05.278 that window was still open at the end

NOTE Confidence: 0.91597318649292

00:34:05.278 --> 00:34:08.707 of the Ed Akron when the Edie Accra

NOTE Confidence: 0.91597318649292

00:34:08.707 --> 00:34:11.387 Biota disappeared and in fact we

NOTE Confidence: 0.91597318649292

00:34:11.387 --> 00:34:13.949 have examples of fossils of younger

NOTE Confidence: 0.91597318649292

00:34:13.949 --> 00:34:16.805 age that are preserved in this same

NOTE Confidence: 0.91597318649292

00:34:16.805 --> 00:34:19.360 style as the Edie Accra Biota.

NOTE Confidence: 0.91597318649292

00:34:19.360 --> 00:34:21.978 As these molds as these impressions in

NOTE Confidence: 0.91597318649292

00:34:21.978 --> 00:34:24.349 sandstone but they're entirely different.

NOTE Confidence: 0.91597318649292

00:34:24.350 --> 00:34:26.684 Organisms and in fact there there

NOTE Confidence: 0.91597318649292

00:34:26.684 --> 00:34:28.740 much more recognizable animal groups,

NOTE Confidence: 0.91597318649292

00:34:28.740 --> 00:34:30.735 so there are jellyfish that

NOTE Confidence: 0.91597318649292

00:34:30.735 --> 00:34:32.730 are preserved in this style,

NOTE Confidence: 0.91597318649292

00:34:32.730 --> 00:34:35.232 and there are different types of

NOTE Confidence: 0.91597318649292

00:34:35.232 --> 00:34:37.918 arthropods that are preserved in this style.

NOTE Confidence: 0.91597318649292

00:34:37.920 --> 00:34:39.428 So In other words,

NOTE Confidence: 0.91597318649292

00:34:39.428 --> 00:34:42.164 this style doesn't need seem to be

NOTE Confidence: 0.91597318649292

00:34:42.164 --> 00:34:44.908 linked to the affinity or the tissue

NOTE Confidence: 0.91597318649292

00:34:44.908 --> 00:34:47.890 structure of Edie acker organisms per se.

NOTE Confidence: 0.91597318649292

00:34:47.890 --> 00:34:50.410 And it also appears to persist

NOTE Confidence: 0.91597318649292

00:34:50.410 --> 00:34:52.680 after the disappearance of the Ed.

NOTE Confidence: 0.91597318649292

00:34:52.680 --> 00:34:55.480 Accra biota, so it seemed really unlikely.

NOTE Confidence: 0.91597318649292

00:34:55.480 --> 00:34:57.820 That the Ed Accra disappearance

NOTE Confidence: 0.91597318649292

00:34:57.820 --> 00:35:00.688 could be attributed to changes in

NOTE Confidence: 0.91597318649292

00:35:00.688 --> 00:35:03.400 fossilization in the closing of the

NOTE Confidence: 0.91597318649292

00:35:03.400 --> 00:35:06.197 preservation a window and because we

NOTE Confidence: 0.91597318649292

00:35:06.197 --> 00:35:08.909 see this same style of preservation

NOTE Confidence: 0.91597318649292

00:35:08.909 --> 00:35:11.166 affecting a number of different

NOTE Confidence: 0.91597318649292

00:35:11.166 --> 00:35:13.860 types of organisms within the Edie

NOTE Confidence: 0.91597318649292

00:35:13.949 --> 00:35:16.403 Accra Biota as well as younger

NOTE Confidence: 0.91597318649292

00:35:16.403 --> 00:35:19.090 animal groups in the Phanerozoic.

NOTE Confidence: 0.91597318649292

00:35:19.090 --> 00:35:22.362 It seems as though this is a type

NOTE Confidence: 0.91597318649292

00:35:22.362 --> 00:35:25.336 of fossilization that is not biased

NOTE Confidence: 0.91597318649292

00:35:25.336 --> 00:35:27.926 toward particular groups of organisms.

NOTE Confidence: 0.91597318649292

00:35:27.930 --> 00:35:30.140 And it should give us,

NOTE Confidence: 0.91597318649292

00:35:30.140 --> 00:35:30.964 in theory,

NOTE Confidence: 0.91597318649292

00:35:30.964 --> 00:35:32.612 a relatively complete snapshot

NOTE Confidence: 0.91597318649292

00:35:32.612 --> 00:35:35.000 of ancient sea floor diversity,

NOTE Confidence: 0.91597318649292

00:35:35.000 --> 00:35:37.115 which was something that had

NOTE Confidence: 0.91597318649292

00:35:37.115 --> 00:35:38.807 previously perhaps been assumed

NOTE Confidence: 0.91597318649292

00:35:38.807 --> 00:35:41.188 that never really demonstrated on.

NOTE Confidence: 0.91597318649292

00:35:41.190 --> 00:35:43.296 So that was very exciting to

NOTE Confidence: 0.91597318649292

00:35:43.296 --> 00:35:44.700 be able to find

NOTE Confidence: 0.9333176612854

00:35:44.780 --> 00:35:46.884 some underlying mechanism that

NOTE Confidence: 0.9333176612854

00:35:46.884 --> 00:35:49.514 could explain the Edie Accra

NOTE Confidence: 0.9333176612854

00:35:49.514 --> 00:35:51.797 fossil record in some sense,

NOTE Confidence: 0.9333176612854

00:35:51.800 --> 00:35:54.572 but also give us some guidance

NOTE Confidence: 0.9333176612854

00:35:54.572 --> 00:35:57.326 stored to what extent we can

NOTE Confidence: 0.9333176612854

00:35:57.326 --> 00:35:59.356 use the Ed Accra fossils.

NOTE Confidence: 0.9333176612854

00:35:59.360 --> 00:36:01.848 As a metric for inch and see for

NOTE Confidence: 0.9333176612854

00:36:01.848 --> 00:36:03.899 diversity and community structure.

NOTE Confidence: 0.944569051265717

00:36:05.820 --> 00:36:07.983 That's extremely interesting

NOTE Confidence: 0.944569051265717

00:36:07.983 --> 00:36:11.588 that just by studying the.

NOTE Confidence: 0.944569051265717

00:36:11.590 --> 00:36:15.622 The rocks I guess he's a very non technical

NOTE Confidence: 0.944569051265717

00:36:15.622 --> 00:36:19.715 term around where these fossils are formed.

NOTE Confidence: 0.944569051265717

00:36:19.720 --> 00:36:23.815 Uhm, you were able to come up with this

NOTE Confidence: 0.944569051265717

00:36:23.815 --> 00:36:27.092 entire mechanism by which these fossils

NOTE Confidence: 0.944569051265717

00:36:27.092 --> 00:36:30.905 were created and I was just curious

NOTE Confidence: 0.944569051265717

00:36:30.905 --> 00:36:34.400 as someone very naive to the field,

NOTE Confidence: 0.944569051265717

00:36:34.400 --> 00:36:36.380 do geologists or archaeologist

NOTE Confidence: 0.944569051265717

00:36:36.380 --> 00:36:38.510 ever tried to replicate,

NOTE Confidence: 0.944569051265717

00:36:38.510 --> 00:36:39.576 hypothesize fossilization

NOTE Confidence: 0.944569051265717

00:36:39.576 --> 00:36:41.708 conditions using, you know?

NOTE Confidence: 0.944569051265717

00:36:41.710 --> 00:36:44.167 Methods in the laboratory to see if

NOTE Confidence: 0.944569051265717

00:36:44.167 --> 00:36:46.850 these things are actually able to occur.

NOTE Confidence: 0.940465688705444

00:36:46.850 --> 00:36:48.314 Yes, they do actually,

NOTE Confidence: 0.940465688705444

00:36:48.314 --> 00:36:50.144 so there's a whole field,

NOTE Confidence: 0.940465688705444

00:36:50.150 --> 00:36:52.352 a whole branch of paleontology that's

NOTE Confidence: 0.940465688705444

00:36:52.352 --> 00:36:53.820 devoted to fossilization experiments.

NOTE Confidence: 0.940465688705444

00:36:53.820 --> 00:36:55.735 And that's actually something that

NOTE Confidence: 0.940465688705444

00:36:55.735 --> 00:36:58.033 I'm currently working on with a

NOTE Confidence: 0.940465688705444

00:36:58.033 --> 00:36:59.971 number of other members of the

NOTE Confidence: 0.940465688705444

00:36:59.971 --> 00:37:01.900 Department of geology and geophysics,

NOTE Confidence: 0.940465688705444

00:37:01.900 --> 00:37:03.886 and we've we've actually just written

NOTE Confidence: 0.940465688705444

00:37:03.886 --> 00:37:06.300 up some of our initial results,

NOTE Confidence: 0.940465688705444

00:37:06.300 --> 00:37:09.236 but we're hoping to do some more work,

NOTE Confidence: 0.940465688705444

00:37:09.240 --> 00:37:11.949 but so far what we've found that

NOTE Confidence: 0.940465688705444

00:37:11.949 --> 00:37:14.060 looks very promising in terms of.

NOTE Confidence: 0.940465688705444

00:37:14.060 --> 00:37:16.965 Being able to replicate some of the

NOTE Confidence: 0.940465688705444

00:37:16.965 --> 00:37:19.758 key processes of this silica mediated

NOTE Confidence: 0.940465688705444

00:37:19.758 --> 00:37:23.167 fossilization in the lab and having that

NOTE Confidence: 0.940465688705444

00:37:23.252 --> 00:37:26.207 occur on relatively short timescales,

NOTE Confidence: 0.940465688705444

00:37:26.210 --> 00:37:28.635 short enough to explain this

NOTE Confidence: 0.940465688705444

00:37:28.635 --> 00:37:29.605 extraordinary fossilization.

NOTE Confidence: 0.936208009719849

00:37:30.480 --> 00:37:31.683 Yeah, that's really.

NOTE Confidence: 0.936208009719849

00:37:31.683 --> 00:37:34.089 That's really cool that you can

NOTE Confidence: 0.936208009719849

00:37:34.089 --> 00:37:36.420 replicate a process from 500 over 500

NOTE Confidence: 0.936208009719849

00:37:36.420 --> 00:37:38.510 million years ago in a lab today.

NOTE Confidence: 0.936208009719849

00:37:38.510 --> 00:37:40.598 That's crazy, yeah, so it's it's

NOTE Confidence: 0.936208009719849

00:37:40.600 --> 00:37:42.700 pretty incredible and you can never,

NOTE Confidence: 0.936208009719849

00:37:42.700 --> 00:37:44.758 you know, totally replicate all the

NOTE Confidence: 0.936208009719849

00:37:44.758 --> 00:37:46.880 conditions in the ancient ocean, right?

NOTE Confidence: 0.936208009719849

00:37:46.880 --> 00:37:48.980 Like it's a very complex place,

NOTE Confidence: 0.936208009719849

00:37:48.980 --> 00:37:50.846 but you what these experiments do

NOTE Confidence: 0.936208009719849

00:37:50.846 --> 00:37:53.458 allow you to do is sort of tease

NOTE Confidence: 0.936208009719849

00:37:53.458 --> 00:37:55.078 apart and ask questions about

NOTE Confidence: 0.936208009719849

00:37:55.078 --> 00:37:57.487 what were some of perhaps the

NOTE Confidence: 0.936208009719849

00:37:57.487 --> 00:37:59.099 most important factors involved.

NOTE Confidence: 0.936208009719849

00:37:59.100 --> 00:38:00.484 And can I test?

NOTE Confidence: 0.936208009719849

00:38:00.484 --> 00:38:02.560 Whether or not this particular factor

NOTE Confidence: 0.936208009719849

00:38:02.633 --> 00:38:05.375 played an important role in fossilization.

NOTE Confidence: 0.924838483333588

00:38:06.900 --> 00:38:09.100 Yeah, so it seems like So what you

NOTE Confidence: 0.924838483333588

00:38:09.100 --> 00:38:11.630 found is that the window of preservation

NOTE Confidence: 0.924838483333588

00:38:11.630 --> 00:38:13.545 was open across the boundary

NOTE Confidence: 0.924838483333588

00:38:13.617 --> 00:38:15.920 between the D Akron in the Cambrian.

NOTE Confidence: 0.924838483333588

00:38:15.920 --> 00:38:18.111 So that kind of disproves the hypothesis

NOTE Confidence: 0.924838483333588

00:38:18.111 --> 00:38:20.164 that these organisms continued to persist

NOTE Confidence: 0.924838483333588

00:38:20.164 --> 00:38:21.929 and just stopped being fossilized.

NOTE Confidence: 0.924838483333588

00:38:21.930 --> 00:38:24.074 So that kind of leads us to the

NOTE Confidence: 0.924838483333588

00:38:24.074 --> 00:38:26.279 other set of hypothesis that this

NOTE Confidence: 0.924838483333588

00:38:26.279 --> 00:38:28.279 was an actual extinction event.

NOTE Confidence: 0.924838483333588

00:38:28.280 --> 00:38:30.716 So can you elaborate on what that

NOTE Confidence: 0.924838483333588

00:38:30.716 --> 00:38:32.769 would look like and what the

NOTE Confidence: 0.924838483333588

00:38:32.769 --> 00:38:34.953 evidence for that is or is not?

NOTE Confidence: 0.922234177589417

00:38:35.690 --> 00:38:38.102 Yes, so that's that is the

NOTE Confidence: 0.922234177589417

00:38:38.102 --> 00:38:39.710 obvious $1,000,000 question here.

NOTE Confidence: 0.922234177589417

00:38:39.710 --> 00:38:41.720 If it's not fossilization and

NOTE Confidence: 0.922234177589417

00:38:41.720 --> 00:38:43.328 it's a real disappearance,

NOTE Confidence: 0.922234177589417

00:38:43.330 --> 00:38:44.934 why did that happen?

NOTE Confidence: 0.922234177589417

00:38:44.934 --> 00:38:46.943 And again, there's sort of

NOTE Confidence: 0.922234177589417

00:38:46.943 --> 00:38:48.547 two end member hypothesise.

NOTE Confidence: 0.922234177589417

00:38:48.550 --> 00:38:50.705 One is that there's environmental

NOTE Confidence: 0.922234177589417

00:38:50.705 --> 00:38:53.685 change that was dealing Terios two ded

NOTE Confidence: 0.922234177589417

00:38:53.685 --> 00:38:55.570 actor organisms and perhaps analogous

NOTE Confidence: 0.922234177589417

00:38:55.570 --> 00:38:57.916 to some of the major extinction

NOTE Confidence: 0.922234177589417

00:38:57.916 --> 00:39:00.202 episodes that we see in Earth.

NOTE Confidence: 0.922234177589417

00:39:00.210 --> 00:39:02.304 Younger history, where on for most

NOTE Confidence: 0.922234177589417

00:39:02.304 --> 00:39:05.039 of the Big 5 mass extinctions.

NOTE Confidence: 0.922234177589417

00:39:05.040 --> 00:39:07.090 We think that some sort

NOTE Confidence: 0.922234177589417

00:39:07.090 --> 00:39:08.320 of environmental change.

NOTE Confidence: 0.922234177589417

00:39:08.320 --> 00:39:11.585 Was implicated in the extinction

NOTE Confidence: 0.922234177589417

00:39:11.585 --> 00:39:14.850 of various groups of organisms.

NOTE Confidence: 0.922234177589417

00:39:14.850 --> 00:39:17.664 And the other scenario is as about

NOTE Confidence: 0.922234177589417

00:39:17.664 --> 00:39:20.489 as often called biotic replacement.

NOTE Confidence: 0.922234177589417

00:39:20.490 --> 00:39:22.884 Or did some sort of ecological

NOTE Confidence: 0.922234177589417

00:39:22.884 --> 00:39:25.625 escalation on some sort of negative

NOTE Confidence: 0.922234177589417

00:39:25.625 --> 00:39:27.753 interaction between mediak or

NOTE Confidence: 0.922234177589417

00:39:27.753 --> 00:39:29.881 organisms and other organisms.

NOTE Confidence: 0.922234177589417

00:39:29.890 --> 00:39:31.004 For instance,

NOTE Confidence: 0.922234177589417

00:39:31.004 --> 00:39:33.789 the emerging complex animals that

NOTE Confidence: 0.922234177589417

00:39:33.789 --> 00:39:36.180 were increasingly appearing on the

NOTE Confidence: 0.922234177589417

00:39:36.180 --> 00:39:38.732 scene did that play some role in the

NOTE Confidence: 0.922234177589417

00:39:38.814 --> 00:39:41.639 disappearance of the diacre organisms,

NOTE Confidence: 0.922234177589417

00:39:41.640 --> 00:39:44.930 and both of these questions are challenging.

NOTE Confidence: 0.922234177589417

00:39:44.930 --> 00:39:47.348 Because often the resolution of the

NOTE Confidence: 0.922234177589417

00:39:47.348 --> 00:39:49.468 fossil record is not necessarily

NOTE Confidence: 0.922234177589417

00:39:49.468 --> 00:39:52.492 great enough to directly get at this

NOTE Confidence: 0.922234177589417

00:39:52.492 --> 00:39:55.159 question of ecological interactions,

NOTE Confidence: 0.922234177589417

00:39:55.160 --> 00:39:58.415 and to what extent they were Dilla,

NOTE Confidence: 0.922234177589417

00:39:58.420 --> 00:39:59.815 Terius or positive.

NOTE Confidence: 0.922234177589417

00:39:59.815 --> 00:40:03.070 So at even in Earth younger history,

NOTE Confidence: 0.922234177589417

00:40:03.070 --> 00:40:05.110 the resolution of the fossil

NOTE Confidence: 0.922234177589417

00:40:05.110 --> 00:40:07.679 record is often not great enough

NOTE Confidence: 0.922234177589417

00:40:07.679 --> 00:40:10.850 to really test some of these more

NOTE Confidence: 0.922234177589417

00:40:10.850 --> 00:40:12.943 detailed ecological models of

NOTE Confidence: 0.922234177589417

00:40:12.943 --> 00:40:15.159 things like competitive exclusion.

NOTE Confidence: 0.922234177589417

00:40:15.160 --> 00:40:17.850 That modern ecologists are constantly

NOTE Confidence: 0.922234177589417

00:40:17.850 --> 00:40:21.070 constantly assessing in the field today,

NOTE Confidence: 0.922234177589417

00:40:21.070 --> 00:40:23.750 but with That being said,

NOTE Confidence: 0.922234177589417

00:40:23.750 --> 00:40:27.243 we can look for evidence of at

NOTE Confidence: 0.922234177589417

00:40:27.243 --> 00:40:30.059 least synchronicity in terms of

NOTE Confidence: 0.922234177589417

00:40:30.059 --> 00:40:33.119 appearances of complex animal life

NOTE Confidence: 0.922234177589417

00:40:33.119 --> 00:40:35.615 and disappearances of organisms

NOTE Confidence: 0.922234177589417

00:40:35.615 --> 00:40:38.440 like the Edie Accra Biota.

NOTE Confidence: 0.922234177589417

00:40:38.440 --> 00:40:40.974 And one of the lines of evidence

NOTE Confidence: 0.922234177589417

00:40:40.974 --> 00:40:43.841 which has been used to suggest that

NOTE Confidence: 0.922234177589417

00:40:43.841 --> 00:40:46.385 there could perhaps have been some

NOTE Confidence: 0.922234177589417

00:40:46.468 --> 00:40:48.783 synchronicity is that trace fossils

NOTE Confidence: 0.922234177589417

00:40:48.783 --> 00:40:51.944 which we touched on very briefly earlier,

NOTE Confidence: 0.922234177589417

00:40:51.944 --> 00:40:55.320 but which are the record of animal behavior,

NOTE Confidence: 0.922234177589417

00:40:55.320 --> 00:40:58.162 and most commonly we think of trace

NOTE Confidence: 0.922234177589417

00:40:58.162 --> 00:41:01.229 fossils as boroughs of trackways and trails.

NOTE Confidence: 0.922234177589417

00:41:01.230 --> 00:41:03.340 So they're the structures formed

NOTE Confidence: 0.922234177589417

00:41:03.340 --> 00:41:05.450 by animals burrowing in sediments,

NOTE Confidence: 0.922234177589417

00:41:05.450 --> 00:41:08.467 and they can only be formed by.

NOTE Confidence: 0.922234177589417

00:41:08.470 --> 00:41:11.515 True animals an in fact not only

NOTE Confidence: 0.922234177589417

00:41:11.515 --> 00:41:12.385 true animals,

NOTE Confidence: 0.922234177589417

00:41:12.390 --> 00:41:14.570 but Bye-bye Loterij and animals.

NOTE Confidence: 0.922234177589417

00:41:14.570 --> 00:41:17.120 Animals with bilateral symmetry and

NOTE Confidence: 0.922234177589417

00:41:17.120 --> 00:41:19.160 with anterior posterior differentiation

NOTE Confidence: 0.922234177589417

00:41:19.160 --> 00:41:21.738 so that front end is different from

NOTE Confidence: 0.922234177589417

00:41:21.738 --> 00:41:24.059 their back and and three tissue

NOTE Confidence: 0.922234177589417

00:41:24.059 --> 00:41:26.349 layers and more complex musculature.

NOTE Confidence: 0.922234177589417

00:41:26.350 --> 00:41:29.572 So in order to make a true like the

NOTE Confidence: 0.922234177589417

00:41:29.572 --> 00:41:33.080 trail in the sand as a typical were

NOTE Confidence: 0.922234177589417

00:41:33.080 --> 00:41:35.972 more arthropod might make you actually

NOTE Confidence: 0.922234177589417

00:41:35.972 --> 00:41:39.458 need to have a more robust musculature.

NOTE Confidence: 0.922234177589417

00:41:39.460 --> 00:41:41.548 And more differentiation of tissue layers.

NOTE Confidence: 0.922234177589417

00:41:41.550 --> 00:41:43.650 All of a pilot Arian animal.

NOTE Confidence: 0.922234177589417

00:41:43.650 --> 00:41:45.914 So although this is one of the lines

NOTE Confidence: 0.922234177589417

00:41:45.914 --> 00:41:48.588 of evidence that although many of the

NOTE Confidence: 0.922234177589417

00:41:48.588 --> 00:41:50.628 individually diacre organisms still remain,

NOTE Confidence: 0.922234177589417

00:41:50.630 --> 00:41:52.961 adding matic to us in terms of

NOTE Confidence: 0.922234177589417

00:41:52.961 --> 00:41:55.068 their affinity's and to whom they

NOTE Confidence: 0.922234177589417

00:41:55.068 --> 00:41:56.798 were most closely related and

NOTE Confidence: 0.922234177589417

00:41:56.798 --> 00:41:58.997 whether or not they were animals,

NOTE Confidence: 0.922234177589417

00:41:59.000 --> 00:42:01.128 we do know that there were son

NOTE Confidence: 0.922234177589417

00:42:01.128 --> 00:42:03.290 animals in the Edie Accra biota

NOTE Confidence: 0.922234177589417

00:42:03.290 --> 00:42:05.636 because we have some trace fossils,

NOTE Confidence: 0.922234177589417

00:42:05.640 --> 00:42:07.380 there's simple trace fossils there.

NOTE Confidence: 0.922234177589417

00:42:07.380 --> 00:42:08.367 Small trace fossils,

NOTE Confidence: 0.922234177589417

00:42:08.367 --> 00:42:10.341 but they tell us that there

NOTE Confidence: 0.922234177589417

00:42:10.341 --> 00:42:12.347 were some Violet Arian animals.

NOTE Confidence: 0.922234177589417

00:42:12.350 --> 00:42:14.615 That were actually burrowing in

NOTE Confidence: 0.922234177589417

00:42:14.615 --> 00:42:16.880 those ancient sea floor sands.

NOTE Confidence: 0.923727035522461

00:42:16.880 --> 00:42:19.285 And that they lived concurrently

NOTE Confidence: 0.923727035522461

00:42:19.285 --> 00:42:21.690 with Spatially and in time,

NOTE Confidence: 0.923727035522461

00:42:21.690 --> 00:42:24.100 with the Ed. Accra Biota.

NOTE Confidence: 0.923727035522461

00:42:24.100 --> 00:42:27.649 But there have been a number of

NOTE Confidence: 0.923727035522461

00:42:27.649 --> 00:42:30.782 observations that tored the ends of the

NOTE Confidence: 0.923727035522461

00:42:30.782 --> 00:42:34.233 Ed Akron period on we see the emergence

NOTE Confidence: 0.923727035522461

00:42:34.233 --> 00:42:38.034 of more complex types of trace fossils.

NOTE Confidence: 0.923727035522461

00:42:38.040 --> 00:42:40.068 Potential recording more complex

NOTE Confidence: 0.923727035522461

00:42:40.068 --> 00:42:42.603 burrowing behaviors or potentially more

NOTE Confidence: 0.923727035522461

00:42:42.603 --> 00:42:45.313 on a broader assortment of different

NOTE Confidence: 0.923727035522461

00:42:45.313 --> 00:42:48.190 types of organisms engaged in burrowing.

NOTE Confidence: 0.923727035522461

00:42:48.190 --> 00:42:50.490 And it's been suggested that

NOTE Confidence: 0.923727035522461

00:42:50.490 --> 00:42:52.330 having more abundant Amor,

NOTE Confidence: 0.923727035522461

00:42:52.330 --> 00:42:55.550 more diverse burrowers on the ancient sea

NOTE Confidence: 0.923727035522461

00:42:55.550 --> 00:42:59.227 floor may have been detrimental to the Ed.

NOTE Confidence: 0.923727035522461

00:42:59.230 --> 00:43:00.094 Accra organisms,

NOTE Confidence: 0.923727035522461

00:43:00.094 --> 00:43:03.550 in part because we think that many of

NOTE Confidence: 0.923727035522461

00:43:03.630 --> 00:43:06.830 them were stationary and also lived on or

NOTE Confidence: 0.923727035522461

00:43:06.830 --> 00:43:10.270 in these widespread microbial mat ground.

NOTE Confidence: 0.923727035522461

00:43:10.270 --> 00:43:12.110 That's been suggested that

NOTE Confidence: 0.923727035522461

00:43:12.110 --> 00:43:13.490 these ancient burrowers,

NOTE Confidence: 0.923727035522461

00:43:13.490 --> 00:43:15.790 these early pioneers of burrowing

NOTE Confidence: 0.923727035522461

00:43:15.790 --> 00:43:17.630 by the terrian animals,

NOTE Confidence: 0.923727035522461

00:43:17.630 --> 00:43:19.980 may have been responsible for.

NOTE Confidence: 0.923727035522461

00:43:19.980 --> 00:43:22.870 Burrowing away or grazing away.

NOTE Confidence: 0.923727035522461

00:43:22.870 --> 00:43:26.419 The microbial mat grounds on which the

NOTE Confidence: 0.923727035522461

00:43:26.419 --> 00:43:29.789 Edie Accra Macro organisms depended,

NOTE Confidence: 0.923727035522461

00:43:29.790 --> 00:43:33.246 certainly for stabilizing the sea floor.

NOTE Confidence: 0.923727035522461

00:43:33.250 --> 00:43:34.404 In these,

NOTE Confidence: 0.923727035522461

00:43:34.404 --> 00:43:37.289 often very high-energy Sandy environments,

NOTE Confidence: 0.923727035522461

00:43:37.290 --> 00:43:41.280 and also potentially for nutrition.

NOTE Confidence: 0.923727035522461

00:43:41.280 --> 00:43:41.730 So

NOTE Confidence: 0.920766651630402

00:43:41.730 --> 00:43:43.955 that would be clear competition

NOTE Confidence: 0.920766651630402

00:43:43.955 --> 00:43:46.124 between the D, Akron Biota,

NOTE Confidence: 0.920766651630402

00:43:46.124 --> 00:43:47.792 and these bile attarian

NOTE Confidence: 0.920766651630402

00:43:47.792 --> 00:43:50.200 animals for a finite resource,

NOTE Confidence: 0.920766651630402

00:43:50.200 --> 00:43:51.980 these microbial mats, potentially,

NOTE Confidence: 0.920766651630402

00:43:51.980 --> 00:43:54.205 if it wasn't nutritional resource,

NOTE Confidence: 0.920766651630402

00:43:54.210 --> 00:43:56.928 but even just from the perspective

NOTE Confidence: 0.920766651630402

00:43:56.928 --> 00:43:59.675 of stabilizing the sea floor that

NOTE Confidence: 0.920766651630402

00:43:59.675 --> 00:44:02.237 may have been more analogous to,

NOTE Confidence: 0.920766651630402

00:44:02.240 --> 00:44:04.024 we could say habitat

NOTE Confidence: 0.920766651630402

00:44:04.024 --> 00:44:05.808 destruction in some sense.

NOTE Confidence: 0.920766651630402

00:44:05.810 --> 00:44:08.420 So it's been suggested that these

NOTE Confidence: 0.920766651630402

00:44:08.420 --> 00:44:11.140 early burrowing organisms may have been

NOTE Confidence: 0.920766651630402

00:44:11.140 --> 00:44:13.410 detrimental to the diacre organisms.

NOTE Confidence: 0.920766651630402

00:44:13.410 --> 00:44:15.990 By either destroying their habitat of

NOTE Confidence: 0.920766651630402

00:44:15.990 --> 00:44:18.805 disrupting these Mac grounds on potentially

NOTE Confidence: 0.920766651630402

00:44:18.805 --> 00:44:20.849 competing for similar resources,

NOTE Confidence: 0.920766651630402

00:44:20.850 --> 00:44:23.175 and maybe those were resources

NOTE Confidence: 0.920766651630402

00:44:23.175 --> 00:44:25.504 within the Mac grounds, um,

NOTE Confidence: 0.920766651630402

00:44:25.504 --> 00:44:29.216 or maybe even by directly praying upon them,

NOTE Confidence: 0.920766651630402

00:44:29.220 --> 00:44:30.465 because modern burrowing

NOTE Confidence: 0.920766651630402

00:44:30.465 --> 00:44:32.955 organisms employ a wide array of

NOTE Confidence: 0.920766651630402

00:44:32.955 --> 00:44:34.800 different ecological strategies.

NOTE Confidence: 0.920766651630402

00:44:34.800 --> 00:44:37.808 Some of them are grazing and some of

NOTE Confidence: 0.920766651630402

00:44:37.808 --> 00:44:41.373 them are mining bits of decaying organic

NOTE Confidence: 0.920766651630402

00:44:41.373 --> 00:44:44.600 matter from settlements and soils like.

NOTE Confidence: 0.920766651630402

00:44:44.600 --> 00:44:45.450 Earthworms today,

NOTE Confidence: 0.920766651630402

00:44:45.450 --> 00:44:48.425 but some of them are also predators,

NOTE Confidence: 0.920766651630402

00:44:48.430 --> 00:44:50.930 so that's been another potential

NOTE Confidence: 0.920766651630402

00:44:50.930 --> 00:44:52.430 negative ecological interaction

NOTE Confidence: 0.920766651630402

00:44:52.430 --> 00:44:54.620 that's been thrown out there.

NOTE Confidence: 0.920766651630402

00:44:54.620 --> 00:44:57.189 The problem is is that we really

NOTE Confidence: 0.920766651630402

00:44:57.189 --> 00:44:59.947 don't have direct evidence for any

NOTE Confidence: 0.920766651630402

00:44:59.947 --> 00:45:02.047 of these ecological interactions,

NOTE Confidence: 0.920766651630402

00:45:02.050 --> 00:45:05.109 and many of the reports for these.

NOTE Confidence: 0.920766651630402

00:45:05.110 --> 00:45:06.874 Latest Edie Akron burrowing

NOTE Confidence: 0.920766651630402

00:45:06.874 --> 00:45:09.520 organisms through the lens of the

NOTE Confidence: 0.920766651630402

00:45:09.601 --> 00:45:12.337 trace fossils of the boroughs that

NOTE Confidence: 0.920766651630402

00:45:12.337 --> 00:45:14.634 they've created are actually found

NOTE Confidence: 0.920766651630402

00:45:14.634 --> 00:45:17.022 in different places than the places

NOTE Confidence: 0.920766651630402

00:45:17.022 --> 00:45:19.848 where we have found Edie Accra biota.

NOTE Confidence: 0.920766651630402

00:45:19.848 --> 00:45:22.849 Fossils so we don't have really the

NOTE Confidence: 0.920766651630402

00:45:22.849 --> 00:45:25.705 concurrence in space or potentially time.

NOTE Confidence: 0.920766651630402

00:45:25.710 --> 00:45:28.300 To be able to say that this

NOTE Confidence: 0.920766651630402

00:45:28.300 --> 00:45:30.560 was a negative interaction,

NOTE Confidence: 0.920766651630402

00:45:30.560 --> 00:45:31.065 Moreover,

NOTE Confidence: 0.920766651630402

00:45:31.065 --> 00:45:34.095 we do have evidence for burrowing

NOTE Confidence: 0.920766651630402

00:45:34.095 --> 00:45:36.026 animals that extending an

NOTE Confidence: 0.920766651630402

00:45:36.026 --> 00:45:38.054 much further back in the Ed,

NOTE Confidence: 0.920766651630402

00:45:38.060 --> 00:45:41.147 Akron again concurrent with some of these.

NOTE Confidence: 0.920766651630402

00:45:41.150 --> 00:45:42.470 Edie Accra biota.

NOTE Confidence: 0.920766651630402

00:45:42.470 --> 00:45:44.670 Fossilized communities and in fact,

NOTE Confidence: 0.920766651630402

00:45:44.670 --> 00:45:46.880 some of these trace fossils.

NOTE Confidence: 0.920766651630402

00:45:46.880 --> 00:45:50.149 Some of these Burrows for these ancient

NOTE Confidence: 0.920766651630402

00:45:50.149 --> 00:45:53.156 burrowing animals on Co occur with Edie

NOTE Confidence: 0.920766651630402

00:45:53.156 --> 00:45:56.150 Accra fossils and what are our richest?

NOTE Confidence: 0.920766651630402

00:45:56.150 --> 00:45:57.754 And most ecologically complex

NOTE Confidence: 0.920766651630402

00:45:57.754 --> 00:45:58.957 and most diverse.

NOTE Confidence: 0.920766651630402

00:45:58.960 --> 00:46:00.556 Edie Accra fossil assemblages.

NOTE Confidence: 0.920766651630402

00:46:00.556 --> 00:46:04.209 So in some of the places where we do

NOTE Confidence: 0.920766651630402

00:46:04.209 --> 00:46:06.579 have evidence for this Co occurrence.

NOTE Confidence: 0.920766651630402

00:46:06.580 --> 00:46:09.660 And for that happening on a long time

NOTE Confidence: 0.920766651630402

00:46:09.660 --> 00:46:13.198 before the end of the Ed Akron and the

NOTE Confidence: 0.920766651630402

00:46:13.198 --> 00:46:15.691 disappearance of the Ed Accra biota

NOTE Confidence: 0.920766651630402

00:46:15.691 --> 00:46:18.610 rather than seeing evidence of a sort

NOTE Confidence: 0.920766651630402

00:46:18.610 --> 00:46:21.010 of a negative interaction between them,

NOTE Confidence: 0.920766651630402

00:46:21.010 --> 00:46:23.666 we don't see any evidence that the presence

NOTE Confidence: 0.920766651630402

00:46:23.666 --> 00:46:26.627 of these burrowers was actually detrimental.

NOTE Confidence: 0.920766651630402

00:46:26.630 --> 00:46:27.764 To the Ed.

NOTE Confidence: 0.920766651630402

00:46:27.764 --> 00:46:28.520 Accra biota.

NOTE Confidence: 0.920766651630402

00:46:28.520 --> 00:46:30.024 Proper that we're living

NOTE Confidence: 0.920766651630402

00:46:30.024 --> 00:46:31.528 in these same communities.

NOTE Confidence: 0.920766651630402

00:46:31.530 --> 00:46:34.434 And that was actually one of the questions

NOTE Confidence: 0.920766651630402

00:46:34.434 --> 00:46:36.775 that I was particularly interested in

NOTE Confidence: 0.920766651630402

00:46:36.775 --> 00:46:40.198 for the end of the Ed Akron as well.

NOTE Confidence: 0.920766651630402

00:46:40.200 --> 00:46:42.391 So I already knew from my work

NOTE Confidence: 0.920766651630402

00:46:42.391 --> 00:46:45.510 on sort of on the Ed Accra fossil

NOTE Confidence: 0.920766651630402

00:46:45.510 --> 00:46:47.610 deposits in South Australia that

NOTE Confidence: 0.920766651630402

00:46:47.689 --> 00:46:50.363 we had trace fossils that were made

NOTE Confidence: 0.920766651630402

00:46:50.363 --> 00:46:52.716 by these early complex animals Co

NOTE Confidence: 0.920766651630402

00:46:52.716 --> 00:46:55.128 occuring with these rich and diverse

NOTE Confidence: 0.920766651630402

00:46:55.128 --> 00:46:56.790 assemblages of Edie Accra biota.

NOTE Confidence: 0.920766651630402

00:46:56.790 --> 00:46:57.206 Organisms,

NOTE Confidence: 0.920766651630402

00:46:57.206 --> 00:47:01.560 but what about the very end of the Ed Akron?

NOTE Confidence: 0.920766651630402

00:47:01.560 --> 00:47:04.170 So again, so far we hadn't.

NOTE Confidence: 0.920766651630402

00:47:04.170 --> 00:47:06.756 We didn't really have great evidence

NOTE Confidence: 0.920766651630402

00:47:06.756 --> 00:47:09.914 for a concurrence in time or place

NOTE Confidence: 0.920766651630402

00:47:09.914 --> 00:47:11.726 between these burrowing animals

NOTE Confidence: 0.920766651630402

00:47:11.726 --> 00:47:14.148 and the latest of RED Accra,

NOTE Confidence: 0.920766651630402

00:47:14.150 --> 00:47:15.980 Biota communities that would really

NOTE Confidence: 0.920766651630402

00:47:15.980 --> 00:47:19.412 allow us to get at this question of

NOTE Confidence: 0.920766651630402

00:47:19.412 --> 00:47:21.957 whether negative interactions between them.

NOTE Confidence: 0.920766651630402

00:47:21.960 --> 00:47:23.576 But then more recently,

NOTE Confidence: 0.920766651630402

00:47:23.576 --> 00:47:26.000 I started working at a Edie

NOTE Confidence: 0.909318029880524

00:47:26.086 --> 00:47:28.070 Akron locality in Nevada.

NOTE Confidence: 0.909318029880524

00:47:28.070 --> 00:47:29.878 That's called Mountain Dunphy,

NOTE Confidence: 0.909318029880524

00:47:29.878 --> 00:47:33.064 which is near the very small mining

NOTE Confidence: 0.909318029880524

00:47:33.064 --> 00:47:35.428 town of gold point in Nevada,

NOTE Confidence: 0.909318029880524

00:47:35.430 --> 00:47:37.158 and Mount Dunphy's really

NOTE Confidence: 0.909318029880524

00:47:37.158 --> 00:47:38.454 an extraordinary place.

NOTE Confidence: 0.909318029880524

00:47:38.460 --> 00:47:40.987 'cause it has a has a great

NOTE Confidence: 0.909318029880524

00:47:40.987 --> 00:47:43.229 geologic record that spans the

NOTE Confidence: 0.909318029880524

00:47:43.229 --> 00:47:45.385 precambrian banner zoic boundary,

NOTE Confidence: 0.909318029880524

00:47:45.390 --> 00:47:47.555 including the end of the

NOTE Confidence: 0.909318029880524

00:47:47.555 --> 00:47:49.720 Ed Akron in its locality,

NOTE Confidence: 0.909318029880524

00:47:49.720 --> 00:47:51.890 where we have chemical archives.

NOTE Confidence: 0.909318029880524

00:47:51.890 --> 00:47:54.050 We have different types of rocks

NOTE Confidence: 0.909318029880524

00:47:54.050 --> 00:47:57.107 that allow us to track changes in

NOTE Confidence: 0.909318029880524

00:47:57.107 --> 00:47:59.677 the physical and chemical environments.

NOTE Confidence: 0.909318029880524

00:47:59.680 --> 00:48:00.877 Across that boundary,

NOTE Confidence: 0.909318029880524

00:48:00.877 --> 00:48:04.191 and it also has a pretty good fossil

NOTE Confidence: 0.909318029880524

00:48:04.191 --> 00:48:06.819 record that allows us to track

NOTE Confidence: 0.909318029880524

00:48:06.819 --> 00:48:09.134 changes in biology and ecology

NOTE Confidence: 0.909318029880524

00:48:09.134 --> 00:48:11.424 across that boundary as well,

NOTE Confidence: 0.909318029880524

00:48:11.430 --> 00:48:14.630 and one of the things that my colleagues

NOTE Confidence: 0.909318029880524

00:48:14.630 --> 00:48:17.259 and I discovered at Mount Dunphy

NOTE Confidence: 0.909318029880524

00:48:17.259 --> 00:48:21.312 ohm is that not only do we have some

NOTE Confidence: 0.909318029880524

00:48:21.312 --> 00:48:23.572 Edie Accra Biota Macro organisms

NOTE Confidence: 0.909318029880524

00:48:23.572 --> 00:48:26.080 in the fossil of sandwiches there,

NOTE Confidence: 0.909318029880524

00:48:26.080 --> 00:48:28.480 but we also have burrowing organisms

NOTE Confidence: 0.909318029880524

00:48:28.552 --> 00:48:30.428 preserved through their trace

NOTE Confidence: 0.909318029880524

00:48:30.428 --> 00:48:32.304 fossils through their Burrows.

NOTE Confidence: 0.909318029880524

00:48:32.310 --> 00:48:34.380 Preserved not only in the same

NOTE Confidence: 0.909318029880524

00:48:34.380 --> 00:48:36.819 section and at the same locality,

NOTE Confidence: 0.909318029880524

00:48:36.820 --> 00:48:39.235 but on the same exact fossil surface

NOTE Confidence: 0.909318029880524

00:48:39.235 --> 00:48:42.006 is so we finally have our concurrence

NOTE Confidence: 0.909318029880524

00:48:42.006 --> 00:48:45.276 in space and time that we were looking

NOTE Confidence: 0.909318029880524

00:48:45.276 --> 00:48:48.100 for to be able to to assess these

NOTE Confidence: 0.909318029880524

00:48:48.100 --> 00:48:50.146 questions and not only were these

NOTE Confidence: 0.909318029880524

00:48:50.146 --> 00:48:52.471 sort of the simple boroughs that

NOTE Confidence: 0.909318029880524

00:48:52.471 --> 00:48:55.147 we've long known that these earliest

NOTE Confidence: 0.909318029880524

00:48:55.147 --> 00:48:57.878 burrowing animals in the Ed Akron could make,

NOTE Confidence: 0.909318029880524

00:48:57.880 --> 00:48:59.755 but some of these boroughs

NOTE Confidence: 0.909318029880524

00:48:59.755 --> 00:49:01.255 were much more complex.

NOTE Confidence: 0.909318029880524

00:49:01.260 --> 00:49:02.612 They were still small.

NOTE Confidence: 0.909318029880524

00:49:02.612 --> 00:49:04.640 But they were very complex and

NOTE Confidence: 0.909318029880524

00:49:04.704 --> 00:49:07.000 sophisticated in their construction,

NOTE Confidence: 0.909318029880524

00:49:07.000 --> 00:49:09.580 and in that matter much more

NOTE Confidence: 0.909318029880524

00:49:09.580 --> 00:49:12.218 reminiscent of the types of boroughs

NOTE Confidence: 0.909318029880524

00:49:12.218 --> 00:49:15.116 that we find in the Phanerozoic on

NOTE Confidence: 0.909318029880524

00:49:15.116 --> 00:49:18.005 that are made by by various animal

NOTE Confidence: 0.909318029880524

00:49:18.005 --> 00:49:20.888 groups that that we know in that we

NOTE Confidence: 0.909318029880524

00:49:20.888 --> 00:49:23.693 recognize so that we had some of these

NOTE Confidence: 0.909318029880524

00:49:23.693 --> 00:49:25.693 more complex styles of burrowing

NOTE Confidence: 0.909318029880524

00:49:25.693 --> 00:49:28.018 which has been previously invoked

NOTE Confidence: 0.909318029880524

00:49:28.018 --> 00:49:31.150 to record behaviors that could have

NOTE Confidence: 0.909318029880524

00:49:31.150 --> 00:49:33.156 been detrimentally taiyaki organisms.

NOTE Confidence: 0.909318029880524

00:49:33.156 --> 00:49:35.546 And we have these occuring

NOTE Confidence: 0.909318029880524

00:49:35.546 --> 00:49:37.889 Co occurring with Edie Accra,

NOTE Confidence: 0.909318029880524

00:49:37.890 --> 00:49:41.215 Biota fossils and we have this persistence.

NOTE Confidence: 0.909318029880524

00:49:41.220 --> 00:49:43.665 This Co occurrence persisting for

NOTE Confidence: 0.909318029880524

00:49:43.665 --> 00:49:47.140 a long stretch of time up until

NOTE Confidence: 0.909318029880524

00:49:47.140 --> 00:49:49.495 the Edie Akron Cambrian Boundary

NOTE Confidence: 0.909318029880524

00:49:49.495 --> 00:49:52.660 on the basis of those evidences.

NOTE Confidence: 0.909318029880524

00:49:52.660 --> 00:49:54.455 We interpreted that we actually

NOTE Confidence: 0.909318029880524

00:49:54.455 --> 00:49:57.174 where one of the best places where

NOTE Confidence: 0.909318029880524

00:49:57.174 --> 00:49:59.718 we can actually test these questions.

NOTE Confidence: 0.909318029880524

00:49:59.720 --> 00:50:02.198 We don't see evidence that burrowing

NOTE Confidence: 0.909318029880524

00:50:02.198 --> 00:50:04.610 organisms played any role in the

NOTE Confidence: 0.909318029880524

00:50:04.610 --> 00:50:05.986 disappearance of the Ed.

NOTE Confidence: 0.909318029880524

00:50:05.990 --> 00:50:07.950 Accra Biota, and in fact,

NOTE Confidence: 0.909318029880524

00:50:07.950 --> 00:50:10.296 even if we cross the Phanerozoic,

NOTE Confidence: 0.909318029880524

00:50:10.300 --> 00:50:11.900 the Precambrian Phanerozoic Boundary

NOTE Confidence: 0.909318029880524

00:50:11.900 --> 00:50:14.724 and look at growing up in the

NOTE Confidence: 0.909318029880524

00:50:14.724 --> 00:50:15.789 early Fanara Zoic,

NOTE Confidence: 0.909318029880524

00:50:15.790 --> 00:50:18.534 which is another area that I've spent a

NOTE Confidence: 0.909318029880524

00:50:18.534 --> 00:50:22.058 lot of time hum from a research perspective,

NOTE Confidence: 0.909318029880524

00:50:22.060 --> 00:50:23.320 we see that.

NOTE Confidence: 0.909318029880524

00:50:23.320 --> 00:50:25.420 The evolution of burrowing organisms

NOTE Confidence: 0.909318029880524

00:50:25.420 --> 00:50:28.217 and their ability to really stir up

NOTE Confidence: 0.909318029880524

00:50:28.217 --> 00:50:30.959 sentiments of the sea floor and disrupt

NOTE Confidence: 0.909318029880524

00:50:30.959 --> 00:50:33.305 them was a very gradual process,

NOTE Confidence: 0.909318029880524

00:50:33.310 --> 00:50:35.326 and it took hundreds of millions

NOTE Confidence: 0.909318029880524

00:50:35.326 --> 00:50:37.169 of years before that burrowing

NOTE Confidence: 0.909318029880524

00:50:37.169 --> 00:50:39.755 started to approach the sort of

NOTE Confidence: 0.909318029880524

00:50:39.755 --> 00:50:41.542 intensities of settlements turingan

NOTE Confidence: 0.909318029880524

00:50:41.542 --> 00:50:43.242 churning characteristic of animals

NOTE Confidence: 0.909318029880524

00:50:43.242 --> 00:50:45.367 in the sea floor today.

NOTE Confidence: 0.899485230445862

00:50:46.900 --> 00:50:49.882 So just just to summarize the

NOTE Confidence: 0.899485230445862

00:50:49.882 --> 00:50:53.524 coexistence of the Ed Acura bio bio

NOTE Confidence: 0.899485230445862

00:50:53.524 --> 00:50:56.626 to with these bile attarian animals

NOTE Confidence: 0.899485230445862

00:50:56.626 --> 00:51:01.064 for a long time is enough to show that

NOTE Confidence: 0.899485230445862

00:51:01.064 --> 00:51:03.523 there probably not a competition.

NOTE Confidence: 0.899485230445862

00:51:03.523 --> 00:51:06.028 With the the the pilot,

NOTE Confidence: 0.899485230445862

00:51:06.030 --> 00:51:08.442 Arian animals are in a competition

NOTE Confidence: 0.899485230445862

00:51:08.442 --> 00:51:10.610 for the Ed Acura biota.

NOTE Confidence: 0.899485230445862

00:51:10.610 --> 00:51:12.560 So essentially what you've told

NOTE Confidence: 0.899485230445862

00:51:12.560 --> 00:51:15.159 us is that based on fossilization

NOTE Confidence: 0.899485230445862

00:51:15.159 --> 00:51:17.989 conditions Edie Accra biota didn't

NOTE Confidence: 0.899485230445862

00:51:17.989 --> 00:51:20.735 disappear from the fossil record

NOTE Confidence: 0.899485230445862

00:51:20.735 --> 00:51:23.919 due to an inability for them to be

NOTE Confidence: 0.899485230445862

00:51:23.919 --> 00:51:25.944 fossilized and they also didn't

NOTE Confidence: 0.899485230445862

00:51:25.944 --> 00:51:28.380 disappear due to the emergence of

NOTE Confidence: 0.899485230445862

00:51:28.463 --> 00:51:30.947 military and animals that sort of

NOTE Confidence: 0.899485230445862

00:51:30.947 --> 00:51:33.750 leaves one thing that you mentioned

NOTE Confidence: 0.899485230445862

00:51:33.750 --> 00:51:36.420 which is potentially a disappearance

NOTE Confidence: 0.899485230445862

00:51:36.420 --> 00:51:38.984 due to environmental change so

NOTE Confidence: 0.899485230445862

00:51:38.984 --> 00:51:41.369 I'm curious if that's currently

NOTE Confidence: 0.899485230445862

00:51:41.369 --> 00:51:43.110 what your hypothesis is.

NOTE Confidence: 0.899485230445862

00:51:43.110 --> 00:51:44.602 As to what happened,

NOTE Confidence: 0.899485230445862

00:51:44.602 --> 00:51:47.678 and if So what sorts of things you

NOTE Confidence: 0.899485230445862

00:51:47.678 --> 00:51:50.662 might need to do to figure out if

NOTE Confidence: 0.93299412727356

00:51:50.670 --> 00:51:52.560 that is what happened. Yeah,

NOTE Confidence: 0.93299412727356

00:51:52.560 --> 00:51:55.564 I think that's that's a big question, right?

NOTE Confidence: 0.93299412727356

00:51:55.564 --> 00:51:58.396 Is if we can say definitively that it

NOTE Confidence: 0.93299412727356

00:51:58.396 --> 00:52:01.250 wasn't closing of a preservation a window,

NOTE Confidence: 0.93299412727356

00:52:01.250 --> 00:52:03.896 and therefore it was a real disappearance.

NOTE Confidence: 0.93299412727356

00:52:03.900 --> 00:52:06.098 But if we don't see compelling evidence

NOTE Confidence: 0.93299412727356

00:52:06.098 --> 00:52:08.440 for it being ecologically mediated,

NOTE Confidence: 0.93299412727356

00:52:08.440 --> 00:52:10.981 that does sort of leave us with

NOTE Confidence: 0.93299412727356

00:52:10.981 --> 00:52:12.590 what about environmental change,

NOTE Confidence: 0.93299412727356

00:52:12.590 --> 00:52:13.712 and that would.

NOTE Confidence: 0.93299412727356

00:52:13.712 --> 00:52:16.882 Really allow us to place the Edie Accra

NOTE Confidence: 0.93299412727356

00:52:16.882 --> 00:52:19.696 Biota and it's an it's disappearance.

NOTE Confidence: 0.93299412727356

00:52:19.700 --> 00:52:22.318 More in the context of the evolution

NOTE Confidence: 0.93299412727356

00:52:22.318 --> 00:52:25.209 of animal life during the Phanerozoic.

NOTE Confidence: 0.93299412727356

00:52:25.210 --> 00:52:27.849 During our modern eon where many of

NOTE Confidence: 0.93299412727356

00:52:27.849 --> 00:52:30.494 our major extinction events have been

NOTE Confidence: 0.93299412727356

00:52:30.494 --> 00:52:32.418 mediated by environmental change,

NOTE Confidence: 0.93299412727356

00:52:32.420 --> 00:52:35.030 and I think that there is a lot that

NOTE Confidence: 0.93299412727356

00:52:35.030 --> 00:52:37.361 is compelling in that hypothesis

NOTE Confidence: 0.93299412727356

00:52:37.361 --> 00:52:40.307 and ded Akron period wasn't interval

NOTE Confidence: 0.93299412727356

00:52:40.384 --> 00:52:42.169 of environmental change.

NOTE Confidence: 0.93299412727356

00:52:42.170 --> 00:52:45.594 Not only is it bracketed at it start.

NOTE Confidence: 0.93299412727356

00:52:45.600 --> 00:52:48.222 My these major snowball earth glaciations

NOTE Confidence: 0.93299412727356

00:52:48.222 --> 00:52:51.736 when the entirety of the world froze over on.

NOTE Confidence: 0.93299412727356

00:52:51.740 --> 00:52:54.260 But we also have some inkling

NOTE Confidence: 0.93299412727356

00:52:54.260 --> 00:52:57.458 that near the end of the Ed Akron,

NOTE Confidence: 0.93299412727356

00:52:57.460 --> 00:53:00.512 we may have had some major perturbations

NOTE Confidence: 0.93299412727356

00:53:00.512 --> 00:53:03.922 to to earths carbon cycle and how how

NOTE Confidence: 0.93299412727356

00:53:03.922 --> 00:53:07.134 carbon is stored and how it is expired

NOTE Confidence: 0.93299412727356

00:53:07.134 --> 00:53:10.122 and oxidize on and that that in turn

NOTE Confidence: 0.93299412727356

00:53:10.122 --> 00:53:12.866 might have had some effect appan oxygen

NOTE Confidence: 0.93299412727356

00:53:12.866 --> 00:53:15.897 levels in the oceans and the atmosphere.

NOTE Confidence: 0.93299412727356

00:53:15.900 --> 00:53:18.618 And this is also occurring against

NOTE Confidence: 0.93299412727356

00:53:18.618 --> 00:53:21.920 the backdrop of a larger interval.

NOTE Confidence: 0.93299412727356

00:53:21.920 --> 00:53:25.434 Longer interval of change in Ocean Chemistry,

NOTE Confidence: 0.93299412727356

00:53:25.440 --> 00:53:29.448 not only in the amount of dissolved oxygen,

NOTE Confidence: 0.93299412727356

00:53:29.450 --> 00:53:32.330 which is of course essential to

NOTE Confidence: 0.93299412727356

00:53:32.330 --> 00:53:35.479 complex life and to animal life,

NOTE Confidence: 0.93299412727356

00:53:35.480 --> 00:53:38.360 but also other aspects of the

NOTE Confidence: 0.93299412727356

00:53:38.360 --> 00:53:41.000 chemistry of the ancient oceans.

NOTE Confidence: 0.93299412727356

00:53:41.000 --> 00:53:43.964 From what sorts of mineral carbonate

NOTE Confidence: 0.93299412727356

00:53:43.964 --> 00:53:46.550 minerals precipitate and two silica.

NOTE Confidence: 0.93299412727356

00:53:46.550 --> 00:53:49.098 To how nutrients are cycled so it's

NOTE Confidence: 0.93299412727356

00:53:49.098 --> 00:53:52.488 sort of an interval of profound change,

NOTE Confidence: 0.93299412727356

00:53:52.490 --> 00:53:55.028 but it's still really broad brush.

NOTE Confidence: 0.93299412727356

00:53:55.030 --> 00:53:58.187 I think in our ability to reconstruct

NOTE Confidence: 0.93299412727356

00:53:58.187 --> 00:54:00.540 what exactly happened over the Ed,

NOTE Confidence: 0.93299412727356

00:54:00.540 --> 00:54:01.605 Akron, Cambrian boundary.

NOTE Confidence: 0.93299412727356

00:54:01.605 --> 00:54:04.552 So we have sort of a larger scale

NOTE Confidence: 0.93299412727356

00:54:04.552 --> 00:54:06.527 picture of larger scale changes

NOTE Confidence: 0.93299412727356

00:54:06.527 --> 00:54:08.811 in these various some chemical

NOTE Confidence: 0.93299412727356

00:54:08.811 --> 00:54:10.719 and environmental parameters.

NOTE Confidence: 0.93299412727356

00:54:10.720 --> 00:54:13.688 But we don't really have a silver

NOTE Confidence: 0.93299412727356

00:54:13.688 --> 00:54:14.960 bullet just yet.

NOTE Confidence: 0.93299412727356

00:54:14.960 --> 00:54:17.570 We don't have an exact marker.

NOTE Confidence: 0.93299412727356

00:54:17.570 --> 00:54:19.466 In time for something that is

NOTE Confidence: 0.93299412727356

00:54:19.466 --> 00:54:21.196 unambiguously evidence of a major

NOTE Confidence: 0.93299412727356

00:54:21.196 --> 00:54:22.836 environmental change that's concurrent

NOTE Confidence: 0.93299412727356

00:54:22.836 --> 00:54:25.110 with the disappearance of the Ed.

NOTE Confidence: 0.93299412727356

00:54:25.110 --> 00:54:25.658 Accra Biota.

NOTE Confidence: 0.93299412727356

00:54:25.658 --> 00:54:28.472 So I think that there are a number of

NOTE Confidence: 0.93299412727356

00:54:28.472 --> 00:54:30.137 potentially interesting candidates,

NOTE Confidence: 0.93299412727356

00:54:30.140 --> 00:54:32.939 and we can't yet rule out that there was

NOTE Confidence: 0.93299412727356

00:54:32.939 --> 00:54:35.877 some sort of a major environmental change.

NOTE Confidence: 0.93299412727356

00:54:35.880 --> 00:54:38.568 But there's a lot of work that still

NOTE Confidence: 0.93299412727356

00:54:38.568 --> 00:54:41.516 needs to be done ohm in order to

NOTE Confidence: 0.93299412727356

00:54:41.516 --> 00:54:43.778 to really unravel whether or not

NOTE Confidence: 0.93299412727356

00:54:43.778 --> 00:54:45.932 we have sufficient evidence to to

NOTE Confidence: 0.93299412727356

00:54:45.932 --> 00:54:48.158 put our finger on any particular.

NOTE Confidence: 0.93299412727356

00:54:48.158 --> 00:54:50.043 Environmental trigger an really one

NOTE Confidence: 0.93299412727356

00:54:50.043 --> 00:54:52.513 of the things that's most needed

NOTE Confidence: 0.93299412727356

00:54:52.513 --> 00:54:54.137 towards resolving this question,

NOTE Confidence: 0.93299412727356

00:54:54.140 --> 00:54:56.140 something I alluded to earlier,

NOTE Confidence: 0.93299412727356

00:54:56.140 --> 00:54:57.478 is that unfortunately,

NOTE Confidence: 0.93299412727356

00:54:57.478 --> 00:55:00.154 the resolution of the fossil record

NOTE Confidence: 0.93299412727356

00:55:00.154 --> 00:55:02.542 on is sometimes not great enough

NOTE Confidence: 0.93299412727356

00:55:02.542 --> 00:55:05.576 to allow us to answer all of the

NOTE Confidence: 0.93299412727356

00:55:05.576 --> 00:55:08.131 questions that we would like to answer,

NOTE Confidence: 0.93299412727356

00:55:08.140 --> 00:55:10.540 or at least not right now.

NOTE Confidence: 0.93299412727356

00:55:10.540 --> 00:55:13.137 So what we really need are we

NOTE Confidence: 0.93299412727356

00:55:13.137 --> 00:55:15.738 need more areas around the world.

NOTE Confidence: 0.93299412727356

00:55:15.740 --> 00:55:17.380 We need more deposits,

NOTE Confidence: 0.93299412727356

00:55:17.380 --> 00:55:18.610 more geologic deposits.

NOTE Confidence: 0.935312449932098

00:55:18.610 --> 00:55:21.634 That have both good fossil archives and also

NOTE Confidence: 0.935312449932098

00:55:21.634 --> 00:55:24.619 um archives of ancient environmental change.

NOTE Confidence: 0.935312449932098

00:55:24.620 --> 00:55:28.442 So when we're when we're forced to, you know,

NOTE Confidence: 0.935312449932098

00:55:28.442 --> 00:55:31.319 say take a fossil record from Australia

NOTE Confidence: 0.935312449932098

00:55:31.319 --> 00:55:34.241 and a chemical record from the United

NOTE Confidence: 0.935312449932098

00:55:34.241 --> 00:55:37.490 Kingdom and try to piece them together,

NOTE Confidence: 0.935312449932098

00:55:37.490 --> 00:55:39.202 that's really challenging to

NOTE Confidence: 0.935312449932098

00:55:39.202 --> 00:55:40.914 gauge not only concurrence,

NOTE Confidence: 0.935312449932098

00:55:40.920 --> 00:55:43.713 but cause and effect what we really

NOTE Confidence: 0.935312449932098

00:55:43.713 --> 00:55:46.373 need are better archives from both

NOTE Confidence: 0.935312449932098

00:55:46.373 --> 00:55:49.042 sides of the spectrum, both fossil.

NOTE Confidence: 0.935312449932098

00:55:49.042 --> 00:55:50.706 And environmental and geological.

NOTE Confidence: 0.935312449932098

00:55:50.710 --> 00:55:53.374 And until we have a greater number of

NOTE Confidence: 0.935312449932098

00:55:53.374 --> 00:55:55.961 examples where we can actually assess

NOTE Confidence: 0.935312449932098

00:55:55.961 --> 00:55:58.271 both environmental and biotic change

NOTE Confidence: 0.935312449932098

00:55:58.271 --> 00:56:00.424 concurrently from the same archives

NOTE Confidence: 0.935312449932098

00:56:00.424 --> 00:56:02.454 from the same geologic succession,

NOTE Confidence: 0.935312449932098

00:56:02.460 --> 00:56:05.148 I think that we're going to continue

NOTE Confidence: 0.935312449932098

00:56:05.148 --> 00:56:08.269 to spin our wheels a bit in terms

NOTE Confidence: 0.935312449932098

00:56:08.269 --> 00:56:10.960 of trying to resolve this question,

NOTE Confidence: 0.935312449932098

00:56:10.960 --> 00:56:13.655 so I guess that's a little bit

NOTE Confidence: 0.935312449932098

00:56:13.655 --> 00:56:15.420 of an unsatisfactory answer.

NOTE Confidence: 0.935312449932098

00:56:15.420 --> 00:56:17.545 I think that environmental change

NOTE Confidence: 0.935312449932098

00:56:17.545 --> 00:56:20.111 could indeed have played a role

NOTE Confidence: 0.935312449932098

00:56:20.111 --> 00:56:22.295 in the disappearance of the Ed.

NOTE Confidence: 0.935312449932098

00:56:22.300 --> 00:56:22.978 Accra biota.

NOTE Confidence: 0.935312449932098

00:56:22.978 --> 00:56:25.690 And I think we can certainly at this

NOTE Confidence: 0.935312449932098

00:56:25.760 --> 00:56:28.322 point say that it would truly was

NOTE Confidence: 0.935312449932098

00:56:28.322 --> 00:56:30.688 a disappearance and not merely a

NOTE Confidence: 0.935312449932098

00:56:30.688 --> 00:56:32.673 closing of preservation a window,

NOTE Confidence: 0.935312449932098

00:56:32.680 --> 00:56:35.407 but we still have a lot of work in

NOTE Confidence: 0.935312449932098

00:56:35.407 --> 00:56:38.465 front of us in order to not only verify

NOTE Confidence: 0.935312449932098

00:56:38.465 --> 00:56:41.002 that there is a sufficient grounds

NOTE Confidence: 0.935312449932098

00:56:41.002 --> 00:56:43.690 for for for invoking any particular

NOTE Confidence: 0.935312449932098

00:56:43.690 --> 00:56:45.868 environmental change as an agent of

NOTE Confidence: 0.935312449932098

00:56:45.868 --> 00:56:48.099 disappearance in the Edie Accra Biota,

NOTE Confidence: 0.935312449932098

00:56:48.100 --> 00:56:50.356 but being able to two more.

NOTE Confidence: 0.935312449932098

00:56:50.360 --> 00:56:52.304 Really get out this question of

NOTE Confidence: 0.935312449932098

00:56:52.304 --> 00:56:54.394 cause and effect and not just

NOTE Confidence: 0.935312449932098

00:56:54.394 --> 00:56:55.850 a question of correlation.

NOTE Confidence: 0.903826475143433

00:56:57.410 --> 00:56:59.990 Yeah, see I would disagree because

NOTE Confidence: 0.903826475143433

00:56:59.990 --> 00:57:03.236 ongoing puzzle and I would argue that

NOTE Confidence: 0.903826475143433

00:57:03.236 --> 00:57:06.850 that's the best kind of puzzle. That

NOTE Confidence: 0.916949927806854

00:57:06.850 --> 00:57:08.776 no, there, that's something to that.

NOTE Confidence: 0.916949927806854

00:57:08.780 --> 00:57:11.034 So yeah, it's a rich area for

NOTE Confidence: 0.916949927806854

00:57:11.034 --> 00:57:12.646 future study, which yes, I'm.

NOTE Confidence: 0.916949927806854

00:57:12.646 --> 00:57:13.934 I'm certainly grateful for,

NOTE Confidence: 0.916949927806854

00:57:13.940 --> 00:57:15.908 because, uh, there's a It's not

NOTE Confidence: 0.916949927806854

00:57:15.908 --> 00:57:18.120 an open and shut story in it.

NOTE Confidence: 0.916949927806854

00:57:18.120 --> 00:57:20.624 It's a much more rich and complex story

NOTE Confidence: 0.916949927806854

00:57:20.624 --> 00:57:23.124 and I'm going to enjoy working on it

NOTE Confidence: 0.916949927806854

00:57:23.124 --> 00:57:25.529 for the next few years or decades.

NOTE Confidence: 0.916949927806854

00:57:25.530 --> 00:57:28.354 But yeah, it still is a still A

NOTE Confidence: 0.916949927806854

00:57:28.354 --> 00:57:31.780 to be continued sort of story. So

NOTE Confidence: 0.925848543643951

00:57:31.780 --> 00:57:35.360 why is it kind of to zoom out quite a bit?

NOTE Confidence: 0.925848543643951

00:57:35.360 --> 00:57:37.376 Why is it so important to

NOTE Confidence: 0.925848543643951

00:57:37.376 --> 00:57:38.720 distinguish between these hypothesis

NOTE Confidence: 0.925848543643951

00:57:38.781 --> 00:57:40.480 about the Ediacaran Biota?

NOTE Confidence: 0.925848543643951

00:57:40.480 --> 00:57:41.840 What does each hypothesis tell

NOTE Confidence: 0.925848543643951

00:57:41.840 --> 00:57:43.827 us about life today or life over

NOTE Confidence: 0.925848543643951

00:57:43.827 --> 00:57:45.257 the course of earths history?

NOTE Confidence: 0.923614203929901

00:57:46.210 --> 00:57:48.634 So I mean, we ultimately want to be

NOTE Confidence: 0.923614203929901

00:57:48.634 --> 00:57:50.646 able to distinguish between these

NOTE Confidence: 0.923614203929901

00:57:50.646 --> 00:57:53.310 various hypothesis to go back to

NOTE Confidence: 0.923614203929901

00:57:53.310 --> 00:57:55.839 this big question of to understand

NOTE Confidence: 0.923614203929901

00:57:55.839 --> 00:57:58.606 sort of larger scale trends in the

NOTE Confidence: 0.923614203929901

00:57:58.606 --> 00:58:01.252 evolution of complex life at the finest

NOTE Confidence: 0.923614203929901

00:58:01.252 --> 00:58:03.666 scale at the most granular scale,

NOTE Confidence: 0.923614203929901

00:58:03.670 --> 00:58:06.334 we need to understand things like

NOTE Confidence: 0.923614203929901

00:58:06.334 --> 00:58:08.489 mechanisms of fossilization before we

NOTE Confidence: 0.923614203929901

00:58:08.489 --> 00:58:10.638 can even start to address the question

NOTE Confidence: 0.923614203929901

00:58:10.638 --> 00:58:13.311 of to what extent these ancient enigmatic

NOTE Confidence: 0.923614203929901

00:58:13.311 --> 00:58:16.312 organisms of the Ed Accra Biota were related.

NOTE Confidence: 0.923614203929901

00:58:16.312 --> 00:58:19.129 To living animal groups or to other groups

NOTE Confidence: 0.923614203929901

00:58:19.129 --> 00:58:21.625 of living organisms or extinct organisms.

NOTE Confidence: 0.923614203929901

00:58:21.630 --> 00:58:24.318 So we need to 1st understand those very

NOTE Confidence: 0.923614203929901

00:58:24.318 --> 00:58:27.073 fine scale mechanisms in order to then back

NOTE Confidence: 0.923614203929901

00:58:27.073 --> 00:58:30.029 out and ask these larger scale questions.

NOTE Confidence: 0.923614203929901

00:58:30.030 --> 00:58:32.094 But we want to understand whether

NOTE Confidence: 0.923614203929901

00:58:32.094 --> 00:58:34.410 or not to Edie Accra Biota.

NOTE Confidence: 0.923614203929901

00:58:34.410 --> 00:58:37.596 It was a lied to modern groups of life

NOTE Confidence: 0.923614203929901

00:58:37.596 --> 00:58:40.798 such as animals and whether or not it

NOTE Confidence: 0.923614203929901

00:58:40.798 --> 00:58:43.712 truly was wiped from the face of the

NOTE Confidence: 0.923614203929901

00:58:43.712 --> 00:58:46.536 earth at the end of the pre Cambrian.

NOTE Confidence: 0.923614203929901

00:58:46.536 --> 00:58:48.496 Because we want to understand,

NOTE Confidence: 0.923614203929901

00:58:48.500 --> 00:58:50.400 sort of that evolutionary trajectory

NOTE Confidence: 0.923614203929901

00:58:50.400 --> 00:58:52.820 of complex life on our planet,

NOTE Confidence: 0.923614203929901

00:58:52.820 --> 00:58:55.956 not just so that we can better reconstruct.

NOTE Confidence: 0.923614203929901

00:58:55.960 --> 00:58:58.704 Where did Braided complex life come from?

NOTE Confidence: 0.923614203929901

00:58:58.710 --> 00:59:00.680 Where did animals come from?

NOTE Confidence: 0.923614203929901

00:59:00.680 --> 00:59:03.242 If these are indeed the ancient ancestors

NOTE Confidence: 0.923614203929901

00:59:03.242 --> 00:59:06.177 of many of our living animal groups,

NOTE Confidence: 0.923614203929901

00:59:06.180 --> 00:59:08.616 but also from an exo planet Tori

NOTE Confidence: 0.923614203929901

00:59:08.616 --> 00:59:10.500 or an astrobiological perspective,

NOTE Confidence: 0.923614203929901

00:59:10.500 --> 00:59:12.654 what should we expect when we

NOTE Confidence: 0.923614203929901

00:59:12.654 --> 00:59:15.219 search for life on other planets?

NOTE Confidence: 0.923614203929901

00:59:15.220 --> 00:59:16.540 Should we expect that?

NOTE Confidence: 0.923614203929901

00:59:16.540 --> 00:59:18.520 There's really sort of a single

NOTE Confidence: 0.923614203929901

00:59:18.583 --> 00:59:20.050 path towards complexity,

NOTE Confidence: 0.923614203929901

00:59:20.050 --> 00:59:22.528 or that there can be a lot

NOTE Confidence: 0.923614203929901

00:59:22.528 --> 00:59:24.340 of hiccups along the way.

NOTE Confidence: 0.923614203929901

00:59:24.340 --> 00:59:26.476 What are the sort of biosignatures?

NOTE Confidence: 0.923614203929901

00:59:26.480 --> 00:59:28.972 What are the markers that we should

NOTE Confidence: 0.923614203929901

00:59:28.972 --> 00:59:31.721 look for that might lead us to infer

NOTE Confidence: 0.923614203929901

00:59:31.721 --> 00:59:33.980 that not only life is present,

NOTE Confidence: 0.923614203929901

00:59:33.980 --> 00:59:36.479 but also that life could be present?

NOTE Confidence: 0.923614203929901

00:59:36.480 --> 00:59:38.260 What constitutes a habitable environment?

NOTE Confidence: 0.923614203929901

00:59:38.260 --> 00:59:40.115 What sorts of environmental factors

NOTE Confidence: 0.923614203929901

00:59:40.115 --> 00:59:42.539 were integral to the emergence of comps,

NOTE Confidence: 0.923614203929901

00:59:42.540 --> 00:59:43.188 less life,

NOTE Confidence: 0.923614203929901

00:59:43.188 --> 00:59:45.456 or may have played a role in

NOTE Confidence: 0.923614203929901

00:59:45.456 --> 00:59:46.909 its extinction so?

NOTE Confidence: 0.923614203929901

00:59:46.910 --> 00:59:49.678 I think there are a number of really

NOTE Confidence: 0.923614203929901

00:59:49.678 --> 00:59:52.291 critical questions in terms of not only

NOTE Confidence: 0.923614203929901

00:59:52.291 --> 00:59:54.146 understanding our own planets history,

NOTE Confidence: 0.923614203929901

00:59:54.150 --> 00:59:56.250 but also to understand what might

NOTE Confidence: 0.923614203929901

00:59:56.250 --> 00:59:58.895 life look like on other planets and

NOTE Confidence: 0.923614203929901

00:59:58.895 --> 01:00:01.241 what sort of trajectories might it

NOTE Confidence: 0.923614203929901

01:00:01.241 --> 01:00:03.559 take and how do we recognize it.

NOTE Confidence: 0.917813718318939

01:00:06.050 --> 01:00:08.370 Yeah, it sounds like we can learn a

NOTE Confidence: 0.917813718318939

01:00:08.370 --> 01:00:10.875 lot of really sort of fundamental

NOTE Confidence: 0.917813718318939

01:00:10.875 --> 01:00:12.727 principles about life itself

NOTE Confidence: 0.917813718318939

01:00:12.727 --> 01:00:14.830 by studying these organisms.

NOTE Confidence: 0.917813718318939

01:00:14.830 --> 01:00:17.700 That's so cool. So what is your

NOTE Confidence: 0.917813718318939

01:00:17.700 --> 01:00:20.020 favorite fun fact about the Ed

NOTE Confidence: 0.917813718318939

01:00:20.020 --> 01:00:22.390 Akron period? Ash, there's so many.

NOTE Confidence: 0.917813718318939

01:00:22.390 --> 01:00:25.050 Well, one of the things I really

NOTE Confidence: 0.917813718318939

01:00:25.050 --> 01:00:27.761 like about the Ed Akron period is

NOTE Confidence: 0.917813718318939

01:00:27.761 --> 01:00:30.542 that the way it's defined is very

NOTE Confidence: 0.917813718318939

01:00:30.542 --> 01:00:33.056 different from how we define most

NOTE Confidence: 0.917813718318939

01:00:33.056 --> 01:00:34.896 intervals in the geologic record,

NOTE Confidence: 0.917813718318939

01:00:34.896 --> 01:00:37.220 or at least in our in our

NOTE Confidence: 0.917813718318939

01:00:37.296 --> 01:00:39.030 younger geologic record.

NOTE Confidence: 0.917813718318939

01:00:39.030 --> 01:00:41.010 So most of our boundaries,

NOTE Confidence: 0.917813718318939

01:00:41.010 --> 01:00:43.495 and in at least the past 500

NOTE Confidence: 0.917813718318939

01:00:43.495 --> 01:00:45.750 million years of geologic time,

NOTE Confidence: 0.917813718318939

01:00:45.750 --> 01:00:48.060 are defined appan the appearance and

NOTE Confidence: 0.917813718318939

01:00:48.060 --> 01:00:50.090 disappearance of individual fossil species.

NOTE Confidence: 0.917813718318939

01:00:50.090 --> 01:00:52.080 What's unique about how the

NOTE Confidence: 0.917813718318939

01:00:52.080 --> 01:00:54.070 E Akron period is defined.

NOTE Confidence: 0.917813718318939

01:00:54.070 --> 01:00:56.219 Is that is defined at it start

NOTE Confidence: 0.917813718318939

01:00:56.219 --> 01:00:58.591 by the end of these catastrophic

NOTE Confidence: 0.917813718318939

01:00:58.591 --> 01:01:00.876 global scale glaciations and at

NOTE Confidence: 0.917813718318939

01:01:00.876 --> 01:01:04.285 its end is defined by the earliest

NOTE Confidence: 0.917813718318939

01:01:04.285 --> 01:01:06.217 really complex style burrowing.

NOTE Confidence: 0.917813718318939

01:01:06.220 --> 01:01:09.433 So I think this really sums up for me

NOTE Confidence: 0.917813718318939

01:01:09.433 --> 01:01:12.875 why the Edie Akron period is a really

NOTE Confidence: 0.917813718318939

01:01:12.875 --> 01:01:15.610 Seminole one in Earth's history in

NOTE Confidence: 0.917813718318939

01:01:15.610 --> 01:01:18.781 terms of not only the origins and

NOTE Confidence: 0.917813718318939

01:01:18.790 --> 01:01:20.570 extinctions of individual organisms,

NOTE Confidence: 0.917813718318939

01:01:20.570 --> 01:01:24.424 which is sort of how we use fossils as

NOTE Confidence: 0.917813718318939

01:01:24.424 --> 01:01:27.690 markers and time in our more recent history.

NOTE Confidence: 0.917813718318939

01:01:27.690 --> 01:01:29.840 But also the major transformations

NOTE Confidence: 0.917813718318939

01:01:29.840 --> 01:01:31.990 of earths climate of earths,

NOTE Confidence: 0.917813718318939

01:01:31.990 --> 01:01:33.662 biogeochemical cycling of environments,

NOTE Confidence: 0.917813718318939

01:01:33.662 --> 01:01:35.752 an life that really characterize

NOTE Confidence: 0.917813718318939

01:01:35.752 --> 01:01:36.720 this interval.

NOTE Confidence: 0.917813718318939

01:01:36.720 --> 01:01:39.300 So even just in its definition,

NOTE Confidence: 0.917813718318939

01:01:39.300 --> 01:01:39.746 ded,

NOTE Confidence: 0.917813718318939

01:01:39.746 --> 01:01:42.422 Akron period really sums up why

NOTE Confidence: 0.917813718318939

01:01:42.422 --> 01:01:46.174 this is one of the most critical

NOTE Confidence: 0.917813718318939

01:01:46.174 --> 01:01:48.494 intervals in Earth's history.

NOTE Confidence: 0.917813718318939

01:01:48.500 --> 01:01:48.940 It's

NOTE Confidence: 0.942204713821411

01:01:48.940 --> 01:01:52.430 really fascinating work. Thank you

NOTE Confidence: 0.90035879611969

01:01:52.430 --> 01:01:54.607 to doctor Tarjan for joining us on

NOTE Confidence: 0.90035879611969

01:01:54.607 --> 01:01:56.669 this episode of the YJBM podcast.

NOTE Confidence: 0.90035879611969

01:01:56.670 --> 01:01:59.127 There are many people behind this podcast

NOTE Confidence: 0.90035879611969

01:01:59.127 --> 01:02:01.558 that you never get a chance to hear.

NOTE Confidence: 0.90035879611969

01:02:01.560 --> 01:02:03.600 Thank you to the Yale School

NOTE Confidence: 0.90035879611969

01:02:03.600 --> 01:02:05.941 of Madison for being a home to

NOTE Confidence: 0.90035879611969

01:02:05.941 --> 01:02:07.747 the wide JBM and the podcast.

NOTE Confidence: 0.90035879611969

01:02:07.750 --> 01:02:09.906 Thank you to the Yale Broadcast Center

NOTE Confidence: 0.90035879611969

01:02:09.906 --> 01:02:11.670 for helping with the recording,

NOTE Confidence: 0.90035879611969

01:02:11.670 --> 01:02:13.300 editing and publishing our podcast.

NOTE Confidence: 0.90035879611969

01:02:13.300 --> 01:02:15.575 Thank you to the YJBM editorial board,

NOTE Confidence: 0.90035879611969

01:02:15.580 --> 01:02:17.210 especially our editors in chief,

NOTE Confidence: 0.90035879611969

01:02:17.210 --> 01:02:19.548 Amelia Hall worth and Evan Washy and

NOTE Confidence: 0.90035879611969

01:02:19.548 --> 01:02:21.830 the deputy editors for the death issue.

NOTE Confidence: 0.90035879611969

01:02:21.830 --> 01:02:24.174 Kelsey Castle and weighing.

NOTE Confidence: 0.90035879611969

01:02:24.174 --> 01:02:26.390 Finally, thank you for tuning into

NOTE Confidence: 0.90035879611969

01:02:26.390 --> 01:02:28.575 this episode of the Yale Journal

NOTE Confidence: 0.90035879611969

01:02:28.575 --> 01:02:30.507 Biology and medicine podcast.

NOTE Confidence: 0.90035879611969

01:02:30.510 --> 01:02:32.808 We'd love your feedback and questions,

NOTE Confidence: 0.90035879611969

01:02:32.810 --> 01:02:35.514 so feel free to tell us your thoughts

NOTE Confidence: 0.90035879611969

01:02:35.514 --> 01:02:37.789 by emailing us at yj.b.m@yale.edu.

NOTE Confidence: 0.90035879611969

01:02:37.790 --> 01:02:39.700 If you enjoyed our podcast,

NOTE Confidence: 0.90035879611969

01:02:39.700 --> 01:02:41.985 please share it on SoundCloud

NOTE Confidence: 0.90035879611969

01:02:41.985 --> 01:02:43.356 or Apple podcasts.