
AB
GRAD
CON23

1
00:00:04,230 --> 00:00:11,410
[Music]

2
00:00:15,950 --> 00:00:13,850
hello we're gonna jump right into things

3
00:00:17,150 --> 00:00:15,960
because I have a lot to say on this

4
00:00:18,529 --> 00:00:17,160
topic

5
00:00:20,870 --> 00:00:18,539
so

6
00:00:23,210 --> 00:00:20,880
um extremophiles can help us predict the

7
00:00:25,310 --> 00:00:23,220
boundaries of life here on Earth and the

8
00:00:27,650 --> 00:00:25,320
possibility of life on other planets

9
00:00:30,429 --> 00:00:27,660
yeah most extreme files that we study

10
00:00:32,450 --> 00:00:30,439
are typically single cellular organisms

11
00:00:34,910 --> 00:00:32,460
leaving a gap in knowledge about

12
00:00:37,310 --> 00:00:34,920
multicellular life and its habitability

13
00:00:39,290 --> 00:00:37,320

limits and Origins and so that's kind of

14
00:00:41,930 --> 00:00:39,300
where our work comes into play for my

15
00:00:43,369 --> 00:00:41,940
lab so we're a nematode lab

16
00:00:45,709 --> 00:00:43,379
um and nematodes are one of the most

17
00:00:47,810 --> 00:00:45,719
widespread and resilient animal phylums

18
00:00:49,610 --> 00:00:47,820
on earth they make about 80 of all

19
00:00:51,250 --> 00:00:49,620
animal life and are found on every

20
00:00:53,389 --> 00:00:51,260
continent and in every ecosystem

21
00:00:54,850 --> 00:00:53,399
including some found in like South

22
00:00:58,990 --> 00:00:54,860
African gold mines

23
00:01:01,369 --> 00:00:59,000
Antarctica and the dry valleys Etc

24
00:01:04,070 --> 00:01:01,379
so my work is based in the Great Salt

25
00:01:08,210 --> 00:01:04,080
Lake it's an analog Lake for the

26
00:01:09,590 --> 00:01:08,220
evaporated saline Lakes on Mars and it

27
00:01:11,090 --> 00:01:09,600
is also the fourth largest terminal lake

28
00:01:13,250 --> 00:01:11,100
in the world meaning that it gets a

29
00:01:15,770 --> 00:01:13,260
large inflow of water

30
00:01:18,109 --> 00:01:15,780
um but the only source of outflow is via

31
00:01:21,289 --> 00:01:18,119
evaporation it's also been geologically

32
00:01:24,350 --> 00:01:21,299
consistent for the last 780 Millennia

33
00:01:27,950 --> 00:01:24,360
and was only once previously part of

34
00:01:29,990 --> 00:01:27,960
like a Paleo histine freshwater lake for

35
00:01:31,609 --> 00:01:30,000
a really brief period of time

36
00:01:32,929 --> 00:01:31,619
but one thing that you might notice is

37
00:01:35,510 --> 00:01:32,939
that it has a really Stark salinity

38
00:01:37,490 --> 00:01:35,520

gradient that's caused from a railroad

39
00:01:38,929 --> 00:01:37,500
construction that cut the Great Salt

40
00:01:41,390 --> 00:01:38,939
Lake in half creating the North and

41
00:01:43,730 --> 00:01:41,400
South arms so the South arm is about at

42
00:01:45,590 --> 00:01:43,740
15 salinity due to the inflow of water

43
00:01:47,210 --> 00:01:45,600
and the north arm doesn't get any inflow

44
00:01:49,130 --> 00:01:47,220
of water and so stays at about 27

45
00:01:51,649 --> 00:01:49,140
salinity

46
00:01:54,350 --> 00:01:51,659
um 15 solidity adjusts so you are aware

47
00:01:56,630 --> 00:01:54,360
is about three times more saline than

48
00:01:58,850 --> 00:01:56,640
the ocean and is well beyond the

49
00:02:00,590 --> 00:01:58,860
previous maximum recorded salinity

50
00:02:02,749 --> 00:02:00,600
gradient that nematodes have been found

51
00:02:05,030 --> 00:02:02,759
to live in and so my lab went searching

52
00:02:06,770 --> 00:02:05,040
for nematodes in the Great Salt Lake and

53
00:02:09,350 --> 00:02:06,780
so we chose four different six different

54
00:02:11,869 --> 00:02:09,360
sites sorry to look at three which were

55
00:02:14,150 --> 00:02:11,879
from an inflow river that

56
00:02:16,070 --> 00:02:14,160
um was between like fresh water to hypo

57
00:02:17,390 --> 00:02:16,080
saline conditions and then three from

58
00:02:20,390 --> 00:02:17,400
inside the Great Salt Lake which were

59
00:02:23,210 --> 00:02:20,400
well into the hyper saline conditions

60
00:02:25,869 --> 00:02:23,220
and it is here that we found some

61
00:02:30,530 --> 00:02:28,190
so one unique structure in the Great

62
00:02:32,390 --> 00:02:30,540
Salt Lake are these microbialites

63
00:02:34,790 --> 00:02:32,400

um they're Organo sedimentary structures

64
00:02:36,650 --> 00:02:34,800
and they're built by file photosynthetic

65
00:02:38,750 --> 00:02:36,660
microbes and so our host to complex

66
00:02:40,729 --> 00:02:38,760
microbial communities as well as our

67
00:02:42,949 --> 00:02:40,739
nematodes they're also in the oldest

68
00:02:44,869 --> 00:02:42,959
known evidence of life on Earth some

69
00:02:46,130 --> 00:02:44,879
dating back to about 3.4 billion years

70
00:02:48,589 --> 00:02:46,140
ago

71
00:02:50,350 --> 00:02:48,599
um and so they can kind of offer us a

72
00:02:53,570 --> 00:02:50,360
glimpse of life before

73
00:02:55,369 --> 00:02:53,580
more complex life forms and they range

74
00:02:57,850 --> 00:02:55,379
about 20 to 30 percent of the Great Salt

75
00:03:00,229 --> 00:02:57,860
lake lake bottom

76
00:03:02,930 --> 00:03:00,239
so we've found that these nematodes

77
00:03:05,270 --> 00:03:02,940
through 18s sequencing are novel hun

78
00:03:07,009 --> 00:03:05,280
hysterity species one hysteria are

79
00:03:09,350 --> 00:03:07,019
typically a freshwater nematode though

80
00:03:12,170 --> 00:03:09,360
some are also found in marine ecosystems

81
00:03:14,149 --> 00:03:12,180
and so our goal now is to look at their

82
00:03:15,949 --> 00:03:14,159
genome and transcriptome in order to be

83
00:03:18,110 --> 00:03:15,959
able to tell the presence and absence of

84
00:03:20,149 --> 00:03:18,120
Gene families and see what genes are

85
00:03:23,149 --> 00:03:20,159
being functionally used here in the

86
00:03:25,190 --> 00:03:23,159
Great Salt Lake to potentially like help

87
00:03:27,770 --> 00:03:25,200
with saline UV and temperature

88
00:03:30,470 --> 00:03:27,780

tolerances and we're also looking at

89
00:03:33,369 --> 00:03:30,480
co-evolution with other microbiota so by

90
00:03:36,290 --> 00:03:33,379
isolating single worms we can look at

91
00:03:39,470 --> 00:03:36,300
Presence of microbiota in or on the worm

92
00:03:42,050 --> 00:03:39,480
so we want to be able to look at diatoms

93
00:03:45,949 --> 00:03:42,060
fungus and bacteria and so far we've

94
00:03:49,309 --> 00:03:45,959
been able to do V4 region of 16sr RNA

95
00:03:50,809 --> 00:03:49,319
sequencing of bacteria and we found a

96
00:03:53,390 --> 00:03:50,819
variety of bacterial orders that are

97
00:03:56,630 --> 00:03:53,400
found in and on our worms but

98
00:03:58,490 --> 00:03:56,640
surprisingly 70 of all the bacteria

99
00:04:00,229 --> 00:03:58,500
found are only unique to the worm and

100
00:04:02,390 --> 00:04:00,239
have never been found in microbialite

101
00:04:04,490 --> 00:04:02,400
structures previously meaning that these

102
00:04:06,410 --> 00:04:04,500
microbiota are possibly living in

103
00:04:08,570 --> 00:04:06,420
symbiosis with these pneumatodes and

104
00:04:10,190 --> 00:04:08,580
offering a variety of functions such as

105
00:04:11,750 --> 00:04:10,200
phototrophic potential solute

106
00:04:13,970 --> 00:04:11,760
accumulation and arsenic tolerance that

107
00:04:16,009 --> 00:04:13,980
allows them to be capable of living in

108
00:04:17,750 --> 00:04:16,019
this extreme environment so by

109
00:04:19,189 --> 00:04:17,760
identifying and Reporting these

110
00:04:21,349 --> 00:04:19,199
communities it can help us understand

111
00:04:22,969 --> 00:04:21,359
mechanisms that maintain a functional

112
00:04:25,490 --> 00:04:22,979
ecosystem in some of the most extreme

113
00:04:27,110 --> 00:04:25,500

environments on Earth and could provide

114
00:04:30,650 --> 00:04:27,120
information about the evolution of life

115
00:04:32,570 --> 00:04:30,660
on Earth and also Beyond

116
00:04:34,490 --> 00:04:32,580
I'd like to thank my lab for all of

117
00:04:35,629 --> 00:04:34,500
their help and thank you today and I'll

118
00:04:41,170 --> 00:04:35,639
be at poster for if you have any