Naturally Speaking, Season 1 Episode 2: Stories in the Stars
Audio Transcript

Alyssa: Thank you for tuning in to the second episode of Naturally Speaking, Nature Up North's podcast, inspiring you to get up and go outdoors. My name is Alyssa Watson; I am a summer naturalist intern with Nature Up North. Nature Up North is a mission-based project that aims to foster a deeper sense of appreciation for and connection to nature in the North Country. Our team is dedicated to protecting the wild things and wild places that define this place we call home. On today's podcast, we have Aileen O'Donoghue, a Henry Priest professor of physics at St. Lawrence University. Aileen has worked to support Nature Up North stargazing programs in the past, and we are excited to have her scientific expertise and storytelling creativity here with us to support our Beginner's Guide to Summer Stargazing series. You can find our guide on our Just Our Nature blog up on our website now.

Aileen, I want to thank you again for joining us for Nature Up North's second podcast. I was hoping you could tell us a little bit about how you got into stargazing and turned it into a part of your career.

Aileen: I always enjoyed looking at the sky, but I grew up in the city so I didn't really get to know the constellations until I went to college. I went to Colorado Mountain College in Glenwood Springs Colorado. It was a small Community College and I took an astronomy course and it just brought the sky to life for me in a whole new way. I hadn't been interested in science as a kid or in school. In elementary school and secondary school, I found science boring and alienating because we did it in these labs that were just, weren't comfortable spaces for me. I wasn't really into school and it was all biology and we had to dissect frogs and memorize the phyla. I found it tedious and alienating so I wasn't into science but then when I found the sky and I took an earth science class and astronomy class and learned that science is about the universe, I got excited. So, then I decided I wanted to become an astronomer and so I have, you know, been a student of the sky ever since.

I do love looking at the sky when I get to go to observatories, optical observatories like Kitt Peak [National] Observatory in Arizona or even Cerro Tololo Observatory in Chile in South America. The sky at night from those observatories, because of course, they have no outdoor lights, it is just so fantastic and it can feel close enough to touch. My favorite season is actually summer, and my favorite constellation is Cygnus the Swan because in the summer it's warm enough at night now. Cygnus rises, really, in June. It's part of the summer triangle and so in July and August and, actually, through December, Cygnus is high in the sky. It's a large constellation; a part of the summer triangle and it's kind of like a swan winging its way South towards the Milky Way. In the late summer when you can be outside, when the sun starts going down a little earlier in August and September and some of the bugs start abating, you can lie in a chaise lounge and just look up at this wonderful constellation. And the arc of the Milky Way, our own Galaxy, and it's just beautiful. In the late fall and in December, the swan is diving into the Milky Way that is setting in the West and so it's literally flying south as all geese need to do in the late fall.
So yeah, I took a class; that's how I got into star gazing! Isn't that ridiculous?

Alyssa: I love this phrase that you just used, "student of the sky." I think that's really beautiful and I also love that you got into it when you were in college, a little bit older.

Aileen: Yeah, I didn't grow up, you know, knowing I wanted to be an astronomer.

Alyssa: I had a similar experience. I grew up in Boston, Massachusetts and with all of the lights from skyscrapers, Fenway Park, I rarely ever saw stars, which wasn't until my freshman year at St. Lawrence. The first week I was there was in August and it was so hot and I was just looking for a break from the heat anywhere I could get it. So I would go out to the track field back by Appleton, lay on my back, and gaze up at the stars for hours. All of my friends in my first-year program knew if they needed me after 10:30 or 11 pm, that's where they would find me. It became a special little tradition that a couple of us would go out every night and just take a minute to talk about our day, decompress, look for patterns in the sky, and I was always just amazed at what I could see because I had never experienced anything like it before.

Aileen: I find that in my students at St. Lawrence. We go out, actually, by the riding arena, its Gunnison riding arena, and they are amazed that they've never seen the Milky Way. The thing I like about teaching astronomy is that you can go out and see the beauty in the sky without knowing anything about it. But then, when you can start to learn things about it, for me, that makes it grow depth and then it's more than just a pretty speckled ceiling: it's the universe. I actually write a newspaper column for the Adirondack Daily Enterprise in the winter and it's called 'The Wilderness Above' because the Adirondack's are, of course, forever wild designated as a park. The deepest wilderness that any of us can access is the one above. All of us can see the worldliness if we just look up and, if you have the privilege of being in a dark place, you can see the stars. But, no matter where you are, you can see the moon and the sun. And those two are part of the universe.

When you know some things about individual stars, like in Cygnus, the brightest star is named Deneb which means tail. The name is actually derived from Arabic, as are many of the names of stars: Betelgeuse, Aldebaran, you can hear the "Al". In Arabic, the article is "Al" meaning "the". The star names come to us in Arabic because Ptolemy, one of the Greeks, made a great Atlas of the stars and that Atlas of the sky was taken all over the intellectual world, which included the Islamic astronomers who were very busy figuring out things about their calendar. Their calendar depends on the moon and they need to know how to face Mecca no matter where they are, so there was a lot of development of mathematics and science by the Islamic scholars. They translated Ptolemy's work into Arabic. Then all the copies in the Greek world were lost. The last ones are burning in the library in Alexandria [Egypt], and so then we got the work back from the Arabs and the stars were named in Arabic! It's not exactly modern Arabic; it's been through thousands of years of mispronunciation, misspelling, and things like that.
But you still get this bright star Deneb, which is 1,500 light-years away. So the light that we see from that stuff, you go out tonight and you look up and you see Deneb, that light that is hitting you in the eyeball has been traveling for 1,500 years! It's been traveling since the year of 520 or so. Which is astonishing, and just now it's working you in the eye and you can say, 'hey there's Deneb!'

And all its friends [other light particles] are hitting the grass; they didn't tell anybody they left Deneb! And yet, Deneb is one of three stars in a kind of a super constellation called an asterism, and it's called the summer triangle. There are just these three bright stars and Deneb is bright. It's slightly dimmer than the brightest one [in the summer triangle asterism] which is Vega and it's a little brighter than the middle one, which is the dimmest one, Altair. Well, Altair is about 17

light-years away and Deneb is 1,500 light-years away. Yet, they look about the same to us. And so, for me, that's the richness of the sky that I gained from actually studying astronomy. So yeah, the sky is just wonderful.

Alyssa: It really is! You mentioned some of the different cultures that have used the stars, from Arabic to Greek. Could you talk a little bit more about the room for cultural interpretation of constellations and their history in the field of astronomy as a science?

Aileen: All cultures used the sky. It was the original clock, the original calendar. You know we see huge structures like Stonehenge, Machu Picchu, all of these. There's [Cahokia] Woodhedge in Illinois, where it was a similar structure to Stonehenge for the calendar. When the sun lines up at sunset on this day we know where we are in the calendar. Because you can't tell from the weather! So, all cultures use the sky as a clock, a calendar, and a navigation aid.

It was also their storybook. You know they didn't have printed books to remember the stories. The stars were the word; "Oh yes that constellation! This is the time for us to have a story about the swans flying South in the fall, and why do they do that?" In the constellation of Cygnus, you know, but other cultures had very different constellations.

Fortunately, we are seeing a rise in some of those [cultural stories, folklore, myths, etc.] are coming out. We're getting publications on the Native American stories, you know, the tribes in Siberia, and in Lapland, and in Africa. Their stories about the stars; those finally [are being published]. It was very hard when I was a new astronomer to find these stories if you weren't from that culture. But now they're starting to be published more and so we can find out more about the cultures. The Chinese actually have a long history of astronomical observations and I have had the privilege to visit the Beijing Observatory that's been there for 1000 years! So, I saw in the logbook where they recorded a supernova explosion, a star that blows up and it's brighter than the rest of the Galaxy and you can see it during the day, that they recorded it in 1054 AD; almost 1000 years ago! The other place we see this explosion of a star recorded is in the Southwest United States in New Mexico at a place called Chaco Canyon. And there's a petroglyph that shows the crescent moon with this star, and there's a hand there for scale, and astronomers were able to figure out that it was the same supernova recorded by the Chinese! Nobody in Europe recorded it, but in 1054 AD Europe was busy having wars. And so, yes, all the other cultures bring a lot into astronomy and all of them enrich us! You know, when I call a star a name, like Deneb or Aldebaran, I'm using words for the star that have been used for like 5,000 years, some of them!

So, it not only connects us to the wilderness above, but it connects us to the long chain of humanity that has looked at this beauty in the sky and they haven't known what they are. One of my joys of being an astronomer is that I can look at them and know what they are. I know why suddenly there was this bright star in the Chinese sky in 1054 AD that they never have seen before! We can actually look now at that spot and I can point to it, not right now because the sun is in the way, but in the late fall I can point to that spot and say that's where that star was. When we look at it with telescopes that explosion is still going on! We can see the material still rushing out from where that star blew up! Explosions in space don't end. How do explosions end on the ground and on the surface of Earth? Well stuff explodes and it falls to the ground and it's over. In

space, there is no ground to fall to! It just keeps going until it gets so diffused that you can't see that it's there anymore.

But we can see this cloud of expanding and we call it the crab nebula. Nebula is just Latin for cloud, but it makes you feel smarter calling it a nebula. And so, cloud has some other language of origin. But we can see it exploding and that connects us to whatever observer there was that wrote that note in the logbook in Beijing that I saw with my own eyes! I'm connected to that astronomer by being able to look at the same explosion that astronomers saw 1000 years later. So yeah, the connections are very deep with the other cultures and the sky.

Well, one interesting thing about cultures is that Ursa Major, the Big Dipper that most people can recognize, that's part of a constellation. The Big Dipper is actually an asterism, which is a pattern with stars that's not a formal constellation. The International Astronomical Union is the entity that gets to decide what formal constellations are recognized. And, of course, it's out of western science, but it's just one opinion really. But anyway, the asterism of the Big Dipper is part of the constellation of the Great Bear. The handle of the dipper is actually the long tail of the bear. Now. think about bears in your mind. Imagine a bear. Do you see a tail?

Alyssa: No, I don't!

Aileen: It's a little nub of a tail! Yet, not only the Greeks, but tribes in Siberia, tribes in the Americas, all saw that configuration as a bear with a long tail! But no bears have long tails! So, it's you know, there are these great cultural puzzles in astronomy. Why would they all name it about bears if bears don't have tails? Some of the stories that get told about that constellation are well, what happened? Why don't bears have tails anymore? So that's a place where cultures can put in their myths and legends. For cultures that don't have written stuff, the oral traditions are where they got their morals and their moral lessons from these stories, like Aesop's fables that we have. So they would tell a story about the bear losing its tail as a lesson that we should be good, be kind to each other, or we will lose our tail. Well, we lost our tails too, unfortunately. I always wished I had a pre-historic tail or something that would be kind of cool.

Alyssa: I'm really glad that you brought up the Big Dipper! In the first installment of the Beginner's Guide to Summer Stargazing, I mentioned Ursa Major and Ursa Minor and how the Big Dipper is just a part of one constellation. In my research, I found a couple of different stories from a few different cultures and I shared them on the blog, which you can go and read on the Just Our Nature page up on our website. I talked about a Native American myth about the three stars that make up the tail being hunters chasing the bear and then I referred to the Greek myth of Zeus in the nymph Callisto and how she was turned into a bear, and you can, of course, read about that if you check out our blog. But, it's interesting how so many different cultures came up with their own stories to explain the same symbol in the sky.

Aileen: Yes and when you study constellations one of the things you quickly learn is very few of them look like what they are supposed to be. Cygnus is one of the exceptions. Leo the lion is another exception. They actually look kinda like what they're supposed to be. But Perseus, the great hero that came and slew Medusa and rescued Andromeda and did all this great stuff in Greek mythology, you look at Perseus and it really looks like, to me, a radio astronomy antenna.

Or you know, for most people, a satellite dish. It doesn't look like a hero! That's because what was important to these cultures was not necessarily the pattern in the sky. Their stories were important and so, for them, the importance was how do we put Perseus in the sky? Well, we can use that collection of stars to put Perseus in the sky. That's how it was a mnemonic thing. It jarred the memory. When they saw that pattern of stars they'd say 'Oh yes! Perseus!'. So that's how it was their storybook. Their culture was the most important thing to hand on, rather than what that particular pattern was.

Alyssa: And in that way, the sky has served as an illustration of different stories to be passed on. Just to backtrack a little, you mentioned that it was used to signal calendar years and time. As we know in the North Country, you cannot rely on the weather to tell you what season it is! You would be very confused if you tried! But, to go off that note, we no longer use the sky to tell us what time it is. You look down at your phone or your Apple Watch, all the technology we seem to be plugged into. Do you think we've lost our connection with this wilderness above?

Aileen: Unfortunately, I think a lot of people have. The way I tend to say it is, I think the way most people kind of live is in a big shopping mall made by human beings. And somebody in the government is running the sky, the ceiling, you know. And they do not see it. When they look at the moon, it's like a painting on the ceiling. It's not a world that is a quarter of the size of Earth 250,000 miles away, it's a painting on the ceiling. And that's unfortunate. The thing is that even all of us can participate, we can use the sky. It's probably easier to use it as a calendar than it is to use it as a clock. I mean, I can use it as a clock, you know, I go out and I can see the Big Dipper every night. And I can see it here. You can't see it in Cambridge, and so that's how you use it as a clock. But a calendar, I can see on this zoom that you have sunlight in the room. So, a simple thing that you can do is if you have a window that faces east or faces west, and the sun shines through when it rises or sets: well starting today, today the sun, it's not in its farthest North but it's still pretty far North. So, when you see the shadow of a window or a lamp on the opposite wall, get a piece of tape and put it there. Then in another few weeks when you can see sunset or sunrise and you see the shadow of that lamp on the wall, well go and put a piece of tape there. Look how far the pieces of tape are separated. You can make your own Stonehenge just on the wall of your bedroom with tape! It's a little easier than hauling those big Saracens around, but you can do that. You can mark the seasons! A friend of mine moved into a new house that has a window that faces East, and he does his meditation in front of that window, and it's the first time he'd really noticed how far the sun moves at sunrise. Between where the sun rises in the winter and where the sun rises in the summer up here in the North Country, there are about 70 degrees. Alright, that's almost all of a right angle! The sun really moves across the horizon. And so that's what Stonehenge is looking at, that's what Machu Picchu is looking at. You can create that in your own living room or bedroom. You know, put a stick out in the yard and do the same thing. When you put a stick in the ground for marking the position of the sun, it changes name. It's called a gnomen. So just a little thing, put a stake in the ground that's my gnomon. And then use rocks and do it once every month. Choose a day at, you know, say noon or something, and go out on the 15th of each month or the closest day that is sunny. I'm gonna go out at noon and I'm gonna put a rock at the end of the shadow of the stick, my gnomon. And do it every month for a year and you'll be amazed! You'll have your own little Stonehenge there. It's called a sundial when you do it that way, but yeah, it's really easy. It's more fun when you do it yourself rather than buy a sundial, you know, on Amazon or something.

Alyssa: Yes! Definitely more fun and interactive that way! If you were going to give a piece of advice to someone who was looking to just get into stargazing, what would you say to them?

Aileen: Usually what I recommend is a book by Chet Raymo. It's called 365 Starry Nights and it's a paperback for about 20 bucks. It's organized by date and it gives simple diagrams of the constellations, you know, like looking east tonight you should be able to see these patterns of stars. It's just the brightest stars, and then it discusses the constellations. He writes about the constellations, he writes about some astronomy, actual astronomy, what are the stars, you know, what if you could look more deeply into the sky? What galaxies would you see, what stories did different cultures have about the stars? You can just do this when it's a clear night and you want to have a look, just go to that date and one of the things that Chet Raymo emphasizes is that when, you know, when you first moved to a new place, like you when you went to St. Lawrence, you learned where your room was. Then you learn how to get to Dana [Note; Dana Dining Hall of St. Lawrence University] from your room and then you learn how to get to the gym. Then on the first day of classes, you have to figure out 'Good grief! Where is Johnson 362?'. Right? [While Aileen references St. Lawrence University's campus in her example, the same follows for any new location.] And so, you start making your map by these little pathways that you create and it's the same with the sky! The Big Dipper: you go to the end of the bowl, and you those two stars point at Polaris, the North star. So you start with the Big Dipper and you learn the Little Dipper, [Polaris is a star in the Little Dipper as well]. The handle of the Big Dipper is an arc and if you follow that arc it leads to another bright star, conveniently named Arcturus. So, you make an arc to Arcturus! Raymo points out how to do these pathways so that from knowing the Big Dipper, having somebody point that out to you, you can start finding all the other constellations. You can learn a lot and you learn, you know, when you have a chance to stargaze you learn about it when you practice. Then when you go outside you say 'Okay, who's up now?'. You get familiar with the stars. The thing is that I can go to China, I can go to India, I can go to South America, Australia, and when I look up all my friends are there! When you know the sky, every place is home in a really profound way.

Alyssa: I'm so happy that you phrased beginning to learn the sky as when you go somewhere new and you start to make your own concept map of how to get places from that one place. I think that helps to frame stargazing in an easier way because it can be incredibly daunting when you look up and all the stars are just overwhelming. They are so bright and there are millions!

Aileen: Right! And so, when you, you know, all of a sudden you go camping and you're outside at night and you look up and it's an overwhelming number of stars. You know, there's no moon. You start building it up slowly. It's like you know somebody visiting Manhattan for the first time, but then you find, 'okay, you know, here's my hotel, and here's a restaurant, and so yes I can get from the hotel to the restaurant'. You develop a relationship with a place that way. Through your pathways and you develop a relationship with the stars.

Alyssa: I think that's very well said! It's like learning anything for the first time. It's overwhelming, but you definitely learn to get the hang of it. As we wrap up this episode, I have one last question for you Aileen. What would you say is your favorite place within the North Country to stargaze from?

Naturally Speaking, Season 1 Episode 2: Stories in the Stars
Audio Transcript

Aileen: Really, my back porch! My back patio! Because I'm relaxed there and I can control all the lights, you know. Just the place where you're comfortable and lie down where you can see the sky. Summer is a nice time because the Milky Way is high over us and it's just a very lovely and glittering part of the sky. If you have some binoculars you can look at the Milky Way and its glittery. This summer, Jupiter and Saturn are showing up in our evening sky! So, you're going to be able to look at Saturn and Jupiter. If you have really good binoculars when you look at Jupiter, you can see four of the moons of Jupiter that Galileo saw in 1609! He was the first person who recorded seeing those moons, and when he noticed this throughout the night, they moved because they were orbiting Jupiter! You can do that for yourself. You can go out early and look and then go out late and look, and they will have moved! So there's all this cool stuff you can do.

Alyssa: It really is amazing! I think it speaks to the accessibility of stargazing. As long as you have somewhere you can sit where you're comfortable, it's something anyone can do!
Well, thank you so much for sharing all of your expertise with us!

Aileen: Thanks, Alyssa! It's fun. We could do it again and talk about Jupiter and Saturn when they're, you know, as they get brighter. Maybe later in July.

Alyssa: Absolutely!

Thank you all for listening along! And a special thank you to Dr. Aileen O'Donoghue from St. Lawrence University.

Be on the lookout for new nature up north events, like our Summer Scavenger Hunt Adventure, our new coloring book pages, and photo calendar contest. If you haven't already, check out our Beginners Guide to Summer Stargazing blog on the Just Our Nature page on our website, natureupnorth.org. Follow us on Instagram, Facebook, and Twitter @natureupnorth to keep up to date with all of our newest events.

Get up and outdoors with nature up north!