Orion: Cosmic Background

Intro

Jordan: Hi, I'm Jordan.

Kit: And I'm Kit.

Jordan: Welcome to Starry Time, where stars plus lines

Kit: equal stories.

Jordan: For this month, we'll be exploring the constellation Orion the Hunter.

Kit: This week's episode will be focused on the astronomy and other cosmic background of this constellation.

Background

Jordan: The constellation Orion is named after a mythological hunter in Greek mythology who we will discuss in great detail in next week's episode.

Kit: Given its link to Greek myth, it's probably not a surprise that Orion was one of Ptolemy's great,

Jordan: great great great great great great great great great

Kit: 48 constellations in the Almagest.

Jordan: Orion is a recognizable, and according to some the world's most recognizable constellation, even though it's relatively mid sized constellation at about 594 square degrees. In other words, it is in fact much smaller than Virgo and Hercules, Aquarius, Ophiuchus, Leo, Pisces, Sagittarius, Taurus, Andromeda, and even Cassiopeia, who we've all explored in prior episodes.

Kit: It actually ranks 26th out of the IAU recognized constellations in terms of size, and it's just a few square degrees smaller than Cassiopeia. And a few square degrees larger than our good friend King Cepheus.

First Impressions and Where to Find Orion

Jordan: Alright, Kit, what were your first impressions of this constellation from the IAU constellation chart?

Kit: This one looks like a stick figure. It's got its arm up, it's got a bow, it has a big belt, got a sword. So, yeah, why not Orion? This one, this one, Um, yeah. Worked for me. How about for you? What did you see?

Jordan: I think there's definitely a reason why it is the world's most recognizable constellation. Stick figure, person with a bow, 100%. If all the constellations were this good, um, they'd probably be a lot more popular and we'd, you know, be able to see

them all instantaneously. But no, this one definitely is head and shoulders, pun intended. Get it?

Kit: Hehe I get it.

Jordan: Um, above the rest.

Kit: Yeah. I mean, if the constellations looked more like what they said they were, we wouldn't need this segment, which would be sad, so we'll be happy about it. But I do think this one is definitely the most human looking constellation we've had probably since, you know, Gemini and the stick figures of Gemini.

Jordan: Yeah, those I think I agree with you, have been the most recognizable so far. Orion is visible between positive 85 and negative 75 latitudes. It is often high in the night sky in the northern hemisphere in January, making that a great time to go out and find it.

Kit: Oh, I definitely have memories of walking our childhood dog shout out Mischief in the winter, having a chat with Orion you know, it really reminded me of, um, Doctor Moya McTier's Milky ah Way book, the very beginning of that book, which I've recommended a bunch. Um, she talks about talking to constellations, and I was like, right there with you. so, yeah, Orion definitely one of my favorite constellations. It definitely makes me feel very at home when I see it. It sort of brings. It's very comforting to me.

Jordan: Definitely. This one reminds me of January, winter nights, walking out, seeing, being able to see your breath, and just being like, wow, we are so small. Even though it

is relatively easy to find, if you want to get technical, the right extension is 5 hours and the declination is positive five degrees.

Kit: Fives all around.

Jordan: Five, five five. Yeah.

Brightest Star

Kit: So, now we know what this constellation looks like and where to find it. But which of the seven main stars is the brightest? And has Bayer been able to redeem himself?

Jordan: Well, Kit, let me start off by saying that Orion contains two of the brightest stars in the entire night sky. And in total, it has eight stars that are brighter than magnitude 3.0.

Kit: So Bayer has some bright ones that he'll need to distinguish between in this constellation, it sounds like.

Jordan: Right. And because of that, I am sorry to report that our good friend Johann Bayer has to collect an L for this one, as, the brightest star in this constellation is Beta Orionis, probably more commonly known as Rigel.

Kit: Oh, Bayer was doing so well until the most recent constellations, you know. Too bad, so sad. bummer.

Jordan: He was really on a roll. But Like you said, there's a lot of bright objects here. He got close with beta, but, you know, an L is an L. Rigel is the 6th brightest star in the night sky.

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Jordan: It is a B type blue supergiant that is found in the left foot of the constellation.

Kit: And, for spoilers, we'll talk a little bit about the right foot in the next segment.

Jordan: At 860 light years from the sun, Rigel has a visible magnitude that ranges between 0.05 to 0.18,

Kit: which means it is pretty bright.

Jordan: Super super bright. Maybe the first star we've talked about that is even close to zero.

Kit: Yeah, I, um, mean, I think it is important to remind folks that the scale goes negative. So our sun has a negative 26.74 visible, magnitude from Earth. So it's, a big scale.

Jordan: It's all relative.

Kit: Literally relative.

Jordan: Literally. But to be fair, Rigel is a lot further away than our sun. Rigel is actually

part of a multiple star system with at least four stars, though you'll need a telescope to tell some of them apart. The largest of these stars is considerably hotter and more luminous than our sun. Rigel is estimated to be between seven and 9 million years old and will likely end its life in a supernova that would be bright enough to be seen from Earth.

Kit: You know, should anybody still be here in a few million years,

Jordan: I mean, the pre order will be available soon. Before we get to Bayer's variable star let's do a brief shout out to the other really, really, really bright stars in Orion. Ready, Kit?

Kit: I'm ready.

Jordan: First, we got Alpha Orionis, aka Betelgeuse, which is the right shoulder of Orion and is a variable star that is between the 10th and 23rd brightest star in the whole sky with a visible magnitude between 0.0 and positive 1.6.

Kit: A side note here, Betelgeuse will also likely go supernova in the next hundred thousand years, creating again a very super super bright event that we'll be able to see from Earth.

Jordan: I mean, if you can't get tickets to Betelgeuse, you're going to have to wait a long time. So hopefully you can get it on the Betelgeuse supernova 100,000 years from now. Um, enjoy it because the next one's not coming around for another few million years. The next brightest star Gamma Orionis, is also known as Bellatrix. It is the left shoulder of Orion and is another variable star that is usually defined as the 25th brightest star in

the night sky with a visible magnitude between positive 1.59 and positive 1.65.

Kit: All I can really say, these stars have really good names.

Jordan: Agreed. excellent names. Extremely bright stars. Orion. Chef's kiss. So those are the brightest stars in the constellation.

Bayer's Variable Star

Now let's move into our next segment, Bayer's variable star where we follow the Greek alphabet to learn more about the Bayer designated stars in the night sky.

Kit: So we've made it to Kappa Orionis, which is the other foot of Orion

Jordan: The left foot of Orion. The Orion hokey pokey is underway.

Kit: Right. So Kappa Orionis is also called saiph after an arabic phrase meaning sword or saiph of the giant.

Jordan: Yeah, it could either be a left foot or a sword. Sure. Not at all confusing.

Kit: Well, I do think it's, it makes more sense when you contextualize it. So, it used to be the case that saiph was only used to describe Eta Orionis, which is, of course, the actual sword of Orion But in 2016, the IAU's working group assigned this name to Kappa instead.

Jordan: Ooh, the IAU, still making moves to this day. Still getting updated.

Kit: Guess so. Saiph is a, another blue white supergiant in this constellation. It is hotter but less luminous than Rigel. It has a visible magnitude of 2.09 and it's relatively young at about 11 million years.

Jordan: It's like a little baby star. It's not even as old as, like, whales. It's just 11 million years old.

Kit: Yes. A little baby star that will go supernova at the end of its life.

Jordan: Lots of supernovae to come.

Kit: Yeah, definitely. I think probably the most interesting thing though that I learned about this star was about its stellar winds, which are causing it to lose the equivalent mass of our sun every 1.1 million years.

Jordan: To be fair, I'm glad it's happening to Saiph rather than our own sun as that would cause considerable problems.

Kit: Yeah. um, smaller mass stars like our sun have much less powerful stellar winds, which of course, on the sun we call solar winds. By contrast, our sun loses the mass of Earth every 150 million years and only lost, you know, some 0.01% of its mass since formation due to solar winds.

Jordan: And the mass of the sun is 333,000

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Jordan: times the mass of the Earth. So comparatively, the sun is losing a lot a lot a lot less mass due to these winds than Saiph

Kit: Exactly. Yeah. And so that's all I have on Saiph not much more to say, I don't think.

Jordan: Very windy. And it is losing mass rapidly. A little baby star that won't live long and blow up quick. Wonderful. Let's take a quick break and then return for Gold star Music

Gold Star

Kit: Welcome back. This segment is called Gold Star. In this segment, we alternate picking the star or space object in our constellation of the month that captures our minds, our hearts and our very souls. So, Jordan, what was your illustrious pick this month?

Jordan: This was a tough month. Like we said, this is a very popular constellation and it does have a number of extremely beautiful and popular deep sky objects and nebulae within it, such as the horsehead Nebula and the flame Nebula. Most of these nebulae in this constellation are part of the Orion molecular cloud complex, which is a formation of two giant molecular clouds where active star formation is currently happening.

Kit: Yeah. So in fact, this area is one of the most active star forming regions of the night sky. And it's located a mere 1500 light years away.

Jordan: Pretty close stellar nursery by galactic standards.

Kit: I mean, the diameter of the Milky Way is what, about 100,000 light years across? So, yeah, 1500 is really not that far.

Jordan: Really not that far. Alright, so I did think about cheating here and just listing the entire complex, but then I realized something very important.

Kit: Uh-huh?

Jordan: Space gym.

Kit: Space Gym forever.

Jordan: Space Gym forever.

Kit: Yes.

Jordan: All right. So what is Space Gym? Kit has a deep dive about this project on our Tumblr.

Kit: Our Tumblr is a little bit defunct, but the old posts are up there.

Jordan: And do you want to give people a quick summary of what the Space gym project was?

Kit: Sure. So um some of you might be familiar with the JPL NASA posters. And if you

are not familiar with these, google them immediately because they are so cool. so JPL NASA posters, they're awesome. I wanted to put them up in our living room, in our house because we had moved. And my partner BoP was like, that's a lot So after much hemming and hawing, we decided to. Well, we. I decided that I wanted to make over our basement home gym into a space gym where I could put up these JPL NASA posters. But then, you know, things kind of, I don't know, got out of hand. I got very excited. I decided, yes, the posters are indeed in Space Gym. But I also decided that we needed a whole wall mural, a space mural. And um, I painted it with, with Jordan's help, when she came to visit last holiday season.

Jordan: I mean, Jordan's help is a very kind way of putting it. But I did watch Space Gym take off. I saw the beginning stages of it, the conceptualization, and it was beautiful. Of course it's going to be the contender, the number one contender for Gold star of the month. And I'll tell you more why.

Kit: but one note first. um, and I think this is important. I have no training in painting. This was my first attempt at painting anything. Not just like, oh, painting something of this scale, which is difficult. um, it came out pretty good, to be honest. I feel good about it. And you can see the Tumblr pictures. But anyways, sorry. Carry on

Jordan: It came out beautifully. Yeah, it was much better. And I also have no formal or informal painting and tried to help with this project. Let's just say Kit's a natural. She's been looking at constellations and nebulae her whole life and I think something about that synthesized in her brain went straight to her brush and turned out to be a really amazing project. The focal part of this mural was inspired by dun dun dun dun dun dun dun.

Kit: the Orion Nebula.

Jordan: The Orion Nebula! Also known as Messier 42. So because of this, I think it's pretty clear my Gold star is going to be M 42 for inspiring my favorite project in a long, long, long time. Space gym. But what is M 42 exactly? Well it's a diffused nebula located just below the sword of Orion belt.

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Jordan: It has an apparent magnitude of 4.0, making it a bright nebula, and one that you could see unaided. Within this Nebula is a beautiful young open star cluster known as Trapezium Cluster, which may or may not contain an intermediate mass black hole.

Kit: It's really got it all.

Jordan: M 42. It's got it all truly. Plus kind of looks like a fairy godmother from Cinderella. There's really no contest. M 42, this is my favorite Nebula probably in the whole night sky is responsible for Space Gym, which is something that brings a smile to my face every time I come and visit you and get to see it. So as a tribute to that wonderful project and truly diverse Nebula M 42, you win Gold star of the month.

Kit: Its a downright enchanting pick. I support it fully.

Outro

Jordan: Thank you for joining us today as we explored the cosmic background of the

constellation Orion Next week well be retelling and reconstellationing the myths of this constellation.

Kit: This has been Kit

Jordan: And Jordan.

Kit: Sisters. Lovers of stars and stories.

Jordan: And we'll see you next time

Kit: On Starry Time. [music].

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