Auriga: Cosmic Background

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 Auriga, the charioteer.

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

Background

Jordan: Auriga is yet again another of the 48 great great

Kit: great great great.

Jordan: great great great great great great

Jordan: Constellations identified in the second century by Ptolemy.

Kit: This constellation has an area of 657 square degrees, which makes it the 21st

largest constellation recognized by the IAU.

Jordan: Unlike our last few constellations, who are named after a specific person or proper noun, this constellation is simply named the Charioteer. And who exactly this charioteer is varies story by story.

First Impressions and Where to Find It

Kit: And we will definitely explore all those myths next week. I don't know about you, Jordan, but I wasn't actually very familiar with this constellation. So what did you see when you looked it up? What did it look like to you?

Jordan: It's difficult because it kind of just looks like a pentagon or a hexagon, but besides that, yeah, it had the same sort of like it looks like a house. It looks like a hut. How about you, Kit? What did you see when you looked at this constellation?

Kit: So I looked at the IAU constellation map, and I was like, Cepheus, is that you? Is that you? Like it looks like, you know, the, like, um, head with a hat on. There's no pipe. like, there is in Cepheus, but it does just have, like, you know, vaguely shaped head with a pointy hat on. And that's what I got. I was like, I don't see chariots here. Really can't get there.

Jordan: Nothing very creative or even, like, symbolic about it, at least to my first impression.

Kit: Yeah. So I'm not sure that our descriptions were the most helpful for finding this

constellation, which means it's probably time

Jordan: to get technical?

Kit: Oh, yeah, to get technical.

Jordan: Let's do it. So the right ascension is about 6 hours, and its declination is positive 45 degrees.

Kit: This is a northern constellation, which means it's more visible to northern hemisphere observers, but it can be seen in the southern hemisphere, especially during the winter when it's a bit higher in the sky.

Jordan: And it's conveniently or inconveniently, depending on how you look at it, located near Orion.

Kit: So, like, boo, mythological Orion. Yay, constellation Orion.

Jordan: So, yeah, the first step to find Auriga is to find Orion, and above Orion is Taurus. And above that, you should be able to locate the winter hexagon asterism, which is most of the Auriga constellation.

Kit: You can also find the Auriga constellation by locating the Big Dipper and then using the stars that comprise the top of the Dipper's cup to draw a straight line to the constellation through the constellation Lynx, and then you will find the brightest star in the constellation Auriga.

Brightest Star

Jordan: Speaking of brightest star, now that we know what it looks like and generally where it is, the most important question that we ask remains. Did our good friend Johann Bayer, astronomer lawyer of the 17th century, get this one right?

Kit: So, Auriga, and this was a little surprising to me because, again, I really don't know much about this constellation, or I didn't before I did research for this. I never really thought about it, but this constellation is actually home to the 6th brightest star in the night sky, which is also the third brightest star in the northern hemisphere. And this star is called Capella. It is a member of the winter hexagon asterism, and it has the Bayer designation of alpha Aurigae.

Jordan: Our guy Bayer is back, baby. He is back.

Kit: Oh, yeah. Capella is 43 light years from Earth, and it's also known as the goat star. Since Capella means small female goat in Latin.

Jordan: We'll talk a little bit more about the mythology around this next week when we get into the myths and ret- constellations of Auriga. But small spoilers, it involves goats and Zeus.

Kit: Capella is a quadruple star system with two pairs of binary stars. Though, with the naked eye, it looks just like one very bright single star. And together, these stars have an apparent magnitude of positive 0.08.

Jordan: In the northern hemisphere, that means Capella is only outshined by Arcturus

and Vega,

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Jordan: which means pretty bright.

Kit: Absolutely. And actually, this system did appear to be the brightest star in the night sky some, 210,000 years ago.

Jordan: Which is a good reminder that even though the night sky looks similar now to the past over long stretches of time, the night sky, it does, in fact, change.

Kit: So the first pair, the first binary pair of stars are both yellow giants that are about two and a half times as massive as the sun, and they orbit each other about at the distance between Venus and the sun.

Jordan: Which is about 67 million miles, which is also, on average, about 0.72 Astronomical Units.

Kit: So this first pair of yellow giants orbits each other every 104 days or so, and the corona of the larger yellow giant, which is called Capella capital A lowercase a. And if you're an astronomer and there's a way to say that, please let me know, because I have no idea. Um, but the corona of that larger yellow giant is actually a very powerful source of x rays. So, the second pair of binaries is actually, they're both smaller red dwarfs and they're called Capella H and Capella L. And they are located about 10,000 AU from the first pair. So that is the brightest stars in this constellation.

Bayer's Variable Star

Now let's move on to 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.

Jordan: We are cruising right along through the Greek alphabet and we've arrived at Lambda Aurigae. Unlike the brightest star, this star doesn't have an IAU official name beyond its Bayer designation. However, in the past, it has been called the fawn, the third star of pool of harmony, where the pool of harmony is an asterism in chinese astronomy.

Kit: Oh, I love that name. That's such a.. I'm like, I need to know more about this. I think maybe we should do an asterism on the pool of harmony. That sounds fascinating.

Jordan: Yes, that sounds wonderful. Let's add it to the asterism list. So Lambda Aurigae has an apparent magnitude of 4.71, which means it's fairly faint. And honestly, there isn't a ton to say about this G type star. It's between a main sequence and a sub giant stage. And probably the most interesting fact is that it's located only 4.5 light years away from Capella and that it used to be located 24 light years away from Earth, but has been rapidly moving away from us over the last hundred thousand years or so. Lambda Aurigae is now about 40.7 light years away. So it is saying, um, goodbye Earth!

Kit: goodbye Lambda Aurigae! We hardly knew ya.

Jordan: Indeed. And that is Bayer's variable star. Sometimes they're going to be super interesting and sometimes not. Let's take a quick break and we'll wrap up with this month's Gold Star. Music

Gold Star

Welcome back. In this segment called Gold Star, we alternate picking the star or celestial object in our constellation of the month that captures our mind, our heart and our soul. Kit, it's up to you. So what was your pick this month?

Kit: Well, this constellation actually has a lot going on. It has eclipsing binary stars, it has variable stars galore, it's got stars with suspected or confirmed planetary systems, and it has got open clusters aplenty.

Jordan: All right, charioteer, you got a lot to choose from.

Kit: Ultimately though, I just was with something that I felt like had a good name.

Jordan: Kid, I'm not gonna lie, I've used the exact same criteria before. So what was your selection?

Kit: So the object I chose is called the Flaming Star Nebula.

Jordan: Wow, that is a good name.

Kit: when I told BoP about it, BoP was like, yeah, I really, that's a great name. And then he took a pause and then he was like, though it's a bit tautological, isn't it? Because stars are all flaming.

Jordan: BoP. Yes, you're correct. But they're not all called the Flaming Star Nebula, are they? No.

Kit: It does have some less exciting names, including IC 405, Caldwell 31 and SH 2-229.

Jordan: Yeah, BoP, you like those more? Those a bit less tautological for you. I prefer Flaming Star Nebula, even if it's redundant.

Kit: But honestly, I was kind of pleasantly surprised to find out that

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Kit: it does actually live up to its name. So this area has both an emission and reflection nebula in it. And so an emission nebula are things like the Orion Nebula or the Ring nebula, which are basically formed from ionized gas around a hot star. So basically the star is living in this cloud where it was born, and it is hot and so it ionizes the cloud. It was born in. Or in the case of a planetary nebula, which is also technically an emission nebula, a dying star casts off gas as it's dying and then it contracts, releasing energy that ionizes the gas around its shed layers.

Jordan: This is what will happen to our sun in the end.

Kit: Yes, we will end up leaving a planetary nebula.

Jordan: And there is also a reflection nebulae in the Pleiades asterism we talked about last week. Correct?

Kit: Right. So a reflection nebula is when a star is among clouds of interstellar dust and the light from the star reflects on the dust, creating this like, illuminating effect. And that's where this gets really interesting because the reflection nebula in the Flaming

Star Nebula is actually being caused by a blue runaway variable star called AE Aurigae And so astronomers think that this runaway star might have been ejected during a collision between binary stars. And they actually think it's from the Trapezium Cluster in the Orion Nebula.

Jordan: Runaway stars, the Trapezium Cluster of the Orion Nebula. These are all things we've discussed before.

Kit: Mhm.

Jordan: Turns out it's a small galactic world.

Kit: Relatively speaking. I mean, after all, the Flaming Star Nebula is 5000 light years across and it's located about 1500 light years away. But, um, honestly, it's a truly beautiful nebula. And when I saw the name, I was intrigued. When I read about it, I was like this, this was the right choice.

Jordan: I really do think it lives up to the name. And we'll be sure to post pictures on the Universeodon server on Mastodon and also on Twitter.

Kit: Of course. I always post any beautiful space pictures I can find.

Jordan: Kit, I think this is an excellent choice and I'm happy to welcome to the Gold Star of the month club, the Flaming Star Nebula.

Outro

Thanks for joining us today as we explored the cosmic background of the constellation Auriga the charioteer. Next week we'll be retelling and retconstellationing 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 on

Kit: On Starry Time. [music]

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