

# TUMBLE TRANSCRIPT:

## *Episode 3 - Observing Mystery Objects*



### INTRO MUSIC STARTS

ME: Hi and welcome to Cataloging the Universe! In this 7 part series, we'll be taking a journey through time and space to try to find our *own* answers to these giant questions about the universe. Along the way, we'll have some help from scientists, experts, and our imagination. I'm Marshall, and I'll be your guide on this journey.

This is Lesson 3: Observing Mystery Objects. In this lesson, we are going to dive deeper into the history of skywatching, and learn how an astronomer's catalog of objects he couldn't identify became key evidence in the Great Debate.

### INTRO MUSIC ENDS

ME: In our last episode, we started your star journal. We learned about constellations with the help of an astronomer named DK. Take a look back at your journal. What were some of the things you saw in the sky? Did you come up with any constellation shapes to help you remember where the stars were? **<Ding>** Go ahead and take a minute to look at what you drew last time in your journal.

### MUSICAL PAUSE

ME: Observing the stars was one of the first natural sciences developed by civilizations all over the globe. Thousands of years ago, people just like you, sat under the stars with nothing but their eyes to explore what was above them. There are some star journals that are over 3000 years old!

Telescopes changed the star-watching game. With each improvement of the telescope, astronomers could see more of space, but many things they saw were fuzzy and unclear. They called these mysterious objects "nebulae", or "nebula" if you are referring to only one.

You might remember those words from Lesson 1: The Great Debate.

**Heber Curtis: Achem.... "Nebula" is a word that means "cloud" in Latin.**

ME: Oh! Hello there, Dr. Heber Curtis. How did you get here?

**HC: It's not important! But understanding these nebulae is!**



ME: Okay...

**HC:** A spiral nebula is pretty much exactly what it sounds like: a cloud in the shape of a spiral. That is what we see when we look at them in the sky. Nobody knows what they are exactly, our telescopes can't quite see what they are made of yet. But I think they're other galaxies.

**HS:** Wait, that's not fair. He can't get the last word. Remember I think nebula are definitely not galaxies!

ME: Oh... Shapley, you're here too... I guess that makes sense.

**HC:** They are other galaxies!

**HS:** Are not.

**HC:** Are too!

ME: Guys, hold on. Stop fighting...

**HS & HC:** All right <but he started it!>

**ME:** Thanks for your help, sort of. We will leave Shapley and Curtis for now...

**HC & HS:** <grumbling>. Fine. Bye.

ME: We'll get back to them later. First, we've got some questions to answer. How had Shapley and Curtis even *heard* of spiral nebulae? How were they discovered? To answer that question, we're going to time travel again.

This time further back to the 1760s, and across the ocean, to France, where we'll meet an astronomer named Charles Messier, whose star journal is full of nebulae.

**[TIME TRAVEL MUSIC]**

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ME: Charles Messier was a comet hunter. Every night, Messier could be found with his telescope recording what he saw in the night sky. He's setting up right now as the sun sets. Let's see if he will talk to us.

Hello, Charles Messier. Sorry to interrupt sir but I was wondering if you could answer some questions for us.

**Charles Messier (French accent): Why, 'ello, je m'appelle Charles Messier... You can call me *Charles*.**

ME: Charles, Thank you. I see you are setting up your telescope. What are you looking for tonight?

**CM: But of course, I am looking for comets. I mean everyone is looking for comets right now. They are just so fascinating, no? What are they? Where will they appear next?**

ME: How do you know when you have seen a comet?

**CM: Eh, zey look like a blurry blob in ze sky. And zey move! Every night in a different place in ze sky.**

ME: How do you know that they are moving?

**CM: Well I record where I saw it, and then I check again the next night to see if it is next to different stars. Those we know stay in the same position.**

ME: Interesting. How many have you found?

**CM: I have found 13 comets, actually! Zey are still named after *moi*!**

ME: Congratulations!

**CM: But you know, during my hunt for comets I have some other things that perplex me. Zey other blurry objects.**

ME: Blurry like a comet, but not a comet. How do you know that they aren't more comets?

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**CM:** Well they don't move! And I am not the only one seeing these, these nebulae. They are a true mystery for everyone. I am actually putting together a list of them.

ME: That sounds like a big list.

**CM:** I knew zees things were important, I have over 45! I am submitting it to the journal of the French Academy of Sciences. Maybe if it gets published, someone else in the future can figure it out.

ME: Thank you for your contribution to science Mr. Messier. I will let you get to your star-watching now that the sun has set.

**CM:** Au revoir!

[MUSIC TRANSITION]

ME: Messier published his list of mysteries in 1774, and it is *still* known today as the "Messier Catalog". His first catalog, or list, had 45 objects in it—but by the time he died, the number of items in the catalog had grown to 110 in total.

Messier's catalog made quite a splash! Astronomers and skywatchers everywhere were fascinated by these objects he'd discovered. Nobody knew for sure what nebulae were or really anything at all about them, except that they definitely weren't comets. Other skywatchers tried their best to find them on their own. About seventy years later, one of these other skywatchers was looking at one of Messier's objects when he discovered that it was shaped like a spiral. And that was the beginning of the idea of the *spiral nebulae* that Curtis and Shapley were arguing about.

**HS:** Yes! Exactly. Those cloudy objects on the outskirts of the Milky Way.

ME: Oh, hi again Shapley.

**HC:** NO! ISLAND UNIVERSES, SHAPLEY!!

ME: Guys, can you stop so I can go on?

ME: Ahem. As I was saying, Messier's catalog was a huge deal—and still is today!

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Today, you can look them up, if you want online, or if you have a telescope at home you can try and spot them the next time you are skywatching.

### **MUSIC BREAK**

ME: But for now, take a minute to think about what you've learned so far. In order to make his catalog, Charles Messier needed to look at the sky *every single night* for a long period of time. In order to accomplish what he did, what do you think he needed? What skills do you think he had to have? Take a minute to think about it. **<ding>** Write it down in your star journal.

### **MUSIC BREAK**

ME: Once again, this has been cataloging the universe, Lesson 3: Observing Mystery Objects. Next time, we'll be back in our star journals, taking careful observations, and trying to apply everything we've learned from Messier, Shapley, and Curtis about what's out there in the sky. See ya then!