Episode 12: **Poison Given at Birth in Orion**

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Pamela: Welcome to show number twelve of Slacker Astronomy; a podcast about astronomy and just about anything else that floats over our heads.

Travis: Every week or so we will bring you a summary of a recent news event from the world of astronomy. And during slow news weeks, we'll spread gossip and slander with other astronomy podcasters.

Pamela: But today we have some real news to talk about, so we've confined our gossip and slander to the Slacker Extra Feed where you can find our "Council of Doom" podcast involving a whole myriad of your potentially favorite podcast personalities.

Travis: But to find out who is on the Council of Doom you'll have to go listen because right now we're going to talk to you about one of the pretties faint fuzzies in the Northern sky: The Orion Nebula.

Pamela: Returning to our "News from Canada" theme of last week, we'd like to bring you some gassy results from the University of Calgary's Sun Kwok. Using the Odin Space Observatory, Kwok and his team of astronomers observed a bunch of molecules in the Orion Nebula, including several forms of cyanide, water, nitric oxide, ether, and much much more.

Travis: Sounds like a bad day at the dentist!

Pamela: Odin was built and launched by Sweden, Canada, France and Finland, and can detect radio waves that we can't detect here on the surface of the Earth. Working at 500 to 600 gigahertz, a frequency about 1000 times higher than your TV antennae receives, Odin allows astronomers to see parts of electromagnetic spectrum that have never before been seen.

Travis: Remember, radio is just another color of light. That whole ROY G BIV thing we learned in school left out the most interesting colors. A more accurate rainbow starts with Radio, wanders through microwave and infrared into our normal Red-Orange-Yellow-Green-Blue-Indigo-Violet space, and keeps going out into Ultra-Violet, X-Rays and Gamma-Ray colors.

Pamela: Hot things tend to show up in the X-Rays and Gamma-Rays, but cold things like molecules hang out in the long wave lengths of radio.

Travis: And compared to the centers of Galaxy Clusters, the Orion Nebula is cold. On the sky, the Orion Nebula appears as a thumb-tip sized, bluish smudge, and in your standard backyard telescope, you can see bright stars embedded in a beautiful web of gas and dust.

Pamela: With big telescopes, and telescopes in space you start to make up hundreds of

stars slowly forming in this giant molecular cloud. The Orion Nebula is a giant star forming region, with new stars occasionally popping into view as the come to life in the clouds.

Travis: The molecules that Odin is observing are part of Orion's recipe for making planets and new stars and new planets.

Pamela: Supher monoxide, cyanogen radicals, methonal, methl cyaide, ethyl cyanide and ammoia are its recipe?

Travis: I didn't say it was an appetizing recipe!

Pamela: According to Kwok, the molecules help astronomers better understand the chemical processes involved in the birth of stars. Every bit of information helps, and I guess that while the bits themselves are gases deadly to life, the information about them is good for understanding the circumstances that may have lead to life.

Travis: And according to some astronomers not working in Canada, these often-deadly gases exist in an often-deadly environment.

Pamela: Astronomers using the Chandra X-Ray observatory recently observed the Orion Nebula for 13 straight days.

Travis: Why 13?

Pamela; Why not 13?

Travis: Why not 13?! Is that the best you can do?

Pamela: Sorry, the press release just doesn't answer all the questions.

Travis: So, these astronomers looked at the Orion Nebula for 13 days using the Chandra X-Ray Observatory and they found, you guessed it folks – X-Rays.

Pamela: They discovered that stars forming in the Orion Nebula emit X-Rays of varying strengths. 30 of the 1400 stars they looked at are eventually going to turn into stars similar to our Sun, and these 30 proto-Suns are emitting X-Rays like nothing we've ever seen from our own Sun.

Travis: Which is good, because the things associated with X-Ray flares in our Sun tend to eat communications satellites.

Pamela: But what is harmful to our current Earth, maybe allowing future earth's around these forming stars to form safely.

Travis: Planets form in rotating disks around stars. Astronomers don't fully understand this process, but they do know that if the disk is a nice calm environment the forming planets will spiral into the star they are forming around.

Pamela: And spiraling into the star isn't conducive to forming life.

Travis: Going "splash" into a star isn't conducive to much of anything actually.

Pamela: Luckily, X-Ray Flares come to the rescue.

Travis: When X-Ray flares hit the planet-forming disk around the young star, the disk gets shocked, and the would-be planets get knocked around.

Pamela: According to Eric Feigelson of Penn State University, “These flares maybe creating havoc in the disks, but they ultimately do more good than harm.”

Travis: All the X-ray induced turbulence prevents the future rocky worlds from plunging into their stars.

Pamela: The nitty-gritty behind how the X-Rays protect young planets is both interesting and very confusing. According to the Chandra Press Release, electric charge may build up on the disk when the disk is bombarded with X-Rays.

Travis: When you said the X-Ray’s shocked the disk, you weren’t kidding!

Pamela: Not kidding at all!

Travis: Moving charge leads to magnetic fields. Since the disk around the star is rotating, that X-ray induced charge will effect the magnetic fields in the system.

Pamela: And that’s what causes the turbulence in the disk that prevents the planets from plunging to their deaths.

Travis: About half the young suns observed by Chandra show evidence of planet-forming disks. Four of these systems-with-disks were observed separately by NASA’s Hubble Space Telescope, and you can find images of them in our show notes.

Pamela: And in about 5 billion years, you may be able to find life around these X-ray flaring stars that are surrounded by nitic oxide, water, and ether.

Travis: And with conditions like that, I still think it sounds like someplace where you’ll find lots of dentists.

Pamela: And if Slacker Astronomy is still around in 5 billion years, you can report on the dental system on the planets around these stars!

Travis: But, for those of you who aren’t interested in listening to us prattle on for 5 billion years straight, we’re going to sign off with this public service announcement: X-rays may be good for forming planets, and cyanide may play a role in star formation, but you should not try and replicate the environment discussed in today’s shows at home. Leave planet forming to the professions.

Pamela: And leave planet destruction to the Death Star.

Travis: And while you watch planets forming and being destroyed, take a moment to check out our site. Some of you may have noticed that things are a bit in flux.

Pamela: For better or worse, I’m in the process of trying to move things off of livejournal and into Wordpress. Here is where the “I am and astrophysicist, not a programmer” disclaimer comes into play.

Travis: But while she may not be a programmer, we want our site to look good. And we want your feedback. Please tell us what works and what doesn't. Be honest, it won't hurt our feelings.

Pamela: Well, it might, but we promise not to cry on air.

Travis: Probably not cry on air. Probably.

Pamela: So let us know what you think. Until next week, clear skies and clear bandwidth. On behalf of Aaron and Travis, this is Pamela Gay.

Travis: This has been slacker astronomy. A podcast for fun, for you, for the voices in our heads.