



Meet Big Red



If you could talk
to a big star ...

Q Hello? Anyone out there?

A: No need to scream. I can't hear you anyway. Sound doesn't travel in space.

Q: Then how can I conduct this interview?

A: Well, use your imagination! If you could talk to me, what would you ask?

Q: Well, what's up?

A: I'm up. Way up . . . in the universe. I don't think we've formally met. I'm a red giant. But

you can call me Red. All the other stars do.

Q: How many other stars are you talking about?

A: In which galaxy?

Q: Pick one.

A: Okay, I'll pick the one Earth is in—the Milky Way. There are about 200 billion stars in the Milky Way galaxy alone. Of course, there are billions more stars in millions of other galaxies out there.

Q: And are they all like you? Red and big?

A: Nope. Every star is different. White dwarfs, stars like the Sun, and red giants, like yours truly, are really quite different. We stars change as we get older.

Q: You mean, you get wrinkles and gray hair and stuff?

A: Um, not quite. If I could take you on a star-studded tour, you'd understand where I'm coming from—and where I'm headed.

Q Okay, let's go.

A: We can't. You'd never get there. The star closest to Earth, the Sun, is 93 million miles away. Even if you traveled at jet speed (600 miles per hour), it would take you over 17 years to get there. And you'd never make it because you'd burn up.

IQ: Whoa! If stars are so far away, why can I count hundreds of them in the sky at night?

A: Because they give off energy and light: They shine. They shine brightly enough to see them—though they're millions and millions of miles away.

Q: How do stars get that brilliant shine? Do they use makeup like Hollywood stars?

A: They don't use makeup—but it's their makeup that makes them shine. It all starts when stars form in a cloud of dust and gas. That cloud starts collapsing under its own gravity. As the cloud clump continues to collapse, it grows hotter and hotter. When a clump's temperature reaches 18 million degrees Fahrenheit (10 million degrees Celsius), nuclear fusion reactions start. And voila! A star is born!

Q: And how does it shine?

A: Now we're getting to the *core* of the matter: the star's core. Inside the core, hydrogen gas is converted to helium gas. That's what keeps the star shining.

Q: Isn't that what happens in the Sun's core, too?

A: Of course. Remember, the Sun is a star, too. Inside the Sun's core, hydrogen is changed to helium. That releases tons and tons of energy, which makes its way into the universe as light and heat.

Q: So, are all stars suns?

A: Definitely not. There are many stars that have more mass than the Sun and they are quite different. Supergiants and neutron stars are just two examples.

Q: I've heard the Sun is almost 5 billion years old. Are other stars that old, too?

A: Absolutely. And as stars get older, they change. Not that you humans can ever see that change. But I've been around for billions of years—from the time I was a baby star to the old red giant I am today. So I've seen thousands of stars come and go in my day.

Q: So, what will happen to our Sun?

A: Well, you know someday it will become a red giant, like me.

Q: Wow. So, how old are you?

A: About 10 billion years old. I know, I know—I don't look it.

Q: Can you tell me about some of the highlights of your life?

A: Well, billions of years ago, my hydrogen ran out, my core collapsed, and my atmosphere expanded and cooled, turning me into a red giant.

Q: And is that the end of the story?

A: Oh, no—there's a lot more to come. Eventually gravity will force my core to collapse and I'll become a planetary nebula. And

then—much later on—only my core will be left: I'll become much smaller, and they'll call me a white dwarf. But that's a long way off.

Q: So why are you called a red giant? Why not a green giant? Or a purple one?

A: It's about heat. A star's color tells you its temperature. Red stars are the coolest, if I do say so myself. Blue or blue-white stars are hot stuff—they have the highest temperatures. And it's a good thing, too, because without our various temperatures, the universe would be another type of place entirely.

Q: What do stars' temperatures have to do with the universe?

A: A lot. There'd be no planets, for one thing. Scientists think very young stars that are surrounded by heat and dust may be on the verge of condensing into planets. They also think that lots of stars were born with an entire planetary family.

Q: So that means there may be undiscovered planets out there?

A: You're almost as bright as I am! There could be millions of other planets out there.

Q: How can we find out?

A: Come back and chat with me in another few billion years—if you can recognize me! It just may take that long to discover everything out here.

Activity

SEEING STARS You know that the Sun is a star, but is every star a sun? Go to your local library or the Internet and do some research. Choose one star and compare it to the Sun. Then draw a Venn diagram to show the similarities and differences between the two.