

Red Stars Aren't Red

And yellow one aren't really yellow, either. About halfway down the solar evolution page there is a little artist's illustration of a red giant star brooding over a dim and desolate planet. I included it partly because it is very evocative of an old and dying Earth – but mostly because it is completely wrong. Except *perhaps* for a very few, very bloated stars known as carbon stars (because they have so much raw carbon – that is, soot – in their atmospheres), red stars only seem red when viewed through a spectroscope. To the naked human eye, they would look quite white.

You see, when astronomers talk about star colors (red dwarfs, blue giants) they are talking about their colors *as compared to each other*, and not as seen with the naked eye. In point of fact, most “red” stars are considerably hotter than an incandescent light bulb, and when was the last time that you looked at an ordinary incandescent bulb and decided that its light was really a deep red color, and not pure white? “Red” stars are normally even whiter than the bulb, so there you are.

Part of the problem is due to the remarkable adaptability of human vision, which can compensate for colored light with astonishing accuracy. Incandescent light looks perfectly white when you are reading by it at nighttime. It seems equivalent to sunlight. However, in fact, the light given off by an incandescent bulb is much more “yellowed” than sunlight, and you can see this if you place an incandescent bulb outside in full sunlight. What looked bright and white when you were reading indoors looks very dim, yellowish, and pale indeed when compared to sunlight, and that's because in the daylight your eyes are adjusted to that, and not to the light bulb.

Likewise, if you were on a planet where the only star in the sky was a red one (whether dwarf or giant, doesn't matter), then the light would look bright and white. Only if you were on a planet with a double star, one “red” and one “white”, and looking at them side-by-side, would you be able to discern that the “red” one is in truth “dirty yellowish” as compared to the “white” one.

In short, if astronomers were to use naked-eye colors to refer to stars rather than spectrographic colors, then stars would run the whole gamut from pale yellowish-white to pale bluish-white, not red to blue.

And by the way, when the Sun's luminosity rises to thousands of times what it is now, just how dim do you expect the landscape to be? In fact, the Earth of the far future will be so brightly lit that you'd need to wear heavy welder's glasses just to keep from being blinded by a single glance at the ground, never mind the Sun. I am afraid that the usual artist's illustrations of bloody red giants floating over dim scarlet-lit landscapes is the stuff of science fiction only.