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## CANNIBAL STAR?

Ken Tapping, 2<sup>nd</sup> May, 2017

These evenings, after the Sun is gone, you should be able to see a bright, orange-red star low in the west. If the colour is not clear, binoculars will show it well, especially if you throw the image out of focus. That star is in Orion, a winter constellation in the process of vanishing into the Sun's glare as we get deeper into spring. The star is an old, red giant, popularly called "Betelgeuse". Astronomer Patrick Moore did not believe any star should be called "Beetle Juice" and consulted some Arab Scholars. The opinion was that "Betelgeuse" came from a French distortion of the Arabic "bit al jawza", meaning "Shoulder of the giant, Orion". A more correct pronunciation is "Bayteljurze", which for some reason is written as "Betelgeux". The star lies some 500 light years away, and looks as bright as it does because it is producing about 100,000 times the Sun's energy output.

Almost all stars have similar lives. They form, brighten slowly during their lives and then swell into red giants. The more massive the star is when it forms, the more brightly it shines and the faster it burns up its fuel. When it starts to suffer a fuel shortage it swells into a red giant. This will happen to the Sun after a lifetime of about 10 billion years; we are about halfway there. Betelgeux began its life with 12 times the mass of fuel the Sun started with, but is burning it 100,000 times as rapidly. This means its life will be short, between 10 and 30 million years, and that life is almost over. It is unlikely there were living creatures on any planets orbiting Betelgeux when their star expanded and engulfed them. On Earth it took 300 million years for the first living creatures to appear. We still have about four billion years before the Sun becomes a red giant. Earth will be engulfed, but Mars may not.

With 12 times the mass of the Sun and about 10 billion times the volume, Betelgeux is far less dense than the Sun. It has been described as being little more than a "hot vacuum". This means its "surface" gravity is scarcely enough to hold the star together. In fact it doesn't really have a

sharply defined boundary like the one the Sun has. Betelgeux is a fuzzy red blob, with its outer material streaming off into space like a really strong version of the solar wind.

How stars end their lives depends upon their masses. Less massive, dwarf stars like the Sun will become red giants, sneeze off their outer layers and end up as white dwarf stars, slowly cooling balls of helium. Stars like Betelgeux will have a different fate. Sometime in the near future, tomorrow or maybe in a few thousand years, Betelgeux will run out of fuel. Its core will cool and be unable to hold up the star's outer layers. The star will collapse and then explode in less than a minute or so. For maybe a month it will be the brightest thing in our skies after the Sun. Luckily we are far enough away for it not to be a threat, but close enough to have a grandstand seat.

One puzzling thing is that as stars age and lose material, their rotation should slow down. Betelgeux is spinning too quickly. One explanation is that it once had a companion star, which it swallowed. When Betelgeux expanded and produced its strong wind, the companion will have had to fight its way through it. This slowed it down, causing it to spiral in until the two stars merged. Paradoxically, getting all that additional fuel from the other star would not have helped Betelgeux. The increased mass greatly augmented its energy output, bringing the end closer. The steady brightening of the Sun as it ages will fry us before we have to worry about it becoming a red giant. Maybe by then we will have found other planets we can live on and colonize.

Jupiter rises soon after dark and Saturn around midnight. Venus lies low in the dawn glow. The Moon will reach First Quarter on the 2<sup>nd</sup>.

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