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Blue Moons and Lavender Suns
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"Once in a blue moon," we say, when speaking of an event so rare we never expect to see it. But blue moons, and blue suns in brownish skies, do happen. One of the best-documented occurrences this century happened during September 1950, and caused a storm of flying saucer reports from Canada to England.

"The skies took on strange colors; there was an eerie sort of light, followed in some places by almost complete darkness.... Shades varying from pink and orange to yellow and brown were used to describe the sky.... The sun disc when visible appeared blue or purple. As it appeared and disappeared through breaks in the clouds it seemed to be in motion -- hence the basis for the impression of flying saucers." The incident was reported thus in the scientific journal, *Weather*.

Blue, green or lavender suns and moons, like blue skies, owe their color to scattering of light in the atmosphere. The difference is in the size of the particles doing the scattering. The sky is blue because the molecules of air are much smaller than the wavelength of visible light. Blue light has a shorter wavelength than red, and reacts more strongly with the tiny molecules than red does. The blue light is thus scattered more than red, and we see the scattered light of the sky as blue and the sun as reddish (especially when it is low in the sky and must pass through a lot of air to reach our eyes). The effect is called Rayleigh scattering, and it is responsible for what is called Tyndall blue. Blue eyes, some blue feathers, and the bluish color of the veins in your skin are all due to Rayleigh scattering.

Particles that are much larger than the wavelength of light scatter all wavelengths about equally. Clouds and snow are made up of particles several times larger than the wavelength of light, and they look white.

Blue suns and moons and pinkish skies occur when there are particles in the air whose size is just a little larger than the wavelength of light. These particles can resonate with light so that certain wavelengths are strongly scattered, while others are only affected about half as strongly. Oily droplets about 1 micrometer (a twenty-five thousandth of an inch) across, for instance, will scatter red light strongly, while letting blue light pass through -- just the opposite of Rayleigh scattering.

On September 23, 1950, several muskeg fires that had been quietly smoldering for several years in Alberta suddenly blew up into major -- and very smoky -- fires. The winds carried the smoke eastward and southward with unusual speed, and the conditions of the fire produced large quantities of oily droplets of just the right size to scatter red and yellow light. Wherever the smoke cleared enough so that the sun was visible, it was lavender or blue. Ontario and much of the east coast of the U.S. were affected by the following day, but the smoke kept going. Two days later, observers in England reported an indigo sun in smoke-dimmed skies, followed by an equally blue moon that evening.

Forest fires are not the only possible producers of blue suns. Fine, far-travelled dust has been known to produce the same effect. So has volcanic ash, and many of the scientific articles written about the blue sun of September 1950 mentioned also the strange optical effects produced by the eruption of the volcanic island of Krakatoa a century ago. The important point is the particles in the atmosphere must all be very close to the same size, and that size must be about a micrometer across -- a combination of circumstances that occurs literally once in a blue moon.

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