A Full Moon Always Rises

A bit of Reality by Phillip Berrie

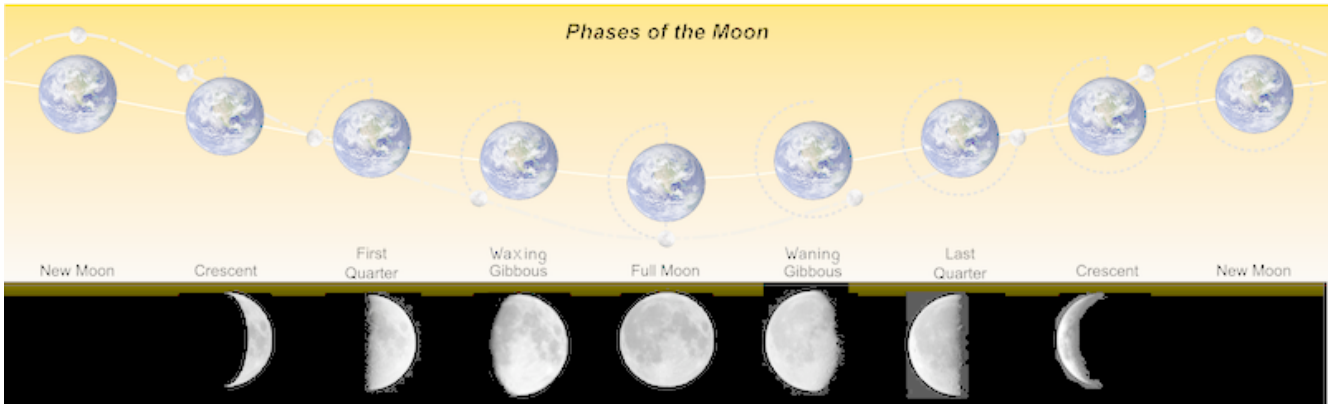
It is my experience that a lot of authors don't really understand lunar phases and how they relate to when the Moon rises. This is my poor attempt to prevent crescent moons rising at sunset and full moons rising near dawn, no matter where they are supposed to be.

It's all about geometry, really ...

Here's an example using our own Moon but the basics apply to all orbiting bodies.

- The Moon is a sphere illuminated by the sun, essentially a fixed point in this system.
- To an observer on the Earth the Moon goes through all its phases in a lunar month.
- The Moon orbits the Earth once every 29.5 days (i.e. A lunar month).
- The Moon appears to cross the sky once a day as the Earth rotates.

What I hope is clear from this list of observations is that the 'phases' of the Moon must purely be dependent on the Earth's position in space relative to the direct line between the Sun and the Moon and that its daily passage through our sky is mostly due to the Earth's rotation. The following image, courtesy of the Royal Geographical Society (ISBN 0540084050) and the Wikimedia Commons project, perhaps shows this more clearly.



Here, the sun is at the top of the page and we are seeing the path the Moon takes as it orbits the Earth. It is the rotation of the Earth that determines when the Moon 'rises' and 'sets', but it is the alignment of Earth, Sun and Moon that brings about the full, new and other phases of the Moon.

Note: The Earth/Moon distance is not to scale here and the Earth only rarely eclipses the Moon because they do not stay in the same alignment with respect to the Sun in the third dimension.

What should writers take away from this ...

1. A new Moon rises at sunrise because at this point in its orbit the Moon is between the Earth and the Sun and the illuminated part of the Moon is away from us.

2. A full Moon rises at sunset because at this point in its orbit the Moon is on the far side of the Earth from the Sun and so we see the most of the illuminated Moon.

3. Therefore, the larger you want your Moon phase to be, the closer its rise should be to sunset.

4. Similarly, for the 'dark of the Moon', the Moon will set at sunset and rise at sunrise.

References:

Here's the Wikipedia on Moon phases

http://en.wikipedia.org/wiki/Phases_of_the_Moon

And for more about the Moon I can't resist giving a pointer to Keith's Moon Page:

http://home.hiwaay.net/~krcool/Astro/moon/

And no, that's not a Rolling Stones tribute site :-)

N.B. Please note that I although I use the Wikipedia (and WikiMedia Commons) a lot for references, this is purely for expediency and the familiarity of my readers. Anyone interested in further studies should make use of the references where available and understand that the Wikipedia is a co-operative project contributable to by anyone and must always be looked at in that light.

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