

Mountaineer Skies

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<http://www.as.wvu.edu/~planet/index.html>

October- December 2004

From the Editor's Desk

There will be a **total lunar eclipse** that begins at 8:06 P.M. on Wednesday, October 27 and ends at 2:03 A.M. on the following day. The table below gives the specific local times.

Moonrise	Oct 27 6:13 P.M.
Moon enters penumbra:	Oct 27 8:06 P.M.
Moon enters umbra:	Oct 27 9:14 P.M.
Start of totality:	Oct 27 10:23 P.M.
Maximum eclipse:	Oct 27 11:04 P.M.
End of totality:	Oct 27 11:45 P.M.
Moon leaves umbra:	Oct 28 00:54 A.M.
Moon leaves penumbra:	Oct 28 2:03 A.M.
Moon Set	Oct 28 8:12 A.M.

The entire eclipse is visible from Morgantown.

Daylight Saving Time (DST) ends at 2 A.M. on the last Sunday of October. This year the last Sunday of the month is the 31st. Remember to set your clocks back one hour.

The **Leonids meteor shower** will have its maximum on November 17 about 7 A.M.

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In The Sky This Month

Visible Planets in the Night Sky

Beginning of October, 2004

	Const	Rise	Transit	Set	Mag
Sun		7:14	13:09	19:05	- 26.8
Mercury	Vir	7:00	13:00	19:03	- 1.5
Venus	Leo	3:49	10:37	17:25	- 4.1
Mars	Vir	6:46	12:51	18:54	1.7
Jupiter	Vir	6:34	12:44	18:50	- 1.7
Saturn	Gem	1:07	8:26	15:49	2.2

Middle of October, 2004

	Const	Rise	Transit	Set	Mag
Sun		7:28	13:05	18:43	- 26.8
Mercury	Vir	8:07	13:32	19:00	- 0.8
Venus	Leo	4:15	10:45	17:14	- 4.1
Mars	Vir	6:36	12:29	18:21	1.7
Jupiter	Vir	5:54	11:56	18:02	- 1.7
Saturn	Gem	0:15	7:34	14:56	2.1

End of October, 2004

	Const	Rise	Transit	Set	Mag
Sun		6:45	12:03	17:22	- 26.8
Mercury	Lib	8:13	13:05	18:00	- 0.4
Venus	Vir	3:48	9:53	15:59	- 4.0
Mars	Vir	5:26	11:03	16:43	1.7
Jupiter	Vir	4:07	10:06	16:07	- 1.7
Saturn	Gem	22:15	5:33	12:55	2.0

Leo	Leo, The Lion
Gem	Gemini, The Twins
Lib	Libra, Scales
Vir	Virgo, The Maiden

About: the Drake Equation
or
Your guess is as good as mine

I am abandoning my rule against using equations because this year's planetarium show, *Oceans in Space*, is about looking for life outside of the Earth. To use this equation you need to do only two things, (1) **make some educated guesses** and (2) **you need to be able to multiply**. Actually, since there is a built-in calculator at

http://www.classbrain.com/artmovies/publish/article_50.shtml

you need only to do the first part, that is, the educated guesses.

The **Drake Equation** was developed in 1961 by Frank Drake as a way to estimate how many **intelligent** civilizations there are in our galaxy, the Milky Way. The test assumes that intelligent beings are capable of sending radio waves.

The **Drake Equation** is:

$$N = R \times f_p \times N_e \times f_1 \times f_i \times f_c \times L$$

N = the number of civilizations in the galaxy with radio transmitting capabilities. This is the number you are after.

Where

R = the number of stars in the Milky Way Galaxy. Current estimates are about 100 billion stars.

f_p = the fraction of stars that have planets with current estimates ranging between 20% to 50%.

N_e = the number of planets around a star that are **capable** of having life. Current estimates range from 1 to 5. So far in our Solar System we know of only 1, Earth, but the possibility of life on Mars, now or in the past, is strong.

f₁ = the fraction of planets in **N_e** where life exists. This can be anywhere from 0% to 100%

f_i = the fraction of **f₁** where there is evolution of the life. Again, this can be from 0% to 100%.

f_c = the fraction of **f_i** that are capable of sending radio waves. It can be between 0% and 100%. A good estimate might be somewhere between 10% to 20%

L = fraction of the planet's life during which the beings are capable of generating radio waves. Remember that species are born, reach maturity, and then finally die.

Here is an example.

If

R = 100 billion stars

f_p = 20 %

N_e = 1

f₁ = 10%

f_i = 10%

f_c = 10%

L = 1% (100 million years)

what does **N** equal?

Plugging in my guesses, the calculator gives me

N = 200,000 communicating civilizations in the galaxy.

But your guess is as good as mine. The only way to confirm this is to check a significant number of planets around the stars of our galaxy. This is clearly an impossible task today.

If you wanted to know how many of the intelligent beings are friendly as opposed to hostile, you might add an **f_F** to the equation, so that it looks like this.

$$N = R \times f_p \times N_e \times f_1 \times f_i \times f_c \times L \times f_F$$

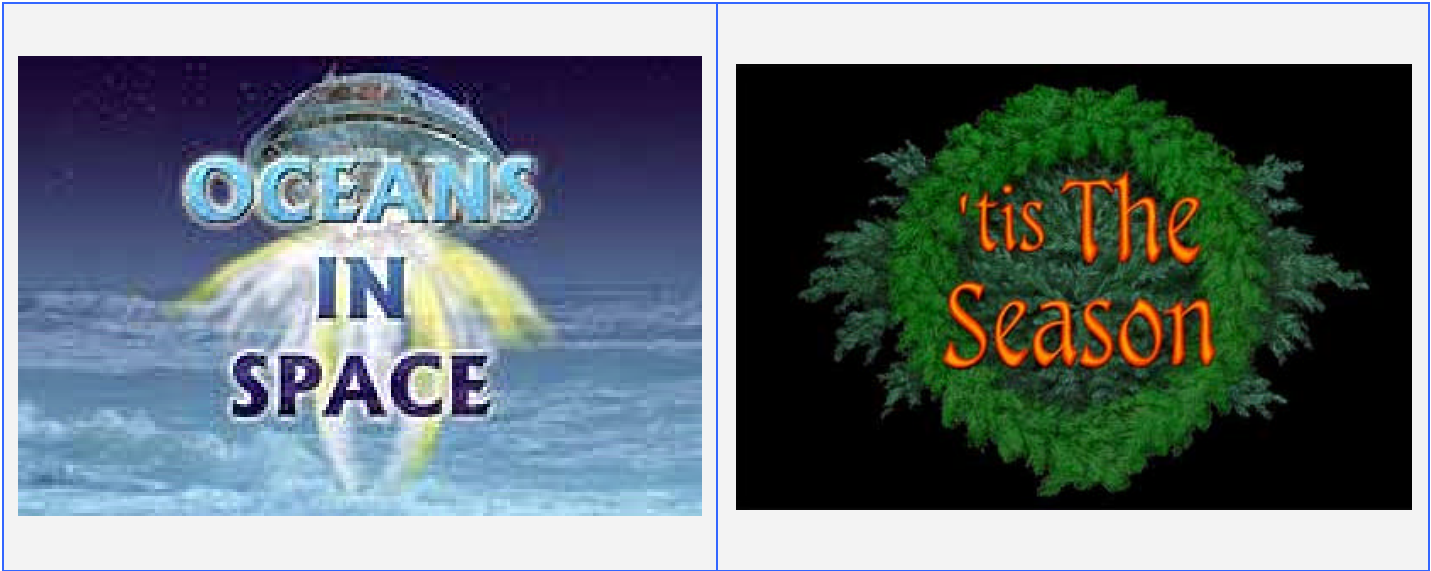
Again, you have to guess between 0% friendly beings and 100% friendly beings. (The calculator does not have this extra variable in it, so you must do the multiplication yourself.)

If you decide that **f_F = 10%**, then you have

$$N = 200,000 \times f_F(10\%) = 20,000$$

So you have estimated that there are **20,000 friendly civilizations** in our galaxy (and consequently **180,000 hostile ones**).

2004 – 2005 Planetarium Shows



Sep. 10 & 24, 2004 <i>Oceans in Space</i>	Oct. 8 & 22, 2004 <i>Oceans in Space</i>	Nov. 12 & 19, 2004 <i>'tis The Season</i>
Dec. 3, 10, & 17, 2004 <i>'tis The Season</i>	Jan. 14 & 28, 2005 <i>Oceans in Space</i>	Feb. 11 & 25, 2005 <i>Oceans in Space</i>
Mar. 11 & 25, 2005 <i>Oceans in Space</i>	Apr. 8 & 22, 2005 <i>Oceans in Space</i>	May 13 & 27, 2005 <i>Oceans in Space</i>
Jun. 10, 2005 <i>Oceans in Space</i>	Jul. - Closed	

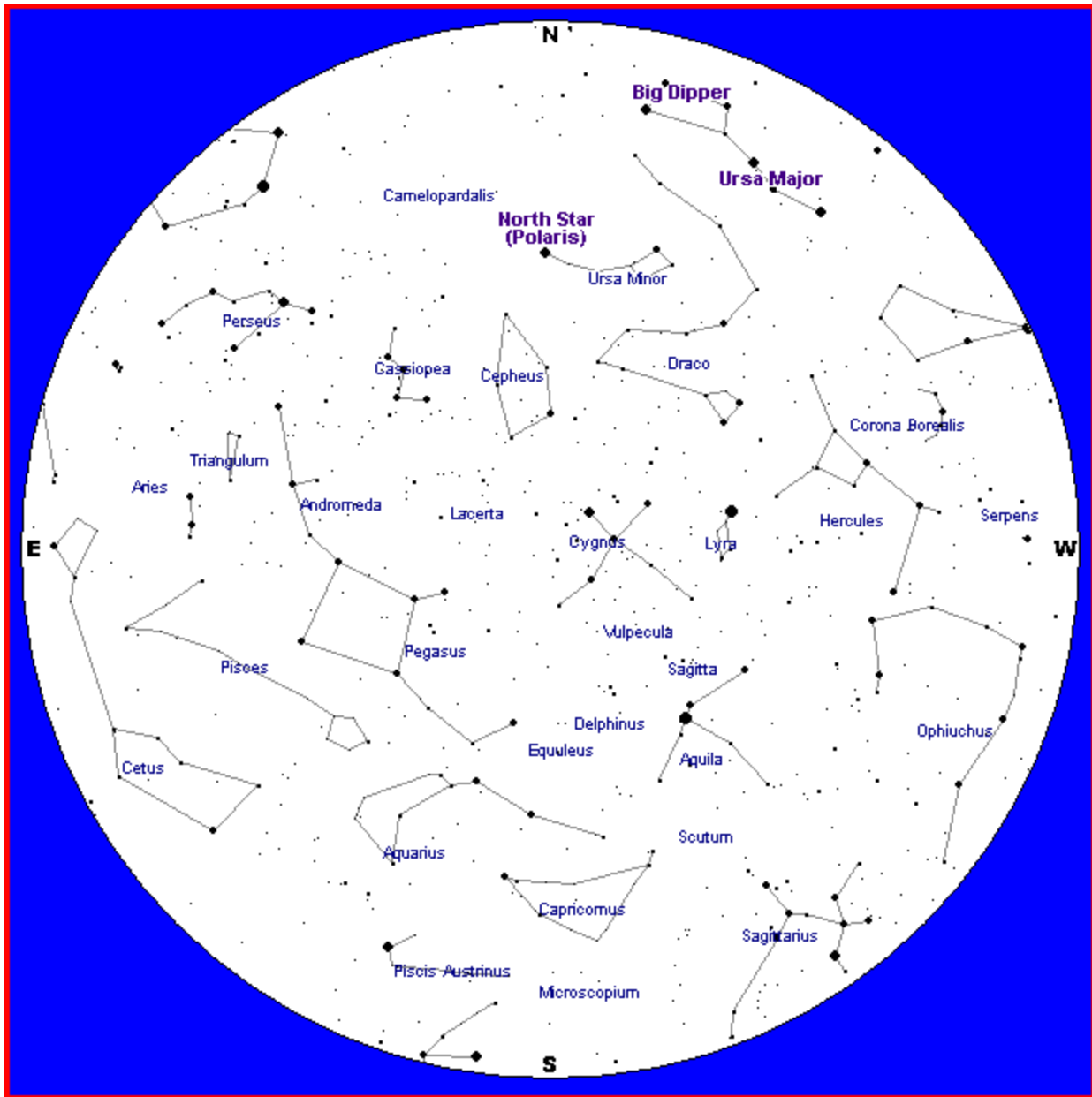
For those who are interested in bringing a group, such as schools or scouts, during the day, please call for more information. These shows are usually given on Tuesday or Thursday mornings.

For further information or reservations, please call John Hopkins at (304)293-3422, extension 1443 or by email at: jhopkins@mail.wvu.edu

Selected Sunrise/Sunset and Moon Rise/Moon Set Times

Date	Sunrise	Sunset	Moon Rise	Moon Set	Moon Phase
Oct 6	7:20 A.M.	6:54 P.M.	None	3:18 P.M.	Last Qtr
Oct 13	7:27 A.M.	6:44 P.M.	6:47 A.M.	6:38 P.M.	New Moon
Oct 20	7:34 A.M.	6:33 P.M.	2:54 P.M.	None	First Qtr
Oct 27	7:42 A.M.	6:24 P.M.	6:13 P.M.	7:06 A.M.	Full Moon
Nov 5	6:52 A.M.	5:13 P.M.	None	2:02 P.M.	Last Qtr
Nov 12	7:00 A.M.	5:07 P.M.	7:03 A.M.	5:04 P.M.	New Moon
Nov 19	7:08 A.M.	5:01 P.M.	1:44 P.M.	None	First Qtr
Nov 26	7:15 A.M.	4:57 P.M.	4:42 P.M.	7:10 A.M.	Full Moon
Dec 4	7:23 A.M.	4:55 P.M.	None	12:54 P.M.	Last Qtr
Dec 11	7:30 A.M.	4:55 P.M.	7:11 A.M.	4:22 P.M.	New Moon
Dec 18	7:34 A.M.	4:47 P.M.	12:38 P.M.	None	First Qtr
Dec 26	7:38 A.M.	5:01 P.M.	4:52 P.M.	8:00 A.M.	Full Moon

October 2004 Sky Chart* for:
10:00 P.M at the beginning of the month
9:00 P.M in the middle of the month
8:00 P.M at the end of the month



*Sky Chart used with the kind permission of **Heavens-Above** at <http://www.heavens-above.com/>

The TOMCHIN PLANETARIUM is named in honor of the late Harold Tomchin, of Princeton, W.Va., who made a generous donation to ensure its continuing operation, and whose family continues to support the planetarium for the educational benefit of WVU students, staff, and faculty members, as well as the local community. Contributions can be made in support of the planetarium through the WVU Planetarium Project at the WVU Foundation, Inc., phone (304)284-4000. Thank You.



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