www.searchforET.org

National Radio Astronomy Observatory
Green Bank Science Center
Route 28/92
Green Bank, WV 24944
304-456-2150

Green Bank Science Center GPS coordinates:
38° 25.482 N
79° 49.393 W

Open Thursday – Monday 8:30 a.m. – 7:00 p.m. during September
Free Guided Tours every hour on the top of the hour
9:00 AM - 6:00 PM

NRAO

The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.

POCAHONTAS COUNTY
West Virginia
Nature's Mountain Playground

SNOWSHOE MOUNTAIN

Pearl S. Buck Birthplace

THE SKI BARN
SNOW CREEK

CASS
scenic railroad
State Park

Droop Mountain Battlefield
State Park

Greenbrier River Trail

SENECA
STATE FOREST

WATOGA
State Park

Appalachian
Sport & Lodge

West Virginia
Wild and Wonderful

SETI @ 50

Celebrating the Search for ET

DRAKE EQUATION PASSPORT

Are We Alone?

Are we alone? One of the most profound questions we humans ask. The search for ET began in Green Bank, West Virginia fifty years ago. A young astronomer, a new radio telescope and this one question added up to a big idea! Dr. Frank Drake set out to make the first attempt at answering this very question, thus, the Search for Extraterrestrial Intelligence (SETI) began. Now, fifty years later and many experiments later, the quest continues. You can celebrate this remarkable anniversary with the National Radio Astronomy Observatory (NRAO) the whole month of September 2010.

SETI month Special Event Schedule	
September 4 - 25	Passport program all month
September 4th	ET The Extra-Terrestrial film, 7:00 p.m.
September 11th	Dr. Frank Drake - lecture 7:30 p.m. Star Party will follow lecture
September 18th	Children's Art/Essay/Poetry Show
September 25th	Dr. Robert Rood - lecture 7:30 p.m.

How to Use the Passport

Step 1 With passport and county map in-hand, explore Pocahontas County attractions.

Step 2 Along the way, collect Drake Equation stamps for each page of the passport. All Drake Equation stamps are available at each partner location listed on the next page. Each Drake Equation page requires a stamp so you will need to visit at least 7 partner locations.

Step 3 Present your completed passport at the National Radio Astronomy Observatory for a free participation prize. Register for the grand prize drawing when you receive your prize. The grand prize will be drawn September 25th. You need not be present to win.

Enjoy exploring!

notes

notes

Passport & Geocaching Partners

Road signs will identify most partner locations with the exception of geocache sites. Look for the alien head road sign and use the accompanying Pocahontas County map. September days of operation noted.

For guests geocaching, be sure to validate your location too. A location validation stamp will be included in the geocache.

National Radio Astronomy Observatory
Rt. 28/92 Green Bank, WV
Open Thursday - Monday
Official passport pickup, stamp location, geocache, prize location
304-456-2150
GPS coordinates:
38° 25.899 N - 79° 48.982 W

Pocahontas County Visitor Center
2nd Ave. Marlinton, WV
Open Daily
Official passport pickup, stamp location
800-336-7009

Cranberry Mountain Nature Center & Pocahontas County Visitor Center
Rt. 39, 6 miles west of Mill Point., WV
Open Thurs. - Mon.
Stamp location
304-653-4826

Pearl S. Buck Birthplace Museum
Rt. 219 Hillsboro, WV
Open Monday - Saturday
Stamp location
304-653-4430

Snowshoe Mountain Resort
Rt 66 Snowshoe, WV
Mountain Top Check-in
Open Daily
Stamp location
304-572-1000

Durbin Historical Train Depot & Pocahontas County Visitor Center
Main Street, Durbin, WV
Open Saturday & Sunday
Stamp location

Passport & Geocaching Partners

Droop Mountain Battlefield State Park
Rt. 219, 3 miles south of Hillsboro ,WV
Open Daily
Geocache location
304-653-4254
GPS coordinates:
38° 06.993 N - 80° 16.254 W

Appalachian Sport & Lodge
Rt. 219 & 39 intersection
Marlinton, WV.
Open Daily
Stamp location
304-799-4050

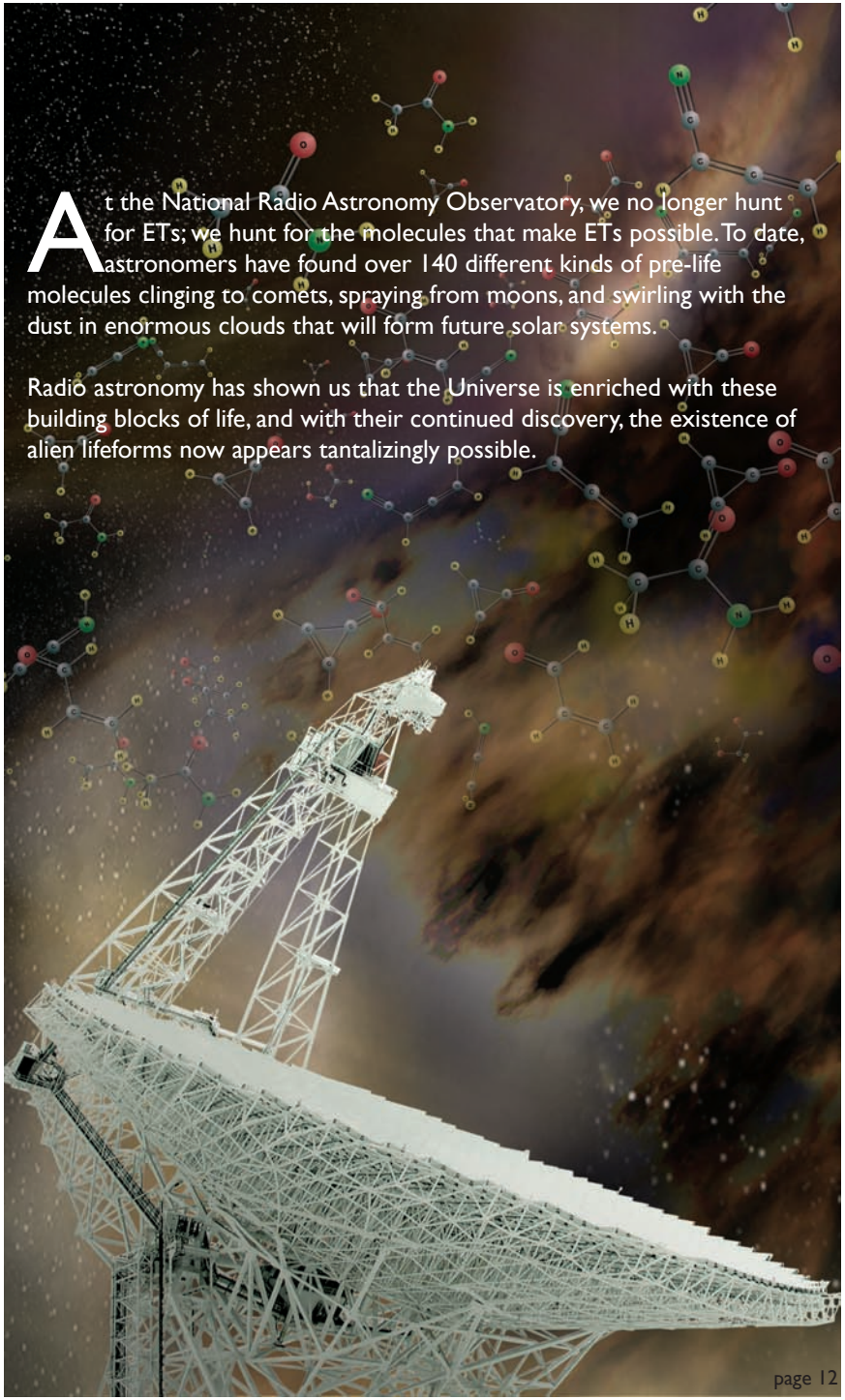
Ski Barn
Rt. 219 & 66 intersection,
Snowshoe, WV
Open Daily
Stamp location
304-572-1234

Cass Scenic Railroad State Park & Pocahontas County Visitor Center
Rt. 66 Cass, WV
Open Labor Day, Fri. - Sun. Sept. 7-25
Stamp location, geocache anytime
304-456-4300
GPS coordinates:
38° 23.879 N - 79° 54.926 W

Watoga State Park
Seebert Road (co Rt. 21/27) Open daily
Geocache location
304-799-4087
GPS coordinates:
38° 07.048 N - 80° 07.512 W

Seneca State Forest
Rt. 28 Dunmore, WV
Open Daily
Geocache location
304-799-6213
GPS coordinates:
38° 18.427 N - 79° 56.512 W

Greenbrier River Trail State Park
Open Daily
Geocache location
GPS coordinates
38° 13.696 N - 80° 05.342 W

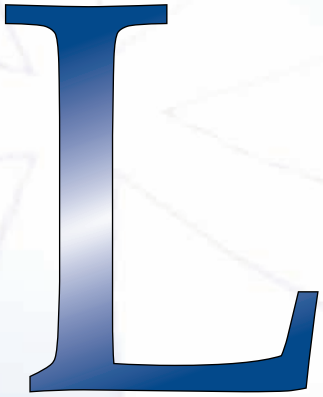


L

LOCATION VALIDATION

L is the fraction of the planet's life during which the communicating civilizations live.

L STAMP GOES HERE



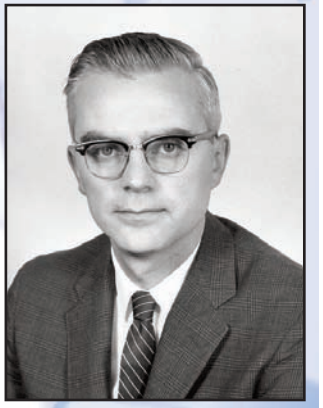
Question: For each civilization that does communicate, for what fraction of the planet's life does the civilization survive?

Answer: This is the toughest of the questions. If we take Earth as an example, the expected life time of our Sun and the Earth is roughly 10 billion years. So far we've been communicating with radio waves for less than 100 years. How long will our civilization survive? Will we destroy ourselves in a few years like some predict or will we overcome our problems and survive for millennia? If we were destroyed tomorrow the answer to this question would be 1/100,000,000th. If we survive for 10,000 years the answer will be 1/1,000,000th.

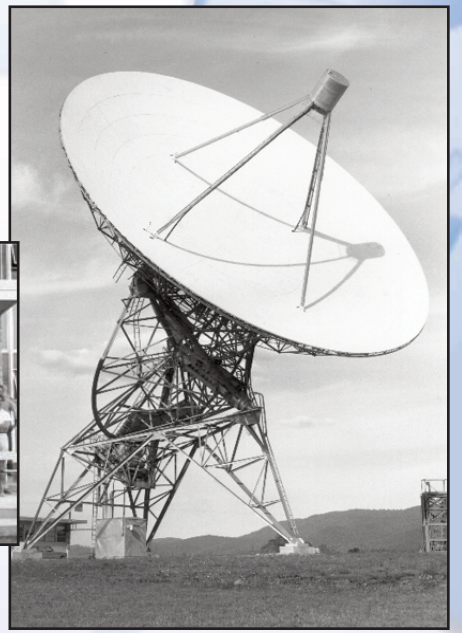
The Drake Equation

$$N = R^* f_p n_e f_\ell f_i f_c L$$

Is there a way to estimate the number of technologically advanced civilizations that might exist in our Galaxy? While working at the NRAO in Green Bank, West Virginia, Dr. Frank Drake *(pictured right)* conceived a means to mathematically estimate the number of worlds that might harbor beings with technology sufficient to communicate across the vast gulfs of interstellar space. The Drake Equation, as it came to be known, was formulated in 1961 and is generally accepted by the scientific community.



The famous Drake Equation was actually the agenda for the world's first SETI meeting in 1961. A plaque now graces the very wall of the room at NRAO Green Bank, WV which once held the blackboard on which the equation was first written.

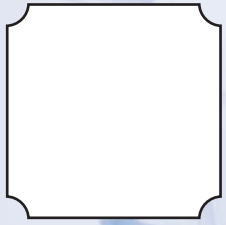


NRAO staff in 1961 *(above)* and the 85-1 Tatel telescope used for project OZMA *(right)*.

R^*

R^* represents the number of stars in the Milky Way Galaxy.

LOCATION VALIDATION

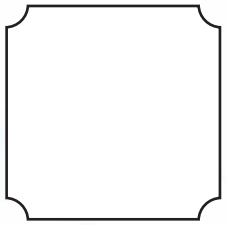


Question: How many stars are in the Milky Way Galaxy?
Answer: Current estimates are 100 billion.

f_c

f_c s the fraction of f_i that communicate.

LOCATION VALIDATION



Question: What percentage of intelligent races have the means and the desire to communicate?
Answer: 10% to 20%.

f_i

f_i is the fraction of f_l where intelligent life evolves.

f_i STAMP GOES HERE

LOCATION VALIDATION

Question: On the planets where life does evolve, what percentage evolves intelligent life?

Answer: Estimates range from 100% (intelligence is such a survival advantage that it will certainly evolve) down to near 0%.

f_p

SETI @ 50

f_p is the fraction of stars that have planets around them.

f_p STAMP GOES HERE

LOCATION VALIDATION

Question: What percentage of stars have planetary systems?

Answer: Current estimates range from 20% to 50%.

n_e

n_e is the number of planets per star that are capable of sustaining life.

LOCATION VALIDATION

n_e STAMP GOES HERE

Question: For each star that does have a planetary system, how many planets are capable of sustaining life?

Answer: Current estimates range from 1 to 5.

f_l

f_l is the fraction of planets in n_e where life evolves.

LOCATION VALIDATION

f_l STAMP GOES HERE

Question: On what percentage of the planets that are capable of sustaining life does life actually evolve?

Answer: Current estimates range from 100% (where life can evolve it will) down to close to 0%.