



CARL SAGAN

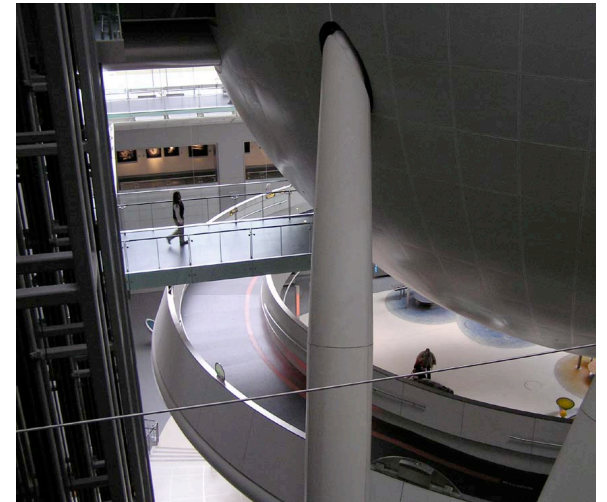
(November 9, 1934-December 20, 1996)

- American Astronomer
- Astrophysicist
- Author
- Cosmologist
- Popularizer of astronomy



Before Carl Sagan was Carl Sagan

- Born in Brooklyn, NY, Russian Jewish family
 - Father a garment worker, not very religious
 - Mother a housewife, active in Jewish temple
 - Encouraged his interest in nature & universe
 - Went to the 1939 World Fair
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- Studied stars & universe at the library
 - Frequented Museum of Natural History & Hayden Planetarium
 - Recounts his youth in his books



Education & College Career

Attended University of Chicago

- 1954 – B.A. in Arts with General & Special honors
- 1955 B.S. of Science
- 1956 Masters of Science in Physics
- 1960 PhD in Astronomy and Astrophysics
- Lectured and researched at Harvard until 1968
- Directed the Laboratory for Planetary Studies at Cornell from 1972 to 1981
- Associate Director of the Center for Radio Physics and Space Research at Cornell.



Books and Film

- Wrote over 600 papers
- Wrote and co-wrote more than 20 books
- Became popular when Cosmos became a PBS mini-series – most watched television show in history, generating more than 500 million viewers in 60 countries.
- Co-produced Contact Time Warner movie (died before production finished)

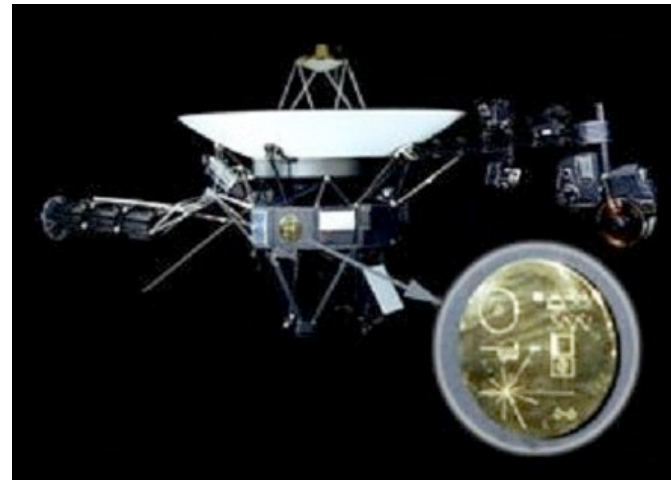
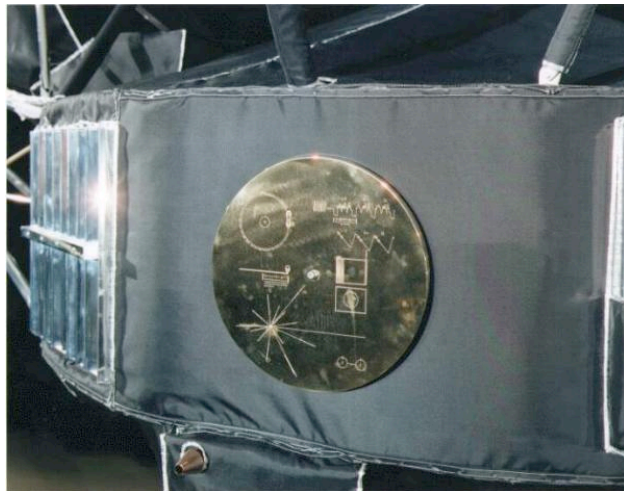
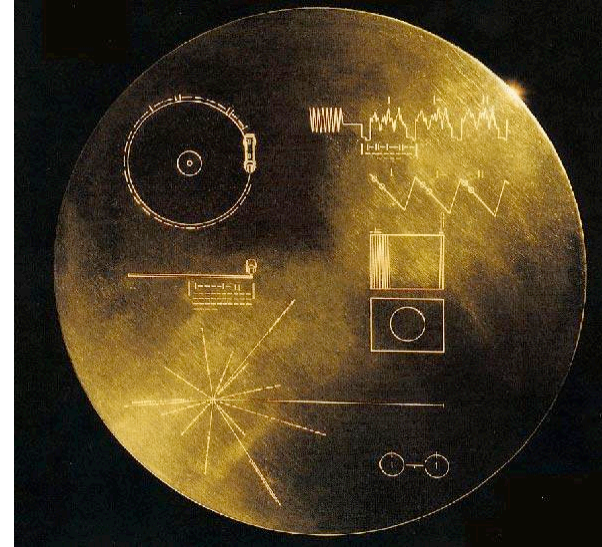
“All of the books in the world contain no more information than is broadcast as video in a single large American city in a single year. Not all bits have equal value.”

Scientific Achievements

- Leading role in the American space program since its inception.
- Consultant and adviser to NASA since the 1950's, briefed the *Apollo* astronauts before their flights to the Moon, and was an experimenter on the *Mariner*, *Viking*, *Voyager*, and *Galileo* expeditions to the planets.
- Helped solve mysteries of high temperatures of Venus (answer: massive greenhouse effect), seasonal changes on Mars (answer: windblown dust), and reddish haze of Titan (answer: complex organic molecules).
- Among first to hypothesize Saturn's moon Titan's surface oceans and Jupiter's moon Europa subsurface oceans
- Perceived Global Warming as growing, man made danger and compared it to the natural development of hot, life-hostile planet of Venus
 - Contributed to Mariner missions to Mars

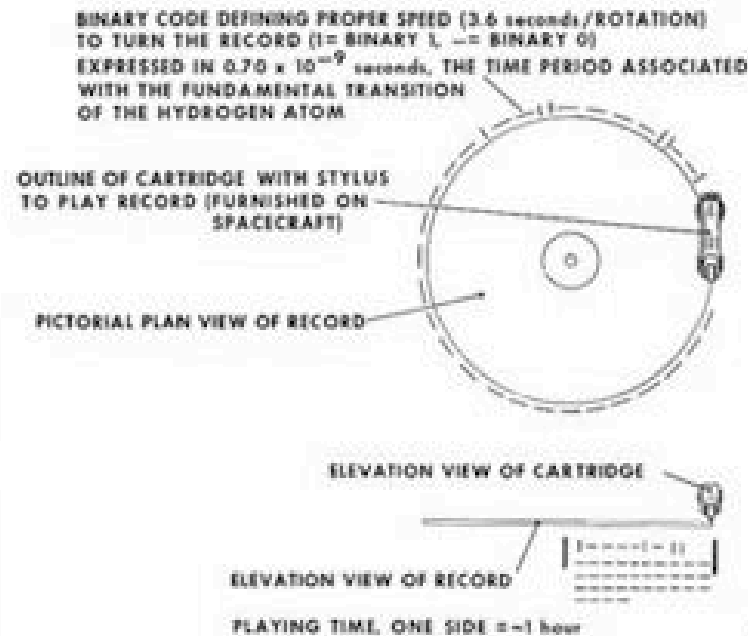
Best known for his research on extraterrestrial life

- Invented the Voyager Golden Record

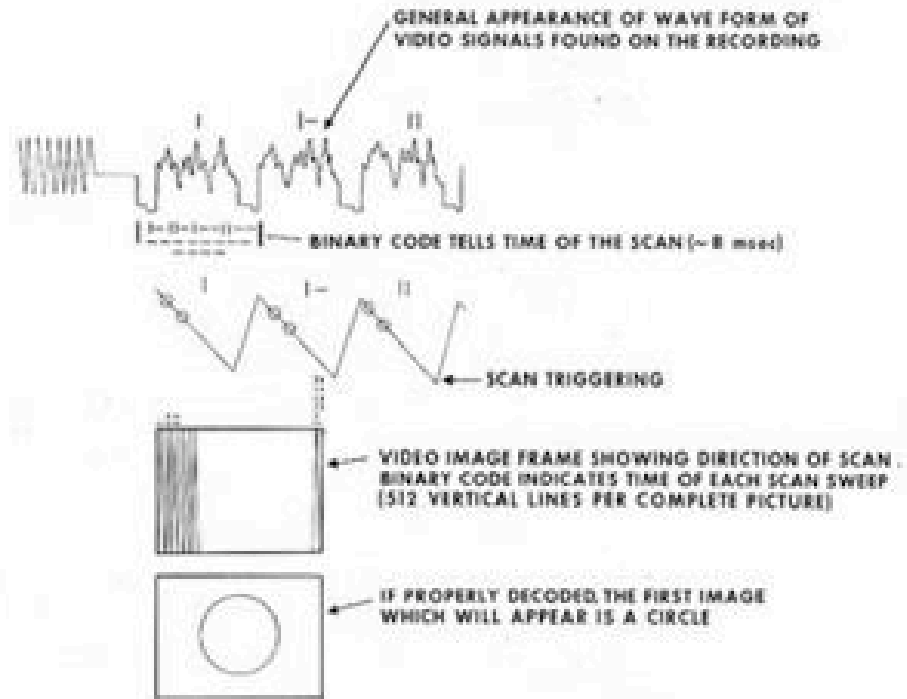
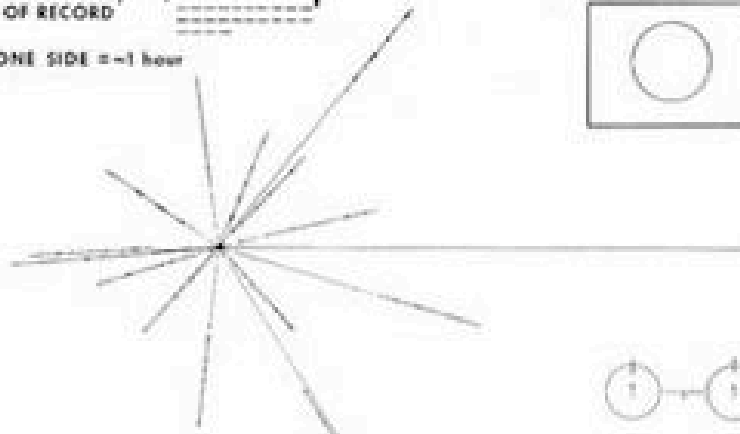


EXPLANATION OF RECORDING COVER DIAGRAM

THE DIAGRAMS BELOW DEFINE THE VIDEO PORTION OF THE RECORDING



THIS DIAGRAM DEFINES THE LOCATION OF OUR SUN UTILIZING 14 PULSARS OF KNOWN DIRECTIONS FROM OUR SUN. THE BINARY CODE DEFINES THE FREQUENCY OF THE PULSES.



THIS DIAGRAM ILLUSTRATES THE TWO LOWEST STATES OF THE HYDROGEN ATOM. THE VERTICAL LINES WITH THE DOTS INDICATE THE SPIN MOMENTS OF THE PROTON AND ELECTRON. THE TRANSITION TIME FROM ONE STATE TO THE OTHER PROVIDES THE FUNDAMENTAL CLOCK REFERENCE USED IN ALL THE COVER DIAGRAMS AND DECODED PICTURES.

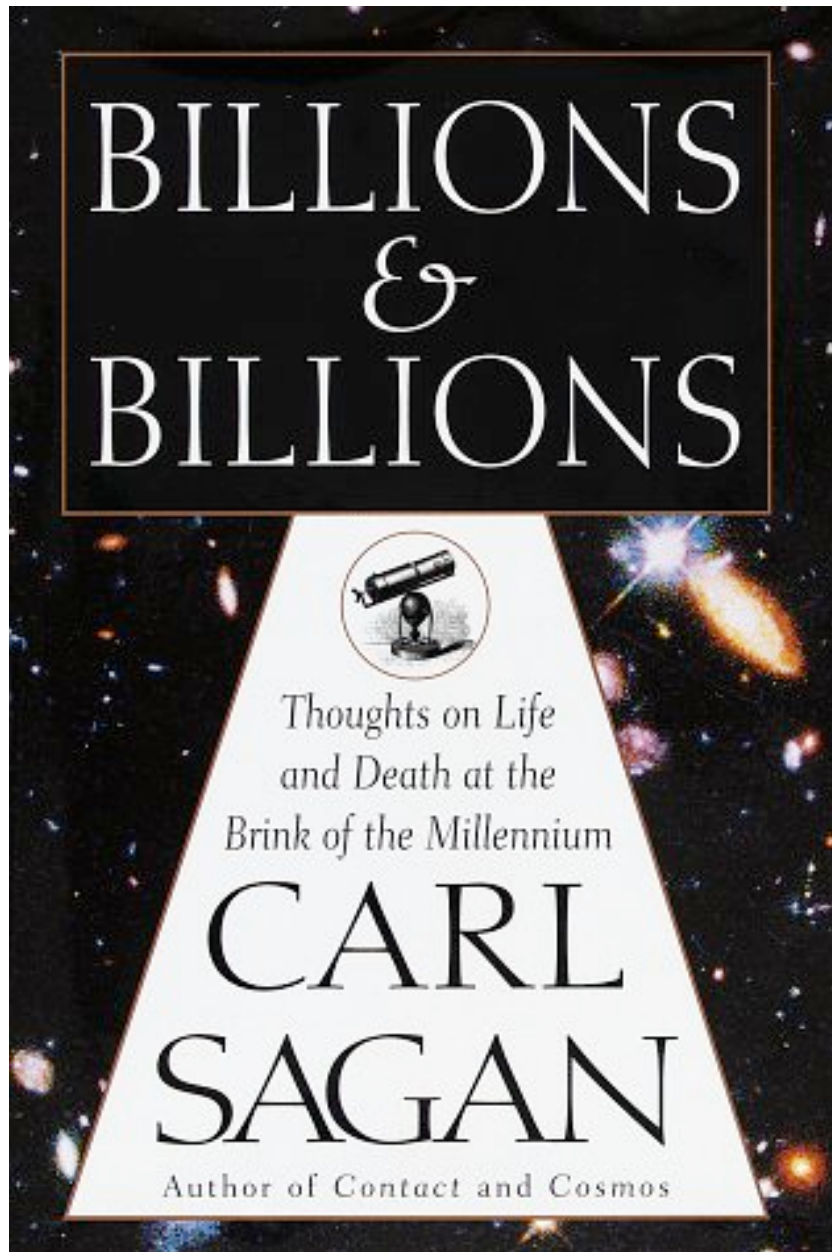
Pioneered and Advocated

- **Skeptical inquiry** is a practical, epistemological position in which one questions the veracity of claims lacking empirical evidence.
- The term is most commonly applied to the examination of claims and theories, which appear to be beyond mainstream science, rather than to the routine discussions and challenges among scientists.
- Scientific inquiry is different from philosophical skepticism, which questions our ability to claim any knowledge about the nature of the world and how we perceive it.
- Scientific inquiry uses critical thinking and inductive reasoning while attempting to oppose claims made which lack suitable evidential basis.

- **Scientific method** refers to a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge.
- To be termed scientific, a method of inquiry must be based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning.
- A scientific method consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses.

- **Astrobiology** is the study of the origin, evolution, distribution, and future of life in the universe and encompasses the search for:
 - Habitable environments in our Solar System
 - Habitable planets outside our Solar System
 - Evidence of prebiotic chemistry, laboratory and field research into the origins and early evolution of life on Earth
 - Studies of the potential for life to adapt to challenges on Earth and in outer space and promoted the Search for Extra-Terrestrial Intelligence (SETI).

- Won numerous awards including the Masursky Award of the American Astronomical Society -- "For his extraordinary contributions to the development of planetary science...As a scientist trained in both astronomy and biology, Dr. Sagan has made seminal contributions to the study of planetary atmospheres, planetary surfaces, the history of the Earth, and exobiology. Many of the most productive planetary scientists working today are his present and former students and associates."



Fun Stuff

- Unit of measure: a Sagan is equal to at least four billion since the lower bound of a number conforming to the constraint of *billions and billions* to be two billion plus two billion
- Asteroid 2709 Sagan is named after him.

References

- **Carlsagan.com**
- **Wikipedia**
- **http://www.mnsu.edu/emuseum/information/biography/pqrst/sagan_carl.html**