

JINS 362 Extraterrestrial Life

When I look at thy heavens, the work of thy fingers,
the moon and the stars which thou hast established;
What is man that thou art mindful of him,
and the son of man that thou dost care for him?

Psalms 8: 3-4

Glendower: I can call spirits from the vasty deep.
Hotspur: Why, so can I, or so can any man,
but will they come when you do call for them?

Shakespeare
Henry IV, Part I
Act 3 scene i

The eternal silence of these infinite spaces frightens me

Blaise Pascal (1546-1601)

Sometimes I think we're alone. Sometimes I think we're not. In
either case, the thought is staggering.

Buckminster Fuller (1895 -1983)

Where is everybody?

Enrico Fermi (1901-1954)

If 1 percent of civilizations can survive technological
adolescence, ... the number of extant civilizations in the
Galaxy is in the millions.

Carl Sagan (1934-1996)

Extraterrestrial intelligent beings do not exist.

Frank J. Tipler, 1981

JINS 362 Extraterrestrial Life

MG 220, TTh, 10:30-12:00

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Office Hours: M 10-12, W 1-3, by chance, or by appointment

Introduction

One of the most pervasive beliefs of the modern world is that life on the earth is not unique. The search for extraterrestrial life and exobiology (or astrobiology) are legitimate subdisciplines within astronomy and biology, and images of imagined extraterrestrials permeate popular culture in books, television, and movies. Yet, despite the near universality of the belief in extraterrestrial life, we actually do not know, in fact, if life exists in any form outside of the earth. In this course, we will look at the issue of extraterrestrial life from a variety of perspectives, in particular many of the arguments for and against its existence. Because the debate is open-ended (we haven't yet met or heard from any extraterrestrials—at least that we know of!), there remains much room for continued debate on the issue.

Textbooks:

Michael J. Crowe. *The Extraterrestrial Life Debate: Antiquity to 1915: A Sourcebook*, unpublished manuscript, 2004 (used by kind permission of Dr. Crowe of the University of Notre Dame).

Steven J. Dick. *Life on Other Worlds: The 20th-Century Extraterrestrial Life Debate*. Cambridge: Cambridge University Press, 1998.

William Whewell. *Of the Plurality of Worlds*. Edited by Michael Ruse. Chicago: University of Chicago Press, 2001.

Stephen Webb. *If the Universe Is Teeming with Aliens-- Where Is Everybody? Fifty Solutions to the Fermi Paradox and the Problem of Extraterrestrial Life*. New York: Copernicus Books, 2002.

Handouts of primary and secondary sources on the twentieth century debate. Some articles will also be available electronically on JSTOR.

Course Objectives:

The primary objective of the course is the production of a major position paper on the issue of extraterrestrial life. You will compose this paper in stages as we encounter material that approaches the subject from different disciplines. Throughout the semester, we will be encountering arguments for and against the existence of extraterrestrial life or intelligence from historical, scientific, philosophical, and theological perspectives. Your goal is to evaluate each of these arguments, choose those which you find most compelling and compose your own position on the existence of extraterrestrial life.

Course Mechanics:

Readings: This course will have a significant amount of reading, but there will be no exams and no outside research projects to add to it. You will be required to maintain a notebook on your reading throughout the semester. This will enable you to digest the major arguments and points and make writing about them easier. Treat the course as a research project in which your topic and the relevant readings are all chosen, and all that remains is reading and evaluating them. Some works will be based on physics, astronomy, or biology. Don't panic, read them primarily for the overall arguments contained in them, and we will discuss the specifics in class, if necessary.

Writing Assignments: During the first week of class, you will write a two-page statement paper outlining your initial thoughts on the existence of extraterrestrial life. Throughout the semester, you will then write a much longer position paper, in which you enlarge, revise, and reconstruct your initial paper in reaction to the various readings of the course. There will be four written drafts. The fifth and final draft will be the "final" statement of your position. Your fellow students will edit two of these drafts and I will edit the other two drafts for content and argument, and you will be expected to extensively revise and rewrite your papers, not simply correct them.

Participation: The class will be primarily discussion-based. Please come to class prepared, by having done the readings for the day, and by formulating questions about them for me or for the class. Answer questions! Ask questions! Feel free to raise any point that may be important. I hope that class discussion will significantly increase your understanding of your position on the issue. You will also be required to maintain a notebook on class discussion.

Leading Discussion: You will be assigned to a small reading group that will be responsible for leading the discussion for at least one class period. Well before the day you are assigned (a week beforehand), your group will need to prepare a discussion sheet (one page) for the class that outlines the issues raised in the readings for your day and the questions to think about for that day's discussion. Your preparation will also require some additional reading. Half of your participation grade will be based on your discussion sheet and your leading discussion.

Grading Scheme (There is a total of 1000 points):

Initial Statement Paper: 50 points

Drafts of Paper: 320 points (80 points each)

Peer reviews: 80 points (40 points each)

Journal on reading/discussion: 100 points (50 points at mid-term, 50 points at end-term)

Final Paper: 200 points

Participation: 200 points

Tentative Due Dates on Papers

Paper 1: Tuesday, February 10, 2004

Paper 2: Tuesday, February 24, 2004

Peer review of paper 2: Tuesday March 2, 2004

Paper 3: Tuesday, March 23, 2004

Paper 4: Thursday, April 15, 2004

Peer review of Paper 4: Thursday, April 22, 2004

Final Paper: May 6, 2004 (comprehensive)

Tentative Schedule

Topics and readings listed here are general and subject to change. Reading assignments for each day will be given on separate handouts.

Date	Subject
January 13, 15	Introduction Ancient and Medieval concepts of plurality
January 20, 22	The Copernican Principle, 1543-1700
January 27, 29	Extraterrestrials and eighteenth century astronomy No class, January conference
February 3, 5	Extraterrestrials and the Enlightenment The early nineteenth century
February 10, 12	William Whewell and the denial of plurality Pluralism defended: the late nineteenth century
February 17, 19	Alfred Russel Wallace: pluralism and evolution Schiaperelli, Lowell, and the canals on Mars
February 24, 26	Maunder, Antoniadi, and the demise of Canals on Mars The <i>Viking</i> landers, 1976
March 2, 4	The <i>Viking</i> landers (con.) Martian meteorites in the Antarctic, 1996
March 9, 11	Spring Break
March 16, 18	Martian Meteorites (continued) Panspermia
March 23, 25	The Oparin-Haldane Hypothesis Organic Soups
March 30, April 1	Inorganic Scaffolding Is life by design, chance, or miracle?
April 6, April 8	No class, Student Research Conference Design, chance, or miracle? (continued)
April 13, 15	How to contact Extraterrestrials—The SETI Program The SETI Program (continued)
April 20, 22	The Fermi Paradox: Where is Everybody? The Fermi Paradox (continued)
April 27, 29	SETI and the limits of science
May 4 May 6	Final Discussion and conclusions Final paper due

Books on reserve

General works on extraterrestrial life

Crowe, Michael J. *The Extraterrestrial Life Debate, 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell*. Cambridge: Cambridge University Press, 1986. (two copies)

Dick, Steven J. *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant*. Cambridge: Cambridge University Press, 1982.

Dick, Steven J. *The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science*. New York: Cambridge University Press, 1996. (two copies)

Steven J. Dick. *Life on Other Worlds : The 20th-Century Extraterrestrial Life Debate*. Cambridge: Cambridge University Press, 1998. This is an abridged version, without footnotes, of *The Biological Universe*

Guthke, Karl Siegfried. *The Last Frontier: Imagining Other Worlds, from the Copernican Revolution to Modern Science Fiction*. Translated by Helen Atkins. Ithaca, N.Y.: Cornell University Press, 1990.

Stephen Webb. *If the Universe Is Teeming with Aliens-- Where Is Everybody? Fifty Solutions to the Fermi Paradox and the Problem of Extraterrestrial Life*. New York: Copernicus Books, 2002.

William Whewell. *Of the Plurality of Worlds*. Edited by Michael Ruse. Chicago: University of Chicago Press, 2001.

Related works

Keay Davidson. *Carl Sagan: A Life*. New York: J.Wiley, 1999.

Crowe, Michael. *Modern Theories of the Universe from Herschel to Hubble*. New York: Dover Publications, 1994.

John Farley. *The Spontaneous Generation Controversy from Descartes to Oparin*. Baltimore: Johns Hopkins University Press, 1977

John North. *The Norton History of Astronomy and Cosmology*. New York: Norton, 1994.

See also Charles Gillispie, ed., *Dictionary of Scientific Biography*, 16 vols, (Scribner's, 1970-1981). This is in the *reference* section of the library.

Bibliographies

Donald Goldsmith. *The Quest for Extraterrestrial Life: A Book of Readings*. Mill Valley, Calif.: University Science Books, 1980.

David W. Deamer, ed. *Origins of Life: The Central Concepts*. Boston, 1994.