

# SCIENCE AND SCIENCE FICTION

## With Emphasis on Chemistry and Science Fiction

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**Science Fiction** is fiction that involves science as part of the story. The science can involve a major role in the story or can just be part of the setting for the story. For example, the movie *Outland* is basically a western story (*High Noon*) set in a future mining colony on Io. The classic film *Forbidden Planet* uses the science in a major role.

Science fiction stories and films often ask *What if?* That is, they extrapolate current science, technology, and social issues to a future society or world. *Star Trek*, has often focused on contemporary social issues in their future society.

Science fiction can be an effective tool for teaching across the curriculum since it involves reading and critical analysis of stories and characters, science principles, technology, social issues, and, even history. (The *Star Trek Voyager* episode "Distant Origins" was a futuristic version of Galileo's trial.)

To utilize science fiction in the science classroom, it is the opinion of this author that the students should experience a wide range of science fiction short stories coupled with science articles so that they can understand how the science is effectively incorporated into the stories and be able to discuss the plausibility of the science. The inclusion of television shows and movies, if time permits, is another way to explore the science. Finally, the students should write their own science fiction stories.

The following is a short list of some useful materials for teaching science and science fiction.

#### Reference works:

Stocker, Jack H., Editor, *Chemistry and Science Fiction*, American Chemical Society, 1998.

The result of an ACS symposium on "Chemistry and Science Fiction". Contains an excellent paper on "Science in Science Fiction: A Writer's Perspective" by Connie Willis, three short stories, including two classics by Issac Assimov, and an excellent list of recommendations for further reading. (Essential reference)

Nicholls, Peter, and John Clute, Editors, *The Encyclopedia of Science Fiction*, (Reprint Edition) St. Martins Press, 1995.

An excellent resource. Also available on CD ROM as the *Grolier Multimedia Encyclopedia of ScienceFiction*. The CD ROM version has short videos of science fiction authors, movie stills and videos, book search capabilities and more. The book and/or the CD are necessary resources for teaching science fiction.

Nicholls, Peter, *The Science in Science Fiction*, Crown Books, 1987.

Out of print, but worth searching for. Examines the science in science fiction books and films,

Clute, John, *Science Fiction, The Illustrated Encyclopedia*, Dorling Kindersley, 1995.

An excellent illustrated history of science fiction. Another essential reference.

Pringle, David, *The Ultimate Guide to Science Fiction*, Pharos Books, 1990.

A guide to science fiction books with short descriptions with one to four star ratings. Very useful.

## Short Stories, Books, and Science Articles

Piper, H. Beam, *Omnilingual*. In Hipolito, Jane and Willis E. McNelly, Eds., *Mars We Love You: Tales of Mars, Men and Martians, 1971* OR Dikty, T.E., Ed., *Great SF Stories about Mars, 1966*.

Trying to decipher writings of a long dead Martian civilization, the periodic table becomes the Rosetta Stone. (Essential reading.)

Should be accompanied by a discussion of the Rosetta Stone and its importance in learning to read Egyptian hieroglyphics.

Discussion should state that the chemical elements are universal. We have never detected an element, anywhere in the universe, that is not on the periodic table.

Willis, Connie, *The Sidon in the Mirror*. In Dozois, Gardner, *The Year's Best Science Fiction, First Annual Collection, 1984*.

Uses Harlow Shapley's theory of stellar evolution setting a story on the crust of a burned out star where a colony is mining hydrogen. No metal is permitted due to the hydrogen that constantly leaks into the air from the core of the star. A Three Mile Island type situation.

Willis, Connie, *Ado*. (Short story)

Political correctness goes too far in a future school when the class decides to read Shakespeare.

Willis, Connie, *At The Rialto*. In Preiss, Byron, *The Microverse, 1989*.

Quantum mechanics at a scientific meeting in Hollywood. The science is well done, but some reading between the lines is needed.

Asimov, Isaac, *The Last Question*. (short story)

The question is proposed by civilization as it progresses into the future: "Can entropy be reversed?"

Asimov, Isaac, *As Chemist to Chemist*. In Scithier, George, Ed., *Isaac Asimov's Worlds of Science Fiction*.

The periodic table and atomic numbers are needed to solve a puzzle.

Asimov, Isaac, *The Endochromic Properties of Resublimated Thiotimoline*. In Stocker, Jack H., Editor, *Chemistry and Science Fiction*, American Chemical Society, 1998.

Written in the format of a scientific paper, the compound thiotimoline is so soluble, it dissolves before coming in contact with the solvent. (There are several more stories on the same "compound". See the bibliography in Stocker.)

Asimov, Isaac, *Pate de Foie Gras*. In Stocker, Jack H., Editor, *Chemistry and Science Fiction*, American Chemical Society, 1998.

A modern goose that lays golden eggs.

Asimov, Isaac, *Too Bad!*, In Preiss, Byron, *The Microverse, 1989*.

Nanotechnology combines with robotics to save a patient with cancer

Bear, Greg, *Blood Music, 1985*.

Considered the first novel to deal with nanotechnology.

Science article: Stix, Gary, *Waiting for Breakthroughs*, Scientific American, April 1996. An excellent article on nanotechnology.

Bradbury, Ray, *A Sound of Thunder*.

The classic time travel story. Trips to the past to hunt dinosaurs, but in a strictly narrow range of conditions.

Science article: Deutsch, David and Michael Lockwood, *The quantum Physics of Time Travel*, Scientific American, March 1994.

Bradbury, Ray, *The Golden Apples of the Sun*. From the book of the same name.

Taking pieces of the sun for energy needs. (Good story to initiate discussion of nuclear fusion.)

Clarke, Arthur C., *History Lesson*. (Short story)

An expedition from Venus tries to understand what long dead Earth people were like from an old movie film.

Keyes, Daniel, *Flowers for Algernon*. (Short story - also on film – but the written word is more powerful.)

The classic story of genetic manipulation. A simple man is changed into a genius. The story has greatest impact, as opposed to the film.

Preiss, Byron, Editor, *The Microverse*, Bantam Books, 1989.

An anthology of science essays on DNA, subatomic particles, quantum physics, and more, accompanied by science fiction stories on the same themes. (highly recommended)

Preiss, Byron, Editor, *The Planets*, Bantam Books, 1985.

An anthology of science essays on the planets accompanied by science fiction stories.

Preiss, Byron, Editor, *The Universe*, Bantam Books, 1987.

An anthology of science essays on stars, pulsars, black holes, and other cosmic phenomena accompanied by science fiction stories.

Preiss, Byron, Editor, *The Ultimate Dinosaur*, Bantam Books, 1992.

An anthology of science essays with the most recent information about dinosaurs (at the time of printing) accompanied by science fiction stories.

Preuss, Paul, *Half-Life*, In Preiss, Byron, *The Microverse*, 1989.

The last days of Marie Sklodowska Curie. A wonderful tribute.

Silverberg, Robert, *Chip Runner*. In Preiss, Byron, *The Microverse*, 1989.

A boy wants to become part of a computer.

Science article: Llyod, Seth, *Quantum-Mechanical Computers*, Scientific American, October 1995

Simak, Clifford, *Desertion*. (Short story)

Set on Jupiter. Genetic transformation allows humans to explore the hostile conditions of the giant planet.

A Note on science articles:

*Scientific American* magazine is one of the best sources of science articles that can be used to supply the science behind the science fiction. All the articles that have appeared in *Scientific American* since 1993 are available for viewing or downloading online at <http://www.sciamedigital.com>. A subscription to the online service is required for viewing or downloading or there is a charge for each individual article.

## Anthologies

There are many collections of science fiction stories to search for materials for classroom use. Any "Year's Best Science Fiction" collection, annual of "Hugo Winners", annual of "Nebula Winners", or survey/collection of science fiction stories will generally contain something useful for classroom use.

## Films

Science Fiction films are great fun. Modern CGI techniques continue to evolve and take these films to new levels of visualization and imagination. True science takes a back seat to special effects in the movies as sound travels through space, space ships maneuver better in a vacuum than they do in the atmosphere, new elements are found in alien ships or weapons, radioactivity makes people grow or shrink (also, household products can do the same thing), cold fusion works to produce unlimited energy, a titanium covered space shuttle is not damaged in a crash on an asteroid, time travel changes the past with no future consequences, and more fantastic things occur.

At this writing, most science fiction films are available on video tape and DVD.

Some films that have a chemistry theme or include some fantastic chemistry to examine:

*The Man in the White Suit.* Probably the best representation of a chemist and a laboratory in a story about a new polymeric fiber that resists dirt.

*The Absent-minded Professor.* Flubber may be a little hard to believe, but a fun movie with Fred McMurry playing a Hubert Alyea type of scientist. (The word was that McMurry was a better Alyea than Alyea.) The remake, titled *Flubber*, never approaches the original. (Author's note: Hubert Alyea, Professor of Chemistry at Princeton University was world famous for his chemistry demonstrations as well as his unique style of presentation.)

*It Happens Every Spring.* A formula makes wood (in the form of a baseball bat) repel baseballs.

*The Invisible Man.* The classic H. G. Wells story of an experiment gone wrong because the researcher did not see an article about his work in a little known journal.

*Dr. Jekyll and Mr. Hyde.* A story of a formula that causes a transformation between good and evil in a man.

*Dr. Jekyll and Ms. Hyde.* A modern parody of the classic story where the transformation is a sex change.

*The Nutty Professor.* Jerry Lewis is transformed from a geek to a man-about-town.

*The Nutty Professor.* Eddie Murphy is transformed from fat to thin.

*Frankenstein.* The reanimation of life from dead tissue. The original book contained a section on alchemy and reincarnation, but not mentioned in the film.

*Young Frankenstein.* A classic comedy version of the Frankenstein story.

*Indiana Jones and the Raiders of the Lost Ark.* No chemistry, except for the early scene where Indiana Jones tries to replace a gold idol with a bag of sand. Great illustration of volume vs. density.

*The Saint.* Cold fusion.

*Chain Reaction.* Cold fusion.

*Total Recall.* The core of Mars is composed of ice.

*Predator 2.* Alien weapon made of new material not on the periodic table.

*Jurassic Park.* Reconstructing the DNA of dinosaurs. See: Paabo, Svante, *Ancient DNA*, Scientific American, November 1993.

*The Incredible Shrinking Woman.* Exposure to household products causes a housewife to shrink. (A parody of *The Incredible Shrinking Man*)

*Island of lost Souls* (1932), *The Island of Dr. Moreau* (1977), and *The Island of Dr. Moreau* (1996). Three versions of H. G. Well's story of genetic manipulation (written before the term "genetic manipulation" was invented.)

*Man Made Monster*. An accident with high tension wires turns a man into a human dynamo.

*The Wasp Woman*. Cosmetics gone wrong.

My Atomic War trilogy:

*Fail Safe*. A military computer launches a squadron of SAC bombers to destroy Moscow.

*On The Beach*. A U.S. submarine lands in Australia after nuclear war has devastated the entire northern hemisphere

*Dr. Strangelove or: How I learned To Stop Worrying And Love The Bomb*. A black comedy about nuclear apocalypse.

These should be accompanied by:

*Thirteen Days*. The true story about the Cuban missile crisis.

*The Atomic Café*. A Cold War history of the atomic bomb, its aftermath, and propaganda of the 1950's. (And you thought *Dr. Strangelove* was fiction.)