

Science and Pseudo-Science

-Demarcation of science from pseudo science (case studies: creationism, alternative medicine, astrology)

■ Literature: Thagard; Lakatos; Kitchner

Challenges (Lakatos)

- Historically many accepted scientific theories have been accused of pseudoscience



Trial of Galileo



Lysenko and Mendelian genetics

Kansas State Science Standards

- August 1999, the Kansas State Board of Education voted 6-4 in favour of state science standards from which several topics, including virtually all references to evolution had been deleted. Students will no longer be tested on these topics
- Also deleted were the Big Bang theory, environmental science concept and any mention of geologic time



Figure 1 The bizarre climax of the sensational Scopes trial occurred on the afternoon of 20 July 1925 when Clarence Darrow (right) questioned William Jennings Bryan (left) about the literal truth of the Bible. The Scopes trial remains the most famous event in the evolution-creationism controversy. Photograph courtesy of Bryan College.

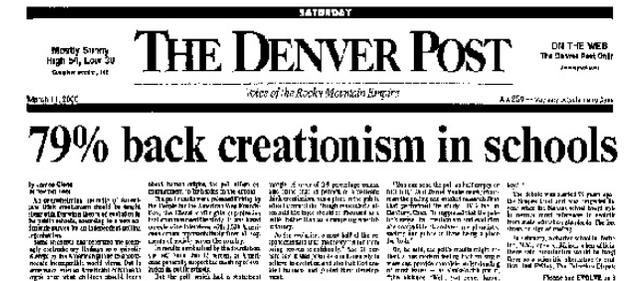


Figure 2 This front-page headline on the 11 March 2000 issue of The Denver Post announced Americans' continuing and overwhelming desire to have creationism taught in public schools.

Decades after monkey trial, debate hasn't evolved much

Theory's detractors say 'popular revolt' under way

By TODD ACKERMAN
Houston Chronicle

Even before he became a Claretan, Jeff Farmer was an opponent of evolution.

His interest in such matters was kindled as a wildlife artist. Farmer studied animal anatomy and as a wildlife biologist built the world's first artificial animal habitats. The more he learned he did, from Farmer, the less certain he became he should be evolution.

"I grew up, like most people, assuming evolution was true," said Farmer, a 1987 University of Houston

graduate who wrote an opinion column for the Chronicle earlier this month calling evolution a "pseudoscience."

"But ultimately, scientists on both sides of the issue are not having a 'popular revolt' in the way we think about evolution," says Farmer.

Three quarters of a century after the Scopes monkey trial, Americans still have a strong interest in evolution and the issue. Since the Kansas Board of Education in August de-emphasized teaching that man descended from a common ancestor, supporters around the country have been inundated with supportive let-

ters to the editor, presidential candidates have taken notice, and polls show an uneasy split over evolution as science.

"It's gotten to the point that leading creationist opponents are warning that a 'popular revolt' is under way."

The state of affairs is raising its eyebrows, who believe that evolution is as well documented as Darwin's revelation across the sea. To deny evolution means believing that Earth is less than 10,000 years old, that carbon dating is false, that the universe once grew much as it did at the beginning of time. No wonder.

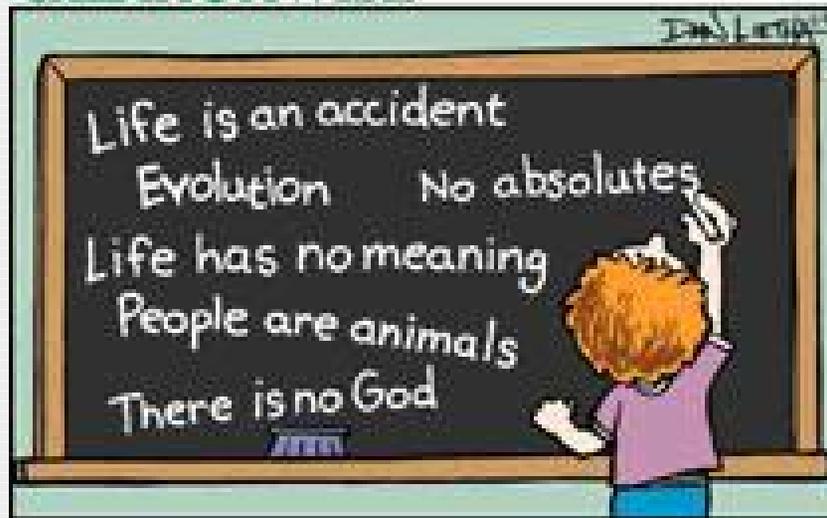
See EVOLUTION on Page 16A.

Figure 3 Decades after the Scopes trial, the evolution-creationism debate rages on in the United States. This article appeared on the front page of the Houston Chronicle on 18 September 1999.

Science and Religion: Creationists

- deny that evolutionary theory is a science
- state that evolution is just a statement of faith
- suggest that evolution theory is less well supported by evidence as compared to other scientific theories

CREATIONWISE

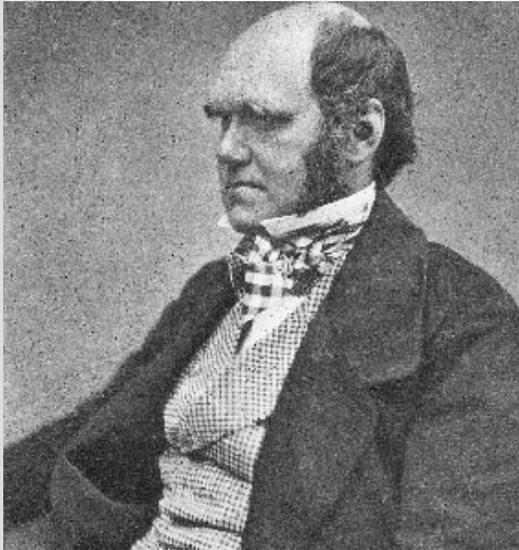


If THIS is what Johnny can read and write...



then this news shows that Johnny really understands his lessons!

Darwin's theory of Evolution

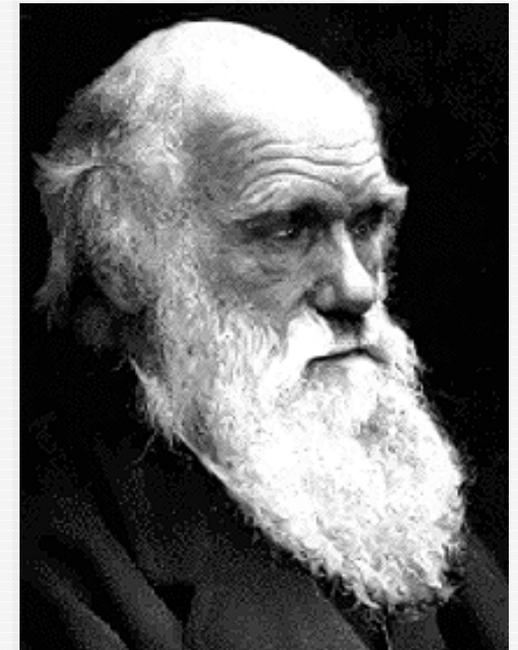


Michael Ruse, 1975: Darwin's Dept to Philosophy

Darwin's theory of Evolution

Started his arguments from lawlike statements

- For any given species of organisms they will be found to have a tendency to increase their numbers at a geometrically high rate
- In each generation there is a differential reproduction of organisms
- The survival of the successful organisms is in part a function of the characteristics that they, unlike unsuccessful organisms, possess.



Then deduced that:

The different chances of survival of differently endowed offspring accounts for the natural evolution of species. Nature "selects" those members of a species best adapted to the environment in which they find themselves.

Michael Ruse, 1975: Darwin's Dept to Philosophy

Some Negative Reactions

- William Whewell:
Refused to let it into
the Trinity College
Library
- John Herschel: “the
law of higgledy-
piggledy”
- Need to find a place
for God, for
«intelligent design»

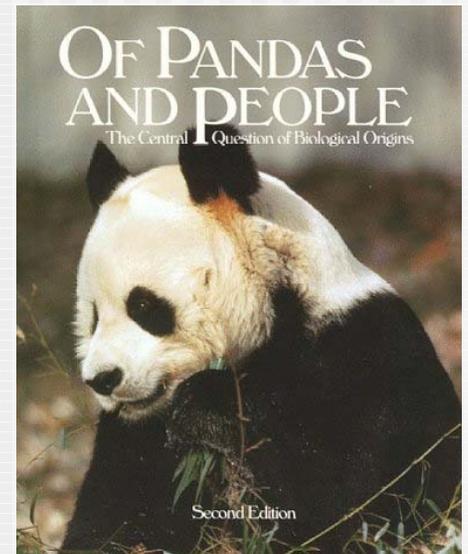


Michael Ruse, 1975: Darwin's Dept to Philosophy

Other cases

- *Kitzmiller and Dover* (2006). Judge Jones ruled that Dover school board's decisions to mention ID to ninth-grade biology students as an alternative to the Darwinian theory of evolution, and to refer students to the book *Of Pandas and People* as a reference source, was unconstitutional.
- In Georgia, 2005 a judge ordered a school district to remove stickers on textbooks that warned:

"This textbook contains material on evolution. Evolution is a theory, not a fact, regarding the origin of living things."



Ongoing debate...

- Ongoing court cases in USA
- Repercussions in other countries

From The Times

September 12, 2008

Leading scientist urges teaching of creationism in schools



(Ian Nicholson/PA)

The education director at the Royal Society says science teachers should treat creationism as legitimate

naturenews

Published online 17 September 2008 | Nature | doi:10.1038/news.2008.1116

News

Creationism stir fries Reiss

Royal Society's director of education stands down.

[Daniel Cressey](#)

The director of education at one of the world's premier scientific bodies has been forced from his job in a row over approaches to creationism in the classroom.

Michael Reiss, a professor at London's Institute of Education and an ordained minister in the Church of England, yesterday stepped down from his post as director of education at Britain's Royal Society. The move, which appears to have been forced, follows a letter to the president of the Society, Martin Rees, from three Nobel-prize winning fellows "greatly concerned" by remarks Reiss was reported to have made at the British Association for the Advancement of Science's annual "Festival of Science" on 11 September.

Reiss's remarks on the need to engage in dialogue with the creationist views some children express in science classes resurrected claims that, as a priest, Reiss should not have been appointed in the first place. "When he was appointed there were concerns that he would push a religious agenda," says Richard Roberts, chief scientific officer of New England BioLabs in Massachusetts, a fellow of the society who in 1993 won the Nobel Prize in Physiology or Medicine. The fact that "Professor Reiss is a clergyman ... in itself is very worrisome," said the letter that Roberts sent on behalf of himself, Harold Kroto, of Florida State University in Tallahassee, and John Sulston, of the University of Manchester, UK.

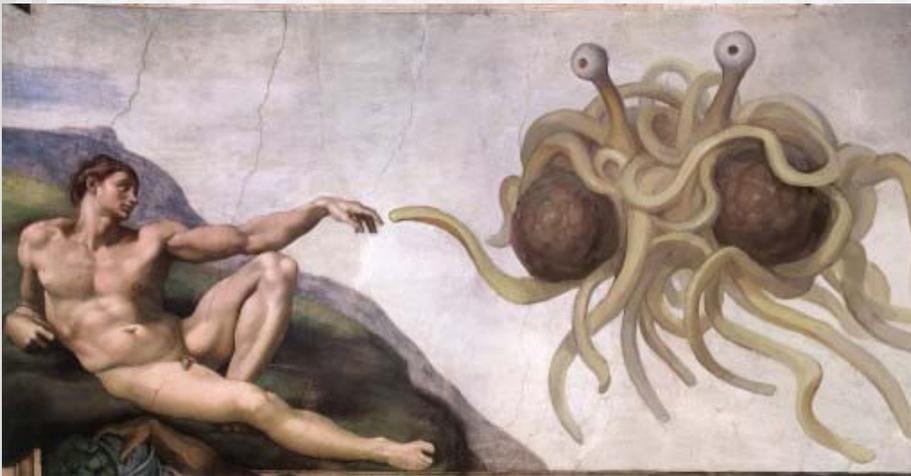


Professor Michael Reiss

Institute of Education

Intelligent Design

- Proponents assert that the workings of this planet are too complex to be ascribed to evolution. There must have been a designer working to a plan – that is, a creator



Touched by His Noodly Appendage
Niklas Jansson (2005)
Church of the Flying Spaghetti Monster

Creationist Museums

**CREATION
MUSEUM**
Prepare to believe.



<http://creationmuseum.org>

THE SCIENTIFIC METHOD

HERE ARE THE FACTS. WHAT CONCLUSIONS CAN WE DRAW FROM THEM?



THE CREATIONIST METHOD

HERE'S THE CONCLUSION. WHAT FACTS CAN WE FIND TO SUPPORT IT?



Why should we be concerned about pseudo-science? (Ziman)

- Lack of public concern with the advancement of science
- Public's "misunderstanding" of science
- Public's preoccupation with the occult, paranormal, astrology
- Use of pseudo-science in marketing: "Detox"



www.timboucher.com

Does the cock's crow
cause the sun to rise?

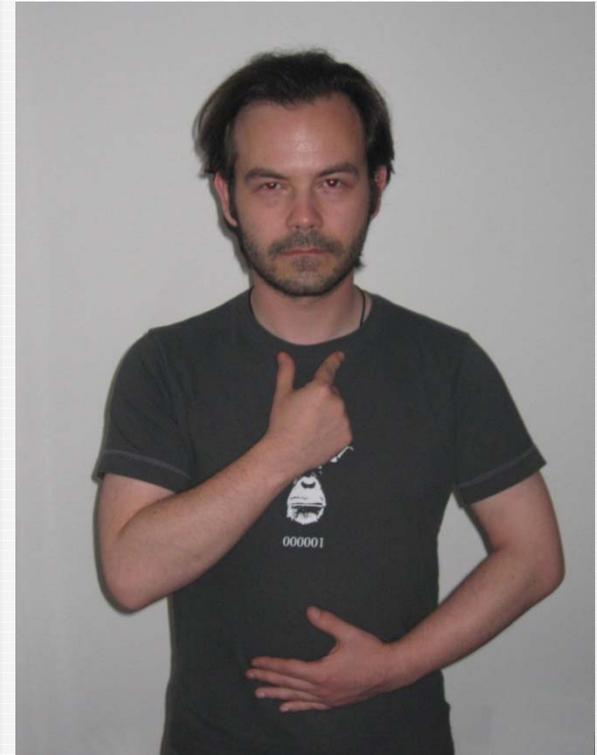


Alternative Facts



"Technobabble": Brain Gym"

- Educational Kinesiology
- Used in UK schools and approved by DHE
- Based on "massaging brain buttons"

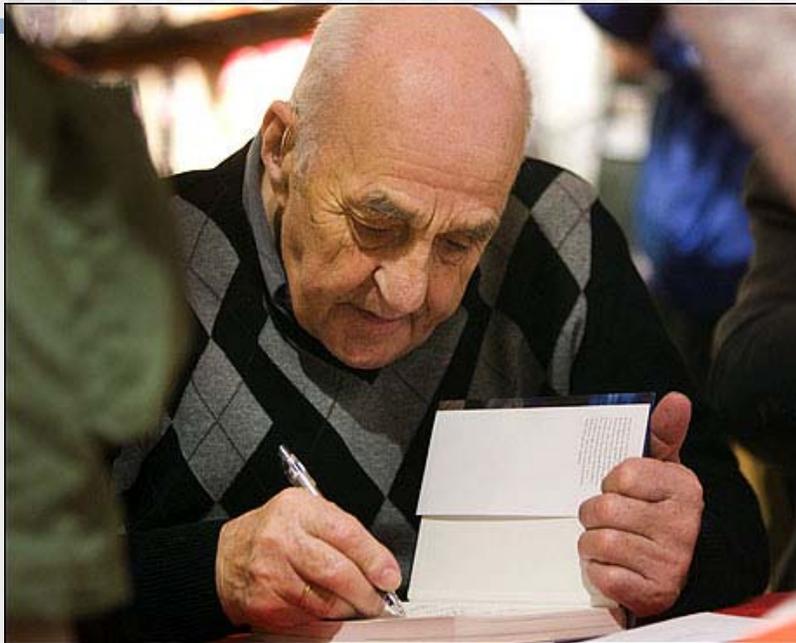


Hugh Charles Sparker

[Newsnight](#)

Threats to objectivity of science or just a matter of spiritual belief?

www.astarte-education.com



Jorlaf Gjerstad.
Photo Frode Hansen



"Use angels and your own power to create miracles in your life"

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MNSES9100

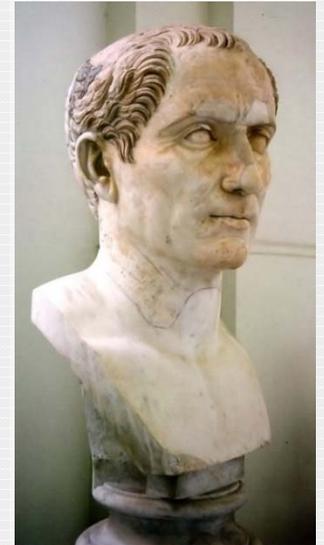
Case study: Science and Astrology

- History of astrology
- Are philosophical theories of science apply to distinguish astrology from other branches of science?
- Do they need to?



Astrology

- Zodiac established in 700 BC in Egypt, Chaldea
- Ptolemy (2 AD) *Tetrabiblos* and *Almagest*
- European Renaissance (14th-16th Century) – widespread rise in developments in arts
- Age of Enlightenment (17th – 18th century) – lost popularity
- Start of own renaissance in 1930's



Kepler



1975 statement by 192 scientists and 19 Nobel prize winners

Called for the rejection of astrology, arguing it was a pseudo-science because:

- Astrology originated as part of a magical world view
- The planets are too distant for there to be any physical foundation for astrology
- Astrology is incapable of making precise predictions
- People believe it merely out of longing for comfort

Counterarguments

- Origins are irrelevant to scientific status (e.g., chemistry and alchemy; medicine and witchcraft)
- Many "scientific" theories are based on a multitude of influences resting on tendencies rather than laws
- Astrology is still vaguely testable or verifiable (see Michael Gauquelin)



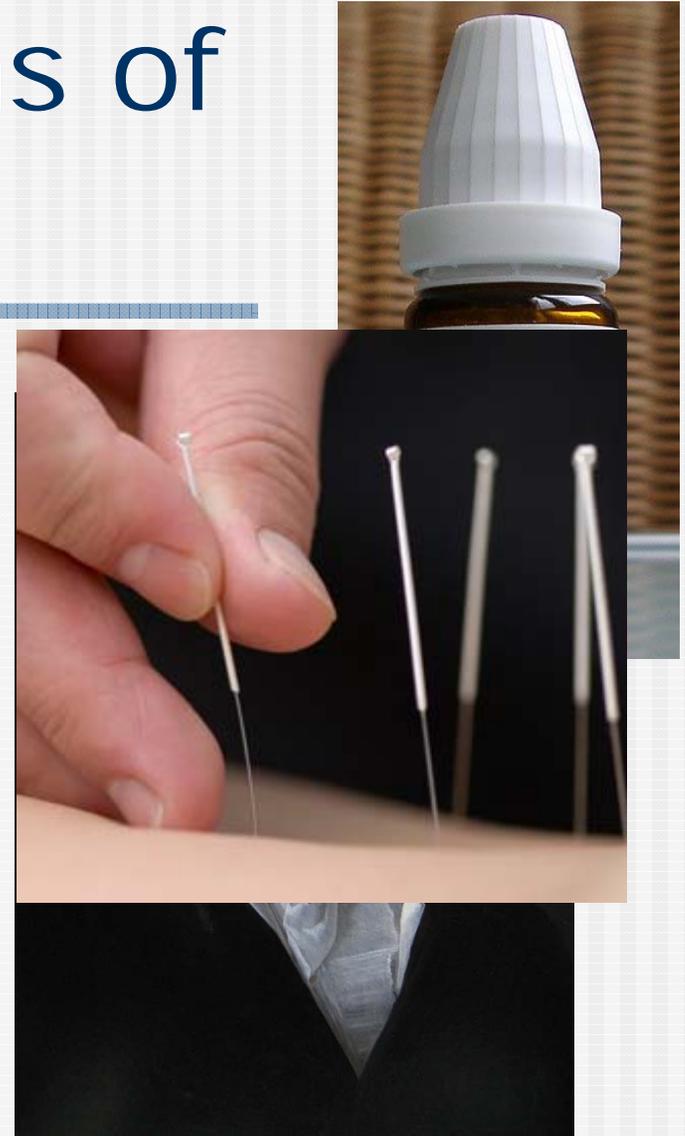
Other criticisms of astrology

- Resists falsification
- Non-progressive
- Non-critical
- Not "public knowledge"
- Not objective
- Can be replaced by a better theory (psychology, genetics, sociology)



Other Accusations of Pseudo-Science

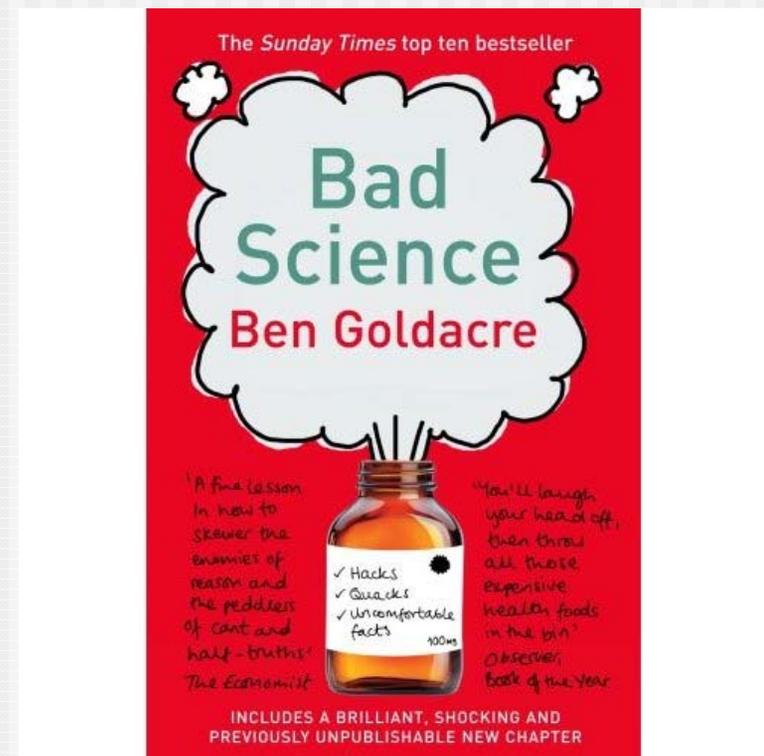
- Homeopathy?
- Nutrition?
- Telepathy?
- Acupuncture?
- Extraterrestrials?
- Intelligent design?



Sammuel Hahnemann

Additional Literature

- "Bad Science" Ben Goldacre, 2006



Essays

Case based studies:

- Is xxx a paradigm shift in my field
- Does xxx fit the model of a research programme
- How does ideology impact on scientific objectivity
- Is xxx a pseudoscience – why?

Should we be concerned about public understanding of science

Science and education

Ny undersøkelse: Nesten halvparten av nordmenn stoler ikke på forskning

ERLEND TRO KLETTE | THEA STORØY ELNAN
OPPDATERT: 04.OKT.2017 13:07 | PUBLISERT: 17.SEP.2017 21:30