Preparing for the 2009 International Year of Astronomy
ASP Conference Series, Vol. 400, ©2008
M. G. Gibbs, J. Barnes, J. G. Manning, and B. Partridge, eds.

Intelligent Design, A Young Universe, Astrology, UFO's, and More: Tackling Astronomical Pseudo-science

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Abstract. During IYA educators and scientists will interact with the public in many ways. There will likely be public questions at IYA events about pseudo-scientific topics. While the particular pseudo-sciences that are in vogue change with time, these days popular astronomical pseudo-science includes creationism and intelligent design (and their denial of the age of the universe), astrology, UFO's as extra-terrestrial spaceships, selling star names, the "face" on Mars, the claim that the moon landings were a hoax, etc. We discuss some of the recent surveys of belief in pseudo-science and some ways to respond to questions about these topics. A separate resource guide to help answer questions about astronomical pseudoscience is also included in this volume.

1. The Problem

Whether it's the supermarket tabloids touting alien invasions, network television giving equal time to creationist religious propaganda, mainstream magazines including astrology columns without shame, publishers issuing books of UFO claims that have already been fully debunked, movies like *Independence Day* and TV shows like the *X-Files*—it's hard to get away from the pervasive and pernicious influence of **fiction science** (pseudo-science) in our culture. Small wonder then, that polls show very high levels of belief in such paranormal phenomena in the U.S. And, as the U.S. exports its lowest common denominator entertainment abroad, we are getting reports of upswings of coverage and belief in these topics in Russia, and throughout the world.

As astronomers, we can restrict our interest in this flood to just those areas connected to our field, but even in the astronomical realm, there is plenty to choose from:

- astrology–that the position of the Sun, Moon, and planets when we are born affects our personalities or destinies; the idea that ancient astronauts had to help us start civilization (and build some of the great monuments and religious sites on Earth) because we were too stupid to do it ourselves;
- that various aliens in UFO's are coming here, kidnapping a variety of not very well educated human beings, and then quietly sneaking away;
- that the Apollo landings on the Moon were faked, because we never had the ability to get our spacecraft and people to the Moon;
- that (paradoxically) NASA has but is hiding evidence of advanced technology they have found from advanced civilizations around the solar system

(the Face on Mars, the crashed saucers and yellow bodies at an air-force base, etc.);

- that the Earth and the universe are only about 10,000 years old and the Big Bang model is a completely unfounded speculation, foisted on us by godless scientists.

This last one is especially ironic, because the Big Bang idea was first proposed by Georges Lemaitre, a Belgian priest, and one of the greatest astronomers of our time involved in showing the details and age of the expanding universe, Allan Sandage, is a deeply religious Christian.

2. Statistics about Beliefs in the U.S. Population

According to the National Science Board's *2008 Science and Engineering Indicators*, the knowledge and beliefs of Americans about science continues to lag behind those of most other industrialized countries.

This report[1] includes a summary of research on public attitudes from past years, which is always instructive and depressing to read. Some examples:

Just to take one example, in November 2004, the Gallup Poll asked Americans about evolution as a theory:

- only 35% of adults said it was a theory supported by evidence;
- 35% said it was one of many theories;
- 29% didn't know.

Gallup has been tracking public ideas of human development since 1982 and they have changed little. In 2004,

- only 13% said humans developed over millions of years with no role played by God;
- 38% said humans developed over millions of years but God guided the process;
- 45% said God created humans pretty much in their present form at some time in the last 10,000 years.

A December 2004 **Newsweek** poll asked if respondents favored teaching creation science in addition to evolution:

- 60% favored it;
- 12% were undecided;
- and only 28% were opposed.

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[1] `http://www.nsf.gov/statistics/seind08/`

For many people, this seems to be only fair, in a loose democratic sort of sense. President George W. Bush and a number of other political leaders have now publicly endorsed this view. Many of these people have a problem understanding the scientific method, and ways of deciding on evidence in science.

This spills over into the teaching of astronomy, as a number of states (including Kansas) are beginning, at the behest of fundamentalist religious groups, to include anything that contradicts a young Earth and young universe among the subjects that should be taught "only as a theory," or "taught with alternative theories" or de-emphasized. This includes radioactive dating and Big Bang cosmology.

Asked if they agreed with the fact that the universe began with a huge explosion, fewer than 40% of Americans answered yes (General Social Survey 2006). Interestingly, if the question is phrased "according to astronomers, the universe began with a big explosion," then 62% agreed. So it is this sense that the big bang idea somehow goes against their own personal religious beliefs that seems to be the crux of the matter.

3. Approaches to Handling Astronomical Pseudo-science in Educational Settings

Many scientists feel that even to acknowledge fiction science ideas during an educational or outreach event is to give them a credence they don't deserve. But this approach, although it may momentarily make us feel as if we had secured the high ground, does not serve science well. For most audiences, this simply reinforces the notion of scientists as insular and close minded. I think it is far better to confront pseudoscientific ideas head on and to help people see the value of applying the scientific method and judgment using evidence.

For example, when I talk about such topics to public audiences, I like to tell them that *being a good scientist is not unlike being a good detective.* People have lots of experience with good detective behavior from TV, shows like Colombo or Law and Order (and, these days, especially CSI.) In a typical case the detective arrives on the scene after the crime has been committed, and the phenomenon under investigation (the crime) must be pieced together from clues, eye-witness reports of varying reliability, and many indirect lines of research that take a while to bear fruit.

An astronomer, far removed from the objects he or she studies, must also rely on clues and difficult evidence to piece the story together. But good detective work can pay off with remarkable rewards, as when careful spectroscopy of galaxies, combined with a distance scale from the study of variable stars, allowed us to find that the universe was expanding.

We can do the same when confronted with suggestions of alien spacecraft, of the positions of stars and planets controlling our love lives, or of the existence of monuments from ancient civilizations on Mars. We can demand evidence, collect clues, do follow-up research, devote time and intelligence to sorting out the different possible hypotheses without prejudice, and see to what conclusions we are led. The books, articles, and websites in the resource guide in this volume will give you many instances where this has been done and even suggest some hands-on activities your own students can do.

I would just point you to one key document that the astronomical community put together: In response to claims that the universe is young, the AAS Astronomy Education Board worked over several years to produce a booklet and website called "An Ancient Universe" to help teachers and school board members understand how we know that the natural world is old.[2] We urge you to pass the booklet or the web address on to your local teachers and school board members.

For a more thorough discussion of handling pseudo-science in the formal classroom than we have time for here, please see the paper in Astronomy Education Review[3].

4. Conclusion

Carl Sagan talked about skeptical, rational, scientific thinking as a "candle in the dark" in the vast night of ignorance, superstition, and irrationality which surrounds us and increasingly threatens us on this little planet that gave us birth.

The detective work I have talked about is something anyone can do, if introduced properly to skeptical thinking and to the facts—not fantasies, not dreams, not unfulfilled desires—but the plain unvarnished facts.

Let's all resolve to spend a little time with a young person, with a relative, with friends, with groups we belong to—helping them get access to the facts in these areas. We astronomers like to say that the universe has attained consciousness through us—that by evolving intelligent beings that can think about the cosmos, the universe has become aware of itself. What a pity it would be if—on our planet—the only example we have of intelligent life surrendered the one thing that truly marks us as different from the other creatures—our ability to reason.

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[2] `http://www.aas.org/education/publications/AncientUniverseWeb.pdf`

[3] `http://aer.noao.edu/cgi-bin/article.pl?id=70`