

# Tyson gives examples of science illiteracy

It's been a long while since the Clearinghouse has looked in on Hayden Planetarium Director Neil DeGrasse Tyson, but his address to the American Association of Physics Teachers (AAPT) in Greensboro (NC) on 30 July 2007 after receiving their Klopsteg Award showed him to be in rare form indeed.

Tyson began his address on "Adventures in Science Illiteracy" with a litany of 10 "oft-told inaccurate statements":

1. *What goes up must come down* (There's still a lot of Apollo hardware on the Moon).
2. *The sun is a yellow star* (If it were, snow would be yellow, but that happens only near fire hydrants).
3. *Weightless astronauts left Earth's gravity* (What keeps them going around the Earth?).
4. *The North Star is the brightest in the sky* (Polaris is only #49 on the list).
5. *On a dark night you can make out millions of stars* (You can actually see only thousands with the naked eye).
6. *Total solar eclipses are rare* (They are more frequent than presidential elections or Olympics but are not visible over large areas).
7. *Days get longer in summer and shorter in winter* (Since the longest day occurs at the Summer Solstice, which marks the beginning of summer, there's nowhere else to go but down, and *vice versa* at the Winter Solstice).
8. *At high noon the sun is directly overhead* (This happens only at latitudes between  $23.5^\circ$  N and  $23.5^\circ$  S and only on certain days).
9. *The Sun rises in the east and sets in the west* (It does so exactly on at the vernal and autumnal equinoxes).
10. *The Moon comes out only at night* (Physics teachers didn't have to be straightened out on that one).

Part of illiteracy, Tyson said, is not paying attention, as he went on to cite other examples:

*The Titanic.* Of all the money spent to replicate the Titanic in the movie of the same name, Tyson pointed out that director Cameron got the stars in the sky wrong and made the left the mirror image of the right. Cameron's easy-out on this was that the sky was put in post-production, but he replied by wondering how much more the movie would have grossed if he had gotten the sky right. Tyson added that the post-production man later called him up to correct the sky for the 10th anniversary version.

*Misleading web page.* Tyson displayed a web page showing a picture of a planetary nebula as if it were the expanding universe.

*Bayer ad.* Bayer aspirin thought to get students interested in science by developing an ad to get them interested in why lighter things fall faster than heavy things. Fortunately, that error never

reached the public.

*Intelligent Design (IT)*. Here Tyson recounted the awe experienced by early scientists when they observed things they didn't understand, but this didn't keep the amount understood from increasing. Galileo's response to Ptolemy was that the Bible teaches how to go to heaven but not how the heavens go, and LaPlace developed perturbation theory to explain the stability of the solar system for which Newton had to invoke God.

Invoking God is not science, Tyson, said, and Intelligent Design requires hubris in expecting that no subsequent person will be able to understand what we presently don't.

*STUPID Design*. Eating, speaking, and breathing through the same hole in our bodies allows us to choke (but you don't see dolphins doing that), Tyson pointed out. He also questioned the juxtaposition of "an entertainment center and a sewer system" between our legs.

*Sidetracking of Arabic science*. Tyson quoted US President Bush as claiming that "our" God has named the stars, but in truth most of them were given Arabic names by a flourishing Arabic culture at a time that Europe was stuck in the Dark Ages. Unfortunately, subsequent events have reversed this relative progress, after Islamic leadership opined that mathematics was the work of the devil (see Resources #3, Spring 2007, and #13, this issue).

Yet, Tyson sees some ultimate signs for hope, at least for cosmology, because of the presence of cosmological concepts and pictures in advertising. Science needs to meet its public at least half way, he emphasized, and this is one way to do this. (He added that he also watches the Super Bowl, though not a football enthusiast, simply so that he can relate to the majority of his public who are.) We need to change people's outlook, so that they see science as a part of life rather than as a separate compartment, he went on, noting that other fields may resent the arrogance that comes from physics' ability to make predictions. We could overcome this arrogance, Tyson suggested, by showing the humility of confessing ignorance of 96% of the universe. But about one thing he was emphatic: Unlike other fields, in science there is only one story that can be correct (a distinction that media reporters fail to make between fields based on opinion and science based on observation).

In an interesting closing observation, Tyson spoke about his belief that the Dover, PA, decision would go in favor of teaching evolution and the exclusion of IT from the science curriculum, even though the judge was a Republican appointed by a Republican president. One thing that he has observed about Republicans, Tyson said, is that they don't like to be poor. Investments in science and technology are the best drivers of economic growth, he went on. If economic growth is valued, so also must be science and technology, and the judge's ruling sustained this.