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## The Evolution Wars

Ever since the theory of evolution was first published, it has engaged in a creative dance with religion. In the early days traditional religionists were enraged by it. With time many sects of Christianity realized it was here to stay and found ways of cohabiting with it. Eventually even the Catholic Church came to accept it.

Acceptance is a significant move. It means accepting that the Genesis accounts are not literally true. Conceding that not everything in scripture is literally true is the first step on a long slope that opens more and more theological and supernatural claims to questioning. That's a good thing - but to many believers it may seem a very disturbing, threatening thing, and so they react defensively/aggressively.

As a result of that reaction, the theory of evolution is under assault, especially in America. Not in the universities, where it deservedly reigns supreme, but in the schools, where the vast majority of minds are intellectually formed. Opponents of evolution have so far lost most of the legal battles, but they may be winning on the most important battlefield: in the classroom. They are making so much fuss and furor that many teachers are pulling back from teaching any aspect of evolution.

That's a shame, because evolution is the most embracing field of biology, and the most exciting for young minds fascinated by dinosaurs and their fiery mass extinction. The study of extinction leads seamlessly into our modern, ongoing, human-driven mass extinction, and how we treat the planet, with all that this implies for consumerist lifestyles.

But it's more than a shame: it's a scandal. It places scripture above science, ancient authority above modern curiosity about the natural universe. It allows dogmatic

parents to close off options for inquisitive young minds - for their own children and other people's children. It keeps at least half of Americans stuck in a pre-Darwinian, almost pre-Enlightenment state, a fact that is having repercussions on progress in human rights in the USA and world-wide.

In the long run the opponents of evolution cannot win: time and history are against them. But just how long the current situation lasts depends on each one of us as citizens and parents. We need to speak out. We need to stand for school boards and textbook boards and boards of education.



We are only just beginning to see the potential of Evolution. We are on the verge of an era where humans will become the major selective force on the human species. At the dawn of astonishing new powers to shape living creatures, we will also become sources of new variation in other species ranging from disease organisms up to higher mammals. It's not certain we will use these powers wisely or that the consequences will be benign. We are already

unthinkingly crossing the boundaries not just between species but between phyla, creating new life forms, largely so far without social/political controls.

More wisely, we are beginning to learn that evolution is the best designer. Software and increasingly hardware will be designed using evolutionary models - setting things to do their chosen task, picking the best performers, introducing variation, testing them again, through many cycles, until we reach better solutions far faster than we ever could using our human brains alone. We will hopefully also learn to do what evolution already does without our help: to make sure that whatever we create fits its environment as well as nature's unaided creations do.

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Photo: Carsten Glaschun

# Answering Intelligent Design Theory

Design theory is the underpinning for today's assaults on evolution education. Its scientific clothing, plausibility, and moderation make it less easy to dismiss than Creationism.

But there are ways, argues Paul Harrison

On my car radio I sometimes listen to a right-wing Los Angeles religious station, KKLA, just to find out how they think. Often they just quote threats and promises from out of the Bible, but sometimes someone will boldly assert that "Science proves the existence of God." That claim is a symptom of a new front in the war between theism and scientific naturalism.

It's based on efforts in the areas of cosmology, planetary science and evolution. In cosmology it's known as the Strong Anthropic Principle - the belief that the Universe is so fine tuned that it must have been designed for life/intelligence to emerge. In planetary science it's the study of all the special factors that make earth such a favorable place for life and observing humans. The box (opposite) covers these two areas. Intelligent Design, which argues that many biological systems are so complex that they must have been designed, is the third partner in this trinity.

These efforts are not so easy to

dismiss as their predecessors. The main proponents have degrees, often in science. They are backed by considerable and sophisticated funding. They use scientific evidence, which at least in the case of cosmology and planetary science is fairly arresting at first sight. They generally don't rant and tubthump and demand that science take a backseat to ancient scriptures. And for the most part the concept of God implied by design theory is a good deal more sophisticated than the God of the Bible.

The new approach is called Intelligent Design. It is more subtle than its backwoods relative Young-Earth Creationism, and therefore potentially more dangerous. It does not argue in favor of God, or of special creation as per the Bible: its sole claim is that the complex structures of biology can be explained only by assuming intelligent causes.

It's key intellectual pillars are biochemist Michael Behe and math and philosophy professor William Dembski.

## Irreducible complexity

In his book *Darwin's Black Box*, biochemist Michael Behe has championed the viewpoint that some organs, structures and biochemical cycles are so complex and interdependent that they could not have arisen by Darwinian mechanisms. Behe focuses on Darwin's own statement: "If it could be demonstrated that any complex organ existed which

could not possibly have been formed my theory would absolutely break down," and then goes hunting for examples that it's hard to imagine could have been produced in that way.

Candidate systems are those where all the parts are needed for the mechanism and a smaller set of the parts, from which the end product might have been built up, would not work. Behe claims that such systems "appear very unlikely to be produced by numerous, successive, slight modifications of prior systems, because any precursor that was missing a crucial part could not function." Behe uses the mousetrap as a simple illustration: it needs a platform, hammer, catch, spring and hold-down bar and, he says, cannot function with even one of these missing.

A living example would be the flagellum of single-celled organisms. This requires not only the spinning tail, but a motor to rotate it, a universal joint to allow it to move freely, and a stator to attach it to the cell. "Dozens of different kinds of proteins are necessary for a working flagellum. In the absence of almost any of them, the flagellum does not work or cannot even be built by the cell."

Behe calls such systems "irreducibly complex." He claims that since they could not be produced by numerous, successive, slight modifications, only design could account for them.

## Specified complexity - William Dembski

Dembski, who has Ph.D.'s in mathematics and philosophy, has tried to add sophistication to ID by trying to pin down what constitutes design, based on how we recognize the hand of intelligent design in the human world.

Dembski claims that intelligence leaves behind a characteristic trademark or signature, to which he gives the grandiose name of "specified complexity."

An event has specified complexity if it has all the following characteristics:

- It is "contingent," not necessitated by the laws of physics - that is, it could have happened differently. Thus, the collapse of a sandpile that's too steep is

## Growing up cosmic: Creation myth versus creation reality



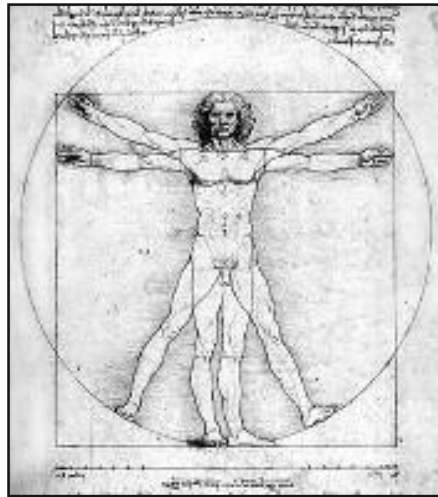
## The Anthropic Universe

Many physical parameters - as far as we know today - do not derive from fundamental physical laws but seem to be independently given. Many of these are astonishingly fine-tuned in a way that makes life possible. The "strong Anthropic Principle" says that the low probability of this degree of fine tuning makes it likely that the universe was designed so that intelligent life should emerge.

**Responses:** The parameters facilitate the persistence of stars and merely permit life. They do not ensure the emergence or persistence of advanced intelligence. Single celled organisms dominated the earth for almost 4 billion years, but our species emerged on earth a mere 200,000 years ago.

Improbability is not the same as impossibility: in a national lottery there are millions of chances to one against any individual winning, but there is a close to 100% probability of one of those individuals winning. And, as cosmology advances, the parameters of our universe may prove to be necessary consequences of fundamental laws.

More promisingly, many current hypotheses suggest that our universe may be just one of myriad parallel or successive universes. The hypotheses include Linde's chaotic eternal inflation, Everett's many worlds interpretation of quantum physics, Smolin's idea that new universes originate in black holes, Turok and Steinhardt's idea of repeated big bangs and collapses caused by the collision of multidimensional "branes." Each universe may have different parameters. Most of them may be utterly inhospitable to life, but some may pass. Clearly, the particular universe we are in must be hospitable to us - otherwise we wouldn't be here.



## The Privileged Planet

A more local complement to the Anthropic Principle is the idea that the Earth is so well and so uniquely located for life to emerge that it must have been planned that way. The many factors involved include our position in relation to the galactic arms and center, the age and composition of our sun, our distance from the sun, the size and distance of the moon, the protective effect of Jupiter, the elemental composition of the earth creating a protective magnetosphere, and the level of volcanic activity.

**Responses:** Multiple universe hypotheses are so far theoretical. Multiple planets are a fact. There are an estimated 300 billion stars in the Milky Way and 100 billion galaxies in our Universe.

So far we can only detect stars with larger planets, yet some 12 per cent of the stars that have been examined have been found to have planets. Thus the Universe may host at least 300,000,000,000,000,000 stars with planetary systems - plenty for there to be many with the right conditions.

Earth's hospitality for higher life is often overstated. Along with great advantages come severe risks. We are sitting on the thin crust of a ball of incandescent hot rock, sited in a cosmic shooting gallery of asteroids and comets, solar flares and supernovae. Our climate is chaotically unstable, fluctuating between ice ages and greenhouse ages, and the whole earth may several times have been frozen over in a "snowball" state.

Mass volcanism and meteor strikes have already caused five mass extinctions, one of which eliminated 90% of all species on earth. DNA research suggests that humans were almost wiped out in a population bottleneck around 70,000 years ago, possibly caused by an eruption of the supervolcano Toba on Sumatra. All this suggests touch-and-go rather than meticulous planning.

inevitable rather than contingent. The Gettysburg address is contingent, not inevitable.

- It is complex and therefore has an extremely low probability of occurring by chance. Dembski fixes the upper limit of what might occur by chance given a long enough time at one in  $10^{150}$ .
- It is "specified" in the sense of exhibiting a discernable pattern - not just any old jumble. Example: handwriting versus an inkblot.

Dembski does not devote a lot of time to doing actual calculations of probabilities for specific biological systems. He does do the sums for the flagellum and calculates the odds against it assembling all in one piece in one place by chance at less than one in  $10^{1170}$ .

### Responding to ID

Chinks in the ID armor are many. The new design arguments suffer from same general weaknesses as the old. First, even if the modern "scientific" design argument were valid, all it could ever possibly prove is the mere fact of design by an "intelligence" of some kind or other. It can't tell us who the designer was or what their methods and motives were. It could have been a mischievous power like Star Trek's "Q," sadistically building quirks like pain and disaster into its model. As

philosopher David Hume imagined, it could have been an old and decrepit deity who died soon after finishing the job, leaving it to run on out of control. The most plausible candidate would surely not be a disembodied intellect but a team of scientists in another universe or dimension, working with advanced supercomputers.

Second, the design argument does not in any way help to prove that the designer was the god of the Bible or the Koran. It doesn't even prove that the designer was the same as the first cause: the designer

may have worked on chaotic raw materials that were there beforehand, like a potter with clay.

Third, ID is not a scientific explanation. It suggests that the natural world was created by an intelligence outside our universe which is not open to further investigation. It does not say who

**I find it ironic that bright people like Dembski use their intellects to argue against a solid theory like evolution, but never to examine the basis of Christianity, which is full of ridiculous things such as the virgin birth or the resurrection.**

**Todd Washington**

or what that force was, but implicitly supports the claims of “revealed” scriptures. It tends to close the door on further attempts to find naturalistic explanations for puzzling facts.

Indeed, it’s not really any kind of explanation, for it raises an enormous new puzzle. Where did the designer with its incredible genius come from? It must be at least as complex as what it created, and therefore it too must have been designed, and so on in infinite regress.

Design theories usually claim that the designer’s goal was the creation of intelligent life. But they ignore all the factors that point to bad or short-sighted design (if intelligent life-forms were the desired end-product) such as the enormous risks of life in a fragile unstable environment on a hot rock, or the pain of disease and disability. They also tend to take the present and an idealized imagined future as the end-point, ignoring the fact that on current predictions earth will become uninhabitable in around 5.5 billion years, and one or two hundred billion years later the universe will go dark.

These challenges apply IF the ID claims are valid. But there are good reasons to think that the claims are not valid. Critics of ID point out that it is based on two major fallacies. First, it uses the “argument from incredulity” - if Behe or Dembski don’t know or can’t imagine any way a system could have evolved naturally, then it must have been created by design. But a few years of further research often shows how the component parts could have been useful - but for other purposes. Behe’s key examples of irreducible complexity have now been shown to be reducible. Biology professor John MacDonald has shown that you can have a working mousetrap with 4, 3, 2 and even one part. Meanwhile research has undermined the ID’s “posterboy” flagellum, by discovering working processes that use a smaller subset of the

My gut feeling is that anything which is irreducibly complex could not possibly have been designed, but must have evolved. Things designed by intelligence are distinguished by their simplicity and predictability, rather than by their complexity and unpredictability. Wolfram points out that anything that isn’t simple takes as much or more computation to predict (and therefore, design) than it does to evolve. So it appears impossible to design such things before they would create themselves.

Tom Moore

full complement of flagellum proteins .

Second, it assumes that functioning systems emerged suddenly all at once. This false assumption allows Dembski, for example, to claim astronomical odds against all the many proteins of the flagellum assembling in one place at one time. But of course things don’t happen that way in the real world. Evolution never needs to start from scratch: it is always recycling devices that are already in place, like developing the mammalian ear bones

from the therapsid jaw bone. It does not build everything from the foundations up, but builds on the rising platforms of what has gone before.

ID takes aim mainly at the idea of successive small changes - yet larger changes can occur rapidly, and we know many of the naturalistic means by which that is possible. Genetic change can occur by horizontal gene transfer, for example, which introduces completely new DNA into an organism. Very small changes in growth and development

regulating genes can result in major differences in appearance or maturation, such as the giraffe’s neck or the human’s extended infancy. Major leaps like the mitochondria of animals or the chloroplasts of plants probably occurred by symbiosis of smaller with larger bacteria.

#### The Greatest Designer

Design theories originate and survive because Nature gives the appearance of being designed with great beauty. It does not seem random but patterned, with astonishing fitting of organisms to their environment.

All this has lured most people into believing in a personal creator. What people find hard to grasp is that a process without consciousness or goals is capable of feats far beyond any conscious designer. Nature IS designed - by the greatest designer of all, Nature itself. Natural selection is not random, it is governed by physical laws. Selection is performed not by chance, but by the whole ecosystem in which the organism lives. Evolution is a shared enterprise of all dead and living organisms to find the closest fit among all of us and the planet. It is the creation of a living community, with a cumulative “intelligence” far greater than human intelligence. If one day we ever get close to its design skills, it will only be by learning from its methods.



So are you telling me we’re not really related?  
Is 98.5% not close enough for you?

Photo: Paul Harrison

# Stand up, speak out in defence of science

Eugenie Scott, executive director of the National Council for Science Education, offers practical guidance on what to do if you are confronted with conflict in school.

## Teachers & Administrators

### What, legally, can and can't a teacher do?

Legal decisions concerning creationism and evolution rely upon the First Amendment of the US Constitution. In part, it states, "Congress shall make no laws regarding the establishment of religion, or inhibiting the free exercise thereof." The Establishment and Free Exercise clauses taken together require that public institutions be religiously-neutral: schools can neither promote nor inhibit religious expression. So it is perfectly legal for a teacher to teach about religion, although it has to be in a nondevotional context. Let's take a look at what not legal in schools and classrooms.

**A state/district/school CAN'T ban the teaching of evolution.** The 1968 Supreme Court decision *Epperson v. Arkansas* struck down anti-evolution laws such as that under which John T. Scopes was tried in 1925 in Tennessee. Noting that antievolution laws were passed because they offended certain religious views, the court wrote,

*... the First Amendment does not permit the state to require that teaching and learning must be tailored to the principles or prohibitions of any religious sect or dogma... the state has no legitimate interest in protecting any or all religions from views distasteful to them.*

So teachers who tell me that their principal has told them not to teach evolution have a principal who is breaking the law.

Some antievolutionists claim that evolution is a religion, and that its teaching is therefore unconstitutional. Alas for this view, the courts have been quite clear that evolution is science, and therefore to teach it does not violate the First Amendment. The 9th Circuit Federal Appeals Court wrote in a California case (*Pelozo v. Capistrano*, 1994):

*The Supreme Court has held unequivocally that while belief in a Divine Creator of the universe is*



*a religious belief, the scientific theory that higher forms of life evolved from lower ones is not.*

**A state/district/school CAN'T require equal time for creationism or creation science.** Creation "science" is the view that there is scientific support for a literal interpretation of the Genesis creation of all things at one time, about 10,000 years ago. Rejected by both scientists and teachers, creation science also has been rejected by the courts. In the 1982 District Court *McLean v. Arkansas* case, the judge wrote that creation scientists *...cannot properly describe the methodology used as scientific, if they start with a conclusion and refuse to change it regardless of the evidence developed during the course of the investigation.*

Bad science is not unconstitutional. However, the Supreme Court in 1987 (*Edwards v. Aguillard*) struck down the Louisiana Creationism Act, which required "equal time" for evolution and creation science. The court noted that even if the word "science" was used, creation science really was religion in disguise, and therefore it is illegal to teach it. The act impermissibly endorsed religion by advancing the religious belief that a supernatural being created humankind.

*...Because the primary purpose of the Creationism Act is to advance a particular religious belief, the Act endorses religion in violation of the First Amendment.*

**A teacher can't teach creationism "free lance" (on his/her own).** Some teachers teach creationism or creation science even though their district does not (and legally cannot) have a policy requiring it. Such "freelancing" is illegal. Schools should be religiously-neutral, and, as a Federal District Court stated (in *Webster v. New Lennox*, a case involving a "freelancing" teacher):

*If a teacher in a public school uses religion and teaches religious beliefs or espouses theories clearly*

*based on religious underpinnings, the principles of the separation of church and state are violated as clearly as if a statute ordered the teacher to teach religious theories such as the statutes in Edwards did.*

**A state/district/school CAN'T have a disclaimer that singles out evolution.** An evolution disclaimer which singles out evolution from all other scientific theories for special treatment (for example, as "theory, not fact") has been declared unconstitutional by a Federal District Court and its associated Appeals Court.

The case of *Freiler v Tangipahoa Board of Education* (1997) involved a local Louisiana school board's anti-evolution disclaimer. Teachers were instructed to read a disclaimer to students stating that instruction in

evolution is "not intended to influence or dissuade the Biblical version of creation or any other concept." The specific reference to the Bible was a major reason this disclaimer was struck down. The judge wrote:

*While encouraging students to maintain their belief in the Bible, or in God, may be a noble aim, it cannot be one in which the public schools participate, no matter how important this goal may be to its supporters.*

In summary: a teacher can teach about religion (though not advocate it), and teach evolution. A state, district or school cannot ban evolution, require equal time for creationism, or require a disclaimer on evolution. An individual teacher cannot teach creationism or creation science "free lance." **More resources at:** <http://www.ncseweb.org/>

## School Boards: Parents and Citizens

### 1. Show up, stand up, speak up.

Elected school board officials respond to numbers, so try to get as many people as possible to attend the meeting-the school board must not think that opponents of evolution are the only voices in the community. Scatter yourself throughout the audience and applaud those on your side.

**2. Plan ahead.** There is usually little time available for testifying. Avoid redundancy and ensure that all of your essential points are made by deciding which group members will discuss which topics.

**3. Be civil.** You want to persuade, not bludgeon. Be friendly advisors, not hostile critics. Avoid personal attacks on the opposition. If you have travelled from outside the community to speak at the meeting, briefly justify your presence.

**4. Say why you care.** Parents want their children to have the best possible education; teachers, as professionals, want to teach accepted state-of-the-art science; professors want their future students to be appropriately educated; scientists want to see their disciplines correctly presented; employers want to have scientifically literate employees; and so forth.

**5. Define the controversy correctly.** It is not about whether or not God exists; it is not about whether or not God created the world. It is about the scientific evidence. And the scientific evidence clearly indicates

that the universe changes over time, that the galaxies, solar systems, and planets of today have changed over time, that life on earth was different in the past, and that animals and plants today are descended from earlier forms and are different from them.

**6. Watch your words.** Be careful using the words *belief*, *theory*, and *fact*. *Belief* is frequently associated with faith, so do not say that you believe in evolution, say instead that you *accept* evolution-as the best scientific explanation. Explain that in science *theories* are not guesses or hunches but *explanations*: evolution is the theory that *explains* the facts. Don't say that evolution is a *fact* without explaining that you mean only that it is overwhelmingly supported by the scientific evidence.

**7. Challenge creationist doublespeak.** After teaching "creation-science" in the public schools was ruled unconstitutional, creationists tried to rescue it by renaming it: abrupt appearance theory, initial complexity theory, and, recently, intelligent design theory. Also popular is the idea that students should be taught, in addition to evolution, the "evidence against evolution." It is harder to counter these strategies because they are less obviously religious. In your testimony, try to demonstrate the parallels between old-fashioned creation science and new-fangled intelligent design theory.

**8. Highlight the scientific consensus.** Cite statements in support of evolution from scientific organizations. Find scientists in your area to testify that creationism (or intelligent design theory, abrupt appearance theory, and so forth) is bad science.

**9. Call on the clergy.** Pro-evolution clergy are essential to refuting the idea that evolution is incompatible with faith. Many mainline religious organizations (Catholic, Protestant, Jewish) have affirmed that evolution is compatible with their theology. If no member of the clergy is available to testify, be sure to have someone do so- *the religious issue must be addressed in order to resolve the controversy successfully.*

**10. Rebut the "fairness" argument.** If the opposition argues that it is only fair to teach creationism if evolution is taught. Teachers can testify on the following points:  
\* Science is not democratic. We do not decide what to teach based on the desires of pressure groups. We teach what has stood the test of time and been accepted by the scientific community: evolution, not creationism.

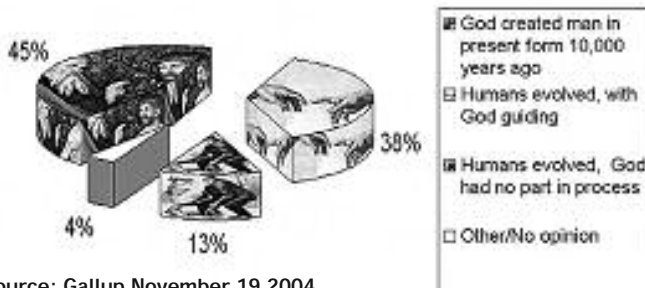
\* Not teaching students about evolution leaves them unprepared for college.

**11. Mention the legal issues.** Gently remind the school board that including creationism in the science curriculum is likely to provoke a lawsuit-and lawsuits are expensive.

# The Battle for Hearts and Minds

Three times more Americans believe literally in the Bible Creation story than believe in naturalistic evolution. On this score, US public opinion is unique in the developed world.

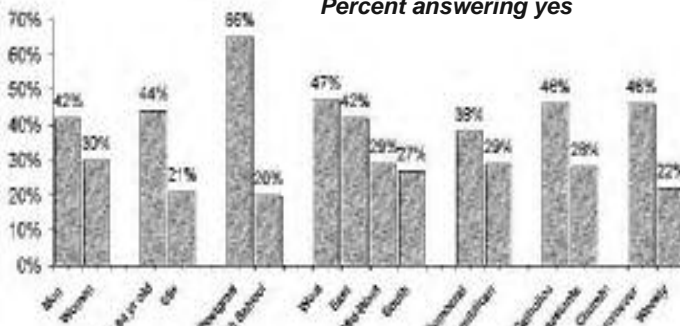
## Did God or Evolution Create Humans?



Source: Gallup November 19 2004

## Is there good evidence for Evolution?

Percent answering yes



Source: Gallup November 19 2004

Americans are less able to give accurate answers to questions about evolution than other developed and even some developing nations (see chart) - the USA ranked bottom out of 21 nations in knowledge about evolution, below Ireland and the Philippines (International Social Survey 1993). Just under half (48%) of Americans believe that there were humans living at the time of the dinosaurs. Some 45% don't know that Earth takes a year to go around the sun, indeed 25% think the sun goes around Earth (National Science Foundation 2001).

To some extent America is caught in a vicious circle. Pressure from religious fundamentalists prevents teachers in many states from tackling the subject of evolution properly (see pages 11-13). As a result the typical level of knowledge about the theory and history of evolution is low. Because of this people have less evidence at their disposal to raise doubts about the Biblical account, so the numbers accepting the biblical account remain high. This keeps up the political pressure to avoid teaching anything that challenges the biblical creation myth, thus closing the circle.

The root of all this is that traditional religion is very much stronger in America than in Western Europe and Japan. Levels of belief in God, Satan, heaven, hell and last judgement are much stronger. Church attendance is much higher. Many commentators have puzzled over the reasons for this dominance. Many of the first migrants had a strong religious motivation. In later centuries high levels of internal mobility, migration and immigration made churches an essential focal point for community solidarity and self-help, while the higher level of insecurity (and the continued lack of universal health care and adequate social security found in Europe) increased the "need" for supernatural help through life.

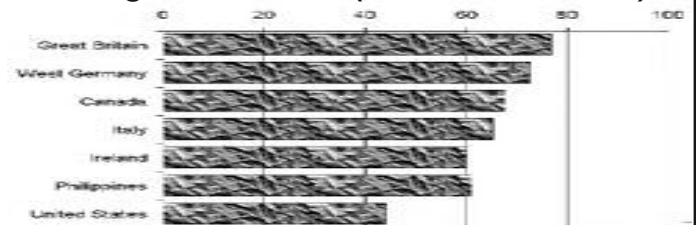
Education is probably the best hope that progressive views on evolution will prevail, plus the gradual ageing and departure of die-hard creationists. But education cannot work its magic if evolution and the naturalistic scientific paradigm are in retreat in America's schools.

While even Pope John Paul II accepts that evolution is a well-established theory, the USA stands out among developed nations in the degree to which a large share of the population still sticks to the idea of Biblical Creation. The proportion of Americans believing that humans evolved naturalistically, through evolution alone, is still remarkably small - only 13% in the latest Gallup poll (see chart). More than three times that level (45%) believe that God created humans in their present form around 10,000 years ago, just as the Bible says. A somewhat smaller proportion (38%) believe that human developed via evolution, but with God guiding the process along the way.

Several social factors are associated with disbelief or doubt about evolution. Women are less likely than men to believe that evolution has good scientific evidence to back it. Other people with more doubters include Mid-Westerners and Southerners (compared to Westerners and Easterners), Protestants compared to Catholics, older v. younger people, Republicans v. Democrats, and frequent church goers compared to infrequent attenders. Education is the strongest factor, with only 20% of high school-educated people accepting that evolution has good evidence behind it, versus 65% of people with post-graduate education.

Because of the degree of strongly-held Biblical literalism, the pressure to resist teaching of evolution has a significant level of public support. In a recent CBS poll 36% of Americans favored the teaching of creationism *instead of* evolution - no less than 45% of Bush voters backed this option.

## Knowledge of evolution (% correct answers)



Source: International Social Survey 1993

## Should Evolution or Creation be Taught?



Source: New York Times March 11, 2000

# Evolution's Evangelists

*For three years Connie Barlow and Michael Dowd have been unique itinerant evangelists for the story of evolution, from the Big Bang to today. Paul Harrison asked Michael about their ideas and activities.*



## **Is anyone else doing this? And what drives you?**

If there are any others, we certainly don't know about them. What drives us is the vision of what one of our mentors, Thomas Berry, calls "the Great Work," the collective calling of a particular time and place. The Great Work of our time, it seems to us, is to ensure a just, healthy, beautiful, and sustainably lifegiving world for future generations of all species. If that work's not done, in another 150 years or so there may not be any work at all left to do. This is also our vision of how we can further the creative impulse of the cosmos most effectively.

## **How long do you spend on the road each year and do you have a home base somewhere?**

We've been on the road for the past three years, 365 days a year. You could say we consider the entire continent of North America our home base. We've lived with dozens and dozens of people, anywhere from a few days to a week or longer. Our van is just a van, not an RV, there's no bathroom or kitchen, so we're forced to live with people, which is really what we want to do anyway.

We've stored memorabilia with family. My mail is forwarded to me through my daughter in Ann Arbor, Michigan. Connie's mail is forwarded to her through her sister in Issaquah, Washington. Our bank is in Oregon. Our business address is in Washington. And we voted in Michigan.

## **How long do you plan to go on living the nomadic life? Can you foresee a time when you might want a change?**

At this point it's inconceivable that we'd ever want to settle down. The thought of living in one place is actually depressing! Who knows, maybe in another fifteen or twenty years we'll change our minds. But when we ask ourselves, "How can we make the biggest difference for the planet in our lifetimes, given our particular gifts and limitations?" Doing what we're now doing is the only thing that comes to mind.

## **What do you do in a typical presentation?**

We tell the 14 billion year history of cosmos, Earth, life, consciousness, and culture – the history of everyone and everything – as a sacred story. We tell the epic of evolution in a way that validates and expands traditional

religious insights by grounding them in an empirical, scientific cosmology. Our content is solidly mainstream science. My style, however, is rather evangelical or even Pentecostal – full of passion, energy, and enthusiasm.

## **I can think of a lot of traditional religious insights that evolution invalidates, such as the Bible creation story, or an even partly external God who intervenes in nature to change history or perform supernatural feats. Isn't evolution compatible only with more modernized versions of theism such as deism or process theology?**

Yes and no. Evolution only "invalidates" traditional religious insights if these insights are interpreted literally rather than symbolically and cosmologically. When traditional concepts are interpreted cosmologically they can be seen in a larger, more meaningful, more this-world realistic way than previous generations could have possibly understood them. But yes, I agree that process theology and other attempts to "modernize" theism in light of evolution correspond to the nature of reality far more so than a mechanistic understanding of God as a supreme landlord residing off

the planet and outside the universe. In light of a sacred understanding of evolution we can now see how trivialized is such a concept of the divine.

## **What kind of response do you get? Can you give any examples of unusual responses?**

The response we've been getting has been phenomenal! We've been enthusiastically



embraced by an exceptionally wide range of audiences: from liberal to conservative to radical – in Unitarian Universalist, Christian, Unity, Church of Religious Science, Quaker, Mennonite, and Buddhist religious settings, as well as in public and private colleges, universities, and grade schools all over North America. So far, everywhere we have gone the vast majority of people tell us they been touched, moved, and inspired by our message.

### Do you ever get trouble from fundamentalists?

Not at all. But, of course, any pastor who believes, as I used to, that evolution is of the devil doesn't invite me into his pulpit.

Wherever I speak there are almost always at least a few

fundamentalists in the audience. But I especially love it when I get the opportunity to speak to groups that are entirely Bible-based. It's rare, at least up to this point, but it's a real treat for me when it happens. For example, last fall I spoke to an InterVarsity Christian

### **"There's a real hunger in liberal religious settings for meaningful ritual and celebration, rationally based and scientifically grounded."**

Fellowship campus group. I'd guess that 80-90% of those attending came as young earth creationists. By the end, however...well, here's one example. A football player size guy who had been extremely antagonistic at the beginning came up to me afterwards and said, "I came loaded

for bear [ready to blow me away]. You haven't converted me entirely, but you gave me a lot to think and pray about." Then he gave me a bear hug! That's a huge move to make after only 90 minutes!

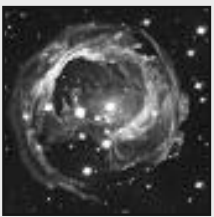
### **Do you encounter resistance to celebration or spirituality from atheists and humanists in UU congregations?**

Atheists, humanists, and freethinkers are among those most excited about what we're doing. Just a few days ago,

the leader of a Unitarian Universalist church where I had presented said, "Congratulations. You achieved something very rare in a UU setting: you've offended no one and impressed everyone!"

A few months ago I preached a sermon in a UU church: "Can the

## The Stardust Communion



Connie and Michael have developed a series of rituals embodying the "Great Story" of cosmic evolution, in atheist/pantheist and in theist versions. One of the most popular is the stardust ritual.

The Great Radiance (Big Bang) Light central candle; turn off house lights. 13.7 billion years ago. Emergence of hydrogen and the formation of great clouds of hydrogen gas. Commune with hydrogen by anointing ourselves with water, recognizing that each hydrogen atom is a true elder 13 billion years old. While doing so, we may each speak of an elder, a mentor dear to us, whose legacy we carry with us and commit to further. Creation of carbon, nitrogen, oxygen in Red Giant Stars and the giving away of those elements crucial for life in the exhalations of such stars. We focus on our breath: the in-breath of oxygen (from plants), and our out-breath of carbon dioxide (given back to plants), and the vast supply of nitrogen that comprises the atmosphere. All these (especially nitrogen) are the gifts of Red Giant stars. Creation of silicon, calcium, etc. in hot blue, massive stars. Here we reflect on how the structural frame of our bodies (calcium of bone) is born within stars when the structural frame of rocks (silicon) is fused with more helium. Participants will feel their bones holding them upright, and may choose to speak the names of rock formations that have been meaningful in their lives.



Creation of copper, gold, and silver in the explosion phase of hot blue stars, when these stars become supernovas. At the start of the ritual, and in anticipation of this part, some participants may have placed rings or other jewelry on the altar, which will be taken back at this time, one by one, while each person may choose to speak of their significance. Black holes, dark matter, and dark energy. Let us not neglect the 96% of the Universe that we know almost nothing about (23% dark matter and 73% dark energy), while honoring the generative "darkness" that periodically comes into our own lives.

Glitter and song. Close the ritual by anointing the foreheads of one another with stardust (glitter), while the group repeatedly sings: "You are made of stardust, every single atom, of carbon and of oxygen, calcium and iron."

More rituals and stories are available at Connie and Michael's website: <http://www.thegreatstory.org/>

Universe be Trusted?" An 85 year-old woman came up to me afterwards. "This may sound strange to you," she said, "I'm an atheist. But I'm just so excited that you've made it okay to use God language here in our church!"

And as far as celebrations go, whenever we do a "stardust communion service" in a UU church, almost everyone participates and loves it. In our experience there's a real hunger in liberal religious settings for *meaningful* ritual and celebration – where the ritual and celebration is rationally based and scientifically grounded.

**How would you describe your own religious orientation? Do you and Connie share the same spirituality?**

Both Connie and I consider ourselves creatheists (we coined the term). I pronounce it "cree a theist" and Connie pronounces it "cree atheist", but we mean the same thing. Essentially we are both "religious naturalists" who ground our religious/spiritual orientation in the widely accepted understanding that reality is nestedly creative and nestedly intelligent: atoms within molecules within organisms within planets within galaxies, etc, like nesting dolls, with each level being creative and intelligent in its own unique way. "God," from this perspective, is a proper name, a sacred name, for the Whole of Reality – the largest nesting doll – the only whole that is not a subset of some larger whole.

**Do you feel there is a direction to the evolution of the universe? A purpose? A goal or "omega point"?**

That's a tricky question. A direction? Certainly. A purpose, goal, or "omega point"? Possibly. It's hard to tell at this point. Given the fact that we are a subset of the whole trying to understand the nature and direction of the whole, I'm not even sure we can

ever know for certain one way or the other. But what I believe we *can* say is that evolution *does* seem to be going somewhere. *As a whole*, the Universe can be thought of as "progressing" in the direction of greater cooperation, interdependence, complexity, sensitivity, and self-awareness at ever increasing scale and evolvability. Human beings are now an integral part of this process.

**Isn't that a teeny bit anthropocentric? In terms of numbers insects would be the direction - as Haldane said "If one could conclude the nature of the Creator from a study of his creation it would appear that God has an inordinate fondness for beetles."**

It's not an anthropocentric perspective! If anything, I'd call it a "pantheocentric" understanding. The focus is on the whole, not on us. The emphasis is not on human beings but merely (yet importantly) on our role within the divine body of life.

**Do you see any significant differences between your viewpoint and WPM pantheism?**

One major difference is that I feel it's important to acknowledge that there is a non-measurable, non-material aspect of Reality that transcends everything we can possibly know, think, or experience: what David Bohm called "the Implicate Order" and others have called, variously, "the All Nourishing Abyss", "Pregnant Void", "Quantum

Field", "Realm of All Possibilities", or "Vacuum State" within which the Universe/Multiverse exists. Other than that, however, WPM pantheism does, indeed, seem very similar to what I am calling creatheism.

**Is it possible to make evolution a religious focus? Is it possible to devise celebrations, and ceremonies focused around evolution?**

Not only is it *possible* to see evolution in a sacred, meaningful, religious way, I believe it is our destiny as a species to do so...indeed, in a multitude of ways. In my opinion, this is some of the most exciting stuff happening on the planet today!

As you know, most of the Earth-honoring religious rituals and celebrations out there are still coming from a pre-evolutionary understanding of the nature of reality. Neopaganism, Goddess worship, Native American and other indigenous spiritualities, all regularly use a "four directions" invocation, for example. Now few of us *really* believe that there are different spirits in the north, south, east, and west. But we go through the motions anyway because such an approach is the only thing many of us have ever been exposed to.

Connie and I (and others) are not saying there's anything wrong with a four direction approach - it's wonderful. But we're committed to *also* providing evolutionary based rituals, ceremonies, and celebrations. For example, on our website we have

a "stardust communion" ceremony, a number of evolutionary parables that can be acted out, a "Coming Home to North America ritual," and other fun, playful, and meaningful science-based celebrations. People consistently tell us how much they love these experiential, evolutionary-based activities.





Former Austin biology and geography teacher John Koonz talks about the chalk-face struggle to maintain the integrity of science education

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**“There can be no compromising on this issue. Either we provide quality science education, or we give in to religious fanatics.”**

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When I took a job teaching life science at Westview Middle School in 1992, I decided to pull out all the stops and teach the entire course from an evolutionary perspective. I set the stage by explaining how the universe began in an explosion of matter and energy. Next I talked about the synthesis of elements inside stars and the development of our solar system from a spinning cloud of dust and gas. I introduced the concept of new organisms appearing at different points along the geologic time scale. I did not ignore transitional fossil forms when I talked about the different phyla and classes of organisms. My favorite unit to develop was a 12-page comic book project that covered the highlights of the history of life on Earth. All in all, the year went pretty well, and I was only accused of being a tool of Satan once.

For the next several years I had a chance to teach eighth-grade earth science again. I had been doing a lot of reading and had learned a lot more about cosmology and evolution. Each school year was spent teaching the way I had dreamed of doing it years ago. That old comic book project evolved into a 157-page textbook, *A Guide Book to Parts of Our Universe from Planck Time to the Hominids*. My book included some of the latest findings concerning the history of our universe and the evolution of life on Earth.

I discovered that it is possible to avoid much conflict with creationist students and parents by making the course a win-win situation. Once fundamentalist students are made to feel safe from ridicule and reprisals they can actually be an asset. When properly encouraged, creationist

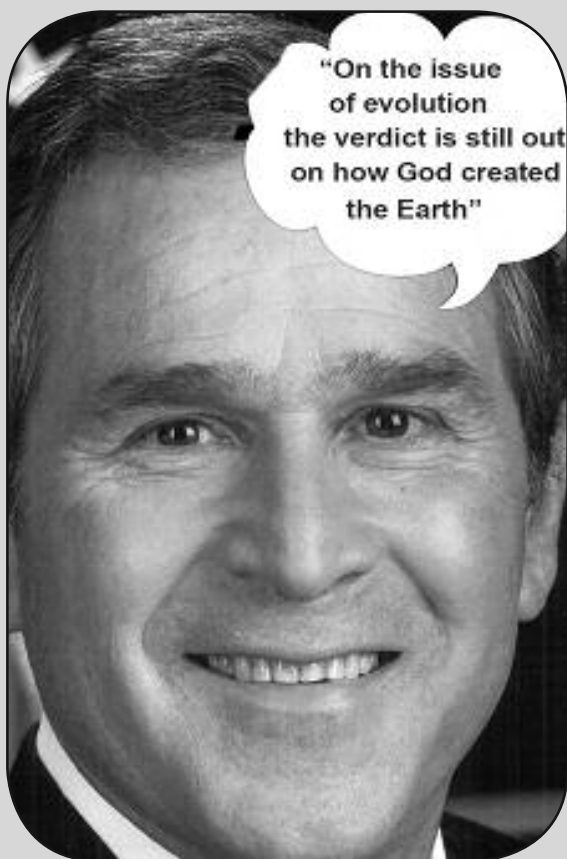
students will ask interesting questions hoping to expose evolution as a lie. Good.

They are being skeptical about fantastic-sounding ideas. That is what a scientist is supposed to do. I wanted my students to understand that they always have a right to question everything they hear. This was important for another more practical reason. A parent would look ridiculous accusing me of harassing kids when I was giving extra credit to students for checking on my facts and asking good questions. I was sure I had figured out how to avoid conflict when teaching evolution.

All good things come to an end. The first confrontation occurred in mid-November of 1994 in the principal's office. Throughout the meeting the parents demonstrated a complete ignorance of basic science. At one point a woman complained quite bitterly about the amount of time I spent on my “cosmetology” unit. They admitted to not having read more than about four or five pages of my book, which included the famous quote from Theodosius Dobzhansky, “Nothing in biology makes sense except in the light of evolution.” These parents were outraged that I had said this to “impressionable young children.” They expressed deep concerns that some of my students might remember this quote when they take biology in high school.

Creationists know that they will lose support for their cause if they blow their cover and admit their religious motives. I knew what their real motives were. Their kid had spent an hour after school one day trying to convince me that his god made the universe as described in the book of Genesis.

## Keeping an open mind I



**"I'd make it a goal to make sure that local folks got to make the decision as to whether or not they said creationism has been a part of our history and whether or not people ought to be exposed to different theories as to how the world was formed."**

He had also tried to demonstrate, using coin tosses, why randomness could never produce organs as complex as an eye. His parents, however, did their utmost to distance themselves from any religious motivation. They said they didn't want me to stop teaching evolution, they just wanted a more balanced view. They demanded to know why I wasn't teaching about all the evidence that refutes evolution. It was chilling to see these people, who could not produce a single well-reasoned argument, flawlessly use standard creationist tactics.

Unfortunately my principal sided with the parents. If I were a social studies teacher, he explained, it would be wrong for me to just teach about communism and not capitalism. In front of these parents I was ordered to "teach the other side" of evolution. I absolutely refused to teach any "evidence" refuting evolu-

tion based on misunderstandings, out of context quotes or outright lies made by creationists. I challenged the parents to produce real evidence by real scientists that I could use in class.

The parents followed up the meeting with a written list of demands. They also sent me some "evidence" refuting evolution, with the masthead thoughtfully trimmed off. It did include a bibliography. Most of the quotes had come from The Creation Science Society Quarterly.

A few days later my principal told me that he had discussed the matter with the district's upper level administrators. The curriculum guide for my course, he was told, was to include theories on the origin of the universe. He was careful to say that I was not being told to teach creationism. It was clear to me that I was being told to water down my course.

It was time to bring in reinforcements. I called the National Center for Science Education, who were extremely helpful and supportive. I discussed the situation with a lawyer friend and her partner. During winter vacation they wrote a letter to the superintendent demanding to know the district's position on the teaching of creationism. We were prepared to file an injunction against the district in federal court if the district didn't back down.

On the first day back at school I had to meet with two of the curriculum coordinators to discuss the situation. After I explained the situation they agreed that I was doing a really great job. They wanted to know how things could be resolved as quickly as possible. A few days later my principal apologized for any misunderstanding that may have occurred. We all thought it was over.

My cosmology/evolution unit was now finished. Each of my students got to keep a copy of my comic book. It was time to move on to meteorology. I hadn't seen the parents since November but they did not drop their complaints. Over the next few months the curriculum people wasted many hours listening to these people and responding to all of their written concerns. I was called to several meetings to rehash the whole thing.

The creationists didn't get their way and were now trying to wear down the school district. I was becoming increasingly irritated with our administrators for allowing this harassment. I put in a written request to have the student removed from my class but that was refused. The parents requested a form to officially challenge my book. A review

committee was set up for this procedure as soon as the parents filled out the paper work.

School administrators generally solve their problems by making compromises. But there can be no compromising on this issue. Either we provide quality science education or we give in to religious fanatics. I was very concerned that some one would give up and make a deal with these parents just to get them off our backs.

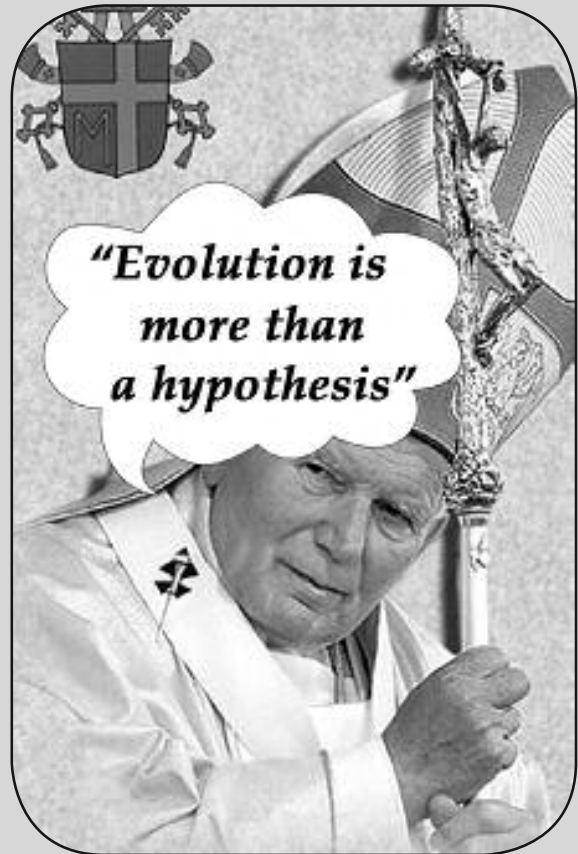
I decided that our administrators could use some encouragement to do the right thing. This is Austin, home of The University of Texas. I took copies of my book to various scientists around campus. I mailed copies to scientists recommended by the NCSE's Eugenie Scott. The response was better than I had hoped for in my wildest dreams. A number of scientists wrote letters to our district administrators strongly supporting the use of my book. Some volunteered to be expert witnesses on the review committee. If the administration had tried to make a deal with these parents, Pflugerville School District, would have been the laughing stock of the area.

This occurred ten years ago and I have since left public education. I continue to offer workshops designed to help teachers cover evolution more effectively, which has given me an opportunity to talk to many teachers in schools throughout Texas. The current situation varies widely across the state. A year ago I met a teacher who had been warned, in no uncertain terms, that teaching about evolution would not be tolerated on their campus. He did it anyway and lost his job. And yet, in the same workshop, I met a teacher who works in a school district that forbids teachers from discussing their personal beliefs at all so as to preserve a sense of neutrality in the classroom.

I do not think that the right-shifting political situation in Texas, or in the rest of the country, has made much difference. The problem was already serious. This *is* a majority Christian country. In a few isolated places in Texas a few teachers hold their ground and try to do a decent job covering evolution. But most high school textbooks don't cover evolution in any meaningful way - and most teachers prefer to downplay evolution so as to avoid conflict.

When I still worked in public school, seventh graders learned about life science and eighth graders learned about earth science. Middle school teachers tended to specialize in one or the other. Both courses provided plenty of opportunity for someone willing to teach about evolution to cover the subject fairly

## Keeping an open mind



**"It is remarkable that this theory has been progressively accepted by researchers, following a series of discoveries in various fields of knowledge. The convergence of the results of work that was conducted independently is in itself a significant argument in favour of this theory."**

well. But now the increasing focus on teaching to the standardized tests means that there is little time left over for anything not found in the Texas Essential Knowledge and Skills requirements. All of the earth science and evolution concepts have been diced up and spread out over the entire middle school curriculum. The TEKS were carefully worded to avoid using the word 'evolution' thereby allowing teachers and districts to water the subject down to virtually nothing.

I think that the future is bleak for science education in Texas. The real threat to science education posed by the Bush administration is not just the far right agenda, but the over-reliance on standardized testing and the dumbing-down of education.

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# Global warfare

## In the world-wide struggle, the USA is the frontline

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The battle over evolution in education is largely confined to those areas of the world where theistic scripture-based religions enjoy some kind of political dominance.

Traditional Judaism, Christianity and Islam share similar beliefs that an invisible deity created the earth in six days. In all three religions, people who accept the literal truth and divine authorship/inspiration of their scriptures do not accept the theory of evolution and many are unhappy about it being taught to their children.

### Islam

The Koran allows a little more leeway for accommodation with the geological timescale, because the timetable of creation is not detailed. However, it is harder for Moslems to move towards the symbolic reinterpretation of their scriptures, because Allah is explicitly claimed to be the direct author of the Koran (rather than just the inspirer).

There is no ready source as to which Islamic countries allow the teaching of evolution at different levels, but some countries have seen backlashes. Turkey was secularized by Kemal Ataturk in the 1920s and 30s, and creationism was relegated to religion classes. But in the mid-1980s the teaching of creationism was made compulsory in biology courses. In addition evolution was often taught in a misleading way that allowed it to be discredited. After 1998 textbooks were rewritten to present a more objective picture. But resistance continues. In February 1999 a representative from the fundamentalist Virtue Party proposed a *Bill of Anti-Evolution* to ban teaching of evolution in the schools and to collect and destroy all the books about evolution in the official libraries, on the grounds that evolution is against Islam.

### Europe

In most of Europe the battle is more or less won. In Catholic countries the Pope's explicit acceptance of the theory of evolution means that evolution is not controversial. In northern Europe scriptural religion has only a weak hold and resistance to evolution is muted.

Attempts at regression have been made, but mostly failed to make headway. Last year Italy's Education ministry proposed removing evolution from the curriculum on the basis that it was too complicated for 10 to 13 year-olds. The proposal was quickly abandoned after massive protests from scientists and educators. In Serbia the education minister Ljiljana Colic said that in future Darwin's theory would only be taught alongside creationism. After a storm of protests, she was forced to resign. In Britain a small number of private schools run by the Emmanuel Schools Foundation are teaching creationism alongside evolution. The schools' benefactor Sir Peter Vardy said: "We do present both - one is a theory, the other is a faith position, and it's up to the children."

### USA

Europe's problems are small stuff when compared with the USA. In many southern states the teaching of evolution remained banned until the 1960s, when the Supreme Court invalidated an Arkansas anti-evolution statute.

Supreme Court decisions (see Eugenie Scott page 5) have made it very difficult to teach Creationism or even Intelligent Design within the science curriculum, or to ban the teaching of evolution. The Edwards v. Aguillard decision in 1987 struck down a Louisiana law requiring teachers to give equal time to "creation science" and to evolution. But the majority opinion, written by William Brennan, left the door open to more sophisticated approaches: "Teaching a variety of scientific theories about the origins of humankind to schoolchildren might be validly done with the clear secular intent of enhancing the effectiveness of science instruction."

After this opponents shifted tactics but the battle still rages. Between 2001 and 2004 forty three out of fifty U.S. states saw some type of anti-evolutionist activity or attempted activity at either the state or local level. Ultra-low turnout for school board elections has opened the way for highly motivated religionists to get on the boards and to push their agenda.

Recent attempts to undermine the theory of evolution have taken three main forms: use of textbook labels warning students to treat evolution material critically; moves to require the teaching of alleged "problems" with the Theory of Evolution; and moves to get Intelligent Design Theory taught alongside of evolution.

**Textbook stickers** aim to undermine the credibility of evolution, or to suggest that it is less well-established than other scientific theories. The singling out of evolution for this treatment appears to place it in a special domain within science, somehow less reliable than the rest.

This book contains an **evolution disclaimer sticker** mandated by your local school board. This sticker should be studied carefully, and critically considered.

**Spoof stickers:** Colin Purrington

The stickers have seen an evolution of their own under the selection pressure of higher court judgements - from the expression of biased skepticism, which the courts have rejected, to much more subtle and seemingly objective calls for critical thinking, appealing to the spirit of science. Sooner or later, one or other of these formulations might scrape past a more conservative Supreme Court.

**Alabama's** stickers have often been used as models for other initiatives. The original 1996 sticker used pretty strong language:

*This textbook discusses evolution, a controversial theory, which some scientists present as scientific explanation for the origin of living things, such as plants and humans. No one was present when life first appeared on earth. Therefore, any statement about life's origins should be considered as theory, not fact. . . Evolution . . . refers to the unproven belief that random, undirected forces produced a world of living things. There are many unanswered questions about the origin*

The sticker in this textbook claims that evolution is not fully accepted by scientists because it is just a theory. It hopes to confuse you into equating "scientific theory" with "cockamamie theory."

*of life, which are not mentioned in your textbook, including: Why did the major groups of animals suddenly appear in the fossil record, known as the Cambrian Explosion? Why have no new major groups of living things appeared in the fossil record in a long time? Why do major groups of plants and animals have no transitional forms in the fossil record? How did you and all living things come to*

#### A MESSAGE FROM THE ALABAMA STATE BOARD OF EDUCATION

...The value of scientific work ... is not only the development of theories but also what is learned from the development process. The Alabama Course of Study: Science was developed within the context of trying to establish scientific literacy, not to question or diminish one's beliefs and/or faith. ...Because of its importance and implications, students should understand the nature of evolutionary theories. They should learn to make distinctions between the multiple meanings of evolution, to distinguish between observations and assumptions used to draw conclusions, and to wrestle with the unanswered questions and unresolved problems still faced by evolutionary theory.

There are many unanswered questions about the origin of life. With the explosion of new scientific knowledge in biochemical and molecular biology and exciting new fossil discoveries, Alabama students may be among those who use their understanding and skills to contribute to knowledge and to answer many unanswered questions. Instructional materials chosen to implement the content standards within this course of study should be approached with an open mind, studied carefully, and critically considered.

Revised January 14, 2005

This sticker covers a pre-existing sticker designed to subtly undermine the teaching of evolution in your class.

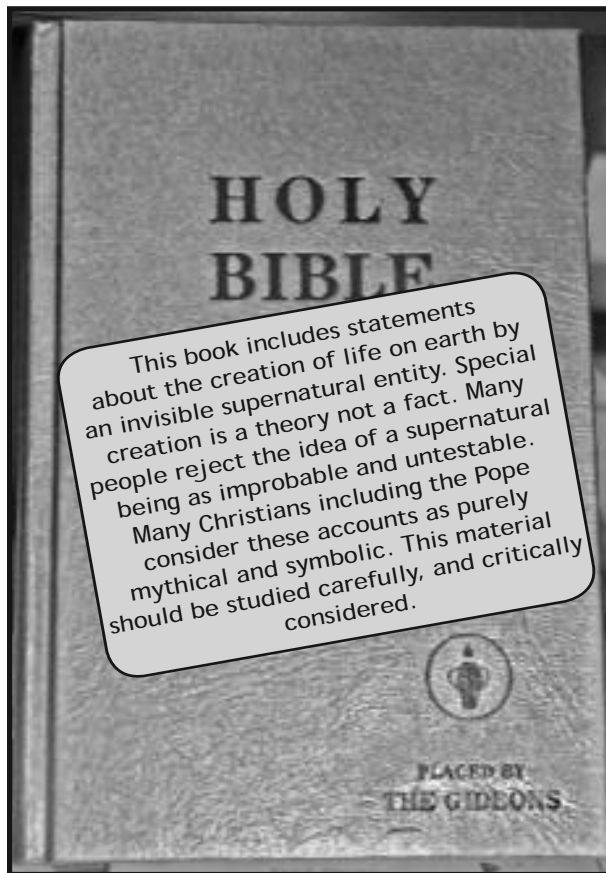
*possess such a complete and complex set of instructions for building a living body?*

In 2001 the wording was toned down considerably and in the latest revision, of January 2005 even more so. The current revision (see box) differs from the 2001 version mainly by omission of the words "controversial" and "controversy." It still refers to the "unanswered questions and unresolved problems faced by evolutionary theory."

**Georgia's** Cobb County School District near Atlanta is the site of the most recent sticker controversy and pending lawsuit. Stickers were added in 2002 after more than 2,000 parents complained that school textbooks presented evolution as fact, without mentioning rival ideas about the beginnings of life, such as the biblical story of creation. The sticker was very brief: "This textbook contains material on evolution. Evolution is a theory, not a fact, regarding the origin of living things. This material should be approached with an open mind, studied carefully, and critically considered."

Six parents backed by the American Civil

Liberties Union brought a lawsuit, contending that the disclaimers violated the separation of church and state and unfairly singled out evolution from thousands of other scientific theories as suspect. On January 13 2005, U.S. District Judge Clarence Cooper ruled that the stickers violated the Establishment Clause of the First Amendment and ordered them removed. Cobb County School Board has already decided to appeal the ruling.



## Raising questions about the Theory of Evolution

Stickers are statements by administrators and leave teachers out of the picture. The second approach is to require teachers to teach not just the theory of evolution, but also the unanswered questions and unresolved problems that allegedly attend the theory.

Of course science should never be taught as unquestionable dogma: science advances because scientists continually challenge and question existing theories. It may often be valuable with older students to point out gaps in knowledge, unanswered questions and competing scientific options. But this applies not just to evolution, also to cosmology, quantum mechanics, relativity and other areas. And the "unanswered questions" should be taken from within

the mainstream science, not by picking on those aspects that disagree with scripture.

In **Tennessee** Senate and House education committees approved a bill in 1996 that would have allowed schools to fire any teacher who presented evolution as a fact. A Senate amendment defined evolution as an "unproven belief that random, undirected forces produced a world of living things." In the full legislature, it was voted down after months of debate.

**Ohio's** State Board of Education in 2002 adopted science standards requiring students to learn how scientists "continue to investigate and critically analyze aspects of evolutionary theory." In 2004 the board adopted a model lesson plan entitled "Critical Analysis of Evolution." The plan did not mandate the teaching or testing of intelligent design, but the Discovery Institute's Dr. Stephen Meyer noted that "Ohio has become the first state to require students to learn about scientific criticisms of Darwinian evolution as well as scientific evidence supporting the theory."

## Attempts to get Creationism or Intelligent Design taught

Since the Supreme Court ruled in 1987 that the teaching of creationism in public schools was unconstitutional, Intelligent Design Theory has been the new Trojan horse designed to get past the defences. ID does not specify who the designer was, it comes with a plethora of biological detail and statistical argument, and it may be regarded differently to creationism by the courts.

The central problem in teaching ID in science classes is that it is not science (see pages 3-4). It laboriously focuses on the most complicated organs and biochemical cycles, and asserts that they could not have originated by any natural means. Since the whole point of science is to seek naturalistic explanations for everything possible, ID is the opposite of science and undermines confidence in the whole enterprise of science.

Attempts in this area so far failed to make much headway - but not for want of continual trying. In 2003, a bill before **Michigan's** state legislature would have required the state science curriculum to include the concept of "intelligent design of a Creator" whenever evolution is mentioned. In 2004 **Missouri's** legislature considered two bills demanding equal time for ID in science classes. None

of these bills passed.

However in **Pennsylvania** things have moved a little further. Pushed by a Christian creationist, Bill Buckingham, the Dover area school district decided that although ID would not be directly taught, 9<sup>th</sup> grade biology students would be told about it and the standard ID textbook *Of Pandas and People* would be made available:

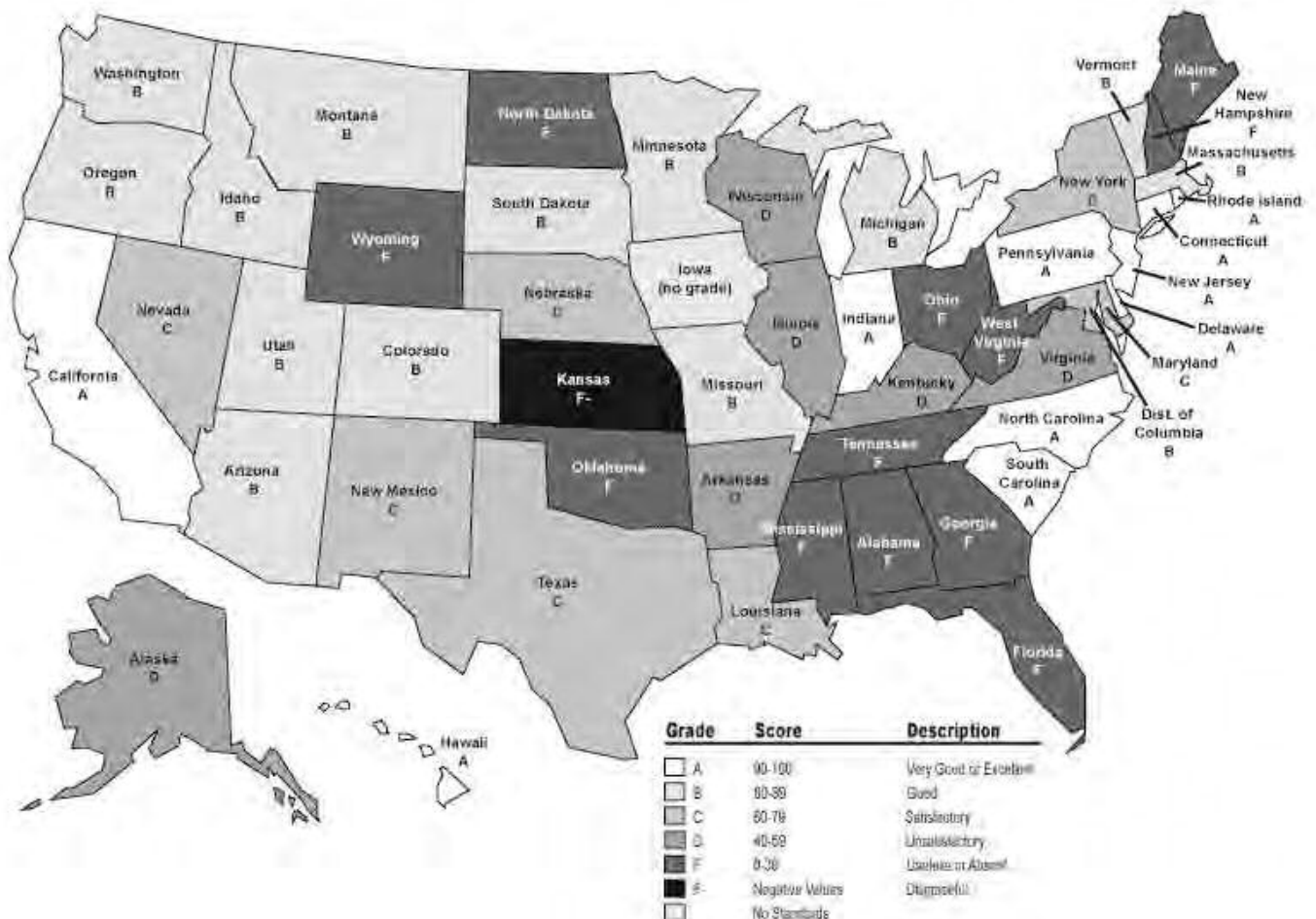
*Because Darwin's Theory is a theory, it continues to be tested as new evidence is discovered. The Theory is not a fact. Gaps in the Theory exist for which there is no evidence. . . Intelligent Design is an explanation of the origin of life that differs from Darwin's view. The reference book, Of Pandas and People, is available for students who might be interested in gaining an understanding of what Intelligent Design actually involves. With respect to any theory, students are encouraged to keep an open mind. The school leaves the discussion of the Origins of Life to individual students and their families.*

On December 14 a lawsuit challenging this

policy was filed by eight Dover families, supported by the ACLU and Americans United for Separation of Church and State.

**Kansas** may yet see the most extensive challenge so far not just to the teaching of evolution but of science in general. In 1999 the state board of education decided to omit references to evolutionary concepts from the state's education standards and standardized tests. The board did not forbid the teaching of evolution, but helped to discourage the teaching of it. In 2001 a new board voted 7-3 to restore the teaching of evolution to the standards and tests. Late in 2004 the balance changed again leaving only four pro-evolution members. A radical revision to the science standards has now been proposed, suggesting that counter-evidence and ID theory be studied as well as evolution. They also challenged the whole concept of science as the pursuit of naturalistic explanations, claiming that this encourages atheism and closed minds to alternative (ie supernatural) explanations.

### Treatment of Evolution in Science Standards by US State in 2000



Source: Lawrence Lerner, Teaching Evolution in the States, Fordham Foundation

## NEWS OF WORLD PANTHEISM

### New Directors



Tom Moore is our new Vice-President for the Americas, taking over from Walt Mandell

who is stepping down to gain more space to pursue his ideas. We would like to thank Walt, who continues as a director, for his services. Tom is head of Interplanetary Physics at NASA's Goddard Space Flight Center, living in leafy suburban Maryland with his wife and cat, her dog, and one of their three daughters, two of whom are in universities this year. Baptized Methodist, Tom grew up in a small industrial community of Catholics. His Mom showed him the spiritual possibilities of a walk in the woods. Long an agnostic student of solar system science, and amateur evolutionist, Tom's spiritual

interests were aroused when his father's mortality struck him. He came upon World Pantheism and found it a satisfying basis for spiritual reflection, with a compelling set of life principles. Tom hopes to find time to promote Pantheism as a source of ethical values. Tom's personal area of interest is in ionospheric plasmas. He has been involved in 10 suborbital, one space shuttle, and 6 orbital NASA missions. Tom is also secretary for the Magnetospheric Physics subsection of the American Geophysical Union.



John "Eljay" Love-Jensen lives in Chanhassen, Minnesota with his wife of

fifteen years Tina, three year old daughter Lexie, and three pets. Eljay is a computer scientist, and holds a Bachelor of Science degree from the University of Minnesota. His interests include his family,

philosophy, comparative religion, linguistics, physics, astrophysics, reading (technical manuals, science fiction, fantasy), role-playing games, computer games, chess, and computers. He was raised Roman Catholic Christian, went through a non-religious period, and then discovered pantheism.



Tony Van der Mude lives in the hills of North-western New Jersey with his wife Mary. He

is a computer programmer with interests in Artificial Intelligence, Machine Learning, Expert Systems and Speech Recognition. Besides touching the sacred in the everyday miracles of the world and living things, his interest in computer logic has led him to the essential mystery and wonder of existence through mathematics. He has a strong interest in music, especially Rock and Jazz.

### 42 acres saved for wildlife



Our click group saving wildlife habitat at EcologyFund now has a record 157 members, and we have saved 1,860,000 square feet or more than 42 acres - that's equivalent to 26 international football pitches. Most of this is tropical rainforest and the benefits for biodiversity are considerable: one hectare (2.5 acres) of rainforest may contain 700 types of tree and 1500 of plants. A single tree in Peru was found to host 43 different species of ant.

We are saving at the rate of about one acre every three weeks, but if every one of our EcologyFund group members were clicking every day we could be saving an acre every five days. The next largest group is Pagans for Mother Earth, with 109 members. Because they started a very long time before we did, they have saved more, but we have nearly caught up with them - we are just 1.1 acres short and at our present pace we should surpass them in a couple of months. They have done excellently too and

should be congratulated.

Traditional religious groups have not done so well, though anyone who is doing anything deserves encouragement. Buddhists have saved 1.3 acres, Hindus half an acre. UUA Member Congregations have saved 17 acres. It's nice to see that there is an atheist group, though it has saved only half an acre. There are four Muslim groups, two of them with the slogan: "Islam is the best way to save Nature." So far there is little evidence to back that claim: they have saved a total of 0 (zero) square feet.

You can sign up and save more than 60 square feet a day at: <http://www.pantheism.net/reserves/nature.htm>

#### Credit Cards



The WPM has signed up with Verisign and can take subscriptions with Visa or Mastercard. We retain our Paypal account so if you are registered with Paypal you can use this route. Renew, as usual, at the members center: <http://members.pantheism.net/renew.html>

## New Green Living section



Our old daily click page for charity has been expanded into a "Green Up your Life" page, providing practical and direct links to make our lives sustainable in all areas. Here with just six clicks from one page you can give 1.6 cups food to humans, save 180 sq ft of wildlife habitat or 3 trees in 5 days, give 1 bowl food to rescued animals, and

more. This is now combined with a sustainable living page with the most direct practical links to audit your lifestyle and make it sustainable. Checkout your home area for pollution - Offset your own pollution through treeplanting - Green up your energy use - Transport - Appliances - Building - Gardening - Workplace. Many of the links allow localized searches for information and services.

In a period in the US when environmental policy will not be progressive, this page gives individuals many of the tools needed to make a difference to their own lives and to the planet directly. It's an active alternative to despair and depression. Please also tell all your friends, whether pantheists or not, about this page.

The url is <http://www.pantheism.net/daily.htm>.

## A long farewell to a great friend

The Hubble Space Telescope, NASA's premier space science tool, gave us a quantum leap in our vision of the Universe, unmatched by earth-bound telescopes. But on current plans it is fated to end its mission in a few years. Electronics tend to fail gradually with exposure to radiation from the Van Allen belts, or Solar Energetic Particles. One important camera died last summer. When the gyroscopes fail, the HST can't be pointed.

Since the accident with the Columbia shuttle, further missions have been grounded for over two years now, creating a backlog of unfinished work on the Space Station. A year after Columbia burned up on reentry, NASA declared that it would cancel the servicing mission needed to keep HST going. Money is always a factor, but NASA disavowed any concern but astronaut safety. During the past year, proposals have been seriously considered to mount a robotic mission to Hubble to carry out the needed servicing, and this appeared feasible for much of the year. However, the National Academy of Science reported that the robotic mission would be a high risk (and high cost) approach. Now NASA is rejecting both the robotic and the crewed servicing mission approaches.

The estimated cost of a Hubble servicing mission is very high either way, measured in billions of USD. And NASA is in the process of transforming itself back into an agency of human exploration at the behest of the Bush administration and the

President himself.

Hubble servicing has thus run square into heavy competition for available funds, under a relatively fixed or slowly increasing annual budget. The larger increases needed to pursue both science and exploration goals seem out of the question in the near term.

The decision to abandon and de-orbit Hubble will be very unpopular with Congress and the taxpaying public. And it may not stick for that reason. Congress can put things back into the budget that it finds to be compelling priorities.

On the other hand, budgetary circumstances are anything but favorable to this outcome at this time. By the time the budgetary crunch eases, the next generation (James Webb) space telescope may be so close to flight that it will make little sense to service Hubble. Considering this, it may be more practical at this point to accelerate JWST than to preserve HST.

There is some philosophical comfort in the age of Hubble, which has survived longer than most NASA missions on the strength of its serviceability by the Shuttle. By any measure, it has had a long and fabulously productive run of astonishing scientific imagery and results. Still it is a great disappointment to NASA, the astronomy community, and the public, to be contemplating Hubble's demise before another space telescope can be deployed to take its place.

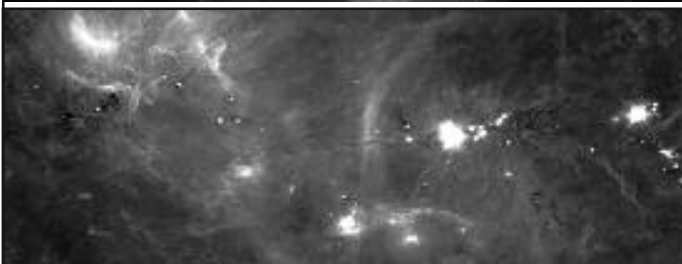
**Tom Moore**

*This article represents the author's personal views, not those of NASA.*

## Some siblings and successors



1999: Chandra X-Ray Telescope, Milky Way core. Beautiful colors, all of them false, and usually fuzzy, but mysterious and awe-inspiring.



2003: The Spitzer Space Telescope, DR21 in Cygnus. Infrared imagery, often in fine detail and almost as good as the Hubble.

2005/2006: Large Binocular Telescope Multinational land-based project in Arizona, scheduled for completion in spring 2006. Two 8.5 meter mirrors will create a collecting area equivalent to a mirror with a diameter of 11.8m. In interferometric mode, the LBT will achieve a resolution about ten times better than the HST.

2011: The James Webb Space Telescope Designed to study the earliest galaxies and stars, the primary mirror will be two and a half times bigger than the Hubble. It will be built in segments, which will unfold in its orbital location about 1.5 million km (1 million miles) from the Earth.

Text and photo © NASA

The World Pantheist Movement depends on the generous support of its members to sustain, improve and expand its activities and services. If you would like to join or renew by check in US \$, please fill in the form below and mail check and form to us. Otherwise please renew at <http://members.pantheism.net/imdms/> or join at <http://www.pantheism.net/join.htm> Please tick as applicable if this is an address change and if you wish us to correct the database entry for you.

Name			
Address 1			
Address 2			
City			
State etc			
Zip code			
Country			
New?	Yes <input type="checkbox"/>	No	<input type="checkbox"/>
Change it?	Yes <input type="checkbox"/>	I'll do it	<input type="checkbox"/>
Membership level:			
Basic (\$30) <input type="checkbox"/> Family (\$60) <input type="checkbox"/> Low Income (\$12) <input type="checkbox"/>			
Other amount _____			

**World Pantheist Movement**  
**P.O. Box 103, Webster, NY 14580, USA**



 Special events		 Equinoxes & Solstices
March		
1st	Establishment of Yellowstone Park	Spring equinox March 20                  12:33
8th	International Women's Day	Summer Solstice
14th	Albert Einstein born	June 21                  06:46
21st	International Day for the Elimination of Racial Discrimination	
22nd	World Water Day	
23 <sup>rd</sup>	World Meteorological Day	
April		
	Arbor Day USA (varies by state between January and May)	
1st	April Fool's Day	March 25                  20:58
7th	World Health Day	April 24                  10:06
21st	John Muir born	May 16                  08:56
22nd	Earth Day	June 15                  01:22
26 <sup>th</sup>	Marcus Aurelius born	
May		
1st	May Day/Beltaine	
3rd	International Sun Day	
7th	"Be Kind to Animals" Week	
15th	International Day of Families	
22nd	International Day for Biological Diversity	
25 <sup>th</sup>	Ralph Waldo Emerson born	
31st	Walt Whitman born World No-Tobacco Day	
		<b>Full Moons</b>
		All times Universal time = Greenwich Mean Time