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European Network of Science Centres and Museums
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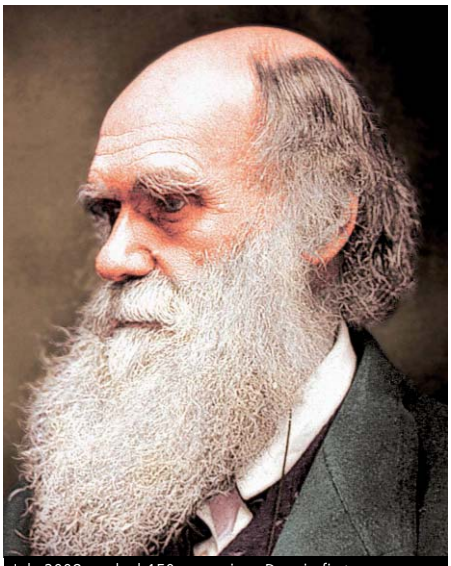
Evolution: new challenges for an old question

It is almost 150 years since Darwin published his book On the Origin of Species by Means of Natural Selection. This theory, hotly contested and debated at the time, has now gained scientific consensus. Despite new methods and discoveries, it has demonstrated its power and its capacity to provide an ever-relevant framework which explains the story of life on earth. It has been taught for over a century and is part of the fundamental syllabus in most countries.

How, then, did teaching evolution come to be associated with the "tension and anxiety" that Bob Bloomfield describes in his article on page 6? How is it that in Europe, at the beginning of the 21st century, an astonishing number of political decisions in various countries have sought to end the teaching of evolution, or to include it on equal footing with other creation stories in science lessons, as we see on the overview, page 8?

Science looks for the simplest possible explanation of all verified facts. This does not always conform to common sense conclusions. "Any dissent is potentially useful as long as it brings more empirical evidence and provides greater, better explanation," as Telmo Pievani puts it in his article on page 2. "For science, reason goes with evidence." In other words, science is the freedom to ask all questions, but the obligation to respond with proof.

At the heart of the current controversy over the theory of evolution is therefore the question of what is scientific and what is not. The political decisions to teach intelligent design in science lessons were taken in the name of freedom of thought. Above all, this shows that the decision makers are forgetting that science is an original method for the production of knowledge, and that which is not produced by means of this method has no place in science lessons. This was the position taken by the Council of Europe in October 2007 when it passed a resolution urging its member governments to "firmly oppose" the teaching of creationism: a reaffirmation of the specific character of the scientific method.



July 2008 marked 150 years since Darwin first presented his theory to fellow scientists, and Darwin Year 2009 celebrates the bicentennial of Darwin's birthday. Image © Natural History Museum, London

We, science centres and museums, provide and encourage a meeting place between science and society, between scientists and citizens. These citizens are coming with what makes them who they are: their knowledge, their beliefs, their values, their ways of thinking, their culture. A conflict can therefore occur between what science does or shows and what values or beliefs tell. As Michele Lanzinger shows in his very telling example on the origins of man on page 6, science centres and museums are well-placed to structure this dialogue respectfully.

Darwin and evolution are one example among others. Many subjects are susceptible to conflict and controversy when they confront dogmatic narratives - and science can very well be presented in an authoritarian way. To do this would be to forget that science is exploration, discovery and, once again, freedom.

Camille Pisani is Director of the Royal Belgian Institute of Natural Sciences, Brussels, Belgium, and the guest coordinator of this issue of the Ecsite Newsletter

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Ecsite Executive Office
T +32 2 649 7383
F +32 2 647 5098
email: info@ecsite.net
www.ecsite.net

Newsletter contributors:
Please contact Michael Creek, Editor
mcreek@ecsite.net

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When faced with a widespread and well-funded movement which goes against the scientific method, what strategy can be employed? Telmo Pievani, Associate Professor in Philosophy of Science at the University of Milan Bicocca's Department of Human Sciences for Education makes the case for a positive message.

What makes science different: how to answer neo-creationistic "arguments"

Should we ignore or accept the challenge issued by the growing neo-creationistic movements? In December 2001, Harvard paleontologist Stephen J. Gould - six months before his death - agreed with his historical antagonist in many bright controversies about evolution, ethologist Richard Dawkins, on the need for a joint public letter concerning exactly this topic. Gould's illness abruptly interrupted the project, but according to the posthumous report of the other signatory, the two eminent evolutionists were going to propose a kind of moratorium of the debates with creationists, at least in institutional locations. The draft of the letter, addressed to the Editor of the *New York Review of Books*, begins in this way: "Dear Editor, like any flourishing science, the study of evolution has its internal controversies, as we both know. But no qualified scientist doubts that evolution is a fact…". And it follows: "We are continually invited to engage in public debates against creationists, including latter-day creationists disguised under the euphemism 'Intelligent Design Theorists'. We always refuse, for one overriding reason. … The coup they seek is simply the recognition of being allowed to share a platform with a real scientist in the first place. … What we shall not do is abet creationists in their disreputable quest for free publicity and unearned academic respectability."[1]

If we have to refuse public debates with creationists in research institutions, denying any implicit approval of their alleged scientific status, the point is very different for public debates with creationists in popular mass media, where a general audience could be exposed to their ideas without contradiction. The situation is much more different, again, when influential and well financed creationistic lobbies achieve the goal of favourable legislations for the "teaching of the controversy" in public schools, like in the very recent case of Louisiana in July 2008[2]. As Dawkins himself demonstrates with his passionate engagement for the public understanding of the Darwinian theory of evolution, in these cases the debate concerns a crucial common interest: evolutionists and teachers cannot simply cultivate their evolutionary gardens, but have a social responsibility for the education of our children.

Indeed, we have today several reasons to accept, carefully and wisely, the neo-creationistic challenge. After the defeats in the Courts - the latest one in Pennsylvania at the end of 2005 - Intelligent Design supporters are concentrating their efforts on mass media and entertainment: maybe a not so bad strategy in our commercial and secular societies. Secondly, the spreading of private teachings in US and Europe - and the current political appeal of the idea that a liberal policy should allow the constitution of private schools distinguished by culture, confession or ethnic group - actually creates a propitious context for these fundamentalist lobbies. Furthermore, as many experimental evidences are pointing out in cognitive sciences and psychology of thought[3], the ID arguments find an unexpected ally in our deeply rooted mental attitudes (results of our adaptive evolution, paradoxically!) for hyper-detecting causes, purposes, intentions and finalities in the external reality and nature. This cognitive, psychological and emotional appeal of the conjunction between science and beliefs seems able to reach even the US campuses, as *Nature* reported in 2005[4].

Recently, among these reasons, we could add a European cultural and political novelty as well. Until very recently, no European anti-evolutionist movement has had as much influence as the evangelical fundamentalists have in the United States. A confirmation of the attitude of respect towards science was offered by an important message concerning evolution that John Paul II delivered in 1996 to the Papal Academy of Sciences.[5] According to Karol J. Wojtyla, "new findings lead us toward the recognition of evolution as more than a hypothesis" and "the convergence in the results of these independent studies - which was neither planned nor sought - constitutes in itself a significant argument in favor of the theory." Unfortunately, since Joseph A. Ratzinger became Pope Benedictus XVI, in April 2005, the Catholic Church's attitude towards the theory of evolution began to change again. In the last years, in fact, important members of the Catholic Church have been increasingly talking about the alleged errors of the neo-Darwinian theory of evolution and, more generally, of the ethical, political and spiritual dangers of the excessive allegiance to science within contemporary Western societies. The hope to find a new, religiously more palatable, version of the theory of evolution tempted, for example, the Cardinal of Wien Christoph Schönborn, one of Pope Benedict XVI's closest aides.

Stephen J. Gould: "What we shall not do is abet creationists in their disreputable quest for free publicity and unearned academic respectability."

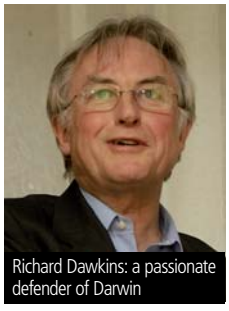
On July 7, 2005, Schönborn wrote an article in *The New York Times*, significantly entitled "Finding Design in Nature", adopting - without saying explicitly - some of the arguments typically employed by the North-American advocates of ID. He presented the ordinary controversies related with the interpretation of the theory of evolution as if they represented insoluble problems for the neo-Darwinian theory; he wrote that the explanation by random variation and natural selection, excluding any "design" and final cause acting in nature, cannot be true and, in any case, is incompatible with the Christian faith; finally, he presupposed the ID as the only acceptable scientific explanation of evolution ("any system of thought that denies or seeks to explain away the overwhelming evidence for design in biology is ideology, not science.") Schönborn's conclusion was that "the Catholic Church, while leaving to science many details about the history of life on earth, proclaims that by the light of reason the human intellect can readily and clearly discern purpose and design in the natural world, including the world of living beings."[6] So, "by the light of reason," a scientist who does not see the overwhelming evidence for design in biology is not a good scientist.

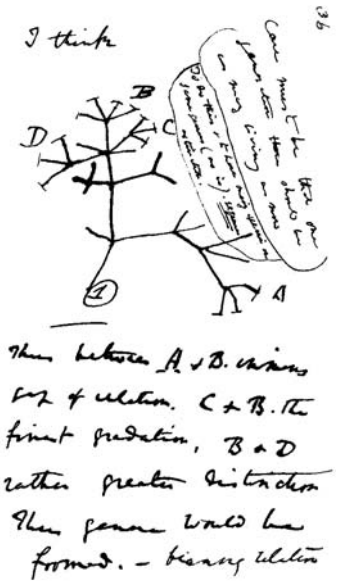
The impression that Schönborn's article signalled a radical change of policy by the Church with regard to the theory of evolution was confirmed by the passage in which he discredited Wojtyla's message of 1996 as "a rather vague and unimportant letter". Benedict XVI himself, by the way, had begun his Pontificate with a homily in which he had proclaimed that, "We

are not the casual and meaningless products of evolution."[7] So, in 2006 Pope Benedict and Cardinal Schönborn decided to publish the proceedings of a private workshop, which in September of that year had been held at Castelgandolfo. The subject of the workshop was the relation between Christian faith and the theory of evolution.[8] Notwithstanding the presence of one of the most important German-speaking evolutionists-the President of the Austrian Academy of Sciences, Peter Schuster-the Castelgandolfo proceedings ended in favor of a form of neo-Creationism. Ratzinger, in particular, officially accepted the position advocated by Schönborn in his *New York Times* article. The new Pope stated that "the theory of evolution (*Evolutionslehre*) is not yet a complete and scientifically verified theory (*komplette, wissenschaftlich verifizierte Theorie*)". Indeed, that theory "is, to a large extent, non-demonstrable experimentally (*nachweisbar*), simply because we cannot reproduce 10.000 generations in a laboratory. This means that there are significant gaps (*erhebliche Lucken*) in the experimental verifiability and falsifiability of that theory because of the immense period of time it covers."[9] Even if it is not properly an official position of the Pope *ex cathedra*, the gap between this statement in 2006 and Wojtyla's one, ten years ago, cannot be underestimated.

At the same time, also some non-predominantly Catholic European countries are now experiencing outbreaks of creationism (the evolutionism-Creationism struggle, for example, has recently reached the Orthodox regions, generating inflamed public discussions). In 2007, the rapid spread of the creationistic inter-religious movements over Europe produced a formal critical response by the Council of Europe ("The Dangers of Creationism in Education").[10] In its document, the European Committee on Culture, Science and Education stated that the teaching of creationism in the schools cannot be considered as an expression of freedom of thought, but only as a form of religious fundamentalism, which threatens both the freedom of science and the freedom of teaching.

So, how to answer the creationistic arguments in this new political and cultural context? A reactive, defensive and spot-by-spot policy of rebutting seems not enough. Science is an open way of thinking, with common rules, it has a public role in our societies and, as a matter of principle, any dissent is potentially useful. If ID were a good alternative "school of thought" about the "explanation of life" - as US President George W. Bush said in August 2005 - it should explain all the empirical basis of current Neo-Darwinian research program, it should explain something more, and it should do all that using different laws and factors from Neo-Darwinian ones. This is absolutely not the case. As many scientists and philosophers analytically pointed out[11], giving ID the benefit of the doubt, we can easily check that there are no empirical evidences at all, just "negative proofs" (about the origins of life or the Cambrian explosion) confusing an impossibility *de facto* with an impossibility *de iure*, and ignoring scientific explanations already available. We can also easily check that in ID works there are no good inferences at all, but a lot of logical fallacies concerning the relationships between the concepts of chance, probability, complexity and information. So we do not find any useful controversy, because ID does not help to outline any potential weakness of Neo-Darwinian frame and its objections cannot have falsification.


Richard Dawkins: a passionate defender of Darwin


Charles Darwin's 1837 sketch, his first diagram of an evolutionary tree from his First Notebook on Transmutation of Species (1837).

So far, the negative side of the debate. But, in a positive way, useful for the outreach of evolutionary researches: what makes science different? Science is discovery, not only theories and frames of concepts: a process of human creativity, a mix of method and imagination, a marvellous adventure of mind such as the young Charles Darwin's one described day by day in his early *Transmutation Notebooks* (1836-1844). Furthermore, scientific theories and ideas evolve, whereas ID has instead the same arguments of William Paley's *Natural Theology* of 1802. The theory of evolution, like any evolving research program, has a flexible structure: there is no "Darwinian orthodoxies" and the theory is quite different from the formulations of 1859 and XX Century, though still consistent with the basic Neo-Darwinian processes. Some evolutionists are beginning to talk about a possible new "extended evolutionary synthesis"[12], where a Neo-Darwinian extended core of the program (variation, selection, genetic drift, macroevolution) is surrounded by new hypotheses concerning the plurality of rates of change, the plurality of levels and units of change, and the plurality of patterns of change deriving from the different trade offs between biological structures and functions, constraints and plasticity. While we spend time in debates with creationists, many interesting discoveries are accumulating in evolutionary sciences, exciting to popularize.

Is it enough for the public awareness? Probably not, because neo-creationism is a political and cultural campaign, manipulating and transcending any contents, and neo-creationism is psychologically attractive whereas science is frequently counter-intuitive. Nevertheless what we need is to clarify that evolution is not the door to atheism: scientific (methodological) naturalism is different from metaphysical (ontological) naturalism[13]. So, we have to do much more than "answer". We need a positive message about the beauty of the freedom of inquiry, a message able to create consensus around science education, and to render useless any attempt to pass off as science what cannot be science in any way.

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[1] In R.C. Dawkins, *A Devil's Chaplain*, Houghton Mifflin, New York, 2003, pp. 219-221.

[2] *About the new Louisiana Science Education Act: Gefter, A., "New legal threat to teaching evolution in the US", in* New Scientist, *09 July 2008*.

[3] Wolpert, L., *Six Impossible Things Before Breakfast*, Faber and Faber, London, 2007. See also: Girotto, V., T. Pievani, G. Vallortigara, *Nati per credere* ("Born to Believe"), Codice Edizioni, Turin, 2008.

[4] Brumfiel, G. (2005), "Intelligent Design: Who has designs on your student's minds?", *Nature*, 434, 1062-1065, 28 April 2005.

[5] John Paul II, "The Truth Cannot Contradict the Truth", Papal Academy of Sciences, Plenary Session, October 22, 1996 (Rome: Libreria Editrice Vaticana, 1996).

[6] C. Schönborn, "Finding Design in Nature", *The New York Times*, July 7, 2005.

[7] This homily was given on April 24, 2005, and can be found at the URL, www.vatican.va.

[8] *Schöpfung und Evolution. Eine Tagung mit Papst Benedikt XVI. in Castel Gandolfo* (Augsburg: Sankt Ulrich Verlag/Rome: Editrice Vaticana, 2007).

[9] *Ibid*. p. 150.

[10] Council of Europe, "The Dangers of Creationism in Education", Resolution 1580, http://www.assembly.coe.int/Main.asp?link=/Documents/AdoptedText/ta07/ERES1580.htm.

[11] Among the most recent: Perakh, M. (2003), *Unintelligent Design*, Prometheus Books, Amherst NY; Shanks, N. (2004), *God, the Devil, and Darwin. A Critique of Intelligent Design Theory*, Oxford University Press, Oxford-New York; Pievani, T. (2006), *Creazione senza Dio* ("Creation without God"), Einaudi, Turin.

[12] Pigliucci, M., "Do We Need an Extended Evolutionary Synthesis?", in *Evolution*, Dec. 2007, 61-12: 2743-2749.

[13] Pigliucci, M. (2003), "Design yes, intelligent no: A critique of intelligent design theory and neocreationism", in P. Kurtz, B. Karr, R. Sandhu, ed. by, *Science and Religion: Are They Compatible?*, Prometheus Books, Amherst NY.

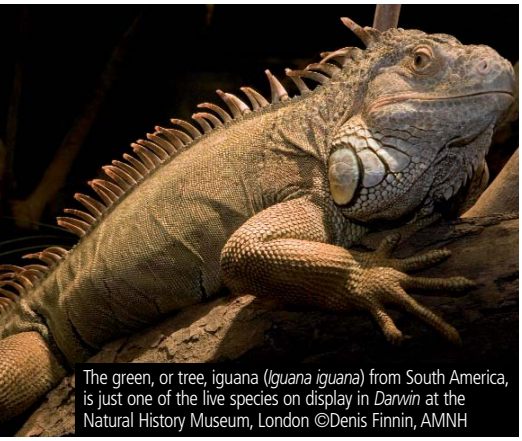
Dr Robert Bloomfield is a senior science communicator at the Natural History Museum London and the co-ordinator of Darwin200, celebrating Darwin's work around his two hundredth[th] birthday on February 2009. Here he looks at the role of public engagement in the issue of evolution.

Why it is time for science communicators to evolve

Teaching evolution at school and engaging with the subject in public have become the subjects of tension and anxiety, first in the US but also increasingly now in Europe. There are reasons for this; in our multicultural society we must quite rightly be sensitive to issues of equality, free speech and religious freedom. In addition, although it isn't unique to this area of science, there is political opposition to evolution from the so-called 'religious right'. Propaganda led by the US creationist lobby, in particular the Discovery Institute, attacks evolution as the thin end of the wedge' in a strategy aimed at undermining western materialism and secularism.

It is helpful to question presumptions. Many scientists have shied away from engaging in public debate with creationists, as they regard this as a futile distraction, undeserving of any publicity. However, this is dangerous thinking if it neglects the much larger numbers of people whose uncertain views lie somewhere between rational science and creationism, and who may well come to appreciate evolution - if only some effort were made to explore the evidence with them.

In recent years, the tendency of science organisations to ignore the issue has colluded with the creationist mantra 'teach the controversy', so that, often, anti-evolutionist propaganda has gone unchallenged. But creationist lobbyists would say that, wouldn't they? It is a clever ploy, as it puts science communicators on the defensive, wary of exacerbating the issue by giving creationism the oxygen of publicity. However, the science communication community in the US, which has more experience in this, has seen through it. In particular the AAAS and the NCSE are increasingly proactive, moving quickly to confront the religious right whenever and however they try to attack evolutionary science.



The green, or tree, iguana (*Iguana iguana*) from South America, is just one of the live species on display in *Darwin* at the Natural History Museum, London ©Denis Finnin, AMNH

When it comes to face-to-face public engagement, the first point to establish is that science is evidence-based, built on the development of theory that has to be supported through multiple lines of enquiry. Faith-based views, of which there are many, may be deep-rooted, but rely on quite different ways of seeking understanding, which by definition are not evidence-based. It is essential to politely assert this as you talk about the context of science, and that scientific enquiry has led to just one consistent model that explains the diversity of life - evolution. Our understanding of the process of evolution comes from the examination of evidence that is objective and value free, and which is scrutinised by peers, not taken as dogma. It should be stressed that a theory is not just an idea, but a framework against which predictions can be tested (which is why creationism is NOT regarded as science, as by definition it puts understanding the complexity of life beyond testing, making it inaccessible to the scientific method).

Secondly, many people, especially young people, are sincere in their beliefs, which for them have formed from their earliest experience in the context of their family and community. This has been of particular concern in the teaching of evolution in science classes at school, but the general point is relevant to public engagement anywhere. Creationism has no place in the science classroom as a scientific idea equivalent to evolution; indeed, it has no place as a scientific idea at all. However, it is not helpful to dismiss pupils' views out of hand, or merely respond that the place to address their concerns is elsewhere in religious education classes. As Michael Reiss, Professor of Science Education at the Institute of Education, London; and former Director of Education at the Royal Society, UK, has accurately commented: 'There is a role for science teachers. Religious education teachers can't be expected to know about the evidence.'[14] So courtesy and sensitivity should prevail. If people make contributions to a forum for debate and express a creationist position or express confusion between their beliefs and evolution, it is not helpful to disparage them. Instead this is an opportunity to first acknowledge their difficulty and then respectfully reassert the importance of evidence to scientific enquiry.

The evidence supporting evolution has burgeoned in the past 150 years since Darwin and Wallace made public their mechanism for evolution by means of natural selection. New insights and discoveries since the time of Darwin; the discovery of DNA; genetic homology; genetic drift; punctuated equilibrium; the discovery of lateral gene-flow by the likes of viruses and plasmids and many other developments have served to enhance our understanding of the evolutionary process. While today some scientists may attach different levels of significance to these areas, that is to be expected within the context of how the science method works, and how knowledge progresses. At the heart of evolutionary biology, the process identified by Darwin and Wallace - natural selection - remains robust.

It is helpful not just to look at evolution over geological time, but to explore and reflect on evolution operating today, and how this is crucial to people and the future of all life on earth. Examples abound, why do we worry about bird flu and the effectiveness of vaccinations? What do we

Darwin's study. An elaborate reproduction of Charles Darwin's study from Down House is one of the centerpiece attractions of *Darwin* at the Natural History Museum, London ©Denis Finnin, AMNH

learn from the use of antibiotics in hospitals about the science of evolution? In the age of rapid global transport what is the consequence of alien introductions - what has this to do with thinking about evolution, competition, extinction and founder effects?

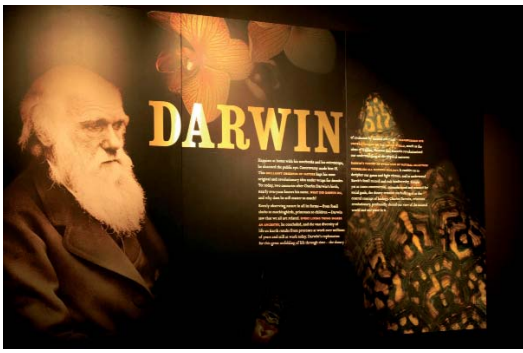
It is useful to explore how the adaptations of each species are constrained by their evolutionary past, by their genetic inheritance and its plasticity. Species are certainly not perfectly adapted as one might expect in a created world. There are many cases where species have succumbed through their own impact on their habitat, a fate of which we ourselves are at risk of. All carry the legacy of the evolutionary past, why do whales have vestigial legs and cave fish blind eyes? What has the quadrupedal, small-brained past of primates got to do with the back-pain and difficulties in child-birth experienced by up-right walking, large-brained humans?

It is inevitable that in 2009 in particular, with the public interest in Darwin's bicentenary and the 150th anniversary of 'On the Origin of Species by Means of Natural Selection', the familiar debates around evolution and creation will be rehearsed. However, things have moved on, there are strong indications for example that, at least in the UK, both the major Protestant and Catholic Church's position on evolution are being reconsidered - they seem to be seeking a new accommodation, might this be welcomed? After all the Vatican publicly suggesting it finds harmony with some sort of 'theological evolution' where humans may share ancestors with primates is quite a leap for that organisation. There is concern, and it is the true that the media cannot always be counted on to report the facts, but this is nothing new and crucially the science establishment cannot afford to dismiss the importance of engaging with the public. This is not only because of the political interplay between science and society, but also because an understanding of evolution is crucial to major global issues today, including the consequences arising with climate change and biodiversity loss (the focus of public interest will move in late 2009 and in 2010 from the Origin of Species to the Future of Species with the Convention of Biological Diversity).

Science centres, science museums and natural history museums have a key role to play in the months ahead as the world celebrates Darwin's life and achievements. Now is a good time to reflect on the history of public engagement with evolution, and where better to look than to Darwin's bulldog - Thomas Henry Huxley. He is most renowned for the 'Great debate', his confrontation with Arch Bishop Wilberforce at the first meeting of the British Association for the Advancement of Science in Oxford in 1860. He was unafraid of championing Darwin's ideas and engaging in debate. Though his is a hard act to follow, he is an inspiration for the science communications community to be courageous rather than to hesitate on the sidelines.

While the details of that encounter remain subject to debate the intent of Huxley's winning argument should not to be lost on us. He was ridiculed by Wilberforce who asked, '*had he descended from an ape on his mother's or his father's side*'. His reply was that he would prefer to have an ape as a grandfather than a man highly endowed with intellect but who used it to dismiss and to ridicule, rather than for reasoned debate. His key point was that people are persuaded by reason and evidence, and we should be mindful that this is equally applicable today.

On Darwin's death the great and the good in England commissioned a Statue of him (which has recently been reinstated in the cathedral-like hall of the Natural History Museum in London). However the world of science should take note of Huxley's disregard for this honour. He wrote, that '*for so long as men occupy themselves with the pursuit of truth, the name of Darwin runs no risk of oblivion*,' and that '*science does not recognise such sanctions, and commits suicide when it adopts a creed*'. Instead he argued that the value of the statue was in reminding people of Darwin's keenness for enquiry, as a '*symbol by which… generation after generation of students of nature… shall be reminded of the ideal according to which they must shape their lives…*'.
Today, as in the past, science cannot afford to be arrogant, dismissive and unwilling to engage with other people's views, nor can it allow the science of evolution to be perceived as dogma and scientific orthodoxy. The science and science communication communities have a responsibility to be proactive and to engage minds in a field where new and exciting evidence continues to emerge, consolidating the huge knowledge which we already know. We need to be particularly conscious of engaging with a new generation, to open them to reason and to argue evolution's place in our understanding of the world around us. It is of course possible that organizations engaged in celebrating Darwin's achievements and exploring evolution could be targeted by anti-evolution protests but it would be entirely wrong to argue this might justify not engaging with the public in your own program of activities and



The Darwin exhibition runs from November 19th 2008 to April 19th 2009 at the Natural History Museum, London, UK

celebrations. This is a question of issues management, so look at how your face-to-face teams are prepared for possible disruption. Reasoned debate is not necessarily disruptive, so what would you regard as disruption, and how will you prepare your floor teams for the unlikely event that you experience it? If your host teams are not expert in evolutionary biology prepare FAQ's for them to share with your audiences. Point to books and on-line resources that interested visitors can explore further. Make sure you have a prepared position statement on evolution, if there is inadvertent controversy then use this to refer to your aims. Ecsite have developed an overall position statement on evolution that you will find helpful in this.

For more information on Darwin200, see www.darwin200.org

DARWIN200

[14] *Michael Reiss: How to convert a generation*, Zoe Corbyn, The Guardian, November 28 2006 http://www.guardian.co.uk/education/2006/nov/28/academicexperts.highereducationprofile

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What happens when exhibitions on evolution get a reaction in the press? How can an institution ensure that the dialogue within the museum is heard over the controversy in the media? Michele Lanzinger, director of the Tridentine Museum of Natural Sciences in Trento, Italy, gives a first-hand account of his experience with their exhibition Naked Ape.

The troubled Naked Ape: the "social balance" of the temporary exhibition

A rather large-scale attack by several "radical Catholic" groups was unleashed against the temporary exhibition Naked Ape, created and organised in 2007 by the Tridentine Museum of Natural Sciences. Public attendance to the exhibition slowed down as the contrast between the secular and Catholics emerged in the press. This decrease in public participation, rather than being a clear testimony in support of one of the two contenders, was - in our opinion - an indirect effect of the pervasive role of the Catholic Church in constructing the cultural framework and the ethical and political views of the Italian citizens. Such a strong interference can result in a sense of individual inadequacy when one is asked to stand for evolution. This is even more evident when dealing with human evolution: here, the absence of unambiguous pronouncements shows how little attention - if any - the Church dedicates to clarifying the difference between religious faith and scientific method.
The Naked Ape led visitors through the various anthropological disciplines, and it culminated with an "ethical climax" fostering environmental sustainability and pacifism. Topics illustrated included: The deep time of human evolution; From shrubs to the uniqueness of the Homo sapiens species; The "human race": an inconspicuous concept; From *scala naturae* to cladistics and the loss of human superiority over other living beings; The evolution vs. creationism controversy; The origin of Art; Sexuality as a diagnostic trait: similarities and differences between humans and anthropomorphic apes. The Naked Ape was a multidisciplinary exhibition, which featured original specimens, dioramas, multimedia, interactive stations, and two "children's corners". The following are comments from the exhibition's guest books:

Comment: "Too little science and too much ideology: are we really similar to apes? So, why do we [humans] talk, draw, choose Good or Evil, why do we collect knowledge or build rockets? And they [the apes] remain always the same, following their instinct…".

Jane Goodall's studies of chimpanzee family and social life were featured at the Naked Ape exhibition, Trento, 2007

A few lines below, another visitor replied: "I think that you should have looked at the exhibition more carefully, if it were merely based on ideology, it would not properly explain the empiric available proof… and not like intelligent design, that is purely ideology".

Comment: "A nice exhibition, but it doesn't demonstrate anything!
Another visitor's reply: If you say so, please visit it again, but more carefully!"

Comment: "I think that the exhibition is enhancing materialism, more than providing reliable information. It reduces mankind to an inferior reality. Just think of the terrible consequences of this way of thinking. I'm really disappointed."
Another visitor's reply: "The basic idea is valuable. All is very clear, well documented, and funny. Faith and science are not one against the other, let us not set them against each other."

If the distant dialogue in the guest book is - on the whole - elegant and polite, the same does not hold true for the local press coverage of the debate. Harsh titles and violent articles were the sharp weapons of the controversy: "*Darwin the scientist: a groundless myth*"; "*The 'Naked Ape': all commonplaces*"; "*Darwin was a fraud like Galileo Galilei*"; "*Autiero* [a priest and University professor of Theology] *should be more careful in defending Darwinism*". And, from the opposite front: "*But religion is only an invention*"; "*Ethics and religion came afterwards*"; "*Science does not provide absolute answers, but God cannot be the stopgap.*"
The exhibition received a total of 302 review articles: 18 reviews conceptually disagreed with the initiative, while 30 were written in reply to the attacks and defended the exhibition. It is noteworthy that all the 18 negative reviews were authored by 5 members (with management roles) of a locally active radical Catholic association. The exhibit was seen by 45,000 visitors: whereas, on the one hand, this figure represents a positive result with respect to Trento's population (100,000 people), the number of visitors is rather low when compared with other science exhibitions that were organised in the same city

(like "Playing with Einstein" or "Deluge") and were seen by some 80-90,000 people.
Two conclusions can be drawn, in terms of museum practices, from the Naked Ape experience:

- The museum, as a physical place, provides the right and suitable location for a respectful discussion. In other words, Science and Society entertain a more fruitful dialogue within a museum's walls than in newspaper columns.
- The museum can talk with those who step inside. But, when controversial issues are raised, many people simply decide not to enter the museum. In other words, in case of complex issues that involve either ethical or religious aspects, bias is stronger than curiosity.

Specifically, in the case of the debate on evolution:

- The Catholic Church holds ambiguous stands whenever science approaches issues that are relevant from an ethical point of view. In the evolution debate, the ambiguity has moved from the direct confrontation between creationism and Darwinism, to the more treacherous grounds of teleology (i.e. the support of the theory of Intelligent Design, which, per se, does not deny the processes of evolution) and the origin of matter (a topic which is not in the main focus of evolution). Furthermore, in the relationship between science and society, the ambiguity of the Church translates into the lack of a clear pronouncement about all those scientific issues that cannot be disproved on the basis of the scientific results, but whose same results, when relevant in terms of ethics and the system of social values that concern religion, the Church cannot embrace nor accept.

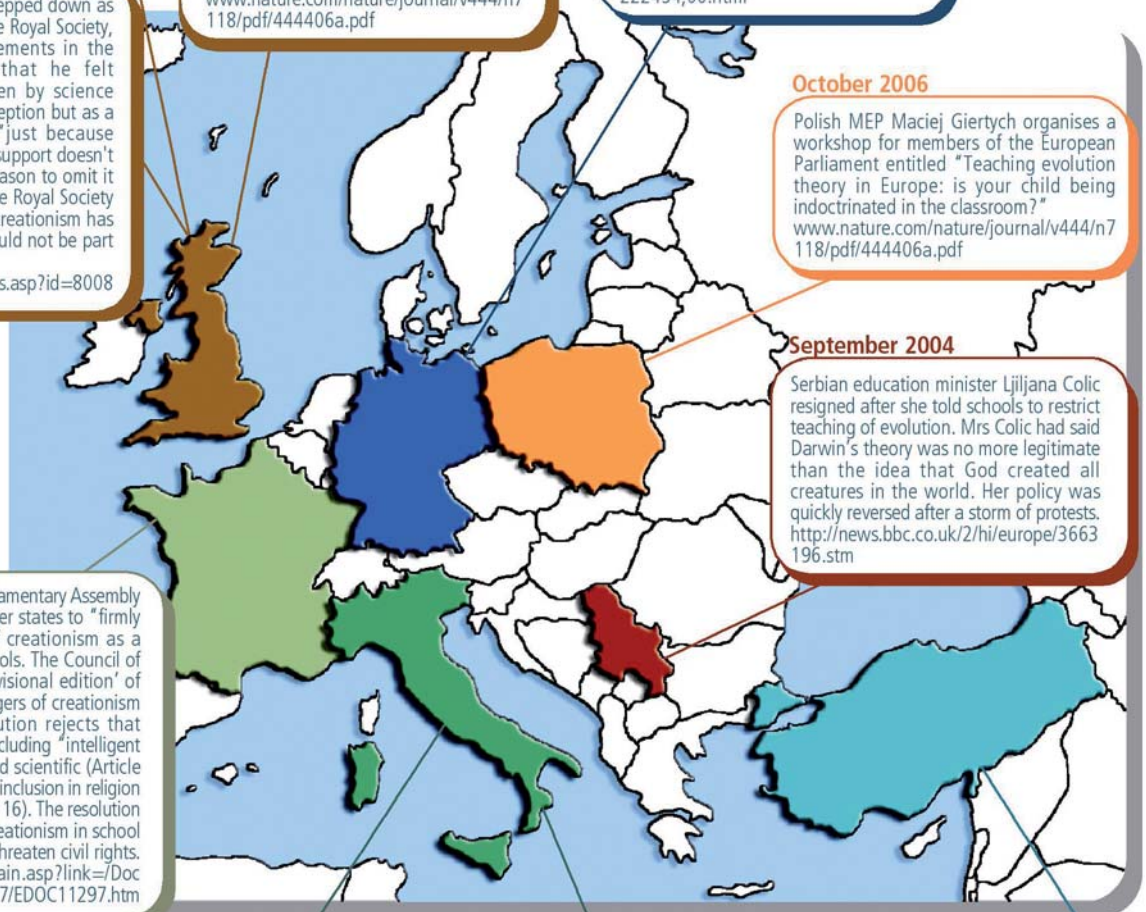
More generally speaking, museums cannot, in our view, relinquish topics as relevant as evolution. Nonetheless, the unquestionable assertion of the right, or duty, to deal with controversial issues must be combined with an effort to differentiate between the perspective of the experimental method and the human-religious aspects. Scientists have a duty to uphold their own professional conduct and achievements, but, when engaging in a religious debate, they must pay the greatest attention not to avail themselves of their scientific authority to challenge statements that concern religious principles, ethical or moral judgments, and historical views. In all these cases, the scientific role must be carefully separated from the scientist's opinion as a citizen and layman. Instead, it will be always advisable to place the burden of proof on the opponent, together with the task to either scientifically prove creationism, or produce experimental evidence of Intelligent Design(!).

In an admirable example of the necessary divide between different approaches, in 2007 Whitsunday sermon the Bishop of Trento said: "It is not up to the Bible to describe how the creation occurred; nor it is to deny or support evolution."
There is some more ambiguity in a speech addressed by Pope Benedict XVI at a recent ecclesiastical meeting: "When, in our epoch, we discuss the reasonableness of faith, we discuss precisely the fact that reason does not end where experimental discoveries end - it does not finish in positivism; the theory of evolution sees the truth but sees only half the truth: it does not see that behind it is the Spirit of the Creation."
In Latin countries of strong religious traditions, religion functions as a framework for culture and identity and it is profoundly embedded in the whole system of values, social relations, ethics and law. Therefore, in the specific case of evolution, it is the task of scientists to consolidate and defend the autonomy of science in terms of both methods and results, as well as to spread and communicate these scientific results to the whole of society.
Still, concerning what impact science could or should have on religious beliefs, scientists must be able to shed light on the differences and incompatibilities between the scientific and the religious approaches. It will thus be clearly evident that creationism and the theory of Intelligent Design both have to do with faith - and in fact they are acts of faith - and not with the processes of evolution as disclosed by science. Only this categorical separation between the domains of scientific reasoning and legitimate religious conviction might benefit the science-religion dialogue and bring about a new season of larger reciprocal understanding and mutual respect.

"The human animal" section of the exhibition showed the anatomical, genetic and cultural similarities between human beings and chimpanzees.

The anti-evolution movement is well-established in the US. In European territory it has begun to gain ground only recently. Michael Creek, Projects Coordinator at Ecsite, charts the last five years, highlighting key events in the rise of creationism.

Creationism and Europe: the last five years



April 2006

A statement opposing the misrepresentation of evolution in schools to promote particular religious beliefs is published) by the Royal Society, the UK national academy of science. http://royalsociety.org/news.asp?id=4298

September 2006

In Britain, the prominent creationist group Truth in Science sends information packs to every UK secondary school. The UK government's education department states that it does not endorse its use. In response to the packs, a group called the British Centre for Science Education is formed to campaign against the teaching of creationism in schools. www.nature.com/nature/journal/v444/n7118/pdf/444406a.pdf

June 2007

In an article in the Frankfurter Allgemeine Zeitung, the Hessian culture minister, Karin Wolff called for the integration of the biblical version of creation into "modern biology instruction." www.dw-world.de/dw/article/0,2144,2222454,00.html

September 2008

Professor Michael Reiss stepped down as Director of Education of the Royal Society, UK, after he made statements in the Guardian newspaper that he felt "creationism is best seen by science teachers not as a misconception but as a world view" and that "just because something lacks scientific support doesn't seem to me a sufficient reason to omit it from a science lesson." The Royal Society affirmed its position that creationism has no scientific basis and should not be part of the science curriculum. http://royalsociety.org/news.asp?id=8008

October 2006

Polish MEP Maciej Giertych organises a workshop for members of the European Parliament entitled "Teaching evolution theory in Europe: is your child being indoctrinated in the classroom?" www.nature.com/nature/journal/v444/n7118/pdf/444406a.pdf

September 2004

Serbian education minister Ljiljana Colic resigned after she told schools to restrict teaching of evolution. Mrs Colic had said Darwin's theory was no more legitimate than the idea that God created all creatures in the world. Her policy was quickly reversed after a storm of protests. http://news.bbc.co.uk/2/hi/europe/3663196.stm

October 2007

The Council of Europe Parliamentary Assembly (PACE) urges its 47 member states to "firmly oppose" the teaching of creationism as a scientific discipline in schools. The Council of Europe released the 'Provisional edition' of resolution 1580: The dangers of creationism in education. The resolution rejects that creationism in any form, including "intelligent design", can be considered scientific (Article 4), though recommends its inclusion in religion and cultural classes (Article 16). The resolution concludes that teaching creationism in school as a scientific theory may threaten civil rights. http://assembly.coe.int/Main.asp?link=/Documents/WorkingDocs/Doc07/EDOC11297.htm

April 2004

Letizia Moratti, Italian education minister, removes the theory of evolution from the curricula of Italy's middle schools on the grounds that teaching Darwin's theory of evolution can instil a materialist view of life in young minds. Following protests, Darwinism is partially reintroduced. http://jcom.sissa.it/archive/05/02/Jcom0502(2006)C05/Jcom0502(2006)C05.pdf

April 2007

Pope Benedict XVI publishes Creation and Evolution, in which he claims that evolution has not been "scientifically" proven and that science has unnecessarily narrowed humanity's view of creation.

October 2006

Tens of thousands of copies of The Atlas of Creation are delivered, on an unsolicited basis, to schools, prominent researchers and research institutes throughout Europe and the United States. The book is by Adnan Oktar, penname Harun Yahya, a prominent figure in Turkish creationism. Oktar is convicted of creating an illegal organization for personal gain and sentenced to three years in prison in May 2008.

BODY WORLDS & THE MIRROR OF TIME AT THE O2

A unique insight into the human life cycle, featuring 200+ exhibits including 20 authentic human bodies preserved through plastination, demonstrating the arc of human development from the spark of conception through maturity to old age, at the O2 arena in London, UK, October 24 2008 - August 23, 2009.

This exhibition will address the human life cycle through the medium of preserved human bodies. Despite the ageing population, maturing and growing older are difficult subjects for many people in the UK to contemplate. This exhibition will examine all aspects of human development and aim to put ageing into a positive context.

Institute for Plastination
Body Worlds Exhibition,
Heidelberg, Germany
Contact Nicky Hewgill:
n.hewgill@plastination.com
www.bodyworlds.com

THE NATIONAL DNA DATABASE ON TRIAL: AVOIDING THE USUAL SUSPECTS

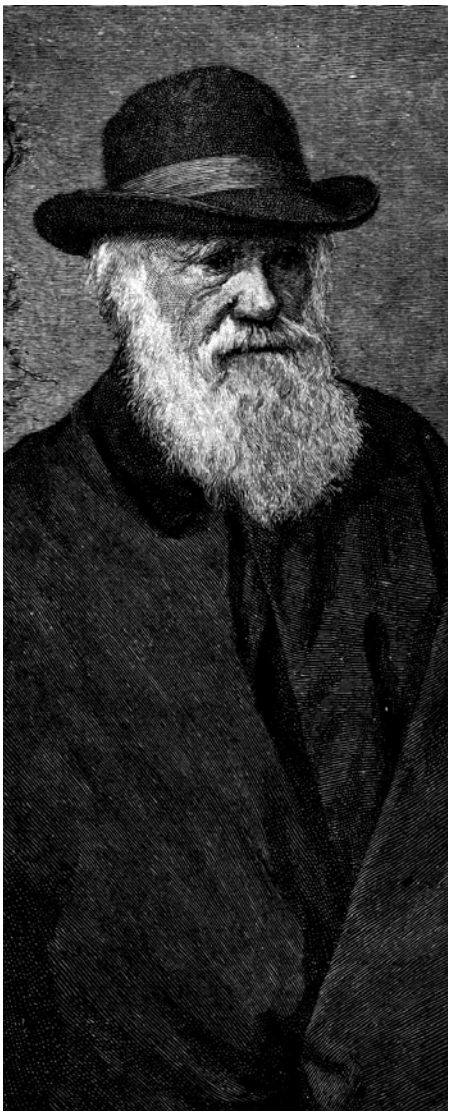
The charge is: 'That the NDNAD is an unacceptable infringement of civil liberties'. All the participants at this trial (jurors and witnesses) will be young people aged 16-19 who have been charged with a criminal offence and whose details are already on the NDNAD.

We will run focus groups with young people to explore the arguments surrounding the NDNAD. Then, 20 participants will be selected. Facilitators will assist with preparing evidence on the ethical, legal and social issues so that participants are enabled to play the roles of prosecution, defence and Jury. The Trial will be held on 8 November 2008, and the verdict will be disseminated widely.

Techniquest, Cardiff, UK
Contact Anita Shaw:
anita@techniquest.org
www.techniquest.org

DARWIN AT NHM LONDON

Darwin is a celebration of Charles Darwin's ideas and their impact, giving new insight into this brilliant observer of nature's achievements. Retrace his life-changing journey as a curious and adventurous young man aboard HMS *Beagle*, on its five-year voyage to the Galápagos Islands, allowing visitors to see the patterns he observed that led to the publication of *On the Origin of Species*. Family photographs and letters show a different side of this famous scientist - Darwin as a family man, husband and father of 10 children. This unique exhibition concludes with an exploration of modern evolutionary biology and the importance of evolution in understanding how infectious disease-causing organisms keep changing as we attempt to control their spread.
The exhibition is a highlight of Darwin200, a national programme of events celebrating Charles Darwin's ideas, impact and influence around the bicentenary of his birth.



Natural History Museum, London, UK
Contact Ivvet Modinou:
i.modinou@nhm.ac.uk
www.darwin200.org

DASA SYMPOSIUM: CONSTRUCTING THE FUTURE OF WORK

DASA starts an innovative, interdisciplinary, series to investigate post-Fordism parameters for the distribution of "decent" work and rewards, marginalisation and intellectual worker migration, through succinct, provocative, presentations from scientists, artists, journalists and others and professionally facilitated discussion panels with an audience of scholars, senior policy makers and practitioners. The event takes place on the 4th and 5th November 2008, Dortmund, Germany.

DASA, Dortmund, Germany
Contact Karin Kaudelka:
kaudelka.karin@baua.bund.de
www.dasa-dortmund.de/Tagung

GMOS: THE SEEDS OF DISCORD

Grown and marketed for a decade or so around the world, GMOs remain highly controversial. The aim of this exhibition-presentation is to report on genetically modified plants and their consequences (environmental, health, economic, legal, etc.) in order to paint the most objective picture possible of a sensitive topic that fundamentally raises the issue of radical changes in farming and the rural world.
This science news exhibition kit in three languages (English, Spanish and French) supplied on a DVD-Rom is intended for museums, libraries, local authorities, universities, associations, science centres, cultural institutes...

La Cité des sciences et de l'industrie, Paris, France
Contact Olivier Poublan:
o.poublan@cite-sciences.fr
www.cite-sciences.fr/english/

HOMÍNIDOS Y HOMÍNIDAS. LA FAMILIA PRESUMIDA

An exhibition at Domus in Corunna, that deals with the evolutionary history of the features that make us human. Human evolution is seen from the collection of prominent biological features of our development, which we like to boast about, such as bipedal locomotion (we show off our speed), precision grip (we show off our handyman abilities), or technologies (we show off sophisticated machinery, such as cars, computers, mobile telephones...). This exhibition serves as a prelude to the Darwin Year that will be celebrated at the Museos Científicos Coruñeses in 2009.

Museos Científicos Coruñeses, Corunna, Spain
Contact Susana Pérez Castelo:
susana@casaciencias.org
www.casaciencias.org

DOES FLYING COST THE EARTH?

This exhibition explores the impact flying has on climate change, checks out cutting-edge technologies aiming to make air travel greener, and reveals why everyone's actions matter.
As the world's population grows and flying becomes more affordable, the appeal of jetting off on holiday or flying in food from abroad often outshines the darker side of aviation - its carbon footprint. It's one of the fastest growing fossil-fuel-burning industries, so there's a need for prompt action - by scientists and engineers, by industry, by governments and by individuals.

Science Museum, London, UK
Contact Holly Cave:
holly.cave@sciencemuseum.org.uk
www.sciencemuseum.org.uk

NEW PERMANENT EXHIBITION ON OIL

How do we find an oilfield? What happens to crude oil in a refinery? How many things can we make from oil and how much research is behind them? In the last century oil industry has become one of the tenets of the world's energetic sector, involving scientific, technological, legal and economic factors. The Museum - in collaboration with Total-Italia - opens a new permanent exhibition on 30th October 2008 about this complex issue, investigating what's behind it and future perspectives through three local case studies: an oilfield, a refinery and a bitumen lab.

Museo Nazionale della Scienza e della Tecnologia "Leonardo da Vinci"
Contact: stampa@museoscienza.it
www.museoscienza.org

Ecsite Director's Forum 2008

The Ecsite Director's Forum opens on Friday November 21st, welcoming a wide range of science centre and museum directors from across Europe. Our hosts this year are the Museo de las Ciencias Principe Felipe - Ciudad de las Artes y de las Ciencias. Under the theme "the power of people," directors have the opportunity to discuss the role of human resources in their institution. After a plenary session at the beginning of the Forum, participants split into working groups in each timeslot and are reunited to discuss the themes: recruitment of staff, motivation of staff, integration and flexibility, implementing change and downsizing.

Grundtvig Grant available for Ecsite Annual Conference 2009

Grundtvig is Action 3 of the European Union's programme in the field of education, Socrates. Through Grundtvig, the European Commission provides funding to promote exchanges of experiences and the development of a European dimension in all sectors of adult education. The Ecsite Annual Conference is for one more year officially accredited as one of the training opportunities for individuals that are involved in adult education. The grant will cover the conference fees, the accommodation and travel expenses. To apply for the grant you need to contact your National Agencies through http://ec.europa.eu/education/programmes/llp/national_en.html
To find further information on the grant, enter the Comenius-Grundtvig database under the reference BE-2009-107-001

Ecsite event: Science Centres and Museums at the European Parliament

The Ecsite network is developing its role of raising the profile of science centres and museums among the European institutions. In this context, Ecsite is organising an event at the European Parliament in Brussels February 18th, 2009 to promote the importance of our field to officers of the European Commission and parliamentarians. As part of this event, we will present a round table on the role of science centres and museums in European society with a range of high profile speakers, alongside six selected best practices in informal learning and engagement activities from Ecsite members across Europe.

New EU project: Pilots prepares for take-off

We are pleased to announce the kickoff of a new project, Pilots, which focuses on the role of the explainer in science centres and museums. Pilots will produce a European survey on the role of explainers, leading to training courses, local events and a dedicated web platform. After the success of their workshops at the 2007 and 2008 Annual Conferences, Ecsite's thematic group for explainers, THE Group, will be central to this project. Pilots is funded through the European Union's Lifelong Learning programme.

Launch of Nature Special Interest Group: T-Nature

The T-Nature Group will be a group of experts working within Ecsite to enhance the exchange of information and sharing of emblematic experiences between its members on nature and related issues and activities. A pre-conference full day workshop during the Ecsite Annual Conference will be dedicated to the T-Nature Group. The Group will also be developing a web community at the Ecsite website. The T-Nature group is looking for science communicators who will share knowledge and experiences on communicating nature-related topics to the public.
If you are interested to find out more about the Group's activities and join us, write to Aliki Giannakopoulou: agiannakopoulou@ecsite.net

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If you wish to receive information about the Corporate Donorship programme, please contact the Ecsite Executive Office in Brussels: info@ecsite.net • http://www.ecsite.net

Designed by CUEN
T +39 081 2301118
E quaranta@cuen.it

for Ecsite - the European Network of Science Centres and Museums

Ecsite Executive Office
70 Coudenberg, 5th Floor • B-1000 Brussels
T +32 2 649 7383 • F +32 2 647 5098
E info@ecsite.net • www.ecsite.net