

## Scientist citizens

The ivory-billed woodpecker is alive! Forty years after the last confirmed report of the bird, a new sighting was announced on 28 April 2005 in the online edition of *Science*. Credit for this exciting find, which has considerable ecological implications, should go to the amateur naturalist Gene Sparling, who first spotted the bird. Volunteers of scientific projects are known as 'citizen scientists'. They contribute substantially to the progress of science, especially in ecology and environmental science, and the only qualification required is a passion for the projects. Such a partnership between the citizen and research scientists not only facilitates the collection of masses of data but also educates the public, sways opinions and promotes awareness of important scientific issues. Unfortunately, technical and ethical impediments prevent the general public from participating more avidly in biomedical research. How then can they be sufficiently well informed and develop a passion for biomedical science to ensure that important issues are sensibly debated, appropriately supported and well represented now and in the future?

The public can obtain an enormous amount of information from the various media outlets. However, it is a daunting task to extract the relevant quality from the sheer quantity. Targeting the 'reputable' news media may help. But readers are left to absorb the information passively, without having their individual concerns addressed or challenged. Such a process may not help the public to identify any misconception they may have about science and is unlikely to inspire the 'scientist' in the 'citizen'. Communication at a personal level, therefore, is an important step toward enhancing the public's appreciation of biomedical issues. And scientists must be the catalyst for this progress.

On 19 May of this year, scientists reported the creation of the first patient-specific human embryonic stem cell lines. This development was a major breakthrough in the field and, true to its controversial nature, it attracted as much ethical concern as scientific enthusiasm. Meanwhile, another scientific issue brewing in the public arena is the 'intelligent design' movement, which promotes creationism as a 'scientific' alternative to darwinism. These are some of the contemporary issues for which all scientists can make a difference at the 'grassroots' level. Thus, without relying on the infrequent large-scale informational events organized by scientific and advocacy groups, all scientists can contribute by making an effort in their immediate community, such as speaking with neighbors and in their local schools.

Advancing science behind a wave of strong public support is exemplified by the debate over stem cell research funding in the US. On 24 May, the US House of Representatives passed a bill to allow federal funding for research on newly derived human embryonic stem cell lines. This 'defeat' of President Bush's policy, which limits the use of federal money to research on embryonic stem cell lines created before 9 August 2001,

seemed improbable a few years ago. A chief driving force for this change is continuing and strong public support, as evident from representation of the many advocacy groups in Washington, DC, on 24 May and the many media surveys before and since the announcement. Obviously, stem cell research is still in its infancy, requiring continual public support to determine further funding and ethical issues, and scientists should be at the forefront of these discussions.

Similarly, scientists should not shy away from the controversy surrounding 'intelligent design'. In late 2004, a district school board in Pennsylvania approved the teaching of 'intelligent design'. This issue continues to polarize communities in other states such as Kansas and Ohio. In Europe, 'intelligent design' was brought to the fore when the Dutch minister of education, Maria van der Hoeven, professed being attracted to the idea earlier this year. 'Intelligent design' is a belief championed by a small but increasing number of people that life on earth is too complex to have originated by chance and for species to have evolved over time. Hence, as the name implies, life must have been designed by a 'higher being'. Proponents of such a belief criticize the inability of evolution to explain every facet of life.

It is important that alternative hypotheses that are scientifically sound and testable be taught at schools and be debated by scientists in the public. However, the irony of a 'scientific' debate on 'intelligent design' is that this belief is untestable because it is based on faith, not science. Thus, although it may be suitable for religious studies, it is inappropriate for the scientific curriculum. The fact that evolution may not be able to explain life in its entirety is a cause for more scientific research and is not a reason to adopt an illogical idea. On 21 June, the *New York Times* reported that some scientists are opting out of public debates on 'intelligent design' because they do not view it as a legitimate scientific discussion. Although their actions seem justified, it remains appropriate and important for individual scientists to impart factual information to the public to advance science education. However, as with any scientific dialog with the public, it is imperative that scientists contemplate the pertinent scientific issues carefully and be prepared to articulate the facts clearly and convincingly in an even-handed manner.

Scientific issues such as stem cell investigation, animals in research and genetic modification cause considerable concern in society. Because of their training, most scientists, regardless of their research background, are able to provide a rational discussion on many of these concerns. By helping the public to understand these scientific issues and students to appreciate the excitement and value of research, scientists can make the future of all scientific endeavors brighter. Through their curiosity and passion, citizen scientists have contributed much to science. Reciprocally, through their knowledge and prudence, 'scientist citizens' should contribute much to the society. 