

In this issue

Society and science: interdisciplinary exchanges

Our world is changing rapidly and in more ways than we can keep track of. One of them involves the increasing role of science and especially its products in our everyday lives. Not surprisingly, society is unable to cope with this in an adequate and timely manner. Even before science became so omnipresent, society and science have always had a love-hate relationship. Science needs societal support for its very existence but does not wish to be controlled by society. And society too needs science for its very existence but wishes to pick and choose what science should and should not be doing. At one extreme there are scientists who denounce any societal control of their activities and prefer to take no responsibility for how society uses the products of science. On the other hand, there are those who enjoy all the benefits of modern science and at the same time blame science for all the ills of modern society.

How can we move beyond this love-hate relationship? Perhaps the only way is to permanently erase the dichotomy between science and society. This can only be possible with a new generation of science practitioners who are themselves, and on a continuous basis, embedded into society in a uniquely different way. And that means that they only do traditional science on a part-time basis and use the rest of their time playing the role of society and examining the implications of their work to the society at large. The latter role cannot just be fulfilled as lay persons but also needs to be done as professional critics of science, trained in the history, philosophy and sociology of science and in what is sometimes called science and technology studies.

An obvious and immediate objection to the above utopian paradigm is

that no young scientist in today's maddeningly competitive academic environment will be able to afford to fit this description. The life of young scientists today is riddled with rapidly approaching competitive milestones – getting a job in an institution with a research-friendly environment, teaching a whole lot of students, writing grants, not just to finance their research but often also to fill the coffers of their institutions with overheads, publishing in so-called high-impact journals, attending conferences to advertise themselves and be recognized by the doyens of their fields, getting tenure and so on. Can one even think of part-time scientists? Apparently yes. The Swiss entrepreneur Branco Weiss finances a Fellowship programme administered by the ETH in Zurich, Switzerland, that apparently makes this possible. Young scientists, typically at the post-doc level are competitively selected to receive a handsome fellowship for five years and a large research grant with freedom to work anywhere in the world and dedicate themselves to exploring the interface between science and society in just the manner envisioned above. One of us (H.N.) was until recently a recipient of one of these fellowships and the other (R.G.) has for some time been a member of the Scientific Advisory Board of this Society in Science: Branco Weiss Fellowship. In October 2006 the Centre for Contemporary Studies, Indian Institute of Science, Bangalore invited several Branco Weiss Fellows to hold their annual convention in full public view of a large number of students of the Institute. Fascinated by the success of the meeting, judged both by the participants and by the audience, we decided some time later to request the Fellows to write summaries or examples of their research endeavours, for a larger audience. That has resulted in the set of articles that follow.

In this special section, we thus bring together nine papers that interface with the issue of bringing 'society' into 'science'. The subjects of discussion are diverse and the methodologies, frameworks and approaches varied, but all papers hold one thing in common – they represent creative and innovative approaches that cross disciplinary boundaries and integrate frameworks, to look at issues that transcend boundaries of society and science. The collection of papers in this section also reveal, incidentally, the diversity of styles when people of different disciplines come together in one forum!

We begin with a paper by Anne Osbourn (**page 1547**) that discusses science action and writing workshops that use scientific images as a nucleus to promote creative investigations in primary and secondary school children. Osbourn discusses the role that science can play in instilling curiosity, and in engaging children in a diversity of approaches, drawing on the unique perspectives that each child brings to bear on different themes. The second paper, by Giovanni Frazzetto (**page 1555**), also examines the theme of individual diversity, using however the lens of pharmaceuticals. He discusses how trends in medicine, directed by some pharmaceutical companies, are increasingly defining social norms of behaviour, such that non-standard but non-pathological behavioural patterns get defined as mental dysfunctions that require medication. Iruka Okeke (**page 1564**) then discusses the issue of drugs from a different perspective, examining the globally significant issue of increasing antibiotic resistance. She likens the issue of the over exploitation of antibiotic drugs to a global tragedy of the commons, and uses this framework to discuss possible solutions to this dilemma.

Claudia Rutte and Thomas Pfeiffer (**page 1573**) examine the commons

at a rather different scale, studying the evolution of cooperation in insect communities. They show that the evolution of reciprocal altruism in small groups can be explained by individuals copying the behaviour of others. Ferenc Jordán (**page 1579**) then looks at a very different kind of community, that of school children in classrooms. He uses a longitudinal approach to examine changes in the network of positive and negative relationships within a school class over time, and uses this approach to look for parallels between social and ecological networks.

Harini Nagendra (**page 1586**) moves the discussion further towards ecological issues. She looks at an increasing trend of forest regrowth in the human-dominated landscapes of South Asia, and examines the social and institutional drivers that appear to be directing this trend. Dominic Johnson and Simon Levin (**page 1593**) take us from forests to another critical issue, of climate change and environmental degradation. They focus on the human psychology of cognitive response to try and understand psychological biases that lead people to downplay the likelihood and danger of environmental change, leading to poor and tardy responses to environmental challenges. Dov Greenbaum (**page 1604**) looks at how humans respond to contentious issues of intellectual property protection, specifically focusing on the challenges of developing locally appropriate levels of intellectual property rights in different developing nations. Finally, Giuseppe Testa (**page 1621**) wraps the special section by looking at how societies respond to another controversial issue, of cloning and stem cell research.

Such research poses ethical dilemmas which have strong implications for the development of molecular biology as a discipline.

From cloning to intellectual property, insects to climate change, drugs to forests, the papers in this special section cover a range of spatial scales, integrate a variety of disciplines, and interrogate a variety of topics, with one common focus – namely, that they all examine issues where society intersects closely with the life sciences. They do so in a diversity of ways, which we hope, when collected together in this volume, will spur continued interest in this theme.

We appreciate the encouragement and cherish the intellectual friendship of Branco Weiss and Olaf Kübler (Director of the Programme) and thank Prema Iyer for expert assistance in putting this together.

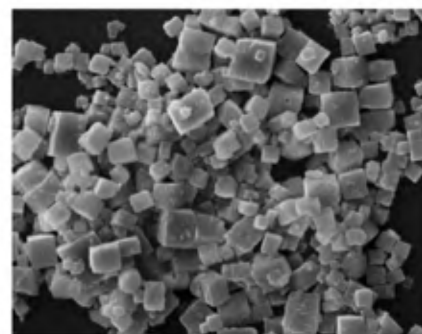
Harini Nagendra
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Guest editors

*Special section: Society and Science—
Interdisciplinary Exchanges*

An Earth analogue for exploring Mars

Earth has many similarities to Mars. It is widely recognized that interpretations about the planet Mars must begin by using Earth as a reference, because Earth analogues can provide ground truth to constrain interpretations on the geological history of Mars. Accordingly, researchers exploring the red planet currently depend on Earth analogues for interpreting the images and other remote sensing data of Mars. In this context, Siva Siddaiah and Kishor Kumar with their discovery of minamiite-

bearing hydrous sulphate deposits from Matanumadh demonstrate (**page 1664**) that the Deccan Volcanic Province (DVP) spread over large tracts of west-central India is an ideal analogue to get insights into several aspects of Mars. The Deccan basalts represent the largest sub-aerial lava flows on the Earth surface, and show a multiplicity of surface morphologies linked to different lava types and related emplacement



mechanisms. An understanding of propagation processes of Deccan basalts can give important clues in the comprehension of emplacement mechanisms of the long flows on Mars. The hydrous sulphate minerals found in the DVP are similar in terms of their geologic association, depositional environment and genesis to those described from Mars. The DVP with its extensive volcanic plains, cones and craters as well as abundant hydrous sulphates of secondary origin, approximates the geological (including thermal plume origin), geomorphological and environmental conditions on the Mars, and thus appears to be a promising analogue site for improving our understanding of the Martian surface as well as for comparing the geologic processes on the two planets.