It cannot arise if there is a monoculture of views. Truth cannot emerge and science cannot advance if there is an absence and/or exclusion of dissent. The standard way of avoiding genuine controversy and peer review is to exclude unorthodox views from seminars, committees, journals and other forums (including the peer-reviewing process). Underlying all this violation of the scientific tradition and its codes of behaviour is the fact, 'he who pays the piper, calls the tune'. Government and quasi-government sources are responsible for the overwhelming share of science funding, so that scientific activity depends strongly on this funding, and almost all scientists are on the government pay-roll or perk-roll. There are also a number of cash-carrying prizes and awards which act as further inducements to conform, rather than dissent.

The nuclear tests exposed this weakness of Indian science. Faced with a complexity of issues raised by the tests, it would have been natural for the body of intelligent and creative scientists to develop a spectrum of views. Instead, the virtually unanimous euphoria was astonishing. Since, it is statistically unlikely that almost the whole body of scientists had independently arrived at a single view, one cannot help suspecting that it was the fear of dissenting that explained the 'unanimity'.

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Losing innocence to big science

This is with reference to the two consecutive editorials, 'Big science, small science' (*Curr. Sci.*, 2001, **81**, 133–134) and 'Lost innocence' (*Curr. Sci.*, 2001, **81**, 229–230). To me, it appears that 'big science' or 'applied science' cannot come into existence unless 'small and basic science' is created first. Consequently, only 'small and basic science', or 'science' to be more precise, is the terminology that needs to be used. The editor is absolutely correct when he says, 'Would it not have been better for the academy to limit its domain to conventional academic science and avoid straying into the difficult waters of strategic science and technology'. But then, who cares for etiquette. The very fact that Balaram, a genuine scientist to the core and staunch supporter of 'basic science', himself has used the word 'big science' to describe the so-called applied science being practised under the handful of mega schemes which are eating the bulk of the meagre funds available for research these days, tells a lot about the direction of the wind. Like anything else, science has become a commodity and the importance of scientific research is not judged merely on its merit or its contribution to the welfare of mankind in the long run; instead it is judged by its glamour and apparent gains, both socio-political and otherwise. If so, the priorities are bound to be decided accordingly. No wonder, therefore, that 'big science' has robbed the naiveté of the academy.

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Social geology

Scientific temperament among the masses is a must for safety, security and prosperity of the nation. However, this faculty is uneven at the level of common man with respect to different branches of science and is particularly negligible or minimal in the case of geology. People generally rely on media coverage, accurate or inaccurate, and form opinions accordingly, about the ongoing geological processes. This situation is very alarming because of the twin nature of geology, i.e. on the one hand, once plentiful mineral resources are continuously being depleted at a relatively faster rate leading to a situation when the bountiful nature may be deprived of such precious treasures whereas, on the other hand, natural disasters, viz. earthquakes, volcanic eruptions, landslides, avalanches, flash floods, sinking of groundwater level, etc. are causing irreparable losses to the society. However, the exaggerated media coverage and reporting by the not so well-informed reporters add fuel to the fire of the public psyche.

Things are further complicated by the so-called estimated predictions about time, location and intensities of the natural calamities. For example, this is quite common with respect to earthquakes in the Himalayan and other regions or groundwater poisoning in West Bengal and Bangladesh by arsenic or groundwater depletion, particularly in the areas of intensive agricultural practices. The public is generally deprived of realistic assessment of the situation arising out of geological factors.

This sorry state of affairs can be attributed to general neglect of geology at the school level in science curricula, late commencement of study, i.e. only at the university level, resulting in a very limited number of students choosing the subject, general ignorance of safety, security and preparedness aspects in the geologic text books, lack of interaction between practitioners of geology and the masses and lack of attempt on part of the authorities to educate the citizens.

A well-informed and scientifically-equipped public, with knowledge about the pros and cons of geological processes, will be able to combat the adversaries caused by such inevitable processes. The need of the hour is to launch a new discipline called 'social geology' at all levels through formal or informal education or through social agencies, which can enlighten the public about the likely impact and proper safety preparedness for pre-, syn- and post-disaster scenario. Professional geologists and students, if trained, can play a very vital role in educating the masses, by giving rational explanation of the geological processes affecting them and the precautionary measures they should adopt to lessen the impact of calamities. Government and non-government agencies should launch campaigns to educate people and to add in the formal educational system, the approaches and methodologies of social aspects of the subject and harvest the returns in the form of protecting the society from mass devastation. Ways should also be devised to put restriction on the predictions about future events by habitual professionals, which create psychological panic in the masses.

Well goes the saying that 'Where there is a will, there is a way' and if this is practised in right earnest in promoting various programmes related to literacy, AIDS, family planning, etc. why can't we be a winner in launching the 'social geology' campaign?

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A synthesis of sedimentary geochemical processes in and around Carlsberg Ridge

The sedimentary geochemical environment in and around Carlsberg Ridge (CR), Arabian Sea is a subject of study for quite some time; yet there is no conclusive picture to understand the metal enrichment processes in this area. Hydrothermal, hydrogenetic and diagenetic processes were attributed by different workers at various sites, during different studies. There are several observations made in this regard in recent years. From the geochemical and mineralogical studies on ferromanganese oxides from the CR area, Colley *et al.*[1] reported that hydrogenetic process is responsible for the δ-MnO_2 mineralogy and metal enrichment (e.g. Mn, Fe, Ni, Cu, Co) of those oxide deposits. The chemistry and mineralogy of ferromanganese nodules from another site of the CR (ref. 2) indicated some possible mixed hydrothermal–hydrogenetic input for the metal enrichment in those nodules. Shankar *et al.*[3] reported that the CR hydrothermal activity during Holocene epoch could be one of the possible sources for the geochemical variations observed in the surface sediment samples from several locations in the Arabian Sea. The idea of metal enrichment by hydrothermal process was contested by the study of rare earth element (REE) enrichment pattern (Ce/La and La/Yb) in the sediments from CR and adjacent Central Indian Ocean and a normal deep sea metal enrichment process in those sediments was suggested, ruling out the possibility of any hydrothermal contribution[4]. Further, from the occurrence of Pteropods in the sediments from the southern part of the CR, it was suggested that the Pteropod preservation at about 2000–2500 m water depth could have become possible due to an increase in alkalinity in seabed sediments, as a result of some hydrothermal inputs in that area[5].

The interlayer geochemistry of ferromanganese nodules from the south-western CR (SWCR) and the specific mineral–chemical assemblages in those nodules indicated that hydrogenetic and diagenetic processes are responsible for their metal enrichment[6]. Further, study on geochemistry, factor analysis and clay mineral distribution of the sediments from the SWCR indicated their relationship with the associated Fe-Mn nodules[7]. *R*-mode factor analyses of the sediment and nodule geochemical parameters indicated different sources of trace metal supply, including biological, detrital, hydrothermal and authigenic processes. The presence of illite and chlorite in these sediments was linked to the Indus source, while an authigenic origin was proposed for the smectite and kaolinite, through the alteration of the ridge volcanic rocks[6]. Evidences recorded from further study on the geochemistry of calcareous sediments from the SWCR indicated the existence of a deeper lysocline (4700 m) and a deeper calcium carbonate compensation depth (CCD > 5100 m), in this part of the Arabian Sea[8]. It was also observed that the CR sediments are enriched in Mg, Ni, Co and Zn in comparison with the adjacent basinal sediments, while they are depleted mostly in all other elements. Also, the Ni and Zn enrichment in these sediments was linked directly to the biological processes (high surface biological productivity) active in this area[8]. The ferromanganese nodules and crusts (Mn/Fe < 1) with higher cobalt concentration (0.9–1%) and fresh basaltic and calcareous nuclei from the Vityaz fracture zone (at the south-eastern part of CR) are hydrogenetic[9].

REE distribution pattern in the surficial calcareous sediments from the SWCR area indicated that the total REE content in these sediments is inversely related to their calcium carbonate content and the REE show a strong positive correlation with Al + Fe + K + Mg + Na, suggesting the combined association of REE with clays and Fe-Mn oxides and also a hydrogenetic contribution of REE to these sediments[10].

From the above information on the geochemical sedimentation processes active in the CR and adjacent areas, it appears that hydrogenetic sedimentation process is most predominant among all other processes active in this region. Future research on sedimentary environment of the CR area should consider palaeoceanographic aspects of ridge sediments through long sediment cores, to understand the past geochemical processes and depositional conditions that prevailed in this area and their relevance to the present sedimentary processes, if any.

1. Colley, N. M., Cronan, D. S. and Moorby, S. A., in *La Genèse des Nodules*