necessary to clean and shade-dry the material to remove moisture. Only dry specimens are convenient to handle and preserve.

In case of powdered samples, purity is a major difficulty for authentication and certification, because particle size is not uniform and the sample may be contaminated with insects, dust particles, soil, etc.

Many a times samples are submitted to the herbarium at the time of writing a manuscript/after receiving comments from referees. It is unethical to provide the voucher number at that stage, because it is a violation of documentation norms of the GLP. In one case, we received a request for voucher number from the Botanical Survey of India for the sample authenticated at our institution. Thus, there is sometimes confusion regarding the concept of voucher number. It is necessary to understand that the authenticated sample is kept in the archives for a specified period of time only. The voucher is deposited only on request and kept with an allotted number in the repository for future reference, if needed.

In view of the above, the following guidelines are suggested for availing of the authentication facility and deposition of voucher of crude drugs:

(i) Sample must be free from foreign materials and infection.

(ii) As far as possible, the sample should be mounted on the herbarium sheet with flowering or fruiting.

(iii) For plant part authentication, dry sample ≥100 g is necessary; one should avoid samples in powder form or in sliced form.

(iv) Documentation of scientific and local name if known, sample size, collector's name, name of the institution, date of collection, location (Global Positioning System can record altitude, latitude), status (vegetative/flowering/fruiting), and any special features as on fresh samples (colour, typical odour, exudations) may help in authentication.

(v) Data to be furnished along with market sample, market name, date and name of purchaser.

(vi) For deposition of voucher authentication and documentation as mentioned above, name of the project must be given for future reference.

1. Anon., General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine, World Health Organization, Geneva, 2000, p. 4.

A. M. MUJUMDAR*
ANURADHA S. UPADHYE

Plant Sciences Division,
Agharkar Research Institute,
Pune 411 004, India
**e-mail: ammpune@hotmail.com*

The crisis in Indian science is more than meets the eye

This is in response to the correspondence by Shukla *et al.*[1]. I am in full agreement with the fact that due to low rating of some universities by the National Assessment and Accreditation Council (NAAC), teachers with exceptional abilities are the worst sufferers because of the dismal performance of other less committed departments and their faculty. There is indeed a dire need to devise and put in place effective empirical criteria for evaluation of teachers. The teaching excellence by exceptional teachers, however, often goes unrewarded. Besides evaluation by students, an alternative system needs to be devised to distinguish teachers on the basis of teaching proficiencies. Despite great disparity amongst Indian universities with regard to infrastructure and other basic facilities, some quality teachers working under ordinary conditions produce results that are globally comparable to those of pioneers and stalwarts in their respective fields. Such teachers deserve due recognition, appreciation and encouragement by UGC and other academic bodies, allied organizations and scientific societies.

Being currently faced with a string of intricate issues and problems, Indian science calls for an immediate and holistic redressal. In order to effectively address the declining motivation of youngsters to science and failure of the scientific community to deliver goods, we need to address a myriad of subtle issues in a decisive way. The important questions that merit priority attention in this regard include: (a) Is science really ailing in India and if so, why? (b) Is science here policy-driven or vice-versa? (c) How to restore the state of science and how to make policies science-driven?

The first and foremost responsibility of the scientific community is to have a fair assessment of the basic bottlenecks in the pursuit of its problems. Do our research programmes make an economic sense in this free market globalization regime with due concern to our social needs? Are our methodologies and approaches of investigating these problems based on holistic understanding of the way systems function? Are our observations, findings and results of research sound enough to drive the public policies at different levels? And above all, in this rapidly progressing science-dominated era, where do we stand at the global level? How honest are we in our research dealings, particularly in terms of originality of contributions in the process of knowledge creation and technology development? Or at least, how efficient are we to draw existing technology to the benefit of our society? These million-dollar questions demand urgent solutions.

Analysing the above problems in a broader perspective along different dimensions should not leave us disappointed. There are no two opinions in that whenever and wherever Indian students have worked in reputed research institutes abroad, they have earned more reputation than others for their creativity, dedication, determination and zeal. Then why not so at home? There are more than one reason for this. Even scientists who work abroad for their doctoral and postdoctoral programmes, when given an opportunity to work at home, turn almost useless. They are used to working with sophisticated and highly sensitive instruments and with good laboratory facilities. However, back home, in most of the universities we find an entire department with an annual budget of what on an average scholar abroad uses in a month. The government needs to reconsider its budgetary allocation to science and technology, which is far lower from that in most of the developed countries. In addition, many of the administrative and financial hurdles in the way of promising research scholars need to be got rid-off. Accessibility for talented students and teachers to good laboratories and rare equipments therein needs to be ensured. The culture of a collaborative and interdisciplinary approach, as commonly seen in European countries, is yet to take-off here. Comparatively poor theoretical background of the problems which they pursue leaves our students handicapped in interpreting their results in a novel way.

Though it is the responsibility of the State to ensure basic facilities to science departments in terms of infrastructure and other services, it is the moral duty of the scientific community of the country to evaluate its approaches and designs of problems for reliability and reproducibility of the methodology, and applicability of the results and findings. Giving special appeal, incentives and inspiration to the younger generation, we need to motivate them to take up science as the most rewarding career option.

1. Shukla, S. K., Singh, V., Shukla, P. K. and Srivastava, G. K., *Curr. Sci.*, 2007, **92**, 8.

MANZOOR A. SHAH

P.G. Department of Botany,
University of Kashmir,
Srinagar 190 006, India
e-mail: mashah75@yahoo.com

Thickness estimation of Deccan Flood Basalt of the Koyna area, Maharashtra (India) and implications for recurring seismic activity

Nayak *et al.*[1] attempted to give a reason for the recurrence of seismic activities around the Koyna area, Satara district, Maharashtra (India), while estimating the thickness of the Deccan Flood Basalt around the area through inversion of aeromagnetic and gravity data. However, they could not provide suitable explanation for many of the inferences and conclusions. For example, it is stated in the abstract and similarly in the conclusion that 'the entire column of lava below this region is made up of non-massive vesicular type of basalts having a low density of 2.58 g/cm^3 and a porosity of about 17%'. Such statements are utterly misleading and contradict the information obtained so far on the Deccan Flood Basalt.

Auden[2] has determined a specific gravity of 2.88 g/cm^3 for massive basalts in the area while looking for concrete aggregate for construction of the Koyna Dam. Srinivasan and Rama Rao[3], while reporting the geological investigations for the Koyna hydroelectric project based on several test boreholes, have determined a specific gravity of 2.77–2.82 g/cm^3 for massive basalts and 2.47–2.37 g/cm^3 for vesicular (non-massive) basalts. A specific gravity of 2.76 g/cm^3 inferred by Nayak *et al.*[1] at the basement of the 1500 m thick basaltic flow is even less than what was actually measured near the surface by the earlier workers[2,3]. For the overlying basalts, Nayak *et al.*[1] infer a specific gravity of 2.58 g/cm^3, which is much less than what is actually found in the field. Thus they are wrong in their whole exercise, and their interpretations are also unreliable.

The statement (p. 963) that 'calculated porosity of basalt is about 16.8%, which is close to the known average porosity of vesicular and amygdaloidal basalt', is untrue. There is no mention of the porosity of vesicular and amygdaloidal basalt in the report by the Central Ground Water Board[4], based on which this statement has been made. This report[4] gives an average value of 17% for basalts in general based on the work of McWhorter and Sunada[5], who found a porosity range of 0.03 to 0.35 while analysing 94 samples of basalts. Deolankar[6] determined a porosity of 50% for vesicular basalt. Porosity information provided by Nayak *et al.*[1] is vague without any proper reference and is completely misleading.

The entire thickness of the Deccan Flood Basalt consists of several basaltic flows, each consisting of two main trap units: (i) a lower massive unit and (ii) an upper vesicular/amygdaloidal unit. The massive unit constitutes the main trap unit and forms 60–85% of the flows. The vesicular/amygdaloidal unit forms the upper horizon of each basaltic flow and constitutes 15–40% of the flows. The density of vesicles increases toward the top of each flow. Generally, the consecutive lava flows are separated by a red layer, varying in thickness from 0.15 to 1 m, termed as 'redbole'. A field disposition of these layers is shown in Figure 1.

Thorat and Ravi Kumar[7] have identified 27 basaltic flows in the exposed sections of the Koyna River basin with thickness varying between 10 and 60 m. What is observed on the surface is an indication of what is expected below the surface. Therefore, below the Koyna Dam, several basaltic flows are expected to occur with alternating layers of non-massive vesicular basalt, slightly vesicular basalt and massive basalt (without vesicles), as already observed[2,3,8–10] in the deep borehole logs of the Koyna Dam site. The borehole sections prove that below the Koyna Dam or even around it, the lava is not made up of non-massive vesicular type of basalt alone. Therefore, the

Figure 1. Disposition of basaltic flow layers and their contacts.