In this issue

The Moon still lives

The scientific community has long thought that the Moon is a desolate piece of rock, devoid of any geological activity. The ripples observed on the Moon's surface are attributed to impact craters, created more than a billion years ago. Images from the NASA's Lunar Reconnaissance Orbiter and the ISRO's Chadrayaan-1, however, provide evidence that question this view. Inside one of the craters – crater *Z* – there is a smear of three different viscous flows typical of volcanic lava flows.

Viscous flow in crater *Z* surface could be due to different reasons. (a) When a meteorite smashes into the crust, it may melt the soil, which then flows, (b) the flow may have been transferred to crater *Z* from an impact crater nearby, (c) the flow may be an endogenous product of volcanic activity in crater *Z*.

Crater *Z* is too small as compared with even the smallest impact craters. So the flow cannot be attributed to an impact melting. The flow could not also have been transferred from another crater because there are no flow marks which can be traced to the primary source of the flow. In a Research Article on **page 454**, researchers from IIT Roorkee and PRL Ahmedabad, deduce that viscous flow births from the crater *Z*, which is volcanic in origin. And what is more, the volcanic activity seems to have been only a few million years old.

The discovery questions the current notions about the Moon. Samples from these volcanic flows could provide valuable information about the age, thermal history and evolutionary state of the Moon.

Comfort with chemical complexity

Today there are several hundred ayurvedic products in the market. The same medicine is available in different brands. But which one of these is the most effective? Which is closest to the prescription in the ancient texts?

It is a tedious task to ascertain the purity of existing ayurvedic medicines because of the complexity of the ingredients.

Some molecules emit light after they are excited to a higher energy level by absorbing electromagnetic radiation. The light emission spectrum of these fluorescing molecules is exploited by various spectroscopic techniques to serve as a molecular fingerprint, a signature unique to only those molecules. Conventional fluorescence spectroscopic techniques, however, cannot deal with the complex concoction of aqueous ayurvedic medicines, due to the overlap of spectra of different molecular groups. The medicines contain a variety of fluorophores at unknown concentrations. There is significant interference from water signals also.

A Research Article, **page 470**, circumvents these problems by exploiting synchronous fluorescence spectroscopy (SFS). SFS, unlike conventional fluorescent spectroscopy, scans both the emission and excitation spectra simultaneously, which filters the noise and improves the resolution of the spectra. However the resolution is not adequate and there is considerable overlap between the spectra of different molecules. Enter chemometric techniques: principal component analysis and partial least square discriminant analysis. Analysis of the SFS data using these two chemometric methods resolves the spectra by demarcating the different molecules.

The research article presents the analysis of samples of different brands of *jirakadyarista*. Though there are 13 different herbal ingredients in *jirakadyarista*, the results show that it is not difficult to identify the real medicine from fake.

Studies such as this can classify aqueous based medicines on the basis of their quality, particularly their safety as recent studies have cited the presence of toxic levels of arsenic, lead and mercury in ayurvedic medicine. The combination of SFS and chemometric analysis has the potential to lead the way in the testing and quality control of ayurvedic medicines.

Open access to science

Three decades ago open access journals were virtually unknown. All serious scientific publications were in print. But the Internet provided a platform for free access to information about scientific research also. In the last 15 years open access journals have grown a whopping 20 fold – to nearly 10,000. Most of these are unfortunately providing information that has not gone through a peer review process. So subscription journals still claimed credibility. But considering that 30% of peer reviewed journals are now available on the net for open access, this argument has now gone down.

Scientists also initially hesitated to publish in open access journals because they assume that their scientific work will garner a low impact factor. A General Article in this issue, **page 380** provides evidence to prove otherwise. While bemoaning the naivety of the scientific community where the worth and profundity of a scientific paper is reduced to decimal, they use the same weapon to counter the misgivings of scientists.

The article compares the two-year and five-year impact factors, normalized impact factors and rank-normalized impact factors of open access and subscription journals across 22 academic fields. They find several open access journals in the top journals worldwide. In the category of multidisciplinary sciences, the two-year mean rank-normalized impact factor of open access journals has even crossed that of subscription journals.

Allowing open access improves visibility and readership, improving the impact of the journal. So the subscription-based journals are rethinking their business model. Many have print which is subscribed and an open version on the net. This is an encouraging trend, for researchers in less developed countries and even in emerging economies. The argument that the information on research done with public funds should be accessible to public is also gaining ground making many subscription-based journals rethink their policies.

Today subscription-based scientific journals still outnumber open access by almost seven to one. Science is mostly out of reach of the scientists from developing countries. While pointing out the cases of misdemeanor in open access journals, the article attributes the continued dominance of subscription journals to generous funding capital and the dubious phenomenon of bundling that pervades subscription journals.

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