I would also like to point out that, in referring to the poster presentation of Natasha Mhatre and myself at the Acoustic Communication Meeting, the first (and presenting) author's name has been dropped! Since I did not make an oral presentation, there is simply no justification for this and the relevant sentence (end of-second column, p. 1399) should read 'Natasha Mhatre and Rohini Balakrishnan (IISc, Bangalore) presented a research paper... .'

The above (possibly inadvertent) errors may seem minor to some but to me they reflect the distressingly hierarchical, 'alpha-male' culture of the Indian scientific community and I have thought it fit to point them out.

1. Anil Kumar, *Curr. Sci.*, 2003, **85**, 1398–1400.

ROHINI BALAKRISHNAN

Centre for Ecological Sciences,
Indian Institute of Science,
Bangalore 560 012, India
e-mail: rohini@ces.iisc.ernet.in

Need for right attitude

I was disappointed to read in the editorial of *Current Science*[1], reference to 'the Sepoy Mutiny of 1857'. I was under the impression that this term was used mostly by persons who followed history books written by the British and not by post-midnight children. In this connection I wish to quote from R. R. Diwakar's book *Mahayogi*[2], where he describes the years 1858–1893, 'which immediately precede the birth of Aurobindo (1872) but follow the most ruthless suppression by the government of the heroes of the war of independence waged by the patriotic elements that were still left in India after decades of British rule. It has often been dinned into the ears of students of Indian history, by official and pro-British writers, that this war was a "mutiny" and that great atrocities were committed by the Indian soldiery. It was reserved for the Indian patriots and historians who came later to assert that it was not a mutiny but a war of liberation, as sacred as was ever fought between foreign usurpers and the sons of the soil'. I believe we should have the right attitude towards our past.

Further on in the same book he discusses the then existing economic field. He writes: 'The British, who came to India as traders, fought like adventurers, intrigued like consummate politicians and ultimately stumbled upon an empire vaster than that of Asoka and richer than that of Moghuls. But the shrewdest of them were never enamoured of the "empire" aspect. Although sometimes they indulged in shows incidental to all empires, they did so because it was necessary, and not because they loved or liked it. The trader in them never died, nay, that attitude was fostered and they flourished on it. They thought constantly in terms of rupees, annas and pies. Napoleon, always busy building empires, contemptuously called English a nation of shopkeepers. He lost his empire in no time but the British kept their shopkeeping and remained safe and prosperous'.

'Thus economic exploitation was the dominating motive throughout the period of British occupation. The industrial revolution in England helped and accelerated the process. The British began to look upon India as a supplier of raw material and upon her vast population as consumer of goods manufactured in England. In the fulfilment of this objective, they were ruthless and remorseless... . No political power in the world has operated with such deadly economic effect on so vast a scale as in India.'

Does this all not sound very familiar now in the era of globalization and liberalization? This again reflects the mental attitude of the British then and of powers that be, now.

1. Balaram, P., *Curr. Sci.*, 2003, **85**, 1389–1390.
2. Diwakar, R. R., *Mahayogi*, Bharatiya Vidya Bhawan, Mumbai, 1953, pp 2 & 7.

B. A. DASANNACHARYA

4, Beach Resort Society,
Sector 10A, Vashi,
Navi Mumbai 400 703, India
e-mail: dasannacharya@vsnl.com

Quantitative estimation of crystalline phases in coal

Sudip Maity and his co-authors deserve congratulations for reporting quantitative estimation of crystalline phases (inorganic) in Indian coals by X-ray diffraction (XRD) technique[1]. The authors claim that the mineral analyses are consistent when compared with chemical analyses. But relationship between the calculated oxide composition from the minerals determined (table 2) and chemical composition of inorganic matter in coals (table 3) does not say so. Correlation coefficients (R^2) derived from linear regression graphs for SiO_2, Al_2O_3 and FeO of the two analyses are reported to be 0.971, 0.448 and 0.258 respectively and these are not appreciably high. It may be that the inherent characteristics of the examined matrix (coal) are not highly suitable for the SIROQUANT technique adopted by the authors.

Consequently attempts may be made to estimate the minerals in the inorganic material fraction separated from the coal by adopting QXRD method wherein standard (reference) sample is prepared with known quantity of the respective mineral. Alternately, if separation is not possible, known quantity of each mineral may be incorporated in the coal sample containing the mineral phases. Based on the XRD intensity of the added amount of the mineral, quantity of the inherent mineral can be determined. Both the methods, adopting some corrective measures for recording XRD intensities[2–4], proved to be successful in accurate determination of mineral phases in ceramic and similar materials.

1. Maity, S., Mukherjee, J., Mitra, S., Moitra, H. B., Singh, R. and Ghosh, G., *Curr. Sci.*, 2003, **85**, 506–510.
2. Goswami, G., Panda, J. D. and Panigrahy, P. K., Proceedings of the International Unified, Technical Conference on Refractories, New Orleans, 1997, vol. 3, pp. 1549–1555.
3. Goswami, G. and Panda, J. D., *Powder Diffraction*, 1999, **14**, 114–117.
4. Goswami, G. and Panda, J. D., *Interceram*, 2000, **49**, 300–307.

G. GOSWAMI

Ratnapur,
Nagaon 782 001, India

Reply:

It has been shown in the paper that without doing the LTA (low temperature ashing, where organic matter of the coal is removed) SIROQUANT gives a good estimation of mineral matter in raw coal. The software has provision by which the background due to presence of non-crystalline material can be subtracted out. The slopes of the regression graphs are moderately high, which show the reliability of the software for direct quantification of mineral phases. Except Al_2O_3 (0.448), FeO has very high correlation coefficients (0.846) and SiO_2 (0.671). As noted on p. 510, 2nd column, 'The FeO regression graph gives low correlation coefficient due to one datapoint from SING-R coal, which is an outlier data with unknown reason. If we plot another regression graph for FeO with the remaining datapoints, R^2 increases to 0.846, which is quite high'.

Goswami has suggested adopting some procedures, which we are also following over the last one decade. But those are old processes, as new software has been developed using Rietveld refinement technique, for quantitative estimation of crystalline phases in complex mixture. We use NIST SRM for determining amorphous content in coal. This paper shows without those time-consuming processes that we can get good results for fast processing of coals. Further references 19, 20 and 23 can be consulted. This is the first paper in India, where full profile X-ray diffraction technique has been used for quantification of mineral phases with the help of modern software.

SUDIP MAITY

Central Fuel Research Institute,
Dhanbad 828 108, India
e-mail: sudip_maity@yahoo.com

NEWS

Nobel Prize in Physics 2003

The Nobel Prize in Physics for the year 2003 was awarded jointly to Vitaly L. Ginzburg, Alexei A. Abrikosov and Anthony J. Leggett 'for pioneering contributions to the theory of superconductors and superfluids'. Vitaly Ginzburg and Alexei Abrikosov made notable contributions to the understanding of the interaction of a magnetic field with a superconductor. Anthony Leggett made significant contributions for understanding the behaviour of superfluid liquid ^{3}He.

Superconductivity in pure metals at very low temperatures was discovered by Kammerlingh Onnes in 1911 (refs 1 and 2). This discovery was the offshoot of his successful attempt in liquifying helium. In 1913, the Nobel Prize in Physics was awarded to Onnes for his work in low temperature physics. Superconductivity, as the name implies, is the vanishing of electrical resistance in certain metals, like mercury, below a temperature T_c characteristic of the metal. That the superconductivity is a true phase transition is exhibited by the Meissner[3] effect. In the superconducting phase not only is the applied magnetic flux expelled but the magnetic flux the material had above T_c (in the normal phase) is also expelled.

The magnetization **M** in the superconducting material exactly equals $-\mu_0\mathbf{H}$, where **H** is the applied magnetic field and μ_0 is the magnetic permeability of free space. However as the magnetic field is increased, one finds two different types of behaviour in different superconductors. In type I superconductors, the relation

$$\mathbf{M} = -\mu_0\mathbf{H} \tag{1}$$

is valid up to a critical value $\mathbf{H}_c$ of the magnetic field. Beyond this value of the critical magnetic field, the magnetization becomes negligible and the magnetic flux penetrates the material fully. The material loses its superconductivity. In the other class of materials known as Type II superconductors, the relation (1) is valid up to a magnetic field $\mathbf{H}_{c1}$. Beyond this value of the magnetic field, the magnetization decreases gradually as the magnetic field is increased, not abruptly as in Type I superconductors (see Figure 1). Full flux penetration is achieved at a magnetic field $\mathbf{H}_{c2}$ much higher than $\mathbf{H}_{cl}$. The resistance of the material remains zero as long as the applied magnetic field is less than $\mathbf{H}_{c2}$ though some magnetic flux penetrates the material. The existence of Type II superconductors was first experimentally shown in single crystals of $PbTl_2$ by the group of L. V. Shubnikov at Kharkov[4] in the former Soviet Union in 1933.

The phenomenon of superconductivity was explained using a theoretical framework based on Lev Landau's theory of second order phase transitions by Vitaly Ginzburg of the Lebedev physical Institute, Russia.

Landau had earlier developed a phenomenological theory for a second order phase transition like the transition from a paramagnet to a ferromagnet. The high temperature phase is disordered while the low temperature phase is ordered. Landau postulated an order parameter which grows in the disordered phase from the value zero as the temperature is lowered