

## Investigating misconduct in science

Recently, the Society of Scientific Values (SSV) examined a few issues of national importance, and the scientific community should take cognizance of SSV's role in maintaining the scientific integrity in the country and applaud what SSV has done, and at the same time neither ignore what requires urgent action, nor regret what it could not achieve. But we must share the common concern and stand solidly behind SSV's actions to correct the floundering integrity and management of Indian science.

Some time ago, the SSV received the complaint that Gopal Kundu and his co-workers of the National Centre for Cell Science (NCCS), Pune, may have misrepresented data in a paper in the *Journal of Biological Chemistry*<sup>1,2</sup>. The actual misdeed was first pointed out in an anonymous email to the Director of NCCS. As the co-founder of the National Facility for the Application of Tissue and Cell Culture (NFATCC, since renamed as NCCS) and as a former member of its Governing Council, I expressed my grief to the Director, NCCS, requesting him to investigate the possibility of misconduct. The Director appointed an internal committee, which found *prima facie* evidence that published data may have been inappropriately manipulated. Another external committee chaired by G. Padmanaban, with several expert members, was then appointed to re-investigate the matter. The Padmanaban committee fully exonerated Kundu and his collaborators.

Recently, the editors of *JBC* conducted an independent inquiry and not only found the charge of misconduct/fraud valid but withdrew the 2005 paper<sup>2</sup>. SSV has also now completed its investigation and found that Kundu and his coauthors may be guilty of misconduct involving data misrepresentation of a far greater magnitude than that found by *JBC*, thereby casting doubt on the veracity of results published<sup>3</sup> in ref. 1. Now, larger questions loom ahead. The SSV analysed Kundu's Western blot pictures by MATLAB software. Recently, Adobe has perfected a method to detect photo forgeries<sup>4</sup>. With the proliferation of digital cameras, the danger of such forgeries is great. In fact, the *Journal of Cell Biology* formally prohibits<sup>5</sup> authors from submitting photographic evidence consisting of

manipulated/touched up images. Will all journals follow this rule?

As *JBC*'s findings have been independently confirmed in India by SSV<sup>3</sup>, we must take exemplary steps to deter such and other malpractices in future by making public, all records of proceedings of the first and second committee, as well as by taking appropriate deterrent action against the guilty.

In his editorial<sup>6</sup>, Balaram eloquently outlines the problem and process of scientific misconduct including the difficulties involved in verifying the pros and cons. In the final analysis, I feel, that the worth of the Indian scientific establishment depends on its own efforts. Cleaning the Aegean stables seems to be the need of the hour. A cursory examination would reveal that there exists a small society of mutual admiration whose members act as self-proclaimed peers and play musical chairs by sitting on every committee be it making national policy, judging grant requests, sanctioning grants and often sharing the pie of huge grants amongst themselves. It is the ire of quiet workers rather than the need of the science salesmen that will decide the value of Indian science. It is unfortunate that *JBC*'s decision has preceded our own as it reflects the lack of adequate surveillance and a shared sense of dignity. *JBC*'s actions will not harm honest Indian scientists unless our scientocrats resort to calling it India-bashing and whitewash the misdeeds exposed by *JBC* and SSV. A news report<sup>7</sup> in *Science* states that 'A US journal and an Indian panel have lined up on opposite sides in case of alleged plagiarism involving a young Indian researcher whose degree hangs in balance'.

There have been well-proven cases of malpractice in scientific research in several countries such as USA, Switzerland, South Korea, China, etc. However, the discovery of malpractices was followed by the establishment of fraud-surveillance apparatuses in some of these countries. But in India, only SSV, a non-governmental organization (NGO), despite its meagre resources and lack of teeth, has shouldered that role and played it with fairness. SSV's findings<sup>3</sup> should be formalized and SSV should be supported with technological capability, and the

funds to consult jurists and scientists to test the accusations of fraud/misconduct. SSV should be kept out of the sphere of influence and interference by the Indian 'scientocracy'. SSV should help frame appropriate legislation to deter further acts of fraud/misconduct in science. I hope that the vast silent majority of honest colleagues react and strengthen SSV's hands.

1. Rangaswami, H., Bulbule, A. and Kundu, G. C., *J. Biol. Chem.*, 2004, **279**, 38921–38935.
2. Rangaswami, H., Bulbule, A. and Kundu, G. C., *J. Biol. Chem.*, 2005, **280**, 19381–19392; see withdrawal: *J. Biol. Chem.*, 2007, **282**, 5968.
3. Case study and final proceedings of SSV on the Kundu–*JBC* case, 28 April 2007, <http://www.scientificvalues.org>
4. Dotinga, R., *WIRED NEWS*, <http://www.wired.com/gadgets/digitalcameras/news/2007/03/72883>
5. *Journal of Cell Biology*, Instructions to authors, 4 April 2007. <http://www.jcbs.org/misc/infora.shtml#conflict>
6. Balaram, P., *Curr. Sci.*, 2001, **81**, 1389.
7. Newsmakers, *Science*, 2007, **315**, 1775.

SOHAN P. MODAK

759/75, Deccan Gymkhana,  
Pune 411 004, India  
e-mail: [spmadak@gmail.com](mailto:spmadak@gmail.com)

### Response (Kundu)

The two *JBC* papers represent two very similar pathways regulated by osteopontin upon binding to the integrin receptor. The experimental design and the methodology used to examine the two pathways are very similar; both sets of experiments were performed in B16F10 cells. Both the papers are highly cited (more than 24 and 14 times respectively)

Based on an anonymous/pseudonymous e-mail, Director NCCS, G. C. Mishra, constituted an internal committee to find the fact of the matter. However, the committee did not go through the original data, computer analysis and supportive data. The committee did not give a chance to Hema Rangaswami – the first author of both these papers who is doing

her post-doctoral work at UCSD, USA – to explain the data before the committee. After submitting the detailed report along with computer analysis to the internal committee, it was decided to further investigate the matter thoroughly by a national level enquiry committee. Accordingly, a national level committee under the chairmanship of G. Padmanaban along with six reputed scientists of the country, was constituted. We had submitted the detailed report to this committee. Hema Rangaswami came from USA along with all the original blots, record books, and supportive data and presented before the committee along with myself and Anuradha Bulbule. The committee examined all the presented data of the two papers extensively and found that there was no substance based on the allegation.

I received an e-mail from K. L. Chopra, President, Society for Scientific Values (SSV) on 11 October 2006. In that email, there were two sets of questions: one, based on scientific issues and the other, based on non-scientific issues. Although most of the scientific questions are not relevant to the data of *JBC* paper in question, I answered all the questions scientifically. The SSV decided to highlight only the non-scientific issues and posted them on its website, whereas the scientific explanations of all the blots did not appear on the website, which seems to me that SSV has deliberately suppressed the scientific facts.

I learnt from the SSV site later that Sohan Modak has made a written complaint to SSV on this issue. It is unfortunate that Modak (<http://www.scientificvalues.org/Modak-complaint.pdf>) had indicated that *JBC* has a *faulty peer-review system* and the paper has been published because of *genealogical relationship* between the reviewer and the authors of the papers. I cannot comment on this although it has been published on the SSV website.

In the meantime, *JBC* received the same anonymous/pseudonymous email and asked me for the clarifications. Although we submitted the original blots and the computer analysed data, *JBC* decided to withdraw the second paper (ref. 2 above) based on only two control blots. Later, the scientific editor of *Science* contacted Shelagh Ferguson-Miller, chair of ASBMB publication committee and confirmed that they have made the decision based on the computer analysis of two control blots (<http://www.scientificvalues.org/Science%2030%20March%202007.pdf>).

There were nine points in the allegation and seven of them are control data. The paper-2 has 53 and the paper-1 has 66 blots/data. It seems that *JBC* has taken the drastic/harsh decision without considering the scientific fact of the paper. After this decision, I contacted the *JBC* office but it has decided to remain silent. Even if one removes these two control blots, the fact of the scientific findings of the paper will remain unaffected.

Renate Pilz and two other UCSD professors (University of California, San Diego, USA) who examined all the data of both these papers felt that the data of the *JBC* paper (ref. 2 above) is valid. They also commented that these types of similar-looking control data can be obtained if one uses the same gel apparatus, combs, spacers, etc. It is unfortunate that although I have submitted all these letters of UCSD to SSV, the SSV did not make any efforts to post these reports on its website.

Although *JBC* and *Science* agreed that *JBC* paper (ref. 2 above) has been withdrawn based on only two control blots, SSV with a computer expert have shown the analysis of seven blots using MATLAB software. It is important to mention here that based on SSV's own analysis, there are distinct differences among the analysed blots of the two papers (ref. 3 above). Moreover, G. Padmanaban has provided one such set of original blots and has given a detailed explanation in his report. After considering all these facts, it is obvious that SSV has prepared the report in a biased way. Moreover, like the Padmanaban's committee, neither *JBC* nor SSV had directly investigated all the original data, computer analysis, raw data, supportive data, and note books along with all the three authors of both the papers.

On the basis of the SSV's report, the media have reported the case in a colourful manner; however nobody is ready to understand the scientific facts of these two *JBC* papers. I feel that SSV should stay out of the sphere of influence and interference and deal with the scientific matter in an unbiased way and keep the moral value of science high. Currently, I have 10 PhD students, two summer trainees and one senior technician in my laboratory. Four of my earlier students have completed their PhD and are continuing their postdoctoral research in USA. A large number of papers have been published from my laboratory in

high impact peer-reviewed international journals. I urge the scientific community to go through both these papers and find out the scientific facts and not allow the career of my students to be destroyed.

GOPAL KUNDU

*National Centre for Cell Science,  
Pune 411 007, India  
e-mail: kundu@nccs.res.in*

### *Response (Rangaswami)*

I feel that *JBC*'s decision to withdraw our 2005 paper was absolutely unfair and unwarranted. One can only hazard a guess about what motivated them to do so. The apparent similarity between two loading control blots out of the 100 or so blots in the papers did not affect the results or conclusions in any way. Our experiments were repeated several times prior to submission and there was no need for us to use the same figures. There were no issues with reproducibility whatsoever and our papers were highly cited. I also got to know that the University of Pune received extremely positive reports of my thesis that contain the same data from all three examiners.

Right after *JBC*'s withdrawal, the SSV and others readily pounced on Padmanaban's committee even questioning its integrity, but why could not some of that doubt and criticism be directed towards *JBC*? Is the *JBC* so infallible? Regarding SSV's 'investigation' and 'conclusion', I cannot help but feel that the final conclusion was decided a long time ago and the recent 'report' was a mere formality. They and other overzealous individuals found this to be a great opportunity to make a name for themselves and settle personal scores. SSV's charter on their own website says 'The SSV feels strongly that prominent scientists in the field best judge scientific unethical practices and thus their verdict should be taken seriously for taking an appropriate action', and yet they attacked Padmanaban's committee and conducted their own 'investigation' without involving a single recognized expert in the field, without examining original data and without contacting all the authors. Even in its own 'analysis', SSV has not found a single image that is an exact reproduction of another image. The 'investigation' also

failed to address an important issue in this case – the motivation for misconduct when results from repeated experiments were available and the fact that none of the allegations affected the central theme and results of the paper. What was more farcical was their repeating of the original allegations and their claim to have unearthed more misconduct than what *JBC* had found.

This whole episode has caused me inexpressible anguish, apart from irreparable damage to my career. There is no doubt in my mind that I have been wronged under the guise of scientific integrity. What has kept me going is the unshakable trust several people have in me and their shared sense of outrage – I am very thankful for it.

HEMA RANGASWAMI

University California, San Diego,  
9500 Gilman Drive,  
La Jolla, CA 92093, USA  
e-mail: rhemu\_2001@yahoo.com

## The NCCS case

In recent times there have been a spate of write-ups expressing concern on the ethics of scientific research among the Indian scientific community. This relates to plagiarism, data manipulation and falsification. One such case relates to that of Gopal Kundu and his colleagues at the National Centre for Cell Science, Pune. I happened to chair a committee that investigated the allegations against Kundu and colleagues that they have used the same data in two different publications in the *Journal of Biological Chemistry (JBC)*, describing different treatment conditions. The committee came to the conclusion that manipulation of data was not evident based on the information provided and exonerated the team involved. In the light of all the subsequent newspaper reports and emails, I thought I should clarify to the scientific community, the basis on which my committee exonerated the team of wrongdoing.

The episode began with emails in the names of Shivaji Bhode and Ganapati Mahabaleswar being received by G. C. Mishra, Director, NCCS (a DBT institute) that the two papers published by Hema Rangaswami *et al.* in the *JBC* (refs 1, 2 above) contained the same data; the

data from the earlier paper was manipulated to describe the results on the responses of different pathways in the subsequent paper.

Mishra informed me that an internal committee had felt that a *prima facie* case exists and, therefore, an external committee should investigate the allegations in detail. My committee consisted of six reputed, active researchers from different institutions in the country as its members. The committee met at NCCS, Pune on 13 August 2006 to examine the allegations, the details of which were made available to the committee earlier. There were nine points in the allegations, each involving mostly Western but also other types of blots. The bands in the blots were subjected to computer analysis. These included the zoom blots of each band, colour cube analysis and lab image 1D-2006 professional software analysis. Original ECL/autoradiograms for six of the nine figures under consideration and the powerpoint pictures of the originals for the remaining three points were provided to the committee by Hema Rangaswami who came from the US to appear before the committee. The committee also had access to the note books where data on experimental repeats of the figures presented in the papers were available. All members of the laboratory, including those not part of the papers, were examined individually.

The committee did not find evidence of manipulation and came to the conclusion that the emails had been sent with a malicious intent of bringing disrepute to NCCS. A brief report was submitted to the Director, exonerating the investigators of any manipulation of data between the two papers.

In the meanwhile, *JBC* had also apparently received emails on the manipulations and on the basis of its own investigation decided to withdraw the *JBC* (2005) paper. In a subsequent input to *Science* (ref. 7, above), Shelag Ferguson-Miller, chair of *JBC*'s publication committee stated that a computer analysis found that two control blots were identical to images that had been labelled differently in the 2004 publication and it seemed that there had been deliberate misrepresentation. This involved two figures that pertained to two of the nine allegations. Kundu had sent replies to both these allegations, enclosing all the data. However, *JBC* chose to remain silent and sent back the data without any comments.

Based on a written complaint received from Sohan Modak, the Society for Scientific Values (SSV) claims to have carried out its own analysis and found Kundu guilty. It also indicates of possible complicity of my committee in the exoneration of Kundu. It basically repeats some of the original allegations and the analysis is available on its website.

Our original report was brief but based on extensive analysis. But, in the light of the unexpected turn of events, the Department of Biotechnology, Government of India has sought a detailed report from the committee. Without getting into all the details, I would like to highlight some of the crucial facts.

I am not a computer expert and although computer analysis of the bands showed that they are not reproductions or manipulations of a single figure, I was not convinced. In my opinion, the output of the computer depends on what is fed in. Thus, analysis of the published figures as such would not add to much, since the original allegations are based on such an analysis. What tilted the opinion of the committee in favour of Kundu, was the availability of the original ECL autoradiograms from which the strips (rows, left to right) were cut. I just want to give one example to highlight the issue. This relates to one of the points of the original allegations and one of the two points on the basis of which *JBC* decided to withdraw one of the papers. In the Figure, the top three strips are images of the original autoradiograms. Although the pattern of intensity changes between the bands (L to R) is similar in all the three cases, it is obvious that the data are from three independent autoradiograms. In fact, one can see an artifactual faint band appearing below the bands of interest in the top left strip and a smudge appearing in some of the lanes above the bands of interest in the bottom third strip. When these strips are processed to highlight only the bands of interest using Photoshop, all the three look identical as given in the bottom part of the figure (below the line). In fact, whole autoradiograms would reveal other artifacts away from the region of interest and it looks it is better not to have clean autoradiograms to prove to the world that data are not duplicates of the same! Top journals demand huge amount of data and there is need for data compaction which results in lanes and rows of gel data from different experiments being lined-up in a sin-