An Indian ombudsman institution for ethics in scientific R&D

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Misconduct in science and technology R&D is about a less than desirable state of honesty, ethics and integrity on part of the various stakeholders, be they individual researchers or organizations (state run or private) and is a matter of concern globally. Though misconduct is a fait accompli, what is more important is the way to deal with it. Since it is a global issue there is an ample scope for learning from others' experience. Is there any well defined system in place in India or is it dealt with essentially in an ad hoc manner? Here we have summarized the information about systems to deal with misconduct in case of a few countries where the misconduct in science and technology R&D is recognized as an offense meriting appropriate punitive measures and deterrents. We also show why an Ombudsman is the need for dealing with misconduct in science in India.

Keywords: Ethics and integrity, ombudsman, misconduct, science and technology, research and development.

IN its broadest sense, misconduct is an improper or an unprofessional deliberate behaviour with ulterior motives. Misconduct in science and technology (S&T) Research and Development (R&D) is about a less than desirable state of honesty, ethics and integrity on part of the various stakeholders, be they individual researchers or organizations (state-run or private), and is a matter of concern globally. Though misconduct is a *fait accompli*, what is more important is the way to deal with it. The global nature of this issue provides ample scope for learning from the experience of others. The process of dealing with misconduct begins with its identification and reporting, and ends with apportioning appropriate quantum of punishment in an organized and transparent manner. Globally, the existing operative systems to deal with misconduct in S&T R&D have been evolved in different countries such as Australia, the UK, USA, Germany, China, South Africa, Sweden, Norway, Japan, Canada, Finland and Denmark. It may be noted that India is yet to figure in this group and also the fact that the list is predominantly populated by countries from the developed world with advanced S&T R&D. Misconduct in any S&T R&D organization can be in financial matters (misappropriation of resources, falsified or wrongly hyped deliverables; seeking funds under false pretences; wrong deployment of resources for gains other than those approved by the mandate); in legislative and strategic matters (misuse or wrong deployment of personnel; personnel not motivated or competent or both, to carry out the given mandates; nepotism; favouritism), and in deliverables (delayed deliverables; wrong deliverables; data falsification or inflation to provide wrong achievements; improper or incorrect publication and patent/IPR data). Misconduct not only raises questions about the quality of the scientific R&D and the credibility of the concerned scientists and their organizations, but also provides clear evidence for severe losses of both time as well as monies that were expended in the R&D.

In USA, for instance, there is a federal National Science and Technology Council Implementation Group (NSTCIG) proposed and established by the Clinton administration during the year 2000. NSTCIG has defined the research misconduct as fabrication, falsification or plagiarism in proposing, performing or reviewing research or in reporting research results. Fabrication is making up data or results and recording or reporting them, and falsification is manipulating research materials, equipment or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. Besides defining the research misconduct, NSTCIG has also laid down guidelines for investigation and apportioning punishment to the guilty. NSTCIG has acted as a strong deterrent and awarded suitable decisions in several instances of fraud and misconduct. Over the past few years, several other countries have also set up professional or statutory bodies/ committees to deal with reported misconduct in S&T R&D. These have variously specified guidelines or actions to be taken in situations of misconduct, while in a few instances have also promulgated strategies to prevent misconduct (Table S1, see Supplementary Information online). Absence of any such federally mandated and

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well-defined structured body in India, till date equivalent to the US NSTCIG gives an impression that either there is no misconduct in India, or that tackling it is nobody's business due mostly to apathy or fear of power and privileges of the offenders. The current status is therefore, a total lack of clarity as to what should be done and how it should be done, in any incidence of misconduct, which has resulted in diverse and inconsistent responses to it.

Some years ago, a recommendation and a passionate plea was made by Valluri[1] to have an 'NSTCIG equivalent' in India, which was questioned by Chopra[2] based on the premise that the country may not have the spirit and practice for an investigation into misconduct in science in the same way as USA does through its NSTCIG. Though both authors agreed on the need to deal with fraud and misconduct in science, their disagreement was primarily on the modalities. Thus it is clear that there has to be a body to deal with misconduct in S&T R&D for prevention and punishment and also upholding the spirit of fairness.

A study was carried out to determine whether or not the punishments meted out befit the cases of misconduct[3]. The study has shown that misconduct declined after punishments were meted out and more important, the perpetrators had their images tarnished due to the punishments and consequently faced hardships in their careers. However, ever increasing incidents/reports of misconduct as well as growing disconnect between the number of perpetrators who commit the misconduct and those who are actually punished for the same have seriously undermined the deterrent role of punishment. Such a disconnect calls for a decisive intervention in the processes associated with detection, reporting and punishing misconduct and therefore, warrants creation of an ombudsman organization for controlling misconduct in S&T R&D in India.

Plagiarism has emerged as a major concern over the years and is one of the most visible forms of misconduct. Plagiarism is appropriation of another person's ideas, processes, results or words without giving appropriate and due credit. With the advent of newer software in publication and open access journals, it is becoming more and more difficult to get away with plagiarism, making this misconduct relatively overexposed compared to others. The rise in plagiarism is also the direct outcome of ever-increasing performance pressure and the rush to publish results in high-impact journals to get recognition or for career progression and securing grants. Considering plagiarism as one of the major visible misconducts, we have focused essentially on publications, as they are a measure of generation of new knowledge and/or extension of knowledge, the well-established aims of scientific R&D. Publications are important to individuals as well as the organization(s) that support and finance the R&D work. Likewise, the publication of good papers is also important to the journals that publish, not only as a source of revenue through manuscript charges, page charges and subscription charges, but also in terms of sustenance or enhancement of the prestige or impact of the journal. Thus with so many stakeholders, it is of paramount importance to evolve a system that safeguards against any malpractice. Misconduct in the publication process is now a well-documented phenomenon and has resulted in a plethora of solutions and options, including software like Ithenticate[4] or Turnitin[5], which are being employed to effectively check any plagiarism; however there is still an ever-increasing occurrence of misconduct in publications caused by a variety of motives. In the Indian context, Valluri[1] considers senior scientists taking unfair credit for the work of their subordinates despite not contributing anything to it, and data falsification and plagiarism to be the most important forms of research misconduct in the country. An 'outstanding' evaluation grade in performance appraisals and peer and national recognition considerably overwhelms the ethical considerations and it is for these very reasons that a mere publication misconduct is seemingly accepted as a 'way of life' and ignored until it is detected and made into an agenda for investigation.

An assessment of the papers retracted in a 10-year study timeframe from 2000 through 2010 from the PUBMED database was carried out to seek answer to the query whether or not the authors deliberately committed research frauds[6,7]. The study revealed that over 50% of fraudulent papers were authored by repeat offenders, while less than 20% of papers with genuine error(s) were authored by repeat offenders. Clearly, deliberate fraud is a repetitive occurrence, while genuine errors by default have much lower frequency of repeats. Another study by Corbyn[8] also showed that misconduct is the main cause of retraction of papers in the life sciences, accounting for nearly 43% of the total retractions. In India, scientific misconduct and plagiarism are on the rise[9], and need to be addressed sooner than later. Oversight and lack of proper training for scientists have also resulted in increased instances of plagiarism and research misconduct[10].

In India, the inconsistency in award of punishments and follow-up actions after the misconduct or fraud is detected or proven is also an important reason why the perpetrators of fraud resort to cover-up and lobbying for their cases to be dealt with sympathetically, citing or invoking extenuating circumstances to the extent of even having a fall-guy to transfer the blame. Balaram[11] has described the inequalities in punishments and highlighted that often students and postdoctoral researchers are easily dismissed at the mere whiff of any controversy, while the senior scientists are protected by institutional armour, powerful colleagues and a reluctance to battle it out for these issues. This highlights the existing institutional gap to address the problem in a fair and transparent manner at the national level. Surely principles of justice require that (a) punishments are handed out proportionate to

the seriousness of the misconduct, (b) the same kind of misconduct, albeit at different places, must still be handed out similar punishments in all cases, and (c) the punishments are to be handed out as a deterrent for others and at the same time are also to be intended to educate the perpetrators of the misconduct about the gravity of their actions that not only tarnish their credibility and image, but also of their organization and the country. India does not have a statutory body to deal with scientific misconduct in academia, like the NSTCIG in the US, and hence cases of misconduct are often dealt with in an ad hoc manner and different investigative routes are followed for different cases. Likewise, no norms have been defined for award of punishment after the investigations have led to proofs about the misconduct. Consequently, the misconduct of some authors may sometimes be condoned all together (due to an author's position or status or linkage with those in high positions and stature), while a similar misconduct of some other authors may result in severe punishments, including suspension, demotion and dismissal from service. This arbitrariness in dealing with the misconduct is the crying reason for the establishment of an independent ethics body in India, also advocated in the past[1,12,13].

Deliberate fraud is a repetitive occurrence, while genuine errors by default have lower frequency of repeats. The rise in non-ethical or potential misconduct in publications of Indian authors can be judged from a scrutiny of Table 1, which is an extract of a shortlist from the Retraction Watch blog, listing details about some of the papers retracted from India during a small sampling window time-frame from 15 May through 30 September 2013 (https://retractionwatch.wordpress.com/). The table also lists retractions as repeat offence for some authors. There are however, not much data available on the action taken in these misconducts in the public domain. Ideally this should have been available in the public domain had there been a body dealing with the detection, investigation and award of punishments against these misconducts and scientific frauds. If one needs to ascertain the details of these offenses and the offenders, one has to invoke the Right to Information (RTI) Act and apply for details at each organization individually. In a few instances the public forum, especially news agencies and newspapers have highlighted some of these misconducts. In any case, it is known that different perpetrators in different organizations or at different levels of authority and position have been penalized inconsistently in the country. This is primarily because there is no nationalized rule book against which the punishments can be graded. Likewise, in some instances the investigations have been speedily cursory, while in others long drawn and yet inconclusive investigations were carried out. It is these inconsistencies in the ways and means with which misconduct is dealt with in India that suggest an urgent need for a suitable 'office' or an 'ombudsman' similar to NSTCIG to deal with these issues covering a large number of scientific personnel and institutions.

Creation of an ombudsman is a daunting task, but not impossible, provided all stakeholders can get together with a single-minded focus on the task. The fraud or misconduct is an act by an individual or by a group led by a leader in most cases and must therefore be dealt with in individual capacities for fixing the charges. In order to have a deterrent effective enough to prevent misconduct, there is need for a policy or legislation that must be in place, and be effective and fully functional. This would also require employer and organizational sensitization, and recognition of the fact that strict publication norms (and by default other ethical norms) must be implemented. Individuals with evidence or the organization after preliminary enquiry can report or recommend the case to the ombudsman for detailed investigation and judgement. The ombudsman can also initiate investigations *suo motto* and proceed accordingly, but the actual imposition of the punishment will be the responsibility of the organization, which can defer with the award and make representation to the ombudsman for review, and any dispute will be ultimately handled by the court of law. Implementation of the punishment will be the sole responsibility of the employer/organization where the concerned individual or the group is employed or engaged on regular or tenure basis. The ombudsman should have the provisions to summon any person for deposition or as defendants, including those who have superannuated and are not engaged in any form. This way, there will be an enforced accountability for the entire process with space for the principles of natural justice to prevail where deserved and appropriate. Thus what we need is not just an NSTCIG equivalent ombudsman organization alone, but also a rule book and an action plan for combating scientific misconduct, irrespective of its form and magnitude. The Union Government therefore, must provide a legislation that creates such an ombudsman and the statutory rules for the functioning of the ombudsman. The ombudsman, Union Government and other stakeholders such as R&D personnel, R&D managers and even the society at large can provide inputs to establish a well-defined rule book for misconduct that unambiguously delineates the actions to follow a reported misconduct, the role of the various stakeholders in these actions, as well as, the quantum of punishment to be meted out if the misconduct is proven after due verification. Such a rule book will engender transparency as well as uniformity in dealing with the various misconducts. The ombudsman can receive inputs about misconduct from several sources and must thereafter constitute an investigative panel for the reported misconduct. The panel can resolve the case in one of the two ways. In the first instance, if the misconduct is not established, the panel can exonerate the defendants. On the other hand, if the panel establishes a clear misconduct, then it must apportion appropriate quantum of

Table 1. Sampling of India-specific retractions as listed in the blog 'Retraction Watch' for the period 15 May 2013 through 30 September 2013 (http://retractionwatch.wordpress.com/)

Title [URL for the source at Retraction Watch]	Remarks based on the blog statements
Plant journals uproot duplicate publications that authors used as a hedge [http://retractionwatch.wordpress.com/2013/09/30/plant-journals-uproot-duplicate-publications-that-authors-used-as-a-hedge/]	A group of researchers in India has lost two articles in the plant literature for duplicate submission. The authors were from institutions in Odisha, India.
Spat over tuberculosis study data leads to expression of concern [http://retractionwatch.wordpress.com/2013/09/26/spat-over-tuberculosis-study-data-leads-to-expression-of-concern/]	A fight over who owns tuberculosis study data has led the *Journal of Clinical Microbiology* to publish an expression of concern. The authors are from USA, India, Moldova, the Philippines and South Africa.
Dental journal pulls paper for duplicate publication [http://retractionwatch.wordpress.com/2013/09/26/dental-journal-pulls-paper-for-duplicate-publication/]	*Contemporary Clinical Dentistry* has yanked a 2012 article on 'full-mouth rehabilitation' after learning that the article had already appeared in two other publications. The article came from a group at the Dr R. Ahmed Dental College, Kolkata, India.
Chutzpah: Authors blame *PLoS ONE* for failing to find plagiarism in a paper on *Botulinum* toxin [http://retractionwatch.wordpress.com/2013/09/25/chutzpah-authors-blame-plos-one-for-failing-to-find-plagiarism-in-paper-on-botulinum-toxin/]	A team of researchers in India has retracted their 2012 paper in *PLoS ONE* on *Botulinum* toxin for plagiarism, while blaming the journal for failing to use its 'software' to catch the same. The article was written by a group from the Defense Research and Development Establishment, Madhya Pradesh, India.
That'll do it: Physics paper retracted for a 'pattern that is unphysical' [http://retractionwatch.wordpress.com/2013/09/18/thatll-do-it-physics-paper-retracted-for-a-pattern-that-is-unphysical/]	A physics paper was retracted because some of the data were fabricated and were 'unphysical'. The paper was published in April 2011 in the *Journal of Physics D: Applied Physics*. Authors are from India and Brazil.
The one that got away: plagiarism cuts line on fish stock paper [http://retractionwatch.wordpress.com/2013/09/09/the-one-that-got-away-plagiarism-cuts-line-on-fish-stock-paper/]	A pair of researchers in India has lost a paper in *Reviews in Fish Biology and Fisheries* for lifting chunks of text from other sources. The article was published by scientists at the NBFGR, Lucknow, India.
Paper on over-the-counter drugs goes over the line in borrowing text [http://retractionwatch.wordpress.com/2013/09/09/paper-on-over-the-counter-drugs-goes-over-the-line-in-borrowing-text/]	The journal *Clinical Research and Regulatory Affairs* has retracted a 2012 article on over-the-counter drugs by a trio of pharmacy researchers in India who decided to 'reproduce content to a high degree of similarity' from other sources.
When two words colloid: 'copied and manipulated' figures prompt retraction of nanoparticle paper [http://retractionwatch.wordpress.com/2013/09/05/when-two-words-colloid-copied-and-manipulated-figures-prompt-retraction-of-nanoparticle-paper/]	The journal *Colloids and Surfaces B: Biointerfaces* has retracted a 2011 paper by a group of researchers who misappropriated and manipulated a pair of images from a previously published article by other scientists. The paper was written by authors from various institutions in Tamil Nadu, India.
Figure error forces retraction of transgenic chickpea paper [http://retractionwatch.wordpress.com/2013/08/29/figure-error-forces-retraction-of-transgenic-chickpea-paper/]	Chickpea, one of the world's most promising cash crops was the subject of genetic manipulation. The group of scientists botched what evidently was a key element of a figure in their 2011 paper in *Plant Cell Reports* (*PCR*). The article was published by researchers at NBRI, Lucknow, India.
Retraction notice for cancer paper gives wide berth to the 'p' word [http://retractionwatch.wordpress.com/2013/07/29/retraction-notice-for-cancer-paper-gives-wide-berth-to-the-p-word/]	The *Journal of Neuro-Oncology* has retracted a 2009 article on brain tumours for what is clearly plagiarism. The article was published by a group at the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, India.
'Administrative error on the part of the author' that led to duplicated text prompts retraction [http://retractionwatch.wordpress.com/2013/07/18/administrative-error-on-the-part-of-the-author-that-led-to-duplicated-text-prompts-retraction/]	The paper was published from the Management Development Institute, Gurgaon, India and retracted by citing an administrative error for 'use of text from author's previously published articles in a new paper'.
'Clear case of plagiarism' forces retraction of chemistry paper [http://retractionwatch.wordpress.com/2013/07/08/clear-case-of-plagiarism-forces-retraction-of-chemistry-paper/]	The *Journal of Chemical Sciences*, a journal of the Indian Academy of Sciences, has retracted a 2012 paper by a group of researchers in India and South Korea who stole material (and a lot of it) from a 2009 article for their reactant.
Forbidden fruit: apple pomace paper retracted for plagiarism [http://retractionwatch.wordpress.com/2013/06/13/forbidden-fruit-apple-pomace-paper-retracted-for-plagiarism/]	The journal *Food and Bioproducts Processing* has retracted a 2012 article on apple pomace – the remnants of a pressed fruit – by a group from India for plagiarism.
Figure misuse leads to retraction of wound healing paper [http://retractionwatch.wordpress.com/2013/06/05/figure-misuse-leads-to-retraction-of-wound-healing-paper/]	A group of researchers from India and China has lost a 2012 article in the *Biochemical Engineering Journal* for lifting a figure from a previously published article from another team of investigators.

(*Contd*)

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Title [URL for the source at Retraction Watch]	Remarks based on the blog statements
Paper on partially entangled states retracted for partially entangling authors [http://retractionwatch.wordpress.com/2013/05/21/paper-on-partially-entangled-states-retracted-for-partially-entangling-authors/]	A paper on partially entangled states seems to have fallen victim to a confusing entanglement of authors and studies. The paper was authored by researchers at Jodhpur and Kolkata, India.
Nanotech researcher S. K. Sahoo notches fifth retraction [http://retractionwatch.wordpress.com/2013/05/15/nanotech-researcher-sk-sahoo-notches-fifth-retraction/]	Nanotech researcher S. K. Sahoo who lost four papers in February 2013 from *Acta Biomaterialia* for what the journal called 'highly unethical practices', has actually retracted a fifth paper also from that journal.

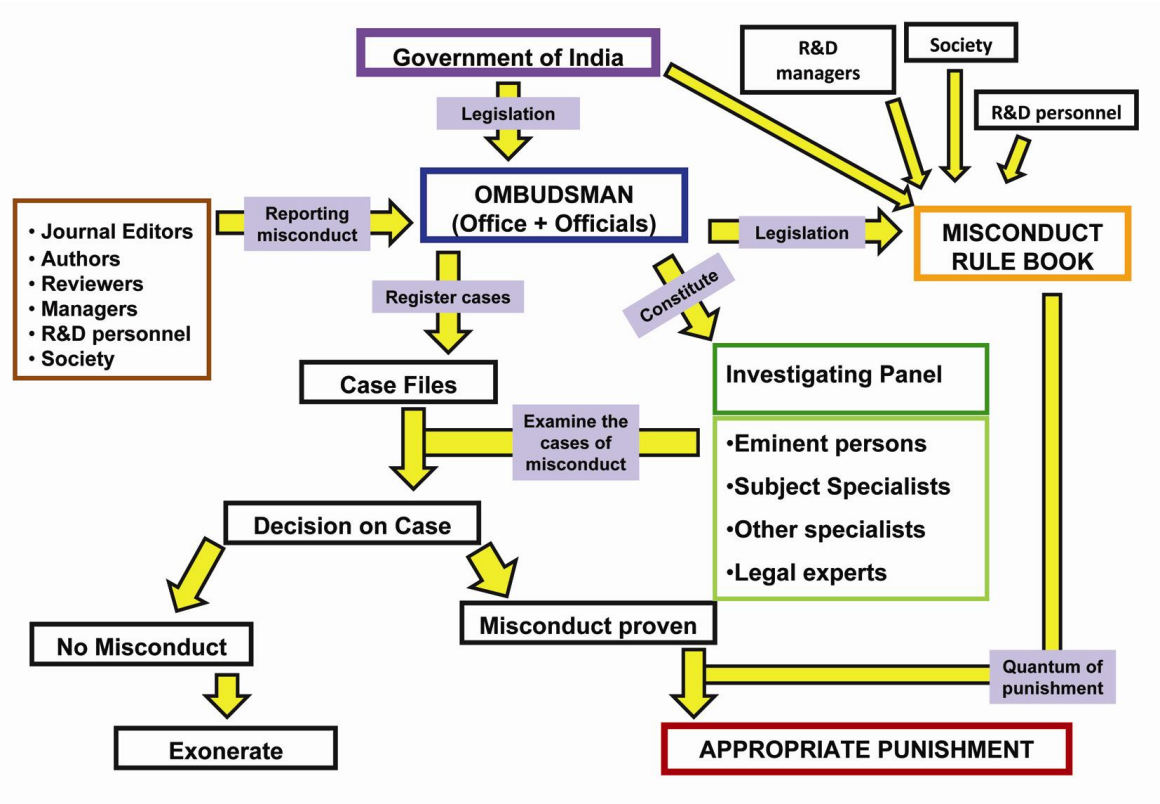

Figure 1. Schematic representation of logical sequence of actions and inputs among and between the various stakeholders to deal with misconduct. Arrows depict directions of inputs and/or actions to be taken.

punishment as mandated by the rule book. Figure 1 depicts in a schematic manner, the logical sequence of actions and inputs including formulation of a rule book and investigation panel to act on misconducts. These scenarios are far removed from the one that is extant, where the process of identifying misconduct and tracking it to its logical conclusion is at best a serendipitous one, more heavily dependent on 'whistle-blowing' or 'falling out among the R&D teams' that allows one party to blame the other. The call for fraud investigations also emanates from the seriously deprived and disgruntled elements in the R&D firmament of the country with or without collusion or coercion from the governing officials and the implicit or explicit 'power' or 'clout' available with the perpetrators. No wonder then that several offences go unpunished, while several others are accorded token punishment and a small minority is rather heavily punished. There are well-known instances where the competent authority in connivance with the offenders overruled the punishment recommended by the disciplinary committees and made the whole exercise a matter of ridicule. So the entire cycle of misconduct continues merrily all over and though the perpetrators are a small minority in number, they impact the majority. Thus far, we have mostly discussed publication-related misconduct. If other forms of misconduct such as management and abuse of power, financial and administrative malpractices are also considered, it is easy to comprehend the magnitude of the

problem of misconduct in scientific R&D. This makes it all the more imperative that there be established an ombudsman in India to deal with such misconduct sooner than later. This will also ensure that transparency, honesty and ethical behaviour are the norms and not the exceptions. Very truly, 'honesty or ethics is about what one does when no one is watching'.

We strongly feel that full realization of the potential of S&T R&D in India would require liberation from entrenched feudalism and strong-arm tactics, both of which constitute substantial parts of misconduct (besides what has been outlined/defined above) and are also the two major stumbling blocks in the Indian context. While envisaging any India-centric system to deal with misconduct(s), we have to be more original than others, for the simple reason that the nations with high standards of S&T R&D have done away with such stumbling blocks more than 200 years ago. Thus the complexities in our context are high, but an honest effort can deliver us a ombudsman system which will liberate the energy lost due to system fault and will have great impact on overall productivity and tangible output in S&T R&D. An ethical and an honest S&T R&D work culture is a critical requirement of the most functional and efficient work habitat for a scientist in the country[14]. Misconduct contributes to degradation of this habitat, making it more conducive to further misconduct as a vicious cycle, that seems to be perpetual. The ombudsman is perhaps the best solution to identifying, penalizing and ultimately and more importantly, deterring misconduct in S&T R&D in the country, thereby breaking this vicious cycle.

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