

Them as has, gits: even more goodies for prize winners?

Judging by his reaction to recent reports of fraud and plagiarism in a number of international science journals, Balaram¹ of the Indian Institute of Science, Bangalore, would appear to be a firm believer in the theory that money is the root of all evil. Or at least in the theory that money, like power, corrupts. As it happens, rather a lot of money is now being offered by the Government of India to any Indian scientist who wins a Bhatnagar Prize or is elected to two national science academies – a monthly bonus of Rs 15,000 to be precise, a sum that works out to a total of Rs 36 lakhs over the 20 or so years that constitute the typical professional life of such an awardee. Balaram believes that this bonus, being so seductively large, would only encourage greed and cupidity, and lead to the kind of unsavoury conduct that is now being seen in the practice of science. He and two of his IISc colleagues, Sen and Ramasesha² (BSR) have called for the bonus to be withdrawn.

Thirty-six lakhs of rupees does seem an inordinately large sum of money; it certainly would to a 'sarkari' scientist, whose sense of scale is naturally diminished by the niggardly pay he has been getting all his life. But it is nowhere near as large as the Rs 500 lakhs that the Nobel Prize is worth, and that the lucky recipient gets at one go, with no strings attached. So why are BSR not similarly agitated by the prospect of someone walking away with that kind of cash? Perhaps it is because Indians have not yet become regular winners. Or perhaps it is because the selection process for this award (and others like it) is seen as being so much more fair, and much less subject to whimsy, or caprice, or the shrewd self-promotion of a potential awardee. If that is not the case with the Bhatnagars and the Academy fellowships (and it is common knowledge that there have been some egregiously bad decisions about

award winners in the last couple of years), the problem would seem to lie, not with the award itself or the new bonus that goes with it, but with the selectors, some of whom, as is also widely known, wield a degree of influence in the decision making process that is in inverse proportion to their ability to make sound, dispassionate judgements. So get rid of them, instead of the bonuses, which to my mind are a legitimate incentive to productive work, and not necessarily an open invitation to chicanery. Yes, of course, the bonuses will sometimes cause internecine bickering, as Sen and Ramasesha suggest, but it is unlikely that getting rid of them will transform our traditionally fractious scientific community overnight into paragons of civility and good behaviour. Yes, the bonuses will not go to everybody, and some worthy souls are going to be passed over, but any system that tries to recognize merit is going to seem inequitable – especially to those not recognized. And that objection certainly has not stopped the Swedish Academy from handing out Nobels every year to only a minuscule number of the many candidates from around the world whose work could easily be argued to be just as deserving. Yes, the bonuses will sometimes go to people who decide not to do a lick of work thereafter, or who decide to use the money to finance their holidays in the Seychelles. So let them. If they have proved their worth, why begrudge them the fruits of their labour? And, yes, there may be other ways to recognize such labour, including the award of fast-track research grants, or funds for the upkeep of equipment, or money to hire personnel. Well, introduce them too, and any other scheme that might lead to productive research activity.

BSR do not actually discount the importance of a system of rewards and honours in the way science is carried out

now. It is all that cash they do not like. And as Balaram points out, scientists should not expect to be given handouts for what they do anyway; they should be sustained in their efforts solely by love of the truth (in much the same way that hockey players, as one sports secretary suggested, should play solely for love of the nation). Many scientists do work for the sheer pleasure of uncovering nature's secrets, but I doubt there are many (the name Grigori Perelman comes to mind) who would prefer the pursuit of truth to carry no personal cash rewards at all. Which scientist believes that the Nobel Prize would have the same cachet if all it came with was a pat on the back by some effete European monarch? I doubt that even BSR – their implied disdain for money notwithstanding – would turn down a Nobel Prize if it were ever awarded to them, on the grounds that it was just too much money for one individual, and that accepting it would only tempt their fellow countrymen to use fraudulent means to try and get a piece of it themselves.

It is a measure of the esteem in which we hold scientists that the mere thought of giving them a piffling amount of pocket money should provoke Calvinist indignation. I only hope that BSR's views represent a minority position that will be quietly ignored.

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Mature coconut as a bio-fermentor

The role of the rhizosphere microbiota in plant growth promotion has received increasing attention¹⁻³. Plant growth-promoting rhizobacteria (PGPR, including both free-living and symbiotic bacte-

ria) are bacteria typically found in soil, which can facilitate the growth and development of plants both directly and indirectly^{1,4}. Indirect promotion of plant growth occurs when these bacteria confer

disease or stress resistance; on the other hand, bacteria can directly promote plant growth by providing the plant with a compound synthesized by the bacterium or by facilitating the uptake of nutrients

from the soil. Thus, PGPR can directly facilitate the proliferation of plant growth by fixing atmospheric nitrogen. The production of plant growth regulators (PGR) has been suggested as one of the mechanisms, by which PGPR stimulate plant growth.

Anith⁵ has developed a cost-effective and layman-friendly method to multiply PGPR using coconut water (CW). *Pseudomonas* sp. and *Bacillus pumilus* can multiply to the level of 10^8 cfu ml⁻¹ in CW within 24 h. Moreover, when compared to treatments using CW alone or bacterial cultures grown in artificial media, the treatment of black pepper cuttings using bacterial cultures grown in CW had the best root initiation effect and produced the highest number of roots under soil conditions⁵. CW contains only a small amount of auxins⁶; therefore, this enhancement of root formation could be due to the extra auxins provided by the bacteria growing in the CW.

CW is a useful medium for enhancing plant growth^{7,8}. It is the liquid endosperm of coconut fruit which contains a myriad of chemical compounds, including PGR⁸. CW is known to induce plant growth in tissue culture and is frequently used as a growth supplement in plant tissue culture media due to its rich content of nutrients and plant growth regulators. One way to enhance the effect of CW is to complement it with PGPR. Studies have been carried out indicating that PGPR can be used to increase crop yields^{9,10}. Proposed mechanisms for plant growth promotion by PGPR include bacterial synthesis of the plant hormones

(auxins, cytokinins and gibberellins); breakdown of plant-produced ethylene by bacterial production of 1-aminocyclopropane-1-carboxylate (ACC) deaminase; and increased mineral and nitrogen availability^{11,12}.

There is already a significant pool of nutrients and phytohormones in CW⁸. There are two purposes for the addition of the bacteria into CW: one is the *de novo* synthesis of PGR by the bacteria *per se*; second is the conversion of existing PGR present in CW into a potentially more active form. The next logical step is to find out the active compounds by using different mass spectrometries, such as LC-MS and CE-MS^{6,13,14}, to fully understand the growth-promoting properties of the biochemicals produced by the bacteria in combination with CW as reported by Anith⁵. It will be interesting to see the types of biochemicals produced by the various treatments of CW as described by Anith, and especially the media containing CW and bacteria. It is noteworthy that this treatment gave the highest growth enhancement.

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R&D projects database

It was interesting to read a note on 'Directory of publicly funded research projects' by K. Gopalan¹. He has highlighted the need for bringing out an annual directory of research projects in various disciplines being funded by various scientific departments/agencies of the Government of India that may be made available on a website. He has suggested that such a directory may incorporate information related to investigators, overall objectives, brief summary of the progress made during the previous year, projected work to be accomplished in the

coming year and any relevant publication emanating from the said funded project. It may be mentioned that the National Science and Technology Management Information System (NSTMIS) Programme of the DST already has R&D projects database wherein a directory of extramural R&D projects funded by the selected central government agencies/departments is available (www.dst.org). This database incorporates information related to the funding organization, project title, project investigator, department, institute's name and address,

amount in rupees and duration in months. So, initial information on the R&D projects is available, which is useful to the interested scientists, particularly the young researchers/scientists in various disciplines.

It is true that a lot of important data is available in the annual reports and project completion reports submitted by PIs of various projects to the concerned departments. In my personal experience, being associated with funding of the R&D projects in earth sciences in the DST, for more than two decades, it has