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CORRESPONDENCE

What ails our universities

This has reference to 'What ails Indian academics' by P. Narayanan which appeared in *Current Science*, 1993, **65**, 442, and many more on similar topics published earlier. There appears to be a widespread notion that the main reason for the slump in our academic field is inadequate funding. This is not wholly correct in the case of our Universities. It is necessary on the part of our academicians and academic administrators to introspect whether the funds are properly utilized. Some of the reasons for decline in academic standards and total lack of/insignificant research contribution by our Universities are:

Inbreeding. Inbreeding is the absorption of students from the same University (department), most often favourites of those wielding power. This necessitates a compromise on what the University department wants for its teaching/research requirements and for its development; also what best is available from outside (the University) Sometimes this favouritism discriminates even the best candidate from the same department. This on the one hand deprives the students of good teachers and on the other confuses the minds of young and enthusiastic researchers about the utility of doing quality research and leads to frustration in the minds of those who are genuine and a tendency for sycophancy among opportunists.

The reasons for inbreeding are caste, regional and gender bias as well as political influence

Inbreeding (literal sense) in any population results in genetic depression. This is true in case of many of our universities.

At times influential persons in different universities indulge in mutual exchange of students. This has developed as a result of widespread (covert) condemnation of inbreeding. This also has the same disadvantages of true inbreeding The only benefit (for those who practise it) is that obvious inbreeding is circumvent.

Lack of strict norms for the selection of teachers. Either there are no strict norms for selection of teachers in the universities or such norms are not followed resulting in loopholes for malpractices. This is true specially in the case of giving weightage to research achievements/experience as evidenced by patents/publications. Abstract of qualifications filled in by the candidates (appearing for teaching posts in universities) themselves should be collected and sent to UGC for verification. In all cases where *prima facie* malpractices are suspected an inquiry should be conducted.

Lack of training for teachers of higher education. In our education system teacher's training is required only up to the +2 level (M.A., M.Sc., M Com. + B. Ed.). For teachers beyond the +2 level M.A., M.Sc. or M Com. alone is sufficient. Provision for appropriate teacher's training for teachers of senior college is necessary.

Improper management of higher education. We have central civil services (IAS, IFS, IPS, etc) for management of administration in different sectors. For these the Union Public Service Commission conducts a competitive examination to select bright young men and women and those selected are given training for proper management of different departments/institutions. But there is no such system in the academic field where persons who do not have any experience or training in administration/management are entrusted with the responsibility of running huge institutions. Starting an Indian Education Service (IES) on the same lines as other civil services will be a right step in streamlining the administration/management of academic institutions.

National level test for lecturers. The present UGC/CSIR National Entrance Test for qualifying for lecturership (the same for Junior Research Fellowship is not included) does not serve any purpose since it is not compulsory/necessary that these candidates be selected. UGC must make selection of candidates who have passed the test, whenever they are available, compulsory.

Political interference. Most Universities are run in a democratic system where there is an elected senate and a syndicate/executive council. This system has both positive and negative sides. There must be a proper check on misuse of power. Moreover, under many universities, capitation fee professional colleges are mushrooming. This is becoming a lucrative business. Corruption is widespread in giving affiliation/recognition at the behest of external political influence. This needs to be minimized/totally eliminated

There may be many more points which can be added to this list by more experienced persons It is not implied that all our Universities suffer from the above ailments It is also not intended to make any generalization. These are

some observations of the author, which are felt to be not very rare, on discussion with many persons in the academic field

MRS. S. JOHN

Shibu Nivas, Sagar Park
S No 46 9, Nagar Road
Pune 411 014, India

Split second and Olympics

Jha[1] points out an error of magnitude ~20 ms (originating from differential arrival time of starting signal at extreme lanes), which is twice as large as the resolving time (10 ms) used to determine winners in modern competitive international athletics. This, however, is only the tip of the iceberg. Much larger uncertainties due to athletes' differential response to stimuli used for starting the events should form the basis of a more serious objection to deciding winners with 10 ms (or perhaps better, in future) resolution. The magnitude of such an uncertainty in the case of a sound-based stimulus, such as pistol firing, can be as large as a few hundred milliseconds[2].

Furthermore, while the error reported by Jha[1] can be rectified by using a light-based starting signal instead, the differential response to visual stimulus, whose magnitude can be of the order of a few tens to hundreds of milliseconds[3], would still give rise to large uncertainties. Therefore, assuming that the winner of a 100-metres dash be decided solely by competitors' relative ability to run, new means of correcting for this uncertainty should be devised.

1. Jha, R., *Nature*, 1993, 365, 398
2. Aird, E. G. A., in *Introduction to Medical Physics*, William Heinemann Medical Books, London, 1975.
3. Shickman, G. M., in *Adler's Physiology of the Eye* (ed Moses, R A), The C. V Mosby Company, Saint Louis, 1975.

PARASHU R. UNIYAL
RAJENDRA P. DOBHAL

MP Council of Science & Technology
159 Zone I, MP Nagar,
Bhopal 462 011, India

SCIENTIFIC CORRESPONDENCE

DNA-binding monitoring made easy

Binding of molecules on deoxyribonucleic acid (DNA) has been a subject of active interest[1]. Understanding the mechanism of such processes helps in gaining insight into the mutagenic, carcinogenic, tumorogenic and antineoplastic properties of different compounds[2]. The modes of binding involve electrostatic, hydrophobic, intercalative and groove-oriented processes.

Various methods are used to locate the molecule on the DNA[1]. Here, we describe a novel procedure to test the binding of fluorophore-bearing molecules on DNA. The compound is incubated with DNA and treated with cetyl trimethyl ammonium bromide (CTAB). DNA forms a 1.1 insoluble complex with CTAB[3]. The precipitated DNA-CTAB complex is insoluble in water and only sparingly soluble in most of the common solvents. But, this can be readily dissolved in sodium dodecyl sulphate (SDS) micelles. If the test compound is capable of binding with DNA, it will be trapped within the DNA structure before precipitation. The DNA-compound-CTAB complex solubilized in SDS will give the characteristic fluorescence emission spectrum of the compound. *Such a signature of the compound detected in the precipitated complex provides a direct evidence for its interaction with DNA.* To ensure that no unbound material adheres to the solid complex, the precipitate is washed with aqueous buffer.

Many aromatic compounds known to bind on DNA possess an emission spectrum. Change in fluorescence intensity of the compound alone cannot be taken as a conclusive proof for its binding since either increase or decrease in intensity has been observed with different compounds. The DNA-CTAB complex has been shown to retain its structural integrity in the solubilized form in SDS[3]. Thus, the drug or ligand molecule will also be retained in the precipitated complex.

The above method has been demonstrated for the first time by us in the dye ethidium bromide which is known to intercalate efficiently with DNA as shown in several studies[4]. The precipitated complex on centrifugation was visibly coloured red indicating the presence of the dye within DNA. Fluorescence spectrum of the dye could be detected in SDS solution of the complex. Conversely, a non-binding compound will not produce its spectrum in the solubilized complex. However, shifts in fluorescence maximum and reduction in intensity are generally observed. Furthermore, in principle, any other spectroscopic property of the molecule may be used to identify its presence in the complex.

Here we describe the details of the experimental methodology for the intercalating compound, ethidium bromide. In a typical experiment with ethidium bromide, 100 µg salmon testis DNA (Sigma Chemical Co., St. Louis, MO, USA) was incubated at ambient conditions with 10.0 nMol of ethidium bromide in 1.0 ml TE buffer (0.01 M Tris-HCl, 0.001 M EDTA, pH 8 0). After 10 min incubation, 90 µmol of CTAB (dissolved in 0.3 ml TE) was added[3]. The precipitated DNA–ethidium bromide–CTAB complex was collected and dissolved in 1.0 ml of 0.01 M SDS. The fluorescence emission spectrum of the solution was studied in a Hitachi F4010 fluorescence spectrophotometer at an