

CURRENT SCIENCE

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CORRESPONDENCE

Rejuvenating Indian science

It is heartening to note that our scientific community is becoming more vocal in their demand for more financial as well as attitudinal support for science from the government. There can be no serious argument about science and technology being the foundation for a modern progressive state. In fact a poor and illiterate country like ours should allocate a larger share of its resources to education, science and technology (EST) than a developed nation where the infrastructure in EST is already well established.

But more money, howsoever essential, does not necessarily mean better science and technology. Our scientists (I include technologists also in this term) and educationists are also in need of major changes in the manner in which they conduct science education and professional practice of science in this country. Since it is rather late in the day to change the present generation, we must give serious thought to the way we bring up our next generation of scientists. It serves no purpose to invest hard-bargained-for money in our research laboratories and universities if we do not at the same time plan to produce the right kind of minds to man/woman these places.

The present scenario of science education in our country is alarming. At the school level, it is just rote learning that has gone to the incredible extent that, for instance, the mathematics paper at a public examination has to consist solely of problems in the textbook reproduced verbatim. Any change even in the numerals leads to cries of the paper being out of syllabus or too hard. The badly written and insipid textbooks have numerous errors, but these errors howsoever absurd, must be reproduced

as such by students in their answer papers since any deviation from the holy text is not tolerated. To talk of encouraging curiosity and originality in the students is meaningless in such a context.

It is surprising that despite this, a few very bright students with keen interest to do higher studies in science do occasionally come out of our schools. But these children, who should be the most valued treasure of a modern nation, have really no place to go. The sorry state of undergraduate science in this country, with ill-equipped laboratories, non-existent libraries and unmotivated and uninspiring teachers should deter even the most enthusiastic student. The curriculum and examination system in most universities are really archaic and it is one of the principal causes of the leakage of question papers, copying and cheating at exams, marks manipulations by bribed teachers, clerks and university officers. Such shameful practices have become the hallmark of our universities. Add to this the gloomy prospect of employment for a science graduate. Any caring parent would naturally persuade the child to go in for a 'professional' course such as engineering or medicine, even by paying lakhs of rupees as 'capitation fees'—a euphemism for the market price of a degree. Failing these options, he may reluctantly go for a degree in science as a last resort with the intention of hopefully making it to the lucrative administrative services or a banking job afterwards.

Obviously science is thus at the bottom of the priorities of the young. It gets reflected in the attitude of the policy makers also; for instance, newspapers recently reported that the Tamil

Nadu Government is planning to scrap all pure science courses in the universities under it! The large number of science graduates at present is a reflection of the growing number of students who could not do anything else, and it is certainly not an indication of heightened scientific temper in the country. Without realizing that the knowledge that these graduates have acquired is so abysmally low and cannot be put to any productive use, we gleefully count their number and take pride as a nation having the third largest scientific manpower. It escapes us that it is a shocking waste of scarce national resources, if not a national shame, to produce such a large number of science graduates who really have no aptitude for science and who have strayed into science due to other compulsions. Our science planners and policy makers should think hard about the quality of the human resources we are supposed to be developing.

A further filtering away of talents to other avenues takes place at the post-graduate level, where the infrastructure, both physical and intellectual, is not significantly better than that at the undergraduate level. At the end of this process, we have a tired, disinterested young man turning to research, his youthful exuberance, curiosity and creativity all having been successfully stifled on the way. For him, his guru has, to quote Richard Feynmann, 'to suggest a problem and suggest a method for its solution and feel responsible after the student is unable to work out the problem by the suggested method by the time his wife is going to have a baby...'. His guru being typically a product of the same system, probably the two would get along well and a Ph D would be 'produced'—a term that

aptly describes the process. It does not need much imagination to see that no great science can be done this way. And indeed nothing noteworthy gets done. Many have lamented, even in these columns, the poor quality of our scientific journals. The reason for it is, in my opinion, very obvious. The quality of your scientific journals cannot be better than the quality of the science you do.

The big casualty in this scheme of things is the self-confidence and dignity of the young man. Having managed to reduce him to a virtual automaton through these years of harmful education, we constantly din into him his worthlessness in comparison to scientists abroad. His papers are not good unless published in foreign journals. His thesis must be approved by a foreign examiner. His qualification for a job in this country is often judged on the basis of the number of years he has spent outside this country. In effect, we tell him that the journals of his country are worthless, his peers in this country are not worthy of judging even his doctoral thesis and he himself does not amount to much if he has never left his native Orient. This tacit colonial acceptance in science of what Edward said calls

Orientalism in a more general context, is passed on from generation to generation of our scientists. I am not calling for 'nationalistic' or 'patriotic' science or for international contacts among scientists. Science is truly international. But it is the content of science that is universal. The content should not be confused with the act of doing science. One practices science in a local socio-cultural environment. That environment has to be conducive to spotting young talent in science, nurturing it and instilling confidence in the young mind to question authority and to be creative. We have failed in creating such an environment.

These are rambling, but agonizing thoughts on the problems of science education in our country. Solutions? There are no easy ones. It is not easy to salvage a system that has been run to the ground through decades of unplanned apathy and neglect. But we cannot afford to abandon hopes. The practising scientists and educationists can do a lot even without much assistance from the politicians and bureaucrats, and in spite of them. Maybe we could try and start in selected schools and colleges special courses for the extraordinarily talented kids. Maybe we could devise assessment

procedures that would measure their creative abilities instead of turning them into cheaters, copiers, bribers or other kind of moral wrecks. Maybe we could persuade our top scientists or fellows of academies, some of whom are great communicators too, to write books for them and even perhaps teach and work with them occasionally. Maybe we could produce a few nuclei of excellence in science teaching through which we could persuade our youngsters that it is still possible to do exciting science in this country. Maybe we could establish a few Indian Institutes of Science specializing in science teaching at undergraduate and postgraduate levels, in addition to doing scientific research, as the IITs do in Engineering. Maybe we could change our assessment, recruitment and recognition procedures to make our youngsters feel that a scientist's lot will not remain for ever that of a second class citizen in a 'third world' country. Maybe these are matters worth thinking about.

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SCIENTIFIC CORRESPONDENCE

Pathogenesis of anovulation in hypothyroidism

Guin *et al.*¹ fill the gap in our understanding of ovarian dysfunction in thyroid deficiency.

Human thyroid deficiency is widely prevalent, and, in some parts of our country, forms the most common of all thyroid disorders².

Clinical studies in women have shown that hypothyroidism can present solely or principally with reproductive dysfunction such as polycystic ovary syndrome (PCOS)^{3,4}.

Normally, coordinated release of hypothalamic-pituitary hormones acts on the ovaries to stimulate ovarian follicular development and hormonal secretion. Ovarian hormones prepare the inner

lining of the uterus to support the conceptus, should the egg and spermatozoan fuse in the uterus. Ovulation is the name given to this orderly cyclic release of the egg from the ovarian follicle for possible conception.

When an ovum is not released, the cycle is termed anovulatory. Anovulation is the central 'non-event' of the PCOS, which is characterized in addition, by hyperandrogenism and altered ratio of pituitary gonadotropins.

Deficiency of progesterone, one of the ovarian hormones, can cause anovulation in hypothyroidism⁵. The progesterone insufficiency has been attributed to deficient luteinizing hormone

secreted from the pituitary. Guin *et al.*¹ have shown that thyroid hormone directly stimulates progesterone secretion from the ovary, independent of pituitary gonadotropic hormones. It seems possible, therefore, that a deficiency of thyroid hormone could lead to insufficient progesterone, and resultant anovulation. If this can be shown to occur in humans, we would be a step closer to understanding the complex relation between the thyroid and the reproductive system.

1. Guin, S., Bandyopadhyay, Jana N. R. and Bhattacharya, S., *Curr. Sci.*, 1993, **64**, 327-329.