SOME THOUGHTS ON SCIENTIFIC JOURNALS IN INDIA†

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TO any one who surveys the quality of scientific publications produced in the country, the position would certainly appear to be bleak. However, this need not lead to total pessimism as there are still a few journals in India which must be considered good by any standard of assessment. The question, therefore, is not whether one can produce a good scientific journal in India, but what is it that has made the vast majority of them so bad. One reason could be that the science we produce in India is bad—for as Professor Raman often said, the quality of any scientific journal in India can never be better than the quality of the science we produce in the country. It is true that the quality of the science we produce is, by no means, of the highest order. But our journals are much worse than the science we produce.

In this talk, it is not my intention to deal with statistics, since this will be done by many speakers participating in this symposium. I shall share with you some of my views as to the possible reasons for our predicament. I believe strongly that it is linked closely to the behavioural patterns and motivations of our scientists—the younger ones who are the main source for scientific publications, and the older ones who rule the roost. I shall also try to suggest some solutions, however inadequate they may be.

In the last few years, a few thousand scientific papers have passed through my office, in my capacity as editor of *Pramana* and the *Proceedings of the Indian Academy of Sciences. Current Science* is also edited and published from the same office as these journals. During this period, we have had to write thousands of letters, both to authors and to referees. As you can imagine, we have received a similar number of letters from both the above categories which were sometimes laudatory, but more often than not rather violent. They have dealt with the quality of refereeing, the promptness (or the lack of it) in bringing out publications, mistakes in printing, the quality of production and not least my abilities as editor. The experience I have gained is what I want to share with you today. But first it may be useful to recall briefly the history of scientific publications in India for the lessons it might have for us.

THE EARLIER INDIAN JOURNALS AND THEIR METHOD

The publishing of scientific papers in India may be said to have begun in earnest in the early part of this century. The twenties and the thirties were the glorious and exciting periods in the history of Indian science and perhaps the only period when it made a definite impact on the rest of the world. Most of the scientists of that era were extreme individualists; they were also ardent nationalists. They took upon themselves, consciously or otherwise, the task of proving to the world that India was a land of intellectual creativity; they did this and succeded in putting India on the map of world science. The pattern they set may be summarised as follows:

(a) They established scientific journals in

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India which appeared *punctually* and which ensured prompt publication.

(b) The texture of the paper or the quality of the printing, were not matters of prime concern for them; *however, the quality of the science they published was.*

(c) They published their scientific papers in their own journals to establish priority.

(d) They invariably sent short communications to reputed scientific journals abroad to achieve the required publicity.

(e) The quality of the work and the references made in foreign journals to Indian counterparts gave to the latter, a standing and a reputation so good that most scientific laboratories in the world subscribed to journals like the *Indian Journal of Physics, the Proceedings of Indian Academy of Sciences, Current Science or Sankhya.*

As an example of the last point I might mention that immediately after the publication of the classical papers by Raman and Nath on the theory of diffraction of light by ultrasonic waves, the circulation of the *Proceedings* shot up considerably.

The Decay of Indian Scientific Journals

The direction of science in India took a new turn in the years following the war and national independence. It was during this period, that the structure of scientific activity in India altered beyond recognition. Vast investments were made in the name of science in India. It was felt that research in pure science, even if prestigious, would do little to solve the myriad problems faced by a nation like ours. It was, therefore, decided to start intense activity in applied science and steps were accordingly taken.

One consequence of this was that large numbers of very young students were sent abroad to get scientific training. This investment in applied science ushered in an era of imitative technology which was considered by many to be essential for the growth of an underdeveloped or developing country. This did possibly help the country to grow industrially. There is a view that this growth was more due to the import of foreign know-how and foreign collaboration. In any case, it must be noted that very few innovations or inventions were made even in the fields of applied science and technology. They made no impression whatsoever on the rest of the world.

Let me digress a little. In recent years, there has been a tremendous interest in the application of science to rural problems. This is all to the good and it is what Gandhi wished for and propagated. It must, however, be recognised that other than in a few exceptional places, very few new ideas have been generated indigenously. Many so-called developments even in this field are based on ideas created elsewhere. This by itself may not sound alarming but it can have very dangerous overtones.

It may be argued that the purpose of encouraging the applications of science, be it to rural areas or for the country as a whole, is not so much to promote originality, as to ameliorate the living conditions of the people. Even so, it is a sad commentary that in spite of so much investment and promotion very few original ideas have come forth.

Let us now turn to the effect, this commitment to applied science has had on pure science and on scientific publications. As I said before, a large number of young scientists were sent abroad to get trained. When they came back, they followed the patterns and trod the paths laid down by their Ph. D. supervisors in the West. While they did carry out genuine research they were by no means pace-setters; they were not creators of new movements as our earlier scientists were but rather the followers of fashions set in other places. Not surprisingly, they preferred to publish in the

scientific journals of the West where their work naturally found its place. It is the Indian scientists who blaze new trails who really need their own journals to guarantee the priority and recognition that quick publication will provide.

There were also other rather disconcerting effects. Those who succeeded in this imitative technology were naturally placed in positions of power both within organisations and in the national scene. Whatever their usefulness in other ways, their judgement and assessment of originality or creativity were, understandably, not of the highest order.

The era of imitative applied science induced much imitation in pure science as well, with very similar effects. All this had a deleterious effect on Indian scientific journals. There can be no doubt that except in a few cases, the quality of Indian journals deteriorated since independence, reaching an all time low in the late 60s and the early 70s. Over these years, the number of scientific journals increased steadily but their quality was mediocre or worse.

THE MOTIVATIONS FOR PUBLISHING

Having discussed the rise and fall of the quality of scientific journalism in India, we shall now examine why a young scientist in India would like to publish his scientific work.

(a) The immediate concern of any young scientist brought up in the tradition of modern science is to get priority and credit for an idea that he has generated.
(b) He would like to get a fair assessment of his work by his peers, get recognition and reputation amongst his scientific contemporaries.
(c) He would like to obtain professional advancement.

Let us examine the state of affairs that exists in relation to these motivations.

Most Indian journals are not punctual, and there is a considerable delay (sometimes of years!) between the acceptance of a paper and its publication negating all the basic concepts of priority.

A scientist has a greater chance of recognition in the world of science if he publishes in a scientific journal outside India. The standards of assessment in many foreign journals are superior to ours. And so, a scientist gets a much better assessment of his work, if he sends his work to a foreign journal. Because of the vestigial state of our peer system of assessment, a good scientist usually gets recognition in India *only* after he gains a reputation abroad. One can therefore understand the motivation of a young scientist to get peer recognition first abroad by publishing there.

Finally, it is fairly well known that professional advancement of a scientist in India can be obtained by processes other than by doing good science or by publishing good quality scientific papers!

THE COURSE OF ACTION

One could, of course, take the stand that these personal motivations of our young scientists are based on false premises. But I feel that it would be difficult to change these attitudes even if they are wrong. The experience in many countries including China supports this.

One drastic suggestion to alter the situation is to have a dictum compelling all Indians to publish only in Indian journals. I discussed this proposition with some of my younger colleagues who were creative scientists and who were truly concerned with the quality of scientific publications in India. While they were not very much in favour of such a dictum, one said this may have a salutary effect if all scientists in high and low positions were to publish in India. Said he "if the transport commissioner has to travel by bus there is some chance of the bus service improving". Added another, with a twinkle in his eye, "provided the transport commissioner has to travel at all". My

personal position is that the idea of compulsion is abhorent to my way of thinking.

I feel that it is futile to preach to the younger scientists to publish in India without doing something positive. From my association with them, I can say that they are usually reasonable and full of enthusiasm for new ideas. They would be most willing to participate in any progressive move, provided they are sure that they are not being led up the garden path.

The only course of action that seems to be open to us is to make a serious effort to improve our scientific publications. The steps suggested are:

(a) To have extended discussions with the scientific community (*i.e.* younger and more creative ones) to assess the requirement for a journal in a particular field and get the collective support of the scientists working in that field.
(b) To ensure that only papers of the highest quality are published in the journal by using the scientific community itself to cooperate in the refereeing and the editing process.
(c) To organise the journal so that it appears punctually.
(d) To decrease the time lag between the submission of a paper and its publication.
(e) To be certain that the contents of journals get into the current awareness, abstracting and indexing journals.
(f) To improve the quality of printing, the paper and the production.

Refereeing

The only method of improving the quality of scientific papers in a journal is by insisting on the highest standards of refereeing. In fact, a good journal disciplines a scientific community by demanding an impartial assessment system based only on quality not dependent on any hierarchical system.

"Relegating the refereeing of our best scientific work leads to loss of judgement and self confidence", we said in our first editorial in *Pramana*.

My experience shows that our referees' comments are more often than not wishy-washy. We see this most clearly when the reports of Indian examiners for Ph.D. theses are compared with those from outside India. The general attitude is one of not hurting any one, not committing oneself — as though there is some fear that the author may somehow come to know of the criticism and resent or dislike the referee personally. This does not mean that our referees cannot give a fair criticism of a paper. After these many years of experience, I can state that 50% to 60% of the referees I have dealt with are critical and would compare with any in the world. However, some are really bad. They do not read the paper carefully at all and make very general comments which are often pompous or platitudinous. Fortunately, it is quite easy to spot this kind and to remove them from the list of referees. Some scientists scarcely find time to read scientific literature. Some of the more senior ones get papers refereed by younger scientists of their group. They often do give the name of these referees helping the editor to enlarge his list of referees. An editorial office must continuously change its referee list.

A grave error is to overload the referees — particularly those who are willing to work. A simple card index with the name of the referee, the subject of his specialisation, the papers he has refereed, the time he has taken in each case along with some confidential comments by the editor proves a useful aid to keep track of the work the referees do.

There has been a lot of discussion on the code of practice for scientific journals (Royal Society Report, Nature Nov. 6, 1975 and Nov. 27 1975). I personally believe that in spite of all that is said against refereeing and about stray incidents in which some outstanding paper has been refereed out, that the best method of improving the

quality of science in a journal and to get the scientific community involved in a journal is to develop and insist on a strict refereeing system.

There has been great deal of discussion on the open refereeing system in the West. The author of a paper would very much like to know the name of the referee who accepts or rejects his paper. The proponents of this concept are mainly motivated by the feeling that nothing should be done surreptitiously. I believe the open refereeing system will not work in India. Firstly, our society is still hierarchical (in spite of our vociferous denials) and our younger scientists who are our best referees may be quite unwilling to accept the open refereeing system. The more serious objection is that a conscientious scientist, while quite willing to give his time for refereeing and thus to the raising of scientific standards, may not wish to waste his time in long drawn out personal controversies. Even outside India, the general consensus at present is against the open refereeing system.

The Editorial Board and The Editor

The members of the Editorial Board are supposed to be the real watch-dogs responsible for the quality of papers that appear in a journal. They have also to point out to the editor whenever a bad paper gets past the referees into the journal. In the Indian Academy journals including *Pramana*, we use them often when there is a difference of opinion between two or more referees (and this happens quite often). Unfortunately, the long list of the editorial board members generally plays only an ornamental role, announcing to the world the "moral" support that a journal gets from many scientific groups and to give evidence that it is not issued by one geographical group.

I feel that it is best to run a journal with three active editors with a large editorial advisory board who can hold a watching brief for the maintenance of quality.

About the Chief Editor of a journal, there are two views. One view is that the editor should be a respected member of the scientific community with a standing in his own field of science. Another is that a journal requires an editor with a professional training and who is a good organiser and administrator and it would even be preferable if he is not a scientist. Each has its own advantages.

I subscribe to the former view—for I feel that the quality of a journal and its prestige is also determined by the direction given by the editor. I did praise and pitch strongly for the refereeing process for building up the peer assessment system so essential for a scientific community. However, one must be aware of its pitfalls and not be carried away. Revolutionary ideas have trouble, getting past referees for the very reason that the latter are orthodox but the former are not. An editor with a broad based view of science may have to overrule referee's decisions, to get new unconventional ideas published. The reputations of many journals have been built on such decisions by their enlightened editors.

The second view has also many supporters and has many points in its favour. A young scientist summarised this by saying that by having a professional editor the journal *would* lose character but *may* gain efficiency. The pros and cons are similar to the problem as to whether the Director of a scientific laboratory should be (a) a professional scientist practising science or (b) an ex-scientist doing only administration or (c) a professionally well-trained administrator.

Printing of Journals

The printing presses have contributed greatly to the disrepute of many Indian scientific publications. All printing presses—the prestigious ones with foreign collaboration, those run by large industrial

houses, governmental printing presses, centralised presses run by autonomous bodies are all in the same boat as far as scientific journals go. They have failed us miserably. One has to make a detailed study of printing presses and their operations to know why the situation is so bad.

The basic causes are not far to seek. The printing of soap wrapping paper, prospectuses or even drama notices is more paying than printing scientific journals. Printing presses are generally overloaded with work and they invariably undertake work much beyond their rated capacity. The salaries of compositors, printers and proof readers are generally too low for the careful work expected of them by scientific journals.

Many solutions have been suggested to overcome the printing problem of scientific journals. One is that India must have a centralised facility for printing all its scientific journals. I am personally averse to this idea. This may possibly work in other countries but never in India. A centralised facility is, of course, very efficient on paper, but it does not work in practice. Something always goes wrong, in which case all the journals of India, good or bad, will suffer. Another is that a journal should acquire its own printing facility. Should a journal take up all the headaches of the printing industry, its labour problems, the instrument maintenance problems, etc.? It may be worthwhile reminding ourselves once in a while that our main purpose is to bring out journals with high quality science—and not to run a printing house.

THE ROLE OF SCIENTIFIC JOURNALS

I shall again ask the question as to what constitutes a good scientific journal. As a scientist, let me say that the quality of a journal is determined only by its science content—not by its printing, its paper, the quality of its diagrams, the accuracy of the indexing, etc. One is reminded of the advice Lewis Carol gives in his "Alice" about speaking. "Take care of the sense, the sounds will take care of themselves".

Recently I visited many centres of learning in the West—Cambridge, Oxford, York in England, Grenoble and Paris in France, Harvard and Caltech in the United States. One could not but be struck by the excitement in the air. There is an intellectual ferment. The arrival of a journal like the *Physical Review Letters* or *The Astrophysical journal* is an event. On that day, the work reported in these journals is discussed in coffee rooms, cafetarias and beer parlours. This type of excitement in scientific work and interest in journals is singularly lacking in our laboratories, research institutions and universities. How is one to produce this excitement in our journals? Our journals can be exciting only if the science they contain is exciting. The problem really reduces to "Can our journals help to produce an intellectual ferment so that the highest quality of science is produced in the country?". This can be done only if the culture of science is made to percolate deeply into the community. Only then can this metamorphosis take place. Can we help to revive our dying universities? Can we help our bright young students to perceive the excitement of creative science?

In fact every editor has to ask himself as to what the purpose of his journal is and as to what readership his journal addresses itself to. Are our journals only to be of archival interest where scientific and technical information is buried for posterity or are they to be alive, a means of promoting science in our country? I feel we have to reach out to our university students and research workers and inspire them. For this, we have to restructure our journals. In doing this we must be cautious and not just "popularise" science. Popularisation of science is, of course, necessary for cultural reasons and is a must, in a democracy. But superficial popularisation may not lead to deeper understanding and a deeper appreciation of science which alone can lead to creativity in

science. One may have to describe and discuss some of the recent discoveries made all over the world so that their essence can be grasped. One may have to review articles. These must have a different structure from the usual ones. The first part must enunciate in simple language the basic principles and present the foundations on which the subject rests while the later parts must discuss the latest developments. The journal *must* contain original research articles, so that the young reader may get the excitement of reading about scientific work "fresh from the oven". There may even be separate annotations explaining the contents and significance of the original papers. We in India have problems which are both different and difficult. We have to evolve our own methods of tackling them or else we would just be following like sheep the patterns evolved by the West for the West—patterns which may be quite irrelevant to us in India.