tion depends on the quantum of publicity made about the person and his work.

Under such a situation the subjectivity in recognition-making is large. The quality of publications of a person has not been given due weightage in the mechanism in respect of the reputation of a journal in which the publication is made, because it is the journal which determines the quality of work. Incidentally, this could be one of the criteria for recognition even for a non-expert, provided the journals are categorized by a committee of experts with appropriate weightage in each category. By this one does not mean that this should be the sole criterion, but that this could be a foolproof criterion to some extent. Hence, attention with due weightage to the journals of publication should be given for making the recognition. The impact factor of a publication, which is given weightage presently for any consideration of recognition, is objective, but this also suffers from the prejudice of current popularity/demand or like/dislike of a subject rather than depending on the quality of work based on ingenuity, precision, critical analysis and thoroughness. The impact factor of a publication does not necessarily reflect the true quality of work. All that one can say is that it has credibility under the circumstances. Hence undue weightage to impact factor overplays the quality of work, so that one can say that if at present any consideration is being made for publication, it is not truly objective.

The number-factor has its role too in determining the quality of work. How is one going to make an assessment of the quality of work when the number of committee experts is fewer and the number of areas of research is much larger? It is then the quality or reputation of the journals and the number of publications in them that determine the quality of work. Several workers in Chemistry (I know of this subject only) with several good publications have been left out in comparison to those recognized with lesser publications. To elaborate the point further, persons with three/four publications in the journals of *American Chemical Society* or *Chemical Society, London* or equivalent journals, have been recognized in preference to or in absence of knowledge of persons with sixty/seventy publications in the same journals. Can difference in the area of work matter to such an extent for the quality of work?

Apart from research, one area which has so far been ignored for recognition, is scientific education. One who spends his life in spreading, propagating or creating an awareness of science in masses or in innovating science education at secondary/undergraduate level, should also be considered for recognition by the highest scientific body in the country. Bharati has rightly pointed out this fact in her letter. It is therefore necessary that all awards/recognition-making institutions or bodies should strike a balance amongst various areas of recognition in a subject, including that of scientific education and adopt some objective criteria, e.g. the quality of publication in terms of category of journals to compensate the subjectivity of the mechanism of recognition.

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Improving research in India

Y. K. Gupta (*Curr. Sci.*, 2001, **80**, 808) has given some suggestions for improving research in India through spiritual 'Karma'. His solution can prove to be helpful in a limited way, e.g. at the project level dissertation in a professional course. Peer review is always helpful for budding researchers. There is no substitute for general facilities and infrastructure for carrying out research at the international level. An up-to-date library, laboratory and workshop are necessary for experimental research. But the competence of the investigator-in-charge or the research supervisor cannot be ignored. What we need the most for promotion of research in Indian universities is networking of research groups with national laboratories where library, laboratory and other infrastructure facilities are available in abundance. DST and other funding agencies must evolve a strategy for networking the research centres. A lot of money can be saved in this way by joint collaborations. All major research projects should be sanctioned only after a thorough survey is made about the infrastructure facilities available with the principal investigator.

It is also pertinent that Indian journals should improve the standards of peer review as suggested by Gupta. I feel that there is a lot of personal bias which discourages young researchers to publish in Indian journals. There are no competent reviewers in some emerging areas of research. As a matter of fact, when an Indian reviewer rejects our paper, we publish it in a foreign journal of repute as its quality is improved in the review process.

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Need for popular science books

Popular science books play a crucial role in kindling the scientific attitude, outlook and perception towards pursuing a scientific career. I fully agree with Dilip Salwi's views (*Curr. Sci.*, 2001, **80**, 331–332) that in India popular science books have still not caught on among the young as well as the general readers. A lot is desirable in this front to popularize reading as well as publishing of quality popular science books.

In general, these books can be classified into two categories – one which caters to the young readers between 6 and 17 years and the other for general readers of any age. Scientists like Feynman, Paul Davies, Stephen Hawking, Penrose, Capra and many more have benefited millions by their books, as they had visions to popularize science among the laymen and understood the importance of populariza-

tion too. The success of the famous *A Brief History of Time* by Stephen Hawking points to the fact that scientists can reach millions not only by their inventions or patents, but by their popular science books which have a far-reaching consequence in the minds of people.

The meagre availability of popular science books in our country can be attributed to many reasons. Firstly, in India where different linguistic communities have their education in regional languages, it is desirable to have popular science books translated and also written in these languages. Regional languages like Bangla, Marathi, Tamil and Kannada have quite a large number of books for children but other languages, including Hindi do not have adequate numbers so as to reach the masses. National Book Trust and Children's Book Trust are publishing popular books for middle aged children. In English, journals like *Resonance* and *Science Reporter* (NISCOM) have grown in popularity immensely during the last few years.

Popular science books have tremendous book value in the real sense and NISCOM should actively engage in arranging science writers/scientists to publish more books for the general readers. Moreover, the pace of scientific and technological development cannot be maintained without a steady influx of bright young students. To nurture the scientific curiosity and temper among the students, it is imperative to reach them through the print medium. This would also create awareness and interest among intelligent laymen and also help youngsters in getting a broad-based knowledge about scientific frontiers. The CSIR golden jubilee series of books has been a very successful venture in this regard. Universities Press, Hyderabad has also published quite a number of titles of popular science topics by writers like John Gribbin, G. Venkataraman and many others.

By integrating scientific principles and applications with history, graphics and humour, a large number of very popular series are available in the West, e.g. *Know About Series* by Ranger Ricks Foundation, Washington DC, USA; *Tell Me Why?* series by Simon and Schuster and many others. The presentation of these books leaves an indelible impression on the minds of young readers. Unfortunately in India these books remain in the libraries of only a few select schools and institutes and are beyond the reach of common readers.

It is therefore suggested that, as is being done with computer books which have obtained copyrights for publishing in India, agreements can be entered into by Indian publishers with their Western counterparts for reprints of Indian editions of such books so that they can reach a large number of readers at an affordable price.

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Shrimping footprints in the sands of time

The mindless enthusiasm for unrestrained shrimp culture growth sensibly curbed an onrushing calamity – an environmental ill that if not utilized properly would spoil the entire industry. In 1993, India produced 62,000 mt of *Penaeus monodon*. A year later the number reduced to 44,000 mt because of the onslaught of virulent diseases. It is obvious that these diseases were the impact of total mismanagement of the ecosystem. The disaster should be considered a model lesson for aquatic farmers. This paper looks into several factors, which most likely precipitated the recent crisis.

The rapid growth of shrimp culture in India can be traced through several milestones starting from 1980. The period that followed saw the dissemination of culture practices throughout the coastal region of India. In 1985, formulated feeds entered the market, facilitating the culture on a commercial scale. The succeeding years (1990–1992) were characterized by a dramatic climb in production. Peak production figures were registered in the year 1993. Subsequently, the challenge that confronted the fisheries industry in the form of a killer disease cannot be ignored, as *P. monodon* is one of the country's most valuable aquacultural crops. The lofty expectations generated by the impressive track record left the industry initially unprepared to face the killer disease. It is unlikely that a single factor can be isolated as the main cause. Only a combination of factors seems to make sense, viz. seed-stock, over-intensified grow out practices, water pollution, pond deterioration and diseases[1].

Under the traditional polyculture and extensive culture systems no major problems were encountered, except for the occurrence of natural disasters and the presence of predators and competitors. As the culture systems shifted to semi-intensive and intensive styles, stocking densities were raised and formulated feeds were used. Intensive production was targeted on ponds with unsophisticated inlet/outlet systems, shallower depths unprepared to treat pond bottom, lesser aeration equipment/ha and insufficient water volumes. Intensive systems have greater needs for water treatment, chemicals and drugs for diseases, prophylaxis and treatment. Misuse of these had serious consequences. Water quality and the general culture environment became difficult to manage and culture species became more susceptible to various diseases. Eventually various types of infection such as protozoan epicommensals, entozoic algae, black gill disease, gill decay, telson damage, body cramp and red discoloration were reported to affect the prawn.

Single-phasic grow out system deteriorated the pond bottom. It seemed that infection with the virus might indeed be lethal, but most commonly some physiological or biochemical stress relating to poor husbandry, whether related to water quality, nutrition or handling gave the virus the opening it needed to become established in a population. This in turn led to debilitation and infection with a secondary *Vibrio* pathogen[2], which caused the high and rapid mortality[3], associated with white spot disease.

Import of broodstock from Sri Lanka and Thailand in the mid-boom phase could have led to vertical transmission of the virus. Import of used aquacultural tools