

capturing the spirit of contemporary neuroscience: sfN lessons for IAN

First, the good news: the Indian Academy of Neuroscience has taken it upon itself to develop strategies to reach out to teachers, students and the general public, if the proceedings of the annual conference of the last few years are an indicator. This is further testified by the thrust given to this area of activities in the editorial policy of its flagship journal, the Annals of Neurosciences. This policy of the Academy and the journal is unassailable, if one considers the ground reality. And that, perhaps, is the beginning of the bad news: for, only 65 of the more than 300 universities of India are represented in the activities of the Indian Academy of Neurosciences (IAN), if the affiliation of life members is taken as the measure. The number of participants of the undergraduate level programs of Indian universities is next to nil. This is when Neuroscience is considered to be one of the frontier sciences with several exciting breakthroughs to its credit. The UGC (University Grants Commission, New Delhi) in its model curriculum for the country's post graduate programs in Zoology, cites Neurophysiology as one among the several optional subjects, without elaborating any further on that; whereas a subject like Gamete Biology is dealt with in detail with an explicit model syllabus! (It is just another matter that in current parlance, Neurophysiology is a highly parochial field within the contemporary discipline of Neurosciences). Of the 72 suggested lab-components/practicals, in the said model curriculum for the post graduate programs of the country, the only one that has some salience to Neuroscience is an amazingly ridiculous stand-alone idea of the dissection of the nervous system of crab!

In this context, it is just apt that one of the senior neuroscientists in India, had shown his uninhibited wonderment as to how the Society for Neurosciences (SfN) in the US, attracts "tens of thousands of participants in its annual conferences, in each consecutive year". In addition, he had insisted that some of us sit down and do an analysis of the situation in India *vis a vis* neuroscience education and research, in order not to "miss the bus" totally.

True, since its inception in 1969, SfN has grown from 500 members to over 40,000. In fact, Neuroscience barely existed as a separate discipline in 1969.

That happened with the advent of many developments including that in cell biology, molecular biology and neurogenetics, computational and imaging techniques and not the least because of the use newer model systems like the fly *Drosophila*, the worm *C. elegans* and the snail *Aplysia*, among others. Neurophysiology, as the field was largely referred to, till then, has thus metamorphosed into Neuroscience, a truly interdisciplinary science that started addressing questions related to the biological basis of behavior, both adaptive, as well as, maladaptive.¹

Apart from creating venues like annual meeting and by the publication of the journal (Journal of Neuroscience), SfN "supports the neuroscience community, connecting people around the globe and across specialties and also actively involved in educating the public about the 'wonders of the brain'." SfN also undertakes it as one of its important missions, to advocate for policies that promote research in this area which still offers enormous challenges. Its intervention in K-12 school education is legendary. Many independent streams like the 'Neuroscience for Kids', started by Eric Chudler of the Washington University have merged into the SfN activities, today. An excellent introduction on the work of the PECC (Public Education and Communication Committee) under the auspices of the SfN was published in this journal a few months ago.² The Public Education and Communication Committee (PECC) has the charge of developing ways to reach out to kindergarten through 12th grade (K-12) students, the public and legislators. According to Spitzer, "for the last three years as chairman of PECC, it has been stimulating and rewarding to work with my colleagues - 20 neuroscientists and 10 staff-to pursue this important agenda".

Above all, the Society works to promote public information and general education about the nature of scientific discovery and the results and implications of the latest neuroscience research. SfN also supports active and continuing discussions on ethical issues relating to the conduct and outcomes of neuroscience research. All this detail is important because, we, in India, are on the threshold of a great era in biology research in general, and neuroscience research in particular.

More so, a recent study reported in this journal³ shows, whereas China published

9,184 papers in the area of Neuroscience in the decade ending 2008, India's score was only 4503 papers and the US stands tall with 1,63,055 papers. China ranks 12th in the comity of nations, where as, India is a poor 21st among the 26 countries pursuing serious neuroscience research. In fact, China's world ranking improved from 21st position in the year 1999 to 12th in 2008. Its global publication share increased from 0.86% to 4.79% in these years. A huge jump, indeed! It is interesting to note that India stands at the same 21st position with an almost similar percentage (0.99%) of the global share, a decade after, in 2008. Though such comparisons may seem odious, one will be tempted to ask: could India covet a similar record by 2017 what China had achieved during the previous ten years? In a moment, we will see that it is quite possible, provided we learn lessons from experience elsewhere.

Indeed, a deeper reading of the said study shows another interesting feature: among the 15 top institutions in China that contributed high impact papers in Neurosciences, 10 are Universities (8 general universities and 2 Science & Technology universities). The rest 5 are specialized institutions that include three Medical Universities. In other words, our major contention is that India can take the giant leap that China had taken as far as the phenomenal progress in neuroscience research in the last 10 years, only if it takes its more than 300 universities that caters to a very large number of students in its hinter lands, seriously; by integrating its teaching with hand-on research and through further reach-out programs with the society, in general. Today, universities in India are largely teaching shops, cut away from the few islands of elite research centers and there is no ongoing interaction between these two, in any planned manner.

As alluded to previously, of the 611 life members of the Indian Academy of Neurosciences (IAN), only 65 are from the university system.⁴ Apart from a couple of such university centers whose members attend regularly and in considerable number, most others from this sector make their presence felt rarely, in its annual conferences. What, if IAN reaches out to students and teachers of all the 300 odd universities in the country!

In another study on ranking Indian universities for their research output, during the

same period of 1999-2008, among the top 25 universities,⁵ barely a few are represented in the IAN list. Though BHU, AMU, JNU and CUSAT are included among the top 25, how many among the 4503 Neuroscience related papers had emerged from Indian universities, is any body's guess. Let's not forget that there are more than 300 established universities in India. That, only three university centers offer neuroscience at the post graduate program, in this sprawling country, betrays the state of affairs, as well as the scope for improvement.

The point we are arriving at is that like the SfN in the US, organizations like the IAN has to draw up plans and chalk out strategies to make a difference to the academic landscape of the country, by focusing on the large number of Indian universities and affiliated colleges as nodal centers for the out-reach programs. It is not easy in India since neuroscience as a subject is scarcely dealt with in the biology curriculum in the country. But, surely, it calls for determined effort.

Indeed, a similar concerted effort was initiated several years ago by the SfN, in the US. As lately as at the Neuroscience 2005, "SfN's Council refined a new strategic plan - later finalized and formally adopted in February 2006 - that identified a number of the Society's key challenges and opportunities and outlined the guiding principles and action plans to achieve SfN's mission." SfN does this type of evaluation for further planning, every so often; it is also done in right earnestness, with the involvement of top level scientists. Look at the following from the message of the President of SfN on this effort: "this new plan is the product of a year-long process that also engaged the committee chairs, SfN past presidents, the SfN staff, and a consultant. Council has outlined some key challenges for the coming years, including expanding our professional development activities and increasing our activities in support of animals in research".

Overall, the framework of the new strategic document is consistent with the four broad mission areas identified in the last plan, developed in 2002: "advancing the understanding of the brain and nervous system; providing professional development activities, information, and educational resources for neuroscientists;

promoting public information and general education about the nature of neuroscience discoveries and their implications; and conveying to legislators and other policymakers the scientific and societal value of neuroscience research."

The council identified 11 strategic issues which are accompanied by a desired outcome, set of guiding principles and actions that will be taken to achieve the desired outcome. The areas include: enhancing member experience, and strategies for international initiatives, professional development strategy, diversity, the annual meeting, open access publishing, NIH funding, science policy, public education, financial reserves, and committee realignment. No wonder, as the senior neuroscientist mentioned earlier had alluded to the more than 14,000 abstracts received at the annual conference of the SfN, last year! With SfN showing the way, we, in India fortunately, do not have to reinvent the wheel; we, surely, have to adapt the means to fit our historical and cultural scenario.

Since Nick Spitzer had elaborated on the work as envisaged by the PECC elsewhere, we will restrict ourselves, here, to a few salient points on the Public Communication and Education Strategy adopted by the SfN with respect to issues proper and also desired outcomes. "Desired Outcomes as envisaged by the study group are: 1. To promote civic neuroscience literacy among the general public 2. To light a fire of curiosity in children in the K-12 group by providing tools to teachers that help them encourage students to study neuroscience or become "brain aware citizens" 3. To foster support for neuroscience research among policymakers, and 4. To help members get engaged in public outreach and strengthen the science community's capacity to communicate science to the public.⁶ "These are unexceptionable in the Indian context, as well. Hence, it is imperative that like SfN, IAN too,

- a. creates venues for sharing great science in an expanding field through an interactive Open Educational Resource portal
- b. supports the neuroscience community, connecting people around the globe and across specialties, again through the emerging internet-based group-networking and other strategies

- c. educates the public about the wonders of the brain and at the same time busting the myths about brain and behavior (one will not be surprised if students and parents hold Aristotelian notions about brain *vis a vis* the heart!) by developing finely tuned modules and by utilizing the network of schools and colleges across the country by functionally knitting them together
- d. supports and encourages collaboration with educators from KG to PG (Kindergarten to Post Graduation) to show the salience of Neuroscience as a frontier area of science, with enormous future.

Our submission to practicing neuroscientists in India, with regard to the expansion of the neuroscience program in the country, therefore, is: reach an agreement first, on what needs to be done and then agree on the best ways of addressing it. This demands immediate attention of all of us to the present state of neuroscience education in the country and to make decision to act without losing any more time. For, potential neuroscientists should be spawned in schools and colleges/universities, and not at doctoral level programs! Further, with 23 Nobel winners in the area of Neuroscience in the last 30 years, the public cannot be allowed to wallow in ignorance about brain and behavior; least of all, perpetuate medieval myths about neurological diseases. And, IAN has the role cut out for it.

doi : 10.5214/ans.0972.7531.1017401

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