

Recognition of traditional medicine in the Nobel for artemisinin is inescapable

On whether or not the award of the Nobel Prize to Youyou Tu for the discovery of artemisinin is a vindication of the efficacy of traditional Chinese medicine¹, it is illuminating to compare certain facts and figures associated with her approach with that of modern antimalarial drug discovery. Tu had tested 200 recipes and 380 herbal extracts, selected on the basis of traditional Chinese medicine literature, in animal models, and identified extracts from *Artemisia annua* L., the source of artemisinin, with promising parasite growth-inhibiting activity^{1,2}. In contrast, no new class of antimalarials has been introduced into clinical practice after artemisinins in the last 20 years, with high-throughput screening of around 4 million compounds in *in vitro* assays only resulting in a single compound in clinical trials, the risk of failure of a new antimalarial in phase-2 trial being significant³. A higher success rate of drug discovery seems apparent in the former approach. A clear recognition of traditional medicine in Tu's award is thus inescapable. It is notable that the majority of new drugs have been plant-

based, either a natural product itself or a synthetic compound derived from the structure of a natural product⁴. The recent emphasis on high-throughput synthetic library screening for drug discovery coupled with decline in new drug approvals on the one hand, and the availability of advance drug discovery technologies on the other are increasingly calling for exploiting vast untapped biological resources towards developing new therapies from natural products^{4,5}. It is expected that the Nobel for artemisinin will energize efforts to meet this demand.

As regards the overall skepticism or enthusiasm about the usefulness of traditional medicine including Ayurveda¹, it is necessary that rigorous scientific investigations are conducted to evaluate their efficacy and safety, and to identify active ingredients in them. To that end, research is being supported by several countries, for example, USA (<https://nccih.nih.gov/>), China (<http://www.cacms.ac.cn>), and India (<http://indianmedicine.nic.in/>). Additional public and private support will be rewarding. The critics

and advocates of alternative medicine alike need to be open-minded about its therapeutic benefits, adverse effects, quality, and impact on biodiversity.

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Indian Science Congress – a circus or a forum for showcasing hard science?

The recent comment of Venkatraman Ramakrishnan¹, Nobel laureate of Indian origin and President of the Royal Society of Britain, about the Indian Science Congress (ISC), 'It was a circus. I find that it's an organization where very little science is discussed', triggered a lot of debate^{2,3} on the seriousness of the organization and deliberations in ISC. Perhaps, the same is relevant for meetings of some other societies in different branches of sciences in India. The media reactions varied from strongly endorsing Ramakrishnan's views² to the defence of the status quo and the manner in which ISC is conducted³. The hallmark for scientific meetings of the size of the ISC is the Annual Meeting of the American Association for the Advancement of Science (AAAS)⁴. The AAAS defines the

science policy and is the watchdog of overall quality of American science with the mission statement: 'advance science, engineering, and innovation throughout the world for the benefit of all people', with nine broad goals⁵.

It seems the opinion of Ramakrishnan is candid when we see it in the context of the experience of a large cross-section of scientists who have been participating in the annual meetings of various societies. Often, there are stalls of sightseeing tour operators in the vicinity of registration counters. Very rarely inauguration starts on time because the chief guest often arrives late. There is a lot of photo-op, with presentation of mementos to the chief guest and other dignitaries on the dais. There have been occasional efforts to do away with these 'time wasting' and

feudal ceremonies, but the show goes on. The usual programme is inauguration (very long) followed by 'inaugural tea', which sometimes extends up to lunch break. The delegates plan for sightseeing immediately after the inauguration. Usually, there is very less attendance in sessions (with few exceptions), but full attendance during lunch and dinner. It is not unusual that in some presentations the attendance could be less than ten, including the chairman, rapporteur and speaker. The extended forenoon rituals in the inaugural session are at the cost of scientific presentations and deliberations. So, the chairmen often ask the speakers to rush through their presentations and advise discussion, if any, during lunch break. Often there is a spillover for the afternoon session. Bigger the scientific

society, more is the overall chaos and lack of seriousness all at the cost of taxpayers' money. There is a general impression that these meetings are more for a social get-together. No doubt, there are some notable exceptions like the Society of Biological Chemists of India, which has a long record of excellence and 'means-business'. More criticism has come from none other than another Nobel laureate, David Gross, who rightly professes to be a great well-wisher of Indian science⁶. In this context it is germane to recall what Winston Churchill said: 'Criticism may not be agreeable, but it is necessary. It fulfills the same function as pain in the human body. It calls attention to an unhealthy state of things'. Sure enough, Ramakrishnan is

passionate to see India, the land of his birth, a science power house. Perhaps, his observations come out of deep anguish with status quo and is a wake-up call. Put together, it is high time for a serious look for a turnaround in overall science culture for science management, doing science and organizing meetings for scientific deliberations for research, teaching and science policy⁷.

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Teaching-based research is a requirement in institutions of higher learning to impart quality education

Concerns regarding the present mode of education and teaching quality in institutions of higher learning in India have been expressed recently in *Current Science*¹⁻⁴. This can also be a warning for the education in colleges and schools, where teaching is performed by university degree holders. Both teaching and research are important requirements in the institutions of higher learning to produce quality human resources, as well as to sustain development. An imbalance between the two will affect the progress. I believe that the above concerns are an

outcome of the unequal treatment towards teaching in comparison to research in the institutions. Faculty members successful in bringing out research publications get encouragement in the form of career advancements, attend conferences at national and international levels, get different awards, become member of Science Academies, and also become policy makers for academic institutions. A newly appointed faculty member is made to realize that publishing research articles is an important activity that she/he should perform. In this approach,

the research problems addressed by the faculty are often a carry forward of the idea from his/her doctoral or postdoctoral research. The philosophy that 'research should complement teaching' largely gets compromised in this way.

Teaching is generally perceived as a method of collection of information from textbooks and passing it on to students, which is incorrect. Understanding the philosophy of a topic, raising fundamental questions, development of innovation in teaching methods and developing teaching aids require several years of

Table 1. Research-based teaching (RBT) versus teaching-based research (TBR)

RBT	TBR
Approach: Soon after joining, a faculty is encouraged to start research in Universities. UGC has a faculty research promotion scheme (FRPS) (http://ugcfrps.ac.in/uohyd/start-up-research-grant/application-for-start-up-grant/).	Approach: A faculty is encouraged to perform quality teaching. UGC should encourage text book writing scheme which has been there for some decades.
Impact on academic institutions: Extramural research grants help in establishing research facilities in Institutions. Research questions are addressed to publish research articles and not necessarily to support teaching. Sometimes creates an unnecessary competitive ambience that affects teaching.	Impact on academic institutions: Quality output occurs both in teaching and research activities. Teaching remains contemporary. Faculty members take up research because of their passion. Research questions addressed will not only complement teaching but will be of fundamental type.
Suitability: RBT is relevant during Ph D course work for students where the course structure is flexible. RBT is also required in case of specialized optional subjects such as molecular evolution, tRNA modifications, etc.	Suitability: TBR is more relevant in academic institutions where the course structure is defined and a student is expected to have understanding in specific areas relating to the degree she/he is obtaining.