The idea of research!

Col Rajul Kumar Gupta*

MJAFI 2011;67:215–216

“The reasonable man adapts himself to the world; the unreasonable man persists to adapt the world to himself. Therefore, all progress depends on the unreasonable.”

George Bernard Shaw

Hailing from a family of researchers and being involved in it since last few years research or the problems of research were never really new to me. However, the research ideas that surfaced at a recent international conference were truly mindboggling. Like, one of my fellow participants Dr Solveig Danilsen, a Professor in Plant Pathology from University of Copenhagen, Denmark, presented an original innovative e-poster on ‘applying the health system approach to plant healthcare’, wherein she discussed, how the human primary healthcare approach could be used for the care of crops! And it was not just a ‘crazy’ idea, as she has already been working on the project in Uganda since 2003, experiences of which she readily shared with me ... and one sometimes wonders as to why we in India lack such ideas!¹

Before proceeding further, let us complete the ‘Natural History of Research’ first. A new, preferably unreasonable or crazy idea is a prerequisite for research. More often than not such an idea germinates in an inherently fresh, talented and inquisitive mind. It is converted by the mind into a research question. A hypothesis is developed. Hard work with immense motivation and perseverance is pursued to test the hypothesis. Unconditional support from the family, peers, organization and funding agency is offered. Researcher is left alone to make the most of the flight of his ideas. Results are honestly analyzed. Researcher and the supporting system are prepared to accept a total failure. On a successful outcome, he is felicitated and on a failure he is motivated to restart. Appears simple isn’t it!

We certainly do not lack the ‘genetic’ material, as Indians are propelling the research engines of the west, may it be the NASA, hotmail or Microsoft. However, it goes without saying that in order to be a Ramanujam or CV Raman, one has to possess huge inherent talent, which can neither be taught nor learned. Even though Boudoulas puts it “*There is no substitute for talent,*” but let us not be compelled to think that those of us with moderate talent can’t think big in the field of research.²

Everyone saw the apple fall, but it was only Newton who noticed it. The keenest sense a researcher possesses is the

sense of observation. Observing what others could not and then analysing and interpreting it, sets a top researcher apart.

Ada Yonath, a Max Planck research scholar, in her early 1980s did not care for a shelter and slept in her car for seven long years, while pursuing research on the chemical mapping of ribosomes. She was forced to find a place ‘to live’, only when her mother planned to visit her! This obsession paid off when she became the first Israeli woman to be awarded the Nobel Prize in 2009.³ This brings us to the personal attributes of a researcher. Ms Yonath personifies single minded devotion, passion, hard work and dedication amounting to obsession that propelled her to the cause of research for more than three decades, before she could finally taste success.

In the mid 1800s structure of benzene was an unsolved mystery, as the arrangement of six carbon atoms did not seem to fit in the then existing system of aliphatic organic compounds that were known to have only straight chains. It was Friedrich Kekule (1829–1896), a German chemist who was constantly intrigued while working for years on unravelling this mystery. It was he who discovered that benzene has a cyclic ring of carbon atoms, rather than being a straight chain; thus laying the foundation of a huge branch of organic chemistry involving aromatic compounds. Later he revealed that he had discovered the ring shape of benzene molecule after having a reverie or day-dream of a snake seizing its own tail with its mouth, thus making a ring! This vision, he said, came to him after years of studying the nature of carbon-carbon bonds. This anecdote goes to bring to the fore the virtue of intense focus and constant meditation on the research idea besides committed devotion.⁴

Maria Curie (1867–1934) had to leave her motherland (Poland) when it was run over in the war and had to migrate to France so that she could continue her research on radioactivity. Here she worked for decades and finally, painstakingly separated out 1 g of radium chloride emitting “pretty blue-green light” from a ton of pitchblende (ore) in 1902. She died of plastic anaemia, contracted from exposure to radiation during her experiments.⁵ This talks of her diligence, dedication and utter disregard to personal comforts and safety, besides of course discipline and extreme hard work. No wonder she is the only woman to have been awarded the Nobel Prize in two sciences.

While curiosity, persistence and an open mind are some of the basic traits that make a good investigator, to wrestle with the unexpected and arrive at new understanding that challenges old ways of thinking is the crux of good research.⁶ There could probably be no better example for this than the work of Copernicus (1473–1543) who challenged the 2000-year-old theory that Earth is the centre of the universe and propounded

*ADH, HQ 16 Corps, C/o 56 APO.

Correspondence: Col Rajul Kumar Gupta, ADH, HQ 16 Corps, C/o 56 APO.
E-mail: rajulk Gupta@yahoo.co.in

doi: 10.1016/S0377-1237(11)60043-9

that it merely revolves around the Sun, thus laying the foundation of modern astronomy. In modern times, a researcher has to be an avid reader, fully aware of the latest work in his field, open to suggestions, analytic and critical.

Craving for instant results in research is a crime. The hunger for fast results tempts the worker to falsify data, that might bear immediate narrow results for him, but the same is done at the cost of science with long lasting detrimental impacts. Instances of plagiarism not only bring disrepute, but also mislead the scientific community. Research by nature is an evolution; it has to be slow, deliberate and progressive if it has to metamorphose into a new life form. Honesty at all costs is a hallmark of a good researcher. An extremely important issue is put forth by Prof. Dan Weary "Never try to prove your hypothesis, just try to test your hypothesis. Let your data show you the way."⁶ This will obviate the temptation to falsify data, which one does in order to reach a certain 'fixed' result.

A sound knowledge of research methodology and statistics makes a scientist more complete as he is able to anticipate, appreciate and interpret results better. Reading literature makes more sense to him if he is well versed with epidemiologic principles and statistics.

The basic principles of management in the form of first, a good team member and later a good team leader hold good as attributes of a good researcher. Being a good communicator and administrator is an asset. Our ex-president Dr. APJ Abdul Kalam, the great scientific leader of ISRO's rocket programme and the brain behind Indian missiles is a testimony to this fact.

Well, 'genetics', inherent talent and personal attributes having been taken care of, we come to the 'environmental' component of the issue. We lack the environment for research. Till now we have been bogged down with the daily earning of bread and we still long for a decent living; and research hardly seemed to provide this, explaining the existing poor environment for research. A curious and inquisitive mind might be good enough for germination of a brilliant idea; but it is the environment that

needs to nurture it through fertile soil so that it flourishes and bears fruit. Ample infrastructure, funding and simple procedures are the basic requirements for a healthy research environment.

No modern doctor can keep off from research for a long time since the old adage '*Publish or perish*' was never more relevant than what it is today. Let us introspect, as to how many of the above attributes do we possess in our system. At the National level, if we set the stage right today, may be in the coming two decades we could hope to see improvement in our research outcomes.

In the Armed Forces, we are fortunate enough to have a well established system, available expertise for consultation and funding. Additionally, recent events are a testimony of research findings being utilized for policy decisions. What needs to be bolstered is our will to conduct honest and quality research utilizing the available resources and strive for excellence in this field too.

REFERENCES

1. International Food Policy Research Institute, Washington DC. *Conference on Leveraging Agriculture for improving Nutrition and Health*. 2020 conference.ifpri.info. Accessed on 16 Feb 2011.
2. Boudoulas H. There is no substitute for talent: there are other attributes that complement the inherent talent of a researcher. *Hellenic J Cardiol* 2005;46:375.
3. Times of India. The woman who won the Nobel with Ramakrishnan. 14 Feb 2011, page 10.
4. Wilcox D, Greenbaum F. *J Chem Edu* [Translated into English] 1965; 42:266–267.
5. Mould RF. The discovery of radium in 1898 by Maria Sklodowska-Curie and Pierre Curie (1859–1906) with commentary on their life and times. *Br J Radiol* 1968;71:1229–1254. PMID 10318996. <http://bjr.birjournals.org/cgi/reprint/71/852/1229.pdf>. Accessed 31 July 2008.
6. Lin B. What makes a good researcher. *UBC Rep* 2002;48(12).