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GUEST EDITORIAL

Genius in medicine

What is genius? 'She's a genius' is a phrase that is often used rather loosely and in different contexts – right from describing Nobel Prize-winning scientists to sports-persons who manage feats not easily accomplished by others. The *Oxford English Dictionary* defines genius as 'native intellectual power of exalted type; extraordinary capacity for imaginative creation, original thought, invention or discovery'. Genius has been the subject of study and wonder for centuries by scientists and laymen; for instance, the May 2017 issue of *National Geographic* has a cover feature on genius.

The components of genius include the capacity to learn and see what others miss; an inborn ability to innovate and enhance, and the uncanny ability to use these and other means to push the frontiers of knowledge beyond what was hitherto foreseen as possible. One of us has earlier argued that genius is the ability to achieve first, that which could have been achieved by others, but was not (*Curr. Sci.*, 1999, 77, 1387).

Genius is a highly individual characteristic, but the products of genius are generally invaluable. They open new vistas and influence mankind over millennia. Not surprisingly, genius may not be recognized and lauded by contemporaries. We can gain further insights from a study of the lives and works of such giants as Galileo Galilei, Isaac Newton, Leonardo da Vinci, Charles Darwin, William Shakespeare, Carl Linnaeus, William Harvey, Gregor Mendel, Rosalind Franklin, Dorothy Crowfoot Hodgkin, Barbara McClintock and others.

The TV series 'House' revolves around a brilliant physician who makes the most unusual diagnoses. His ability to read between the lines and to think out of the box and see patterns that are not obvious to others, makes him worthy of being called a genius – perhaps. Some might, however, argue that the good doctor is smarter than most of his colleagues and is indeed, more intelligent, but not quite a genius.

Were Banting and Best (and MacLeod and Collip, to complete the team) who isolated insulin in 1923 geniuses? None would disagree that their discovery was one of the greatest and most important discoveries in medical science in the 20th century – but it was the result of carefully studying the research of others in the field

and continuing the work in a logical manner. Is Stanley Prusiner's prion disease an idea of a genius? Yes, because it was a novel concept and went entirely against conventional thought. By the same yardstick, the hypothesis and subsequent proof that peptic ulcers were caused by bacteria, *Campylobacter pylori* (now *Helicobacter pylori*) and not by worry or spicy food was a revolutionary idea proposed by Barry Marshall and Robin Warren.

Two other geniuses in medicine are John Hunter (1728–93; British anatomist, surgeon and naturalist) and Ramón y Cajal (1852–1934; Spanish neuroscientist and Nobel Prize winner in 1906). Hunter's careful observation, experimentation, maintenance of records and self-experimentation resulted in his making the field of surgery a true science. His exhortation to Edward Jenner, 'Why think, why not try the experiment?' led to the latter's successful vaccination against small pox and is perhaps the one statement that typifies the scientific method. Attempting to place Hunter 'in this moving stream of scientific thought', Hedley Atkins concluded, as did Henry Morris, that John Hunter was 'the only great natural philosopher between Newton and Erasmus Darwin'.

Santiago Ramón y Cajal, struck by the potential unleashed by Golgi's discovery of staining nervous tissue, rapidly improved upon it and permanently altered human understanding of the structure of the nervous system. No more was the brain a reticulum or meshwork. There were clearly defined nerve cells, processes and junctions; supporting cells and blood vessels. The transmission of nerve impulses could now be understood and elaborated.

What about the Indian contribution to the world pool of scientific genius?

In the 19th century, many great scientists were of British extraction. George Everest, William Lambton, Andrew Scott Waugh and James Walker and the great trigonometric survey remain memorable. In the field of medicine, the work of Henry Vandyke Carter is an outstanding example. Before joining the Indian Medical Service, Carter had attained distinction by his illustrations in *Anatomy: Regional and Applied* (now known to the world as *Gray's Anatomy*). Besides being an able administrator and teacher of anatomy at the Grant Medical College,

Bombay (now Mumbai), Carter's researches in India resulted in the description of Madura foot as a specific entity.

Names like C. V. Raman, Jagdish Chandra Bose, Srinivasa Ramanujan, Janaki Ammal, Asima Chatterjee and Homi Bhabha readily come to mind. In the field of medicine, V. R. Khanolkar's name stands out. A polymath, Khanolkar made original contributions in the fields of cancer and leprosy, and can be called the 'Father of pathology and medical research' in India.

Others include B. C. Roy (first-class physician, Chief Minister of West Bengal of distinction, educationist, etc.), Major General S. L. Bhatia (hero during World War I, physiologist, teacher, administrator – Principal Grant Medical College, Indian Medical Service, Governor of States, contributions to history of medicine, thinker on medicine in India, etc.), G. V. Deshmukh (physician, surgeon, Municipal Corporation of Bombay, fought for getting Indian doctors on the staff of Grant Medical College, etc.), Jivraj Mehta (physician to Mahatma Gandhi, founder of Seth Gordhandas Sunderdas Medical College and King Edward VII Memorial Hospital in Mumbai, Finance Minister, High Commissioner in London, Chief Minister of Gujarat, etc.) and Noshir Antia (plastic surgery, leprosy, research in community health, research in tropical medicine, rural health, etc.).

To our knowledge, the one thing that is common to all of these individuals is that after their training in India, they went abroad for further training before returning home. Is there a message in this? Could the latent genius in them have been unmasked upon their stints abroad?

Is the field of medicine in India conducive to the development of genius?

Not surprisingly, the answer must be in the negative. Medicine involves a lot of leaning by rote. Because it is an information-heavy field, there is little scope for medical students to display creativity while they are busy amassing data (and hopefully, some knowledge). This is true all over the world and especially so in India. Most medical students do not question dogma and hence, Pter Skrabanek and John McCormick use the satirical term 'skepticaemia', which, according to them describes an 'uncommon generalised disorder of low infectivity. Medical school education is likely to confer life-long immunity' (*Follies and Fallacies in Medicine*, Taragon Press, Whitmore, UK, 1998, 3rd edn).

Are we capable of improving the existing conditions? We take hope from the fact that there are beacons of light in India. Institutes such as the Centre for Cellular and Molecular Biology, Hyderabad; National Centre for Biological Sciences, Bengaluru, Tata Institute of Fundamental Research, Mumbai and Indian Institute of Science as well as National Institute of Mental Health and Neurological Sciences, Bengaluru, have in their faculty, some who are capable of strikingly original thinking. That many scientists have chosen to return to India after successful stints abroad is also encouraging. Yet, we are far from reaching the tipping point where creativity supersedes rote learning. A prime requirement for genius to flourish is appreciation of intellectual talent at an early age and the provision of a multitude of opportunities for its development. Fettering such a mind in a curriculum, howsoever well-designed, and straight-jacketing it in a vicious, competitive system that is intended to reward memorization and regurgitation is the surest way to destroy any potential for genius. We need to set free young minds so that they can show dissent with respect to 'established truths' in science.

For this, development of intellect and character should form the twin goals of all teaching institutions. The curriculum must have as its key goals the promotion of understanding of the means to acquire and further knowledge, the fostering of innovation and the development of critical skills in the Indian context. The goals of such a system of education should be the creation of confident and creative individuals well equipped to advance science while following the paths of their choice.

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