

Sparking Creativity in Young Researchers

BY JOHN CARMODY

Integrity and scepticism are, perhaps, two sides of the same coin. We must encourage both in young scientists.

Research is an imperative in the modern Australian university. While half the respondents to a recent Australian National University poll believed that universities run principally as businesses, this overlooks the real importance of a university's research: its reflection of innate human creativity and its significance for keeping ourselves intellectually alive and honest.

For those of us who seek to educate as well as flourish in research there is the added question: what characterises a fine researcher?

One crucial trait is scepticism, about our own results as much as those of others. Publication is such a serious business that students want to believe everything in print. It is important for educators to urge them to ask hard questions and avoid being gulled.

Remarkably it is not just the students who need that education. So do many of the administrators who seem to believe that counting the numbers of research publications absolves us of the task of assessing quality. I was shocked some years ago when a Dean who was examining alleged scientific fraud asked: "How can there be any question of fraud when the work has been published and has therefore gone through the refereeing process?"

A research worker has to be just that: a real worker undeterred by failure, willing to change tack and methods, capable of designing a feasible project, a strict analyst of the results, alert to new ideas and paradigms.

Scientific history shows striking examples of renowned researchers who have been blind to the significance of their results. The Moravian colleagues to whom Gregor Mendel presented his results in 1865 – results that established the science of genetics – had no sense of the importance of what they heard. The rest of the scientific world was no more astute: his work was not "rediscovered" until 1900.

Nor was there greater insight shown 50 years ago when the British endocrinologist, Geoffrey Harris, presented results which showed that nerve cells in specific parts of the brain are crucial targets for certain circulating hormones. In other words, the brain not only controls the endocrine system but is importantly influenced by it. That work established the new discipline of neuro-endocrinology, which made untenable any rational distinction between neurotransmitters and hormones, yet the recorded questions of his expert audience reveal that they had no notion of the significance of what he said.

Camillo Golgi was a spectacular example of this scientific myopia. In the 1880s he invented a new method of staining slices of the brain for microscopic study, its great advantage being that it revealed only a very few of the thousands of cells on a slide but showed their ramifying morphology splendidly. Yet no matter how often he looked down his microscope Golgi failed to understand what he saw. That required the genius of



For physiologist and historian John Carmody, science is more than contemplation of the human skull as a metaphor for scientific medicine. It involves experiment and rigorous scepticism about the outcomes. Photo: Sean Carmody

a young Spaniard, Ramón y Cajal, who realised that the cells of the nervous system (contrary to the contemporary dogma) are separate and distinct. That insight revolutionised neuroscience but Golgi resented Cajal terribly for his discovery.

William Harvey, the first modern physiologist, should be remembered as much for the design and analysis of his experiments as for his discovery of the circulation. He was undeterred by the renown of his predecessors and questioned every possible interpretation of his results. He also willingly engaged in discussion with his critics in seminars and in letters. He is a peerless model for young scientists.

As we educate the next intellectual generation we should convince them that they are different from their teachers only in age and experience, not in intelligence. But we must also strive for scepticism and quantitative rigour in their work.

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