

Science Policy and the Fractal Random Walk of Ants

by Tom Gregg and Giles Pickford

(This article was published by *Campus Review* on 25 February 2004. It is published now in *ATEM Matters* for the convenience of those who do not subscribe to *Campus Review*)

‘What are ants doing, running around everywhere like that?’ said the grandchild.

‘They are doing a fractal random walk’ said the grandfather.

‘What is a fractal random walk?’

‘It is a way of walking which helps you find something which you know is there, but you don’t know where it is.’

Governments and bureaucrats, looking at the daily activities of scientists, often ask the same question as the grandchild.

‘What are they doing? Why are they doing it? Is there any point in it? Where is the gain to the economy? I can’t find it in the five-year business plan’

Whales, on the other hand, are well understood and appreciated by governments and bureaucrats. They have a business plan from which they never stray. They know what they are looking for and they know where it is. As summer approaches they head off in a straight line (the geometry most loved by governments) to the vast plankton-rich watery fields of Antarctica to graze and get fat.

They leave behind them the hot dry summer and the ant colonies, whose inhabitants frantically scurry in every direction at once, hoping to stumble on something useful.

Governments appreciate the world of business and industry, which behaves like the whale and enriches us all.

Governments have never understood the fractal random walk of science. So they respond to the phenomenon by cutting back on funding, instituting numerous reviews and performance measurements, and tightening regulatory controls.

In New Zealand and elsewhere the phenomenon has evolved into a research funding system which is based on someone in ‘the centre’ measuring the work of researchers and giving each one a grade. These grades are then accumulated progressively until a University has a set of grades. Funding is then calculated on the basis of what research has already been done, rather than on what the fractal random walk might soon find in and for the future.

Possibly Ernest Rutherford would have struggled to be funded under this system – he used a fractal random walk in his method. Likewise the philosopher Ludwig Wittgenstein would not have made the grade because he only wrote one book. It did change the philosophical world; but alas there was only one book, not two.

All this unproductive behaviour, which is carried out in the name of efficiency and effectiveness, makes the work of our ant-like scientists harder instead of easier.

We once asked a priest why the Church was so slow in recognising scientific advances (Galileo, Copernicus, Darwin) and the reply surprised us.

‘Science needs to be slowed down so that it does not get too far in front of the people it serves. It must be opposed so that the people can catch up with it’ he said.

Governments behave as if they and the churches are unanimous on this point, but there is one important difference. Governments constantly state that they are unhappy about the rate of progress made by science.

This puts them in the uncomfortably dissonant position of being one of the main stumbling blocks to science, while at the same time being one of its strongest critics on performance.

The churches would never be so silly as to do that. Their position is internally consistent and well thought out. Science needs to be slowed down because it is going too fast: not because it is not going fast enough.

As the old farmer said, 'If you want to make progress you have to get out of the way and let the dog see the rabbit'.

An Example

An Australian scientist was studying a species of sponge that can be found near Point Perpendicular. The research doubtlessly would have been roundly criticised by Alan Jones and John Laws (two talkback radio shock jocks who set the policy direction of governments in Australia).

Eventually the routine fractal random walk of the scientist resulted in all the pieces of the jigsaw puzzle being put together and a chemical, related to that found in the sponge, is now preventing angiogenesis in cancer patients.

Angiogenesis is the process of new blood vessel growth. If solid tumours are to grow beyond the size of a pin head, they need to activate this process. Without angiogenesis the tumour will be starved of oxygen and nutrients and its growth will be arrested.

A public company was formed and is listed on the stock exchange. Although profits are a little way off yet, things look most promising.

It is only at this point that talkback radio starts clapping and shouting about what a wonderful thing science is.

The tragedy for science is that rowdy approval is never there when it is most needed.

It is most needed at that point in the project when the ant has emerged from the nest at the beginning of a new day, and is running around in the famous fractal random walk of science, but found nothing in the first ten minutes.