

Science for art's sake

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Hollywood's absent-minded professor, always a cliché, is now more unrealistic than ever before. Just how can biological research move forward in the modern era?

HAS 'big picture' science become extinct? Have we carried scientific methodology to a point where we stifle creativity? Is scientific research doomed to expand laterally, and has progress in scientific knowledge become merely a probabilistic event determined more by serendipity and numbers rather than the genius of the individual scientist? Today's biologist is more likely to dream of receiving a pink sheet that puts his or her \$300,000 RO1 grant in the top 14 percentile than to fantasise about wonderful groundbreaking experiments. At a time when billions of dollars are being spent to appease the appetite of the huge industry of the scientific enterprise, it is surely appropriate to evaluate, once again, our definitions of 'good' science.

Advancement in our knowledge of a field seems to come in tiny bursts after enormous investment of time and money and hundreds of papers, many of very little consequence. The goals of grand projects inevitably become more modest, even though applications are still phrased in terms of global advances to obtain funding. I am not arguing against examining the role of an amino acid in altering the desensitization rates of a receptor, but rather for doing so in the process of attaining a bigger goal. My plea is for science to be conducted in a more creative and integrative fashion.

Many of us would blame the ever-tightening financial situation for proliferation of mediocrity, perhaps rightly so. At a time when the number of grants being submitted has escalated exponentially, the money allocated for research has not. It is, therefore, not surprising that grants funded are those that are the most likely to work and that are backed up by preliminary data. There is a growing feeling that unless the results are knowable in advance, funding agencies will reject a proposal. It is, therefore, not uncommon for a principal investigator to spend most of the time and money allocated for a project on obtaining preliminary results that will ensure the funding of the next grant. Definitely not a prescription for creativity.

That, however, is not the only ailment that cripples the beast. As science has become more specialized and irrevocably separated from art and philosophy, the scientist has become more reductionist and isolated. From a time when science consisted of biology, physics and chemistry to one when we divide neurobiology

into molecular, cellular, systems and behavioural neuroscience, the individual scientist now knows more and more about less and less. Today's cellular neurobiologist knows practically nothing about the work of his or her colleagues studying behaviour and vice versa. Scientific method, as commonly defined today, is reductionistic: very little effort is devoted

integral part of the scientific process.

A third problem has to do with the hierarchical structure of science. Research has always had a whiff of élitism to it, a 'country club' mentality. Pedigree is invariably important in an individual's advancement, whether it is in terms of obtaining jobs and grants or of publishing papers in major journals. It is assumed that good laboratories produce good students and postdocs, though one would logically have to assume that a researcher from a minor university in small-town Mississippi who publishes a paper in a first-rate journal must, by necessity, be more creative than his or her counterpart in Harvard (for example), whose supervisor churns out ten such papers annually. The obvious effect this has on the careers of scientists who have failed to establish an acceptable pedigree is, of course, an issue for a separate debate. But this has also a way of stifling the progress of science. More and more universities are being staffed with postdocs from a few big-name mentors, carrying with them similar approaches and attitudes.

We need to bring back artistry and creativity to science. This does not necessarily have to be at the expense of scientific methodology. There are numerous intermediates between the dreamy and unrealistic and the emotionless and logical clichés of science fiction. Every scientist needs to have his or her perspectives broadened, and the way to do this is obvious: more interaction among disciplines. I propose that all research institutions have an open forum, a club whose membership consists of anyone interested in science. Members can then discuss their interests with physicists, chemists, biologists, economists — even poets.

A key feature of the discussions will be their lack of formal structure. Talks will consist of concepts and implications rather than experiments and controls, and any member of the audience is invited to interject with his or her own perspective. Ideas will be restricted only by logic and not by feasibility. At best, such a communal free-association will result in the development of novel ways of looking at scientific problems, and at worst scientists will receive perspectives from outside the ivory tower. □

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to integrating different levels of a problem. As a result there is a massive lateral expansion in our knowledge, with little to show in the way of new concepts and innovations. The average scientist is a lot more adept at designing adequate controls for an experiment than at developing a new approach to solve a problem. There is a tremendous reluctance not just to be speculative in discussing one's work but even to extend the discussion to the next logical step. Surprisingly, this is true even in review articles, most of which are nothing but compilations of work done in a particular area. I believe that we have made scientific criteria for the interpretation of data so stringent as to eliminate the inspiration and idealism that once were an