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EDITORIAL

Sport and Science: Olympic Musings

The Olympics are a compelling spectacle. Since the invention of the modern version of the Games, by Baron de Coubertin in 1896, the Olympics have come to signify the ultimate in international competitive sport. The events are diverse, providing opportunities for demonstrating individual talent, perseverance and discipline in little known sports, that require special skills. There are also the glamour events, the track and field sports, many of which feature the world's best known athletes, sometimes pitted against unknown performers from small countries. The Olympics celebrate both individual achievement and collective team effort, in traditionally well known sports like hockey, football and basketball. Every four years, for a fortnight, the Olympics dominate our television sets, pushing cricket, Formula 1 racing and football from the viewing agenda of sports fans. Even the journals *Nature* (5 August 2004) and *Science* (30 July 2004) have been caught in the spirit of Athens 2004, devoting several pages to the Games, albeit slanted towards an analysis of the impact of science on sports. Inevitably, the discussion has turned to the use of drugs to enhance athletic performance. In an editorial in *Science*, Donald Kennedy succinctly summarized the issue: 'What we now have is a pharmacological arms race between the detection technology of the antidopers and the inventiveness of the designer steroid mavens. It is a close contest and if past is prologue, we cannot know who is ahead at any given moment. I liked track and field a lot more before they took it into the lab' (*Science*, 2004, **305**, 573). While drug use is a clear case of science abetting athletic misconduct, technology has helped enhance sporting performance in many legitimate ways. Sporting equipment has become wonderfully sophisticated; a dramatic example, as Kennedy notes, is the fibreglass pole, which allows even vaulters of moderate achievement to easily go past records set with traditional poles. Science has also contributed greatly to the understanding of human physiology, permitting naturally talented athletes to scale amazing heights after training regimes, which dramatically boost performance. But, even here the performers push themselves to dangerous limits, prompting an editorial preface in *Nature* (2004, **430**, 602) to conclude ominously: 'In the coming weeks, *Nature* will be watching to see what records – and which athletes – are broken in the process'.

Although doping scandals have inevitably hit Athens 2004, with Indian participants among the tainted, the vast majority of athletes depend only on natural talent, total commitment to their chosen sport and years of hard preparatory work. With training becoming an increasingly specialized and expensive affair, organized state support for sports becomes necessary if countries are to realize the full potential of local talent. China, which many years ago had to be content with limited Olympic success, has propelled itself into the position of a sporting superpower by harnessing talent in a spectacularly professional manner. In marked contrast, India's collective performance is dismal, despite flashes of individual brilliance. The final ranking of nations will soon be available as Athens 2004 draws to a close and lamentably India's position will compare poorly with countries which also used to perform poorly, but have improved. For readers of this column, the sports rankings coming so closely on the heels of rankings of science in nations (*Current Science*, 2004, **87**, 273) must provoke some thought on the parameters that determine success in spheres of human activity as distant as sports and science.

My thoughts turned to the early results from Athens, even as I sat in one of the interminable committee meetings that debate the direction of science funding and priorities for investment in specific research projects. The topics were diverse, the committee large and representative of a diffuse and sprawling discipline and the discussion rambling and unfocussed. I wondered whether there was any similarity to meetings at the Indian Olympic Association, which select events and athletes for participation in major international sporting events. Are chances of success estimated pragmatically? Do the selectors have a deep intuitive feeling for the nuances of a sport or do they have a first hand knowledge of the requirements for success? Are the selectors unbiased judges of performance; or are they promoters of an agenda that institutionalises poor performance? Who will judge the selectors in sport and science?

In science success measured by any yardstick (publication counts, citation statistics, products generated or peer perception) depends on choice of research problems, intrinsic intellectual skills ('talent' in simple terms), commitment to the work at hand, abilities to generate financial and institutional support and in the case of most projects the abilities to manage students, junior colleagues and to keep senior management both happy and at a distance. The equation for success is complex, with different weights for each of these parameters; the situations being vastly different for small basic research projects as compared to the large, purposeful, targeted enterprises. A theoretical physicist pondering 'grand unification' or a mathematician seeking a proof for Fermat's theorem would clearly be a breed apart, their requirements for success completely different from the overwhelming majority of their colleagues in other areas of science. In successfully overcoming technological challenges, putting satellites into space or in generating the promised amounts of nuclear energy safely, team efforts involving very large numbers of people and an enlightened management structure are critical. Unfortunately when science is discussed in a general sense, the diversity of fields and projects is inadequately appreciated; we attempt to impose common yardsticks of management and judgement on projects with vastly different goals and outcomes. In the mood of the Olympics, a parallel can be drawn with sports. Rajyavardhan Singh Rathore's silver medal came in the double trap shooting event, which requires a special combination of individual talent, very hard work, extremely steady nerves and complete concentration. Coaching (and in his case an Australian was involved over the last few months) would have been an important factor, but it may be difficult to give weights to each parameter. In the team events, and for us hockey is a prime example, managers and coaches play a crucial role in welding a medal winning team. In science too, there are areas where individual talent must be fostered by unobtrusive, supportive and modest management. There are also many projects which require a strong and aggressive management style which brings the best out of large teams of scientists. The former would be the area we often call 'basic' research while the latter would fall into the category of 'applied' research (although, I must confess that I do not like the name).

In the area of basic research, one problem which appears to be becoming more evident is the tendency of many starting researchers to continue to work in areas (and sometimes on specific problems) picked up during their postdoctoral years, which in many cases have been spent in the West. A lifelong commitment to imported research problems is not a prescription for success. There is also a distressing tendency to focus on sophisticated methodologies, with little regard for their suitability in a specific research problem. In fields like biology the distinctions between basic ('purposeless') and applied ('purposeful') research are blurred, as the growth of biotechnology seems to have bridged the chasm between discovery and application. A favourite at committee meetings is the 'Cuban Model'; an allusion to Cuba's recent successes in producing and marketing biotechnology products. Interestingly, as I write, the Cuban tally at the Olympics stands at 2 silver and 5 bronze medals, suggesting that determination and discipline may be important parameters in harnessing talent.

Biotechnology is a field in which I have been an interested (if not detached) observer. There is an enormous desire to translate the results of laboratory research into products. Diagnostics, vaccines and drugs seem tantalizingly close in the area of 'medical biotechnology', while in the area of agriculture genetically modified crops promise to resist both drought and pests. When investment decisions are made on projects which are predominantly 'basic' research exercises, the talk turns to 'deliverables'. Scientific papers are increasingly being disregarded as a desirable outcome of a project. The managers (and indeed judges) of research are often out of touch with the realities of laboratory research; although it must be admitted that good managers need not necessarily play the game. Project monitoring committees spend a great deal of time on unrealistic discussions and invariably underestimate the scientific complexity of the research issues involved. In science it may be necessary for large coordinated projects to be driven in a manner that the distinctions between managers, coaches and players are blurred. Our abilities to identify potential champions and nurture them seem limited in both sport and science. At the midpoint of the Olympics, recalling Thomas Gray's immortal lines seems appropriate:

'Full many a gem of purest ray serene
The dark unfathom'd caves of ocean bear:
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air'.

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