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Intellectual Freedom in Academic Scientific Research under Threat

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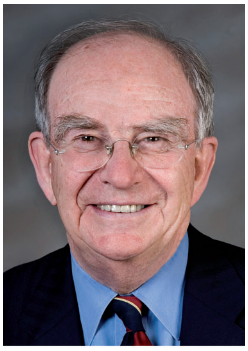

Sir John Meurig Thomas

"Research at the institute is primarily curiosity driven, which is reflected in the five sections comprising this Review" (on the oxidation of carbon monoxide). So wrote H.-J. Freund, G. Meijer, M. Scheffler, R. Schlögl, and M. Wolf in a Review in the special issue of *Angewandte Chemie* to mark the centenary of the Fritz Haber Institute (FHI) of the Max Planck Society (*Angew. Chem. Int. Ed.* **2011**, *50*, 10064). These words were music to my ears. The philosophy that animates research at the FHI also prevailed in almost all universities of the United Kingdom in former times. But this is no longer so: indeed, such has been the transformation in the attitudes of policy makers and funding bodies that it has prompted many leading academics in this country to establish a Council for the Defence of British Universities (CDBU) so as to reinstate an ethos that is still pervasive at the FHI and doubtless at many other Max Planck Institutes. Four former Presidents of both the Royal Society and the British Academy, along with the present holders of those prestigious posts, two former UK Government Cabinet Ministers, and numerous leading academics representing the sciences and the humanities are among the founders of the CDBU.

Ever since the days of Isaac Newton, university teachers have cherished the freedom to investigate any aspect of the natural world irrespective of the need to justify the possible practical importance of their discoveries. In the early 1850s, for example, the young James Clerk Maxwell became fascinated by the experimental discoveries of Michael Faraday, especially the observation that light could be "manipulated" by a magnetic field. So intrigued was Maxwell by Faraday's work that he decided to write a treatise on "Faraday's Lines of Force" as his Research Fellowship submission to Trinity College, Cambridge. The outcome of Maxwell's work led to the mathematical foundation of the phenomenon of electromagnetism. One of the consequences of the Maxwell–Faraday work is the realization that every ray of light has a magnetic and electrical component. If this were not so, it would be impossible to explain the transmission and reception of radiowaves or to account for the mode of action of devices such as televisions and telephones. Newton's Laws do not help us one iota in understanding the mechanisms of these and the other electronic gadgets now in popular use. It was Faraday's question of a possible relation between magnetism and electricity that led him to discover electromagnetic induction, which gave us the dynamo, the transformer, and the means of generating continuous electricity now used worldwide in power stations.

In the 1920s, young Paul Dirac, stimulated by the work of Heisenberg, Born, and Jordan in Germany, undertook his quantum-mechanical studies, which were motivated by sheer intellectual curiosity and the desire to incorporate relativistic features into the Schrödinger equation. Dirac's mathematical formulations led him to propose, in 1927, the existence of the positron, the first-ever suggestion that antimatter was a reality. It took another four years before the experimental proof of the positron's existence was established by Carl Anderson at the California Institute of Technology. For many decades thereafter, the positron was regarded as a novelty with little prospect of it ever being harnessed for practical purposes. Now, however, almost every major hospital in the industrialized countries uses positron-emission tomography (PET). Its many uses include charting cerebral activity and identifying stages in the growth of tumors.

It was pure curiosity that led scientists in the late 1940s to discover NMR spectroscopy; a few decades later, another noninvasive medical technique based on it, magnetic resonance imaging (MRI), was invented. In the 1950s, at Columbia University, Charles Townes became intrigued by the possibility that the population of electrons in simple molecules could be inverted. When he proposed this experiment, he was told that he was wasting his time by several notable physicists. But Townes stubbornly persevered and so discovered the maser, the forerunner of the laser. This has changed our world comprehensively. In addition, it duly led to the discovery that our nearby galaxies shine maser light upon us.

There have been many other transformational discoveries, the practical importance of which could not have been readily foreseen: X-rays, nuclear fission, antibiotics, antibodies, immunosuppressive drugs (that make spare-part surgery feasible), and the structure of DNA, to name but a few. Scientific researchers know that discoveries cannot be planned: they pop up, like Puck, in unexpected corners.

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But why is it so relevant now to recall these facts? It is because scientific research in our universities is under threat! The freedom to pursue in untrammeled fashion research prompted by intellectual curiosity is being increasingly restricted by the paladins of the research councils. Public bodies that fund academic research in the UK now tend to emphasize the perceived practical importance of the scientific research that they decide to support financially. The Chief Executive of the UK's Engineering and Physical Sciences Research Council (EPSRC), which spends some £900 million per annum on research grants, informed all applicants that, from 15 November 2011, they should identify clearly the national importance of their proposed research project over a 10 to 50 year time frame.

This edict prompted outrage among academic researchers in the UK because they felt that it violated a cardinal principle of their proven prior attitudes. Delegations lobbied MPs and the Prime Minister. In response to these protests, the newly appointed chairman of the EPSRC recently announced that the need for applicants to identify the national importance of their proposals be rescinded. The CDBU welcomed this change of heart because one of its aims is to emphasize that scientific research, as well as being subject to accountability and having economic applications, should be animated by the desire to enhance our knowledge and understanding of the physical world, of human nature, and of all forms of human activity.

No one disputes that there are several urgent scientific and technological quests that merit study in the national interest by academical researchers: production of energy and chemicals/materials from renewable resources; better

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photovoltaic systems and better industrially applicable catalysts; better light-emitting diodes and biotechnological converters are among the viable targets. But the best approach is to concentrate on identifying the talented individuals capable of proposing new ways of addressing these tasks, and to ensure that the requisite scientific training is provided in our higher educational institutes.

This raises the question of how best to secure openings for talented young people. As the eminent US chemist Allen Bard said a decade ago, the culture of academic research has shifted from evaluation based on excellence in teaching, creativity, and productivity to one based on the amount of money raised. This is a consequence of implementing a "business model" for universities: In 2003, the UK Government explicitly encouraged universities to think of themselves as a business, the primary function of which was to serve an economy that demands instant return for financial investment. It is no accident that in the UK at present, the Cabinet Minister for Universities and Science is in the Department of Business, Innovation and Skills. Moreover, UK universities are increasingly expected to generate their own funds (from patents and spin-off companies). If we think the quality of science suffers because of this approach then what, one wonders, will happen to the humanities.

It is undoubtedly mutually beneficial for scientists at universities and in companies to interact, and thereby help to foster work of national importance. But this must not be the only way forward. A very successful, but short-lived scheme in the UK that gave academics opportunities to indulge in "blue skies" research and to investigate natural phenomena out of curiosity, was the ROPA (Realising Our Potential Award) initiative. This gave academics the money and the freedom to explore whatever topic took their fancy, provided they had previously gained joint grants with private industry to pursue a mission-oriented project. Nearly half of the 1000 or so ROPAs were so potentially interesting that industry was prompted to follow up the "blue skies" investigations of the academics.

In Great Britain and most probably also in other countries, a restoration of the proven qualities of intellectual freedom is mandatory. It has contributed so much to the culture, and facilitated the economic growth and the communal well-being, of the nation.

We should recall the principles advocated by the late Max Perutz, founder and first Director of the Laboratory of Molecular Biology (LMB) of the UK Medical Research Council in Cambridge: "*Choose outstanding people and give them intellectual freedom; show genuine interest in everyone's work and give younger colleagues public credit; enlist skilled support staff who design and build sophisticated and advanced new apparatus and instruments; facilitate the interchange of ideas, in the canteen as much as in seminars.*"

Unless the continual erosion of the intellectual freedom of scholarly academics is arrested and reversed, the consequences for both the sciences and the humanities, as well as the whole society could prove catastrophic.