Women in Cell Biology

WOMEN IN CELL BIOLOGY

Confronting the Social Context of Science

Much of biological science both in academia and in the for-profit sector is done in complex group and organizational settings. Collaborative efforts are increasingly common and often result in spectacular contributions. Indeed the "NIH Roadmap" recently announced by NIH Director Elias Zerhouni provides extraordinary resources as incentive for scientific collaboration. But many partnerships do not succeed or are hampered by issues that transcend the scientific. Chief among these issues are those that fall into the social dimension of science, encompassing interpersonal conflict, poor team dynamics, and dysfunctional organizations.

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American universities do a superb job of teaching scientific and technical skills to those who choose science as a profession. While there will continue to be debate as to whether we are producing too many or too few scientifically trained professionals, those that we do train are generally thought to be reasonably well prepared to pursue their careers. Are they?

Scientists are typically well trained in the technologies and academic subjects of their discipline. However, they are missing a set of skills which handicaps them both in academic and for-profit environments. These are the interpersonal, social and organizational skills needed to practice science in a social context. They include conflict management and negotiation skills, working in and managing teams, understanding and working within complex scientific organizations, and communication skills.

Every first year graduate student can relate stories of projects stymied or collaborations hampered by principal investigators who fail to communicate clear objectives; simmering conflicts gone unaddressed and of team members who function more as antagonists than supporters. The private sector is afflicted by all of the problems encountered in academe (interpersonal conflicts, poor team dynamics, turf issues etc.) and a few of its own. As the barrier between academe and the private sector, especially biotechnology, becomes more porous, the problems will become indistinguishable.

Scientists who enter the biotechnology industry spend their first three or more years adapting with difficulty to new reward structures and new work paradigms. In academia, rewards come largely on the basis of individual achievement (although much of the work is done in teams). In the private sector, well-meaning attempts are made to reward on the basis of team performance. Under such conditions, young scientists may hoard information or ideas and use them as currency to enhance their individual status. In biotechnology especially, projects begin and end for reasons that are often opaque to bench scientists. Because scientists become intellectually bonded to projects, they often react to this experience with feelings of frustration and of being manipulated. In some cases they may avoid fully committing themselves to projects to minimize disappointment. These behaviors hamper productivity and are typically attributed to individual personality issues. In fact they are a direct result of the poor preparation that scientists receive for functioning

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as a member of a team, and of the failure of scientific leaders to anticipate and deal with the human consequences of scientific and business decisions. In short, both the members and leaders of science efforts are deficient in skills that extend beyond the technical discipline of their specialty.

> Traditionally, scientists have believed strongly that if you get the science right, everything else is irrelevant. While this view may be harmless in a scientist working by his- or herself, it is detrimental when adopted in a social or organizational scientific context and constitutes a fatal conceptual error when adopted by scientists in the private sector.

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Scholarly studies in other disciplines reveal that biological scientists are no more likely to fall into the trap of focusing only on the technical aspects of their discipline than others. Analysis of catastrophic failures in the chemical industry[1], in the space program[2] and in military contexts[3] is instructive. The principal cause of failure to learn from military disasters lies in the tendency of analysts to focus exclusively on technical and logistical explanations[3]. This narrow focus betrays a naive indifference to the roles of leadership style, command structure, and of the organization as a whole. By the same token, because the business of biotechnology is one which is deeply rooted in science, what *post hoc* analyses of success and failures there are tend to focus on the science, technology and economics, and fail to include the organizational and managerial context in which the science was applied.

It is a tribute to the individuals and organizations involved that despite managerial and organizational problems, science, and often superb science, gets done. Scientists in training will bear an enormous amount of conflict, ambiguity and heavy-handed manipulation in order to achieve their educational and professional goals. Unfortunately, in addition to acquiring superb technical skills, trainees frequently are imprinted with the same dysfunctional managerial skills as their mentors. If we take the view that work style is as important for scientific and business success as technological methods and approaches, this is a serious deficiency.

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The scope of scientific training should be increased in the service of improved communication, greater productivity and, from the perspective of the private sector, greater return on investment. Seizing the opportunity requires an explicit recognition that much current biological science is inherently a team, group or organizational activity done in the context of economic, business and social constraints. Training scientists without attention to this larger context makes no more sense than training soldiers in the use of automatic weapons without simultaneous training in teamwork and group tactics. ■

—Carl M. Cohen

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2. Vaughan, D. " The Challenger Launch Decision: Risky Technology, Culture and Deviance at NASA" Univ. of Chicago Press, 1996.
3. Cohen, E.A. and Gooch, J. "Military Misfortunes: The Anatomy of Failure in War" Vintage, 1991.

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