

Out of these detailed explorations of the social construction of cod stock assessments Finlayson concludes with the brief policy observation that better mutual respect and improved communication between subcultures with competing images of 'rationality' would have helped overcome the risks of the kinds of bureaucratic inertia and false confidence which underpinned the Canadian crisis.

Overall, *Fishing for Truth's* greatest merits lie in giving the reader an excellent historical, almost anthropological, account of the Canadian fisheries crisis. It also demonstrates the value of SSK-types of tools in helping to understand the dynamics of scientific knowledge construction, particularly when they are enhanced by an awareness of the potential 'structural' factors shaping micro-social negotiations. Despite these considerable merits, it was surprising that Finlayson did not put more effort into placing his study within the growing body of work inspired by SSK and sharing theoretical concerns close to his own. Finlayson fails to make use of a number of key writers in the field whose work is relevant to his concerns. These caveats aside, *Fishing for Truth* still provides a concise, sophisticated case study which would make a worthwhile addition to any reading list concerned with the dynamics of knowledge construction and scientific controversies.

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Reviews (continued)

Jacqueline Fortes and Larissa Lomnitz, *Becoming a Scientist in Mexico: The Challenge of Creating a Scientific Community in an Underdeveloped Country*, (University Park, PA: The Pennsylvania State University Press, 1994), x +225 pp., \$35.00/£32.00. ISBN 0-271-01018-5.

This book is an analysis, covering the period 1974-80, of an experimental programme carried out at the Universidad Nacional

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Autonoma de Mexico (UNAM) for solving the problem of training professional scientists in Mexico. The central thesis is that 'the transmission of scientific ideology (or ethos) is the key link in training researchers. Knowledge and techniques are necessary but insufficient conditions in training scientists; ideological aspects (i.e. beliefs and values) hold a predominant position'. Therefore, the authors focus their attention on the underlying ideal model in this particular socialization process, and on how that model was transmitted to and assimilated by students. A basic assumption of the institutional experiment was that in peripheral countries, the training of scientists faces institutional and cultural conditions different from (and 'adverse' compared to) those that exist in the central countries where Western science arose. Developing countries, generally speaking, lack scientific traditions. Therefore, basic scientific attitudes and values which are necessary for carrying out research activities must be acquired by individuals relatively late in their academic careers. These adverse conditions are the result of various factors, such as late development of the scientific community and its cultural dependence on foreign centres. In Mexico science did not result from internal development, it is an imported cultural product.

The authors argue that the one Mexican institution in which science has fundamentally developed is UNAM, but this is a 'university for the masses', devoted to training professionals — that is, users of knowledge, future technicians and liberal professionals. In addition, the university has been obliged to fulfil certain political duties, including the training and selection of state elites. On the way, it has been transformed into an administrative bureaucracy that handles an important budget. Hence, the scientific community has developed and survives as a minuscule elite, operating within an enormous mass university, experiencing political and student egalitarian pressures that tend to lower its academic level, union activity by the administration and the faculty, pressures exerted by the professional sector, and demands of an ever more complex administrative machinery.

The teaching programme to train students in biomedical research was the idea of a group of researchers at UNAM's institute of Biomedical Research (IIBM). Born in 1940 as the Laboratory of Medical and Biological Studies (in order to make room for a group of Spanish refugee students and followers of

Santiago Ramon y Cajal, the Nobel Laureate in Medicine), the IIBM changed course 1965. New people brought in an orientation fundamentally different from the traditional Spanish school from which the Institute's founders had come. The new orientation showed the influence of recent advances on the study of the fundamental physical and chemical processes within the living cell. During this period the Institute's structure gradually changed until it had the departments and research areas it has now: neurobiology, physiology, molecular biology, developmental biology, biophysics, biomathematics and immunology.

In the 1970s, the problems identified in the training of researchers by the core group within the Institute, triggered the new teaching programme. The personal decision to pursue a career in research was the result of random processes, and the choice of a scientific field was also random. The training of researchers was incomplete and late, after having studied for a traditional undergraduate degree (this was seen as limiting future scientists and hindering their analytical ability, their basic scientific culture and their creativity). The student was usually exposed to the influence of a single person, the head of the laboratory where he or she had fortuitously arrived. In addition, the type of science that was being produced was questioned. It was felt that, in general, research was neither groundbreaking nor particularly relevant to the needs of the country. This was attributed to a series of factors: an excessive dependence on the formative stage abroad; the organization of science in Mexico; the deficiencies in recruiting and training researchers; the manner of obtaining promotions; the division of labour; the division of work groups into hierarchies; the lack of a mechanism for cooperation and communication; and the absence of critical mass.

The programme that was eventually developed and designed by the group of researchers was based on the idea that they themselves would teach in their own laboratories. The classroom was not to be separate from the reality of research. Each student would pursue his or her studies with the aim of posing, designing and solving scientific problems in an active research environment. In contrast to what usually occurs at UNAM, groups would be small and rigorously selected. Professors were imbued with a profound sense of mystique and a desire to begin forming Mexican scientists who would be highly motivated and well trained from an early age. They saw the programme as a break from the existing academic

tradition and, therefore, as something revolutionary within the national educational system since, for the first time at UNAM, the social production of scientists would, from the outset of the undergraduate programme, be headed by researchers themselves. There was an awareness of the need for a change of attitude and a niche for the local researcher. On the assumption that they cannot compete with the large countries, it was felt necessary to carve out niches for the Mexican researchers in which their creativity could be expressed in the local context. This implied looking for good ideas, working in groups and finding relevant problems. The experimental undergraduate programme was aimed at producing a new type of researcher, one who would not only have a better scientific training but would also know how to face creatively the opportunities and limitations of the Mexican reality.

Nationalistic concerns were important initial motivations. It was thought that an effective programme for training Mexican scientists would simultaneously solve the problem of forming scientists who would be focused on problems relevant to the national society and of selecting relevant topics by eliminating the excessive dependence on foreign advice. The programme attempted to train researchers in a way appropriate to the problems and needs of a Third World country. The programme was seen as being on the cutting edge, and there were high expectations of it. But soon experience would cause the nationalist aspect of the ideology to be reformulated with regard to the importance of forming scientists who would be sensitive to the country's needs. The nationalist discourse was discarded and efforts were redirected toward training solid researchers.

In my opinion, the lack of a more extended consideration of social and political aspects of the ideological commitments involved, and of the tension between nationalism and scientism, weakens the authors' achievement. To phrase it differently, in assuming that ideology is a tool of socialization, the authors are able to describe this particular training programme in a stimulating manner they first describe the socialization of scientists ethnographically; then they analyze the manner in which ideology, theory and technical knowledge are transmitted and internalized, and then they describe how scientists work and what sort of social relationships exist within the scientific community. But they fall short of the mark in 'making sense' of this description. We are left wanting to know more of the programme's confrontation with the real world.

The programme attempted to train researchers in a way appropriate to the problems and needs of a Third World country where scientific work develops in difficult and at times adverse conditions. The specific institutional conditions of UNAM — the 'university of the masses' — and prevailing conditions in Mexico caused the programme to become closed and turn into a kind of monastic sect in which, owing to a shared mystique, invisible walls were built. Students were pressured to weaken their links to external activities that might compete for their loyalty and they were transmitted a mystique that would give them an awareness that ceased to be explicit after the early years, though never less intense.

Although their analysis has profound policy implications, the authors do not embark on a political discussion. They do not elaborate on the collective action mechanisms exerted by Mexican researchers in the 1970s, the nature, motivation, mobilization and politics of collective action at the time and the ensuing process of assimilation of the programme's graduates into the local context. We are merely informed that between 1980 and 1989 the programme trained 409 students (89 undergraduates, 212 masters, and 108 doctoral) in the biology field. I wonder what is the point of training young scientists in a developing country in an environment that is closed to external influences when the rationale for having such a programme is precisely to adapt them to those 'adverse' conditions? If the effective way to train scientists in a developing country is to encapsulate them, it would probably be better to train them altogether in the North. Socialization is constructed by a process of consensus-building, negotiations and political processes deeply ingrained in local mores and customs, but which are difficult to discover in the authors' accounts. Their tendency to neglect the political or social aspects of the local context makes the outcome of their (encapsulated) case study seem more universal than I believe to be the case. Their promising initial assumptions about different — adverse — conditions appear to be thrown overboard in the concluding pages when they say that only socioeconomic conditions are what distinguish science in developed countries from those of the Third World. A paradoxical lesson that seems to emerge from this analysis — one that can contribute to the current debate about survival strategies of higher education and research in Latin America — is that nurturing a few centres of excellence and a small cadre of high-calibre researchers,

the approach taken in Mexico in the 1970s, may not be enough to fuel a dynamic for the continued development of scientific activity.

The authors are not unaware of recent trends in the social studies of science, but they do not really integrate them into their rather traditional Mertonian framework. Although doing, like the constructivists, detailed 'ethnographic' work with a small group of scientists, in their working place the laboratory, they did not do so in order to describe how scientific facts are produced, but rather to understand the training of scientists through the transmission and internalization of an ideology, with its world-view, norms and values, analyzing what that ideology is as well as the internal conflicts that arise. Admittedly, much work in social studies of science has failed to capture many of the more subtle nuances of intellectual and material life within science. Retreating into 'thin' descriptions of laboratory practice is no solution. But fragmentary descriptions of socialization ideologies and idealizations will not do either.

I suggest that we should look carefully into the local domains of economic, social and cultural history, and learn how to better integrate them all. Only then, perhaps, will we begin to have a truer understanding of science in developing countries. I applaud the book's focus on socialization of scientists in Third World countries with the aim of contributing to the understanding of science in Latin America, but I am disturbed by the lack of a balance in the study between scientific ideology and actual results *vis-à-vis* the integration and adjustment of the new crop of scientists to the local society. Still, this is an interesting and useful book for everyone the problems of socialization of scientists. It follows some important classical research avenues which are worth exploring afresh.

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