Review
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Published by: Cambridge University Press on behalf of British Society for the History of Science
Stable URL: http://www.jstor.org/stable/4500765

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been a public-relations ploy escapes him. He insists that synthesis historiography treats natural selection as the centre of the whole evolutionary movement, even while citing books of my own which were written deliberately to draw attention to the role played by non-Darwinian theories.

Since for Amundson formalism is by definition a good thing, he cannot concede that it might have had some negative implications for evolutionism. Hence the non-Darwinian and often formalist-inspired explanations of evolution within the major groups – explanations which dominated the biology of the late nineteenth century – are virtually absent from his account. Formalists may have had something to contribute on issues such as the origin of body-plans, but they also put much of their effort into devising non-Darwinian theories of orthogenesis and neo-Lamarckism in which forces from within development drove microevolution along predetermined paths. In this area, recent historiography has revealed the negative side of formalism and has shown how it was eliminated from evolutionism by the rise of modern Darwinism. Whatever the challenge of evo-devo on the origin of body-plans, its supporters are not trying to revive the theory of orthogenesis (although they are interested in developmental constraints on the open-endedness of adaptation). By focusing solely on the evo-devolutionists’ concern with deep structure, Amundson ignores what became formalism’s most distinctive, and ultimately destructive, contribution to evolutionism. Whatever the success of evo-devo in reviving interest in a non-Darwinian approach to the origin of deep structure, it will not undermine the validity of synthesis historiography’s account of the triumph of Darwinism over the formalists’ effort to depict the whole evolution of life as the unfolding of a developmental plan.

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Most of the history of science is the history of successful science, a chronicling of undertakings which we herald as advances. Race to the Finish: Identity and Governance in an Age of Genomics, Jenny Reardon’s recent book on the Human Genome Diversity Project (HGDP), is not that. Race to the Finish provides a lively and fascinating narrative that follows the many controversies which dogged HGDP organizers and ultimately derailed their plans to reconstruct human evolutionary history by way of the worldwide sampling of the DNA of indigenous peoples.

The first half of the book situates current controversies about race and science within the history of twentieth-century biology. Chapter 2 considers the scientific controversy surrounding the 1950 and 1952 Unesco Statements on Race, the typological-population distinction introduced in 1950 by Theodosius Dobzhansky, and Frank Livingstone’s 1962 clinical challenge to an ontology of populations. Chapter 3 demonstrates the ways in which the aims of the HGDP were – contrary to reputation – continuous with neo-Darwinian approaches to the study of race formation. Here Reardon challenges the idea that, in her words, ‘population genetics demonstrated the biological meaninglessness of socially meaningful racial categories’ (p. 8). She thus departs from the prevalent view that the Unesco statements marked the beginning of the decline of race as a biological category and its transformation into a sociological one (a view which in the history of science is indebted to George Stocking, Nancy Stepan and Elazar Barkan). According to Reardon, historians’ separation of acceptably scientific approaches from those that are unacceptably ideological relies on the typological-population distinction and five related dichotomies: race/population, race/culture, classificatory/empirical, history/natural selection and phenotypic/genotypic. She argues that science and ideology cannot be so readily disentangled, because every one of these dichotomies remained contested post-1950. For example, although
Dobzhansky criticized physical anthropologists for basing racial taxonomies on ideal types, he was in turn criticized as being typological by Livingstone, who drew attention to clines and discordant traits as posing problems for the natural classification system and the population-genetic concept of race that Dobzhansky favoured.

The second half of Race to the Finish moves away from the history of science to follow HGDP organizers in their often unsuccessful attempts to respond to various critics. Chapter 4 concerns criticisms of the HGDP arising from within anthropology. Physical and biological anthropologists – like geneticists, experts in the study of human diversity and evolution – protested their exclusion from initial plans for the HGDP. Geneticist organizers responded by welcoming anthropologists’ participation in the project, but their integration of this additional expertise faced obstacles, as anthropologists resisted being relegated to an assistant role in extracting DNA samples from indigenous groups of interest. In Chapters 5 and 6 we find different criticisms arising within indigenous and African-American communities. Against the promoters of the HGDP, African-American geneticists and biological anthropologists contended that the focus on indigenous populations would not, given the great genetic diversity of African populations, compensate for the eurocentric bias of the Human Genome Project (HGP). Indigenous-rights activists, meanwhile, were outraged by the project’s stated aim of preserving the DNA of culturally threatened groups before they disappeared as distinct peoples, and questioned the commercial motives of HGDP scientists. Responding to these diverse criticisms, project organizers made matters worse by seeking to manage problems instrumentally, when what was needed was more fundamental rethinking of the project. For example, ethical provision was made to recognize community as well as individual autonomy by adding a requirement for group consent, but organizers’ assumption that anthropologist experts would identify those culturally defined groups from which it made sense to seek consent ignored the sovereign right of tribes to determine their own membership.

Dusty boxes in archives are not much help for the history of recent science, and Reardon adopts an appropriate range of alternative methods: ethnographic fieldwork at university labs, American Indian reservations, non-governmental organizations, government agencies and scientific meetings; historical investigation of the project’s internal documents and materials relevant to post-Second World War debates about genetics and race; and sociological surveys of Internet exchanges among project organizers and members of indigenous groups. Reardon’s background as a politically engaged scholar who followed an undergraduate degree in biology with graduate study in the history of science and then science and technology studies (STS) enables her to move easily between these multiple sites and to weave a surprising and seamless narrative.

Foucault’s critique of modern regimes of power/knowledge contributes to Reardon’s discussion of interactions between HGDP organizers and indigenous critics, especially organizers’ seemingly naive conviction that the pursuit of scientific knowledge is invariably a good. For the most part, however, the theory informing the analysis in Race to the Finish lies squarely within STS, most notably incorporating recent work on ‘coproduction’. Coproduction is the view that, in the pursuit of scientific knowledge, the natural order and social and political orders alike are not given but produced. Reardon’s thesis is that the HGDP was ultimately unsuccessful because project organizers failed to coproduce complementary realms of nature and society that would support the scientific investigation of the ‘new object’ of human genome diversity. The outcome might have been better had organizers realized they needed to produce, not simply enlist, anthropological expertise, or had they been willing to relinquish the science–ethics dichotomy to produce groups that could be consenting subjects as well as objects of research. Coproduction helpfully takes debates about race beyond the realist–social constructionist divide, and, as Reardon says, brings into ‘focus the intertwined epistemic and political contexts in which biological science is now asked to operate’ (p. 159). (There are other approaches: my own work adopts a pragmatic framework to accomplish similar ends.) To reassure coproduction-wary readers,
I hasten to add that Reardon’s theoretical interests in putting coproduction to work in *Race to the Finish* seldom get in the way of the telling of a good story. Indeed, I suspect that coproduction’s embrace of process and contingency helps to make this the good story it is.

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doi:10.1017/S0007087406009423

The Golem is a beast of Yiddish lore. Made out of mud and then brought to life, the Golem is able to defend its master against any onslaught. But it is also unreliable. It can go out of control and wreak wanton destruction. *Dr. Golem* is a very welcome third volume in Harry Collins and Trevor Pinch’s well-known ‘Golem’ series dealing with the nature and ironies of science and technology. The major strength of the previous two volumes was their accessibility, and on this score *Dr. Golem* does not disappoint. It follows the tried and tested formula of collecting case studies, each based on a number of main sources, linked by commentary. As in the earlier volumes, the cautioning metaphor of the Golem is candidly deployed to evoke the shortcomings and ambiguities in science. The implication is that no matter how sophisticated the science of medicine becomes there are still countless concepts, actions and effects that are contradictory and clumsy. In the view of Collins and Pinch, modern medicine has grown into a discipline that exercises the power to heal but acutely suffers blindness to its imprecision. Although the authors’ clear-cut writing makes this message palatable, answers to the big questions brought up lie buried beneath the case studies.

The eight cases considered by Collins and Pinch from the recent history of medicine are fascinating, sometimes amusing, sometimes unsettling. What unites them is the way each carries broader implications for the current state of medicine. Collins and Pinch use case studies to explore the blurring of two main identities for modern medicine, as a science and as a source of ‘succour’ (p. 2). Nowhere is this more apparent than in their discussion of what they call the ‘hole in the heart of medicine’ (p. 18): the placebo effect. With compelling clarity, they devote a whole chapter to dissecting this phenomenon and the paradoxes that accompany it. Though it is still not clearly explained by science, the placebo effect shapes much of medical practice and both doctors’ and patients’ unconscious evaluation of their encounters. As such, medicine’s stubbornness to transform easily into a ‘discourse of evidence-based science’ has implications for therapeutic encounters and the introduction of new drugs.

Subsequent chapters further explore the Golem-like character of modern medicine. A chapter on the diagnostic inconsistency among ‘real’ doctors when confronted with ostensibly innocuous things such as inflamed adenoids and tonsils makes for alarming reading. The invention of ‘new’ diseases also gets the customary treatment, especially chronic fatigue syndrome, Gulf War syndrome and fibromyalgia. The authors expertly question the commonly accepted medical wisdom of the effectiveness of cardio-pulmonary resuscitation. The current debate about the relationship between autism and vaccinations – especially the triple measles, mumps and rubella (MMR) vaccine – features in a particularly strong section. A chapter on the patient as expert uses the history of AIDS. (This last chapter is reprinted from the earlier volume on technology.)

Like their readers, the authors have intimate relationships with medicine, while medicine has both worldwide and personal missions. Throughout the volume the authors self-consciously present themselves as patients as well as sociologists. Such reflexivity is seen most memorably in the chapter on the MMR vaccine conflict, on which Collins and Pinch have conflicting views. Their volume is not, it should be emphasized, a radical assault on conventional medicine; they do...