Homei A, Worboys M. Fungal Disease in Britain and the United States 1850–2000: Mycoses and Modernity. Basingstoke (UK): Palgrave Macmillan; 2013.

Conclusion

Our aim in writing this book, apart from presenting the first history of fungal diseases, was also to contribute to the historiography of medicine. In this conclusion, rather than restate and revisit our histories of particular mycoses, we focus on crosscutting themes concerning the history of infectious diseases, the limits of the medical gaze, the history of medical specialisation and biographies of disease.

Our narrative has shown the value of approaching the history of infection in the twentieth century in terms of 'seed and soil'. Our reading of the medical record has been against the grain of the common focus on the 'seeds' – the specific causative organisms – of disease. It is no surprise that doctors' histories of infections are in this genre, after all the major trend in medicine in our period has been to define diseases in terms of their causes (aetiology), and from the middle of the century, to treat disease by targeting those specific causes with drugs, surgery or other technologies. The history of pulmonary tuberculosis exemplifies this trajectory. First, its medical name changed from phthisis (wasting) or consumption, a symptomatic definition, to TB.[1] The latter conflated pathology ('Tuberculosis') and aetiology (*Tubercle bacillus*), and approaching the disease in terms of its 'seeds' was reinforced after 1950, when antibiotics arrived as the long sought after 'magic bullets' that selectively killed the *T. bacillus* in the body. Doctors' histories of TB tended to write off pre-1950s treatments as 'unscientific' and ineffective, as they had focused on making the human 'soil' unsuitable for the *T. bacillus*, either by strengthening the body through the sanatorium regime, or removing the nidus of infection by surgery. Historians of medicine have been less judgmental and, in recovering the thinking and practices of the pre-antibiotic era, have shown the contingent nature of assessments of scientificity and efficacy, and suggested that for many patients, now abandoned treatments that aimed to improve bodily 'soil' did 'work'.[2]

The role of the 'soil' in the history of infectious diseases is implicit in Thomas McKeown's famous explanation of the decline in mortality from infectious diseases in Britain in the nineteenth century.[3] In his analysis, he discounted the influence of factors linked to the 'seeds' of infection, such the changing virulence of germs, along with medical and public health measures targeted at germs, and concluded that the principal cause of the decline was rising standards of living and improved nutrition, which had strengthened the body's soil and resistance to infection. The fact that many people whose body was infected with a specific germ did not develop disease was well known to doctors and especially with TB, as skin tests had long shown that while up to 90% of adults had been infected with the bacillus, only a fraction went on to develop the disease and fewer died.

In our discussion of fungal infections, we have also extended the metaphor of the 'soil' beyond its normal references to the individual body and its vulnerability to infection, to an ecological one that also embraces social and geographical settings, and to how these affected opportunities for the spread of infection as well as susceptibility. Our chapter sub-titles refer to particular types of 'soil' in this extended sense. Thus, for ringworm in children the 'soil' included an institution – schools, and for adults with foot infection, the 'soil' was a lifestyle – athleticism. With endemic mycoses, such as coccidioidomycosis, where the fungi were in fact literally in the soil, our larger notion of 'soil' included the social changes that brought in-migration and economic development. Warwick Anderson has recently highlighted the importance of the ecological tradition in work on infectious diseases in the twentieth century, but he shows that this expanded approach remained nevertheless predominantly 'biological', with any social and technological dimension implicit.[4] We have made the latter components explicit.

This book can be characterised as a history of diseases at the periphery of the medical gaze, or at the ends of the spectrum of infectious diseases. At one end, infections such as ringworm and thrush were ubiquitous, everyday and mostly either self-limited or self-treated, involving at most a single consultation with a doctor. This is not to deny that such infections can be chronic and hard to eliminate, even since the arrival of oral antifungal drugs. At the other end, infections such as candidaemia and invasive aspergillosis were rare and unusual, sometimes termed 'orphan diseases', and commonly fatal until recent decades.

But what can a study of these diseases at the margin contribute to our understanding of the middle, the majority and the mainstream? Above all, our analysis reminds historians that the minor, self-limiting and self-treated conditions are common across medicine and not just with infectious diseases. Illness 'ice bergs', the many episodes that do not reach

the medical gaze, were and are present across all areas and most diseases. Yet, gaze of historians has always tended to be 'above the water'. For example, histories of the 'Great Influenza Pandemic' of 1918–1919 emphasise that between 20 and 40 million people died of the infection or complications such as pneumonia, yet the average mortality rate was around 2% (varying between 1% and 10%) amongst those who suffered.[5] This rate was very high compared to the normal experience of influenza, where case fatality rates was and remains typically less than 1%.[6] Both figures make our point that the majority patient experience of influenza was and is one of recovery; with an illness of variable severity, which was and is typically self-treated and not require medical attention, if indeed, the sufferer had access to, or could afford, professional consultation. Moreover, then, as now, those likely to die of pneumonia were and are people with underlying health problems; in other words, those with weakened 'soil'.

The investigation of rare and unusual diseases highlights the importance of the adaptation of mainstream ideas and practices to novel problems, and the opportunities to 'experiment' with new methods of diagnosis and treatment. In an era when standardisation and formal protocols dominate medical practice, our study of 'orphan mycoses' has shown the variability, complexity and individuality of clinical practice and the many resources, theoretical, practical and material, that doctors drew upon, and still draw upon, in all aspects of clinical work. The ways in which uses of amphotericin B, one the earliest antifungal antibiotic drugs, has been reinvented many times exemplifies this adaptability and shows the need to think about invention and innovation as processes rather than events. The very recognition of 'orphan diseases' in part derives from novel medical and social technologies of surveillance, which have provided new types of recognition of infection, such as X-rays and immune reactions, and new attitudes to risk associated with social, economic and technological changes, such as the negotiation of thresholds for intervention in public health and with specific populations.

Marginality has been studied by historians and sociologists of science as a 'context' that stimulates innovation.[7] These ideas have been critiqued empirically and for having loose definitions of marginality and innovation, but in this study we have discussed a group – medical mycologists – who were routinely designated marginal by their professional peers and saw themselves as such.[8] At the end of the twentieth century, medical mycology remained a small and marginal field; indeed, some in medicine argued that it was often oversold, with specialists exaggerating the importance of fungal diseases as causes of morbidity and mortality. We do not want to enter this debate, but instead reflect on the development of medical mycology as a specialism. As we noted in the Introduction, historical studies of specialisation in medicine are now less teleological and more nuanced, but there remains a focus on major specialisms and what might be termed 'mono-specialists'. As we have shown, most medical mycologists were 'multi-specialists', or had a number of 'specialist practices', even in the United States where the size of agencies, such as CDC and NIH, or the foci of regionally specific infections made mono-specialist careers possible. Indeed, a feature of our story is that the tension, expected in the 1930s and 1940s, between 'botany types' and 'medical types', which can also be seen as between laboratory and clinic, did not develop.[9] Cooperation and collaboration were characteristic as roles co-existed and were combined. In part, this was because of interdependence, especially as clinicians relied on laboratory-based experts to confirm and refine their diagnoses and, then after the 1950s, for the development of antifungal antibiotics. Solidarity was also prompted by size and marginality, which meant that creating and maintaining critical mass was a priority and specialist organisations, not least ISHAM which spanned the Americas and not just North America, were pivotal in this respect. In the United States, a presence at NIH and CDC was a boon. In contrast, medical mycologists in Britain had to be content with a single organisation, the BSMM, though this effectively lobbied national and, latterly, European agencies. Needless to say, the relatively small size of the field meant that individuals were very important, as too were personal connections and networks, which were facilitated by air travel from the 1950s, which made international meetings, both disciplinary and those sponsored by pharmaceutical companies on single drugs, more common and better attended. Our focus on diseases has meant that we have not dwelt on the careers of individual medical mycologists, though the repeated mention of names of key individuals, often with many infections and in multiple contexts, is testimony to their success in combining specialist practices.

The biographical mode is now fashionable in the history of medicine, not only for doctors, scientists and institutions, but diseases too.[10] We have not termed our narratives of fungal infections biographies, but have kept with 'histories'. Roger Cooter, while appreciating the richness of much of the new biographical genre, has criticised it for tending to be essentialist and singular, taking diseases as given, rather than looking at their construction and many identities.[11] Cooter was after all making these observations in the *Lancet*, the implication of his remarks being that historians of disease need to recognise that 'modern', singular narratives are no longer tenable in 'the face of contemporary impressions of fragmentation and the collapse of universal meanings'.[12] Our study supports this view. For example, consider the many views put forward on how to explain the rise in the incidence of fungal infections in the twentieth

century. Some doctors maintain the increase was real and material, some said that it came from new conceptions of what constituted an infection, others said it was product of new medical technologies of surveillance and diagnosis, and others that it was iatrogenic. To these views can be added claims that the apparent rise came from changing public attitudes to infection and expectations of medical power. Our conclusion is that all the above forces were in play in the rise of mycoses, shaping, not just epidemiological patterns, but experiences and meanings; hence, despite the subtitle of this volume, over the twentieth century, mycoses can be seen as paradigmatic postmodern diseases.

Footnotes

1 Worboys, M., *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900*, Cambridge, Cambridge University Press, 2000, 193–223.

2 Such assessments have proved controversial, see Wilson, L. G., 'The historical decline of tuberculosis in Europe and America: Its causes and significance', *J Hist Med Allied Sci*, 1990, 45(3): 366–396; Bryder, L., 'Correspondence', *J Hist Med Allied Sci*, (1991) 46(3): 358–362.

3 McKeown, T. and Record, R. G., 'Reasons for the decline of mortality in England and Wales during the nineteenth century', *Population Studies*, 1964, 16(2): 94–122; McKeown, T., *The Role of Medicine: Dream, Mirage, or Nemesis?* Oxford, Blackwell, 1979; Rosenberg, C. E., 'Pathologies of progress: The idea of civilization as risk', *Bull Hist Med*, 1998, 72(4): 725–726.

4 Anderson, W., 'Natural histories of infectious disease: Ecological vision in twentieth-century biomedical science', *Osiris*, 2004, 19: 39–61.

5 Johnson, N. P. A. S. and Mueller, J., 'Updating the accounts: Global mortality of the 1918–1920 "Spanish" influenza pandemic', *Bull Hist Med*, 2002, 76(1): 108–115.

6 Taubenberger, J. K. and Morens, D. M. '1918 Influenza: The mother of all pandemics', *Rev Biomed*, 2006, 17: 69–79.

7 Mulkay, M. J., *The Social Process of Innovation*, London, Macmillan, 1972.

8 Gieryn, T. F. and Hirsh, R. F., 'Marginality and innovation in science', *Social Studies of Science*, 1983, 13(1): 87–106 and responses *Soc Stud Sci*, 1984, 14(4): 612–614.

9 On the history of laboratory and clinic see Study, S., 'Looking for trouble: Medical science and clinical practice in the historiography of modern medicine', *Soc Hist Med*, 2011, 24(3): 739–757.

10 Reverby S. M. and Rosner D., ' "Beyond the great doctors" revisited: a generation of the "new" social history in medicine', in Huisman F. and Warner J. H., eds, *Locating Medical History: Stories and Their Meanings*, Baltimore, Johns Hopkins University Press, 2004, 167–193; Linker, B., 'Resuscitating the "Great Doctor": The career of biography in medical history', in Söderqvist, T., ed, *Poetics of Biography in Science, Technology, and Medicine*, Aldershot, Ashgate Press, 2007, 221–239.

11 Cooter, R., 'The life of a disease?', *Lancet*, 2010, i: 111–112.

12 Ibid., 112.

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