A dose of Dr Darwin

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Why We Get Sick: The New Science of Darwinian Medicine*. By Randolph M. Nesse and George C. Williams. *Times Books/Weidenfeld and Nicolson: 1995. Pp. 291. $24, £20.*

WHERE I live, a few hundred metres from the US Centers for Disease Control (CDC), I opened the local paper recently to find news of their report that in Atlanta 27 per cent of the cases of *Streptococcus pneumoniae* are resistant to penicillin, an order of magnitude higher than the national rate. Why the difference? No clue, really. A few days later, a team of spacesuit-clad CDC virologists sped to Zaire to examine a so far punctate explosion of Ebola, a horribly destructive virus that helped to inspire the recent movie *Outbreak*. If this seems a case of life imitating art, it is only one of many in the offing.

What these two unpleasant pieces of news have in common is a new consciousness of how infectious organisms work. It could have come many decades ago, if physicians and medical scientists had understood the simple ideas developed in this lively, informative book. The 'new' consciousness sees microbes as evolving. With the aid of what doctors call the retrospectoscope, it seems obvious. Indeed, if Paul Ehrlich, Robert Koch, Alexander Fleming and other early explorers in the jungle of infectious disease had packed a copy of Darwin, their nightly reading of him might have changed the course of history and prevented much unnecessary suffering. Because of course, as we see today, bacteria and viruses are trying to make a living like the rest of us, and when they stumble upon a new way of doing that — moving to humans from other primates, say, with a change in virulence, or degrading penicillinase, or resisting AZT — they are going to keep doing it. And as natural selection shapes the odds among them, they are going to do it better and better.

The shame of it is that if medical students had been made to study Darwin — and remember, they could have started in 1859 — the healing professions would have long since been imbued with a knowledge of nature that might have made a difference. The irresponsibility with which penicillin was distributed throughout the mid-twentieth century was not just likely to produce resistant organisms, it was certain to do so. Failure to see that was very like the failure, a century earlier, to notice that childbed fever was being spread by obstetricians — a decades-long lag in the adoption and application of a principle of science.

As for our new vigilance regarding emerging viruses, well, any evolutionist can tell you that the microbes have barely begun to fight, while we have barely begun to take their evolutionary dynamics seriously. A truly Darwinian epidemiology would be looking for new and newly virulent viruses behind almost every felled tree in the shrinking tropical forest. It is humbling to wonder what might have happened if we had had an early-warning surveillance apparatus in place to notice adaptive trends in the immunodeficiency viruses when they were just starting to be on the move evolutionarily. In this Darwinian 'arms race', with our current level of vigilance based on a pre-Darwinian consciousness, we are likely to be surprised again and again.

Randolph Nesse, a physician who teaches at the University of Michigan Medical School, and George Williams, a professor at the State University of New York and one of the leading evolutionary theorists of our time, have written their book in an effort to prevent more such surprises. It does not have great scholarly or scientific depth, but it is intended for a general audience, not a scientific one. It is a needed preventive measure against the enduring, endemic nineteenth-century consciousness about nature that pervades medical thinking near the turn of the twenty-first century — a vaccine, one might say, against the lulling delusions of pre-Darwinian thought. Although Nesse and Williams did not originate the field of evolutionary medicine, they have helped to integrate and advance it, and with this volume they give both physicians and lay readers a chance to remedy, quite painlessly, the ignorance of evolution that expensive educations have usually left them with.

Resistant bacteria or parasites and 'hot' emerging viruses are only the most dramatic puzzles that evolutionary medicine could have helped us solve sooner. Would post-war paediatricians, at the peak of their persuasiveness, have made a blanket recommendation against breast feeding if they had had the slightest evolutionary perspective? Laborious exploration of the immunological and

DRAWING from a Tibetan medicine manual showing the placement of 'fire tips', hot iron rods, used in the treatment of injury. The picture is taken from *Caravans of the Himalaya* by Eric Valli and Diane Summers. The authors spent two years with the Dolpo-pa, a nomadic people who live between the high peaks of the Himalaya and the Tibetan plateau Chang Tang. With the help of many outstanding colour photographs, they recount their adventures among this fascinating civilization while exploring its history and traditions. Thames and Hudson, £36.

* UK title: *Evolution and Healing.*

anti-allergenic properties of human milk has been of value, to be sure, but a knowledge of the functional history of lactation could have saved women and babies a lot of pain while these explorations were under way. Would the obstetricians of the 1950s have recommended 'twilight sleep' as the best way for a woman to go through childbirth, reluctantly acknowledging the 'naturalness' of birth only after two decades of patients' demands, if they had seen human delivery in its evolutionary context?

The consciousness now forming about chronic mid-to-late-life degenerative disease is bringing medical thinking into line with another kind of evolutionary reality. These diseases — atherosclerotic cardiovascular disease, diabetes, alcoholism, hypertension and several common cancers — must be increasingly thought of as 'diseases of civilization'. They are the great sources of morbidity and mortality in the industrialized world; rare or unusual in the kinds of societies in which we spent most of human history (even after correcting for age and the impact of infections); and often demonstrably the result of our pervasive, ingrained and yet quite novel living habits. In evolutionary terms, there is a discordance between the genome evolved in adaptation to a radically different environment and the new metabolic conditions in which we have now steeped those genes. Not surprisingly, they have not adapted to this sudden change.

I knew that medical consciousness was changing when I heard a renowned physician-scientist, an authority on the genetics of lipid disorders, say in a lecture that it is not "natural" for humans to have cholesterol levels in the mid-200s (milligrams per decilitre). But he went on to cite average levels in Japan as his evidence. American–Japanese differences are of interest, but the evolutionary perspective demands a much broader look at different types of human societies. Such a look strongly suggests that a serum cholesterol of 190 is not natural either, and that we may some day be targeting the mid-100s.

Of course, no mere theory, even bolstered by cross-population data, can clinch a piece of clinical advice; there is evidence that low cholesterol, for example, may have a medical downside. But theory can suggest randomized controlled trials and laboratory experiments that otherwise might not be done. Could truly low salt intake — less than a gram a day — prevent hypertension even if there is no dose response in a higher range? Could letting a fever, within limits, take its natural course make life more difficult for certain common bacteria? Could too many ovulatory cycles be the key to understanding major gynaecological cancers? Could the hormones in human milk help lull a baby to sleep? None of these questions can be answered by evolutionary analysis, but each of them is strongly suggested by such analysis.

What Nesse and Williams, along with S. Boyd Eaton, Matthew Kluger, Paul Ewald and others in this exciting field, are trying to tell us is that evolutionary theorizing points to hypotheses that we otherwise might not even think of. They are not trying to substitute theory for experiment, but to accelerate the process by which experiment leads to clinical knowledge. The preventable mistakes of the past, due to ignorance of evolution — sometimes pig-headed and 'principled' but usually just lazy — should suffice to convince us that they are right.

But perhaps even more important than the suggestion of specific hypotheses is the change in consciousness that medical scientists need. The Bohr model of the atom did not change workaday chemistry overnight, and it has been a long haul from the identification of the structure of DNA to the methods that discovery now brings to the street-corner clinic. Subtler still is the way in which quantum theory has slowly but surely pervaded and altered practical physics. But in the case of evolution the delay has already been inexcusably long. It is high time Hippocrates gave Darwin his due. □

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