Book Review by Michael Ruse

Robert L. Perlman, *Evolution and Medicine*, Oxford: Oxford University Press, 2003. Xiii+162 pp. $98.50 hb.; $49.50 pb.

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Evolution has never been a value-free idea. Ultimately, it has always been all about us. It started in the early Eighteenth Century as an epiphenomenon on the new philosophy of progress. The Ancient Greeks did not really have an idea of historical change and certainly not one of upwards climb. Plato's *Republic*, for example, saw rise and development and then decay and decline. People are often surprised that, having built an ideal state, then at the end of the book Plato sets about letting it fade and whither. This was bound to be. For him, this world of ours is one of change and lack of permanence. Nothing lasts, not even the best. At most, history is like a sine curve, up and down endlessly. True stability is to be found only in the rational world, the world of Forms.

Christianity introduced a sense of history and made us humans the focal point. God's creation led up to us and from then on what happens is the story of humankind. But note that, for the Christian, humankind is fallen – it is tainted with original sin, and there is nothing that we unaided can do. To think otherwise is to commit the "Pelagian heresy." We can be saved only by the sacrifice of Jesus on the cross. The blood of the Lamb buys our salvation. We must put ourselves in the

hands of Providence. By the beginning of the Eighteenth Century, however, people were sufficiently impressed by the advances in science and in political thinking and the like that they were prepared to go it alone. Humans unaided can improve life – science and technology, medicine, education, politics and more – and God is unneeded. From humble starts, we can progress up to a better state and beyond.

Almost at once, those who embraced this philosophy – notably the French savant Denis Diderot – read the idea into the organic world and then in a happy circular fashion read it right back out again as justification for their beliefs in the social doctrine! Organic evolution was thus about the climb up to our species – monad to man, as they used to say. It was this vision of evolution that persisted right down to Charles Darwin and his great work, *On the Origin of Species*, published in 1859. And the fascinating thing is that, visionary as he undoubtedly was, Darwin himself embraced the old progressionist view of evolution. The final words of the book spell it out.

> It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the external conditions of life, and from use and disuse; a Ratio of Increase so high as to

> lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

Darwin writes here of "higher animals," but let there be no mistake, he is talking about us, as his next great book, the *Descent of Man* (published in 1871) makes very clear.

All about us! And here we have something of a paradox. If evolutionary theory is all about us, and if it started life as an epiphenomenon on the back of social views about progress – which have always had human health and wellbeing front and center – then wouldn't you expect that evolutionary theory would have been grabbed at once by the medical profession and used to its own ends? I don't know exactly how, but that's the challenge and opportunity not the deterrent. There are good reasons why you might think that something precisely like this would have happened. On the one hand, the Darwin family was a medical family. Grandfather Erasmus was not only a physician – he was so good that poor old crazy George the Third begged him to come to London and work at court (he didn't and so missed out on a peerage and so the *Origin* was written by plain Mr Darwin and

not Lord Darwin of Litchfield or some such thing) – but he was one of the early and best known of the evolutionists.

> Imperious man, who rules the bestial crowd,
>
> Of language, reason, and reflection proud,
>
> With brow erect who scorns this earthy sod,
>
> And styles himself the image of his God;
>
> Arose from rudiments of form and sense,
>
> An embryon point, or microscopic ens!
>
> (Darwin 1803, 1, 11, 295-314)

Erasmus Darwin made no bones about the way in which he tied his biology into his philosophy. This idea of organic progressive evolution "is analogous to the improving excellence observable in every part of the creation;... such as the progressive increase of the wisdom and happiness of its inhabitants" (Darwin 1794-96, 509).

On the other hand, by 1859 medicine was in a crisis state. Something had to be done. The Crimean War was recently finished and what a mess up that had been from a medical point of view! Far more people died of disease in hospital than on the battle fields. Had it not been for Florence Nightingale and her squad of dedicated women the story would have been far worse. As part of a general reformation going on, trying to take Britain from the eighteenth century and face it towards the twentieth – major efforts were needed in other fields likewise, for example sanitation – a number of talented men and women were working flat out

to upgrade education, medical training, engineering, the military, local politics, and much more. One of the leaders of this group was the self-styled Darwin's bulldog, Thomas Henry Huxley. He was primarily concerned with higher education – he became dean at the newly founded London science university, today Imperial College. Huxley, who had trained as a doctor – unlike Darwin who dropped out after two years and turned to a career in the Church! (He dropped out of that too) -- was much concerned with biological education. He himself was an anatomist but he knew also that physiology was a vital part of the equation. He knew also – he really was a very good university administrator (they called him the "General") – that if you are going to succeed in building a discipline in a university then you need patrons. Someone has to be willing to pay the cost.

Huxley turned to the school teachers for anatomy. He argued that the young student didn't really need Latin and Greek for today's world, but they did need hands on practical training. What better training than cutting up worms and frogs and rabbits? He Huxley would train science teachers and in turn the teaching profession would provide paying trainees and pressure the government for support. (To this end, Huxley ran for and sat on the first London School Board. One of his better-known students was the future novelist H. G. Wells.) For physiology and embryology (as well as anatomy, of course) Huxley turned to the medical profession. "You need to stop killing people and start to cure them. To do this, medics need a proper foundation of biological science on which they can then build their practical training. I will give them the foundation if you send me your students and if you support me." The medical profession responded enthusiastically – apart from anything else this would be a good way to shore up

the profession and exclude pretenders like chiropractors – and this is the way of British medical education to this day. First the theoretical science and then the practical training.

So what happened to evolution in all of this? It got pushed out and excluded! Apart from the fact that it might be a bit risqué for school teaching use, Huxley just couldn't see how it would cure a pain in the belly. So he virtually ignored it entirely. I once went through four sets of very detailed lecture notes of Huxley's students and, in a hundred and sixty lecture course, evolution got less than half a lecture, if that. He just kept it out. I should say that Huxley wasn't entirely blameless on this. Darwin's mechanism of natural selection demands an adequate theory of heredity. This was not provided in the *Origin* and indeed, as is well known, did not become available until the beginning of the twentieth century when the work of the Moravian monk Gregor Mendel was discovered and the science of genetics was able to get underway. So in a sense, at most a truncated theory of evolution was available for people like Huxley. But also, if blame is to be handed out, Huxley deserves it. He just wasn't interested in using evolutionary theory for practical ends because he already had it down for another end. He, with some good reason, saw traditional Christianity as one of the biggest obstacles in the way of the reforms that he and his fellows were about. As today, any sensible proposal for human betterment finds a host of fanatical religious believers arguing that it should not be – it is impossible, it is against God's will, and it stands in the way of the profits of the rich and comfortable. The aristocrats and landowners of Victorian Britain wanted nothing to do with reforms. And Christianity backed them up. So Huxley was looking for a secular alternative and he found it in evolution – a

progressivist evolution leading up to humankind. The theory of descent with modification became a kind of metaphysical world picture rather than a tool of scientific and practical understanding.

So, what happened next? It is useful to go back to a distinction first made by Aristotle, between proximate causes and ultimate causes (what Aristotle called final causes). Proximate causes are immediate, material, efficient causes. Why is the glass broken? Because the cat knocked it down onto the floor. Ultimate causes refer to ends, to intentions. What is the reason for the lip on this teapot? To stop it from dripping when it is poured. Thanks to Darwin's mechanism of natural selection, evolution is very much an ultimate cause type of science. There are no intentions but there are lots of ends. What is the end, the purpose, of the funny plates along the back of the dinosaur the stegosaurus? They exist in order to provide temperature stability – they dissipate heat when the animal is hot and they catch the sun's rays when the animal is cold.

Medicine as it developed was very much a proximate cause sort of science. Why do I have a pain in my belly? Because of an ulcer. Why am I covered in red spots? Because I have measles. Why have my periods stopped? Because I am pregnant. So overall, it is perhaps no great surprise that, even as evolutionary thinking started to develop in the twentieth century – culminating with the work of the "population geneticists" around 1930 who showed how Darwinian selection and Mendelian genetics combine to give a picture of life's history—medical interest was minimal. The closest anyone got to anything was the rise of the eugenics movement, something that was intimately tied to the development of genetics.

(Much of the funding for genetics in the early years came from two, less-than-prestigious sources: eugenics and agriculture. I taught for many years at a university founded on an agricultural college. To my surprise, I found we had all of the major genetics journals from the first day of their publication.)

Finally by the 1950s, things started to change. Major breakthroughs came in England, from geneticists who were starting to look at human issues. A major reason for this was the need of funding. A great deal of money came from the Nuffield Foundation, something based on the fortune of a car manufacturer who was the British equivalent of Henry Ford of Detroit. Since the Foundation existed to support medical research, the inventive evolutionists trimmed their sails according to the wind, and did fundamental work on the genetics of diseases in populations. But cutting a long story (not very!) short, the birth of evolutionary medicine as we know it today had to wait until the 1990s, when we got the fruits of the collaboration between the leading American evolutionary biologist George C. Williams – who in 1966 wrote one of the seminal works on evolutionary theory, *Adaptation and Natural Selection*, and the American physician Randolph Nesse, an academic and practicing psychiatrist. Technically, it would be incorrect to say that their work *Why We Get Sick: The New Science of Darwinian Medicine* proclaimed a new paradigm, for their thinking was firmly located in the already-existing paradigm of Darwinian evolutionary theory (brought up to date by Mendelian, now molecular, genetics). But sociologically it was a new paradigm for it was announcing to the world, particularly the world of medicine, that a whole new approach was needed for understanding health and disease. It was not a question of giving up proximate-cause thinking, but of embedding it in ultimate-cause

thinking. Unless one treats of the human body as an evolved entity, one is missing half of the story – a half that might, in fact, have significant implications for medical practice and for human wellbeing.

Like most new paradigms – for let us call it that – progress has been slow and not always gradual. But increasingly there are those who are listening to the message. Notable has been the production of textbooks on the subject: *Evolution in Health and Disease* by Stephen Stearns and Jacob Koella and *Principles of Evolutionary Medicine* by Peter Gluckman and co-writers (Alan Beedle and Mark Hanson). Once you get to that stage you realize that you are making some advance. And now that we are getting to what one might call at least the second stage we have the excellent little primer *Evolution and Medicine* by the distinguished academic physician Robert L. Perlman.

I take it that this is a book with a purpose. It is not very long and it is not very technical. Only occasionally did this non-medical reviewer have to resort to Wikipedia to find the meaning of terms! It is clear – oh gosh, is it clear, this man must have been a wonderful undergraduate teacher – and comprehensive, authoritative without being condescending. The author tells us that he wants to reach a broad audience – physicians, students, related workers – and if there is any justice in this world, he will. I would hope that it might become simply standard reading for just about anyone interested in health care. My worry is founded on the tragic refusal of so many Americans to accept the truth of evolution. The university at which I used to work also had a college of veterinary science. If you wanted to find the evolution deniers on campus, you went there first. I suspect that this is a

frightening phenomenon that can be generalized. The mega-churches of evangelical America are packed with medical professionals. If, because of religious prejudice, there is opposition to Perlman's book and what it represents, then that is yet one more reason why the New Atheists, crude and offensive as they often are, might well have a point.

Evolution and Medicine trots at what is necessarily a brisk clip through the main topics, illustrating points with specific examples. (This latter point I think is a real strength. It makes the subject come alive.) We start with a general introduction to the topic ("Evolution and medicine") telling us about the theory of evolution and why humans are open to disease. Next ("Human demography, history, and disease") we get some background to the human species taken as a whole – population growth, death rates, and that sort of thing. Following this ("Evolutionary genetics") comes a general discussion of genetics, particularly at the population level – superior heterozygote fitness and such topics, the things that the great geneticists of the twentieth century articulated and illustrated. (The Nuffield Foundation investment really did pay off.) Now ("Cystic fibrosis") we have an example to make clear such topics as the ways in which genes make their effects known at the physical (phenotypic) level. Aging ("Life history tradeoffs and the evolutionary biology of aging") is the next topic. Obviously this is of major medical importance (says this reviewer now in his eighth decade with feeling) but it is also an area of great conceptual interest to evolutionists as such. George Williams first made his mark as a scientist with his thinking on this topic.

I guess it would be hard, especially in this day and age, to avoid the topic of cancer. (I say this day and age because I presume that, say, in the Middle Ages most people died before it could become a big issue. How many men lived long enough to get prostate cancer, for instance?) I think more than any, this chapter ("Cancer") brought home to me how difficult some of these subjects are, in the sense of how difficult to know the various causes before we can even think of treatment. I don't mean in the sense of giving up but that sometimes simplistic slogans like "winning the war against cancer" are not always tremendously helpful. The next three chapters deal with attacks by other organisms on the human body. First ("Host-pathogen coevolution") there is a more general discussion of how one organism can infect another and what evolutionary consequences this has for both sides – one trying to make itself at home and the other usually very reluctant to offer hospitality. Next ("Sexually transmitted diseases") comes a survey of what we know about what used to be known in my youth as venereal diseases. There is barely a reference to the social factors here, but I would have thought that there is scope for a major discussion of how culture – religion and the like – can get involved in medical issues. I wonder how many people have suffered and died – and infected – because of the fear brought on by religious taboos. Finally of this group ("Malaria") we get a discussion of malaria and what is known of its causes and its transmission and persistence and so forth. Expectedly sickle cell anemia makes an appearance here.

So, moving towards the end, we get coevolution ("Gene-culture coevolution: lactase persistence"). Here is a fascinating discussion of the human move to agriculture and the use of dairy animals and our evolution to be able to use their

products – milk – in our diets. Charles Darwin's adult-long history of illness has been an ongoing mystery, with some favoring a psychological solution and others a physical solution. A recent hypothesis is that he might have been suffering from lactose intolerance. In other words, when he went off to take the water cure, his improvement in health was not a function of having cold water squirted up his rectum (I am not joking) but that he was taken off the cream-rich diet that we know, from his wife's set of recipes, was the normal fare of the rich, upper-middle-class Darwins. When he got home and started gorging to make up for lost meals, he fell sick all over again. The final chapter ("Man-made diseases") looks at the ways in which we are killing ourselves through our eating habits and exercising (or rather not exercising) and so forth. Speaking as one who is at least twenty-five pounds overweight, whose fish and chips and mushy peas (no prizes for guessing that I am English-born) lie beneath a two inch layer of salt, and who looks longingly at the clock for the moment when it is time for the first drink of the day, I found this chapter uncomfortable reading. A bit mean, I thought, to end such a splendid book with a direct attack on me!

What's missing? I am a philosopher so as you can imagine I would have liked a bit more theoretical discussion about testing and about concepts. For instance, does evolution shift our thinking about what constitutes a disease? If those of our would-be ancestors who got temperatures when infected tended to survive and reproduce better than those of our would-be ancestors who did not get temperatures, how now should we regard a high fever? This and like topics are touched but really just in passing. I would have thought that they merited a chapter in their own right. But my gloomy experience is that most of the world

gets on pretty well without too much worrying about the things that concern me. So let me not end on a down note. Buy and read this splendid book. Then make sure that all of your students do too. Although I do fear that at the ludicrous price being asked for this book by Oxford University Press, the only people able to afford it will be consultant surgeons and university administrators.

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