

Book Review

Spillover: Animal Infections and the Next Human Pandemic

David Quammen (Bodley Head, 2012)

Tom Marsh

marshtom@gmail.com

David Quammen's latest book is about zoonoses – the opportunistic pathogens that have leaped from a “nonhuman animal into a person”, and caused an infection. Human bodies are a “marvellous target for any organism that can adapt itself to invading us”. The seven billion individual members of our profuse and profligate species have a total biomass of something like 340 billion kilograms (Quammen gives this figure in pounds, being American), and he quotes Edward O. Wilson's estimate that *Homo sapiens* has already exceeded by perhaps as much as 100 times the biomass of any large wild animal species that ever existed on land. We are an outbreak. Our ubiquity means that we come into intimate contact with a huge range of animal species, both wild and farmed. Some of these interactions have grisly repercussions.

Pathogens such as polio and smallpox are pathogens that evolved to infect only humans, and hence were vulnerable to the vaccination programmes that have reduced or eradicated their impact. By contrast, the human infectious diseases that cross (or have crossed recently) from animal hosts present a different challenge. Even a universal vaccination programme targeting all the human populations exposed to a particular zoonosis would fail to address the issue of the residual pathogen within the animal hosts, breeding away out there in the treetops or swamps. An early step towards preventing the spread of such a zoonosis would probably require, as a necessary condition, the identification of the particular animal species that is acting as host. Some zoonoses are more complicated still, and have intermediary “reservoir” species, that may be able to amplify the virulence of the pathogen. This is why one of the most troubling facts about the Ebola virus family is the on-going mystery surrounding their host

animal (or animals). Ebola has proven to be a virulent yet sporadic pathogen, killing hundreds of people over the past fifty years. The author's discussion of a key aspect of the disease - why are the outbreaks of Ebola so devastating, yet so limited in scale? – gives insight into the more general patterns of transmission and virulence of all zoonoses. Another intriguing side-branch of the topic (or is it?) concerns the devastation that Ebola viruses wreak on gorilla populations, and the implications this has for a species already threatened by ecological pressures.

Quammen's reportage and analyses are convincing. Partly this stems from his immersion in the topic. He interviews the key players, both scientists and survivors, and he travels to the relevant sites, taking part in field work. With Ebola, this meant heading to a forest in Gabon to count gorillas, a location where “Ebola virus is not in your habitat. You are in its.” (The italics are the author's, and very evocative they are too). He celebrates the work of the many brave individuals who are involved in zoonosis research, one of the few scientific endeavours that retains unavoidable dangers to one's own health. The stories about these good guys are hugely compelling. Of course, from a dramatic point of view, Quammen was spoilt for choice by a most nefarious cast of villains. One gets a frisson just browsing a list of the pathogens under discussion: Ebola, Marburg, SARS, HIV, H5N1 influenza, Nipah, Hendra – modern bogeymen all. What quickly becomes clear is that, when it comes to virulent disease, the public perception and the reality can be widely divergent. The longest - and possibly the most original - section of the book concerns the origins and progress of HIV1. En route to debunking several widespread and persistent myths about the retrovirus, Quammen provides

a convincing narrative version of the crossover event and its aftermath, the tale of how HIV1 leapt from a primate host to a human early in the twentieth century.

Quammen has written a very persuasive sort of book - a snapshot of current scientific understanding, a polemic, and a vivid recreation of key moments in zoonotic history - all delivered in a conversational, no-nonsense idiom. He is a marvellous storyteller; his subject provides a prime source of fascinating stories, because it encompasses the interaction of science, medicine, politics, ecology and plain old-fashioned human suffering. "Pinpricks of light against a dark background" is how Quammen describes the current scientific understanding of Ebola virus.

Other enigmatic outbreaks covered include the Hendra infections in Australia, and Nipah in Bangladesh. Revealing here the putative identity of their host animals would dispel the suspense that the author stylishly develops and exploits. Suffice to say that you are relatively safe in the North East of England, but should nevertheless beware of spending time in caves, and avoid drinking sweet sap tapped from trees. Spillover is fascinating and terrifying, often simultaneously, and should be read by all potential zoonosis targets. This means you.

Dr Tom Marsh has recently taken up a consultant post in Dorchester, but we are pleased he has agreed to be a corresponding member of the Editorial Committee.