Theory blames major human infectious disease on agriculture

By Jamie Rothenburger

A small subset of human infections diseases are classified as “crowd diseases.” These include smallpox, measles, plague, tuberculosis, flu and whooping cough. Crowd diseases have similar characteristics, including an acute clinical course with easy transmission between people and two possible outcomes: recovery with establishment of long-term immunity or death.

To avoid snuffing itself out, this type of disease requires large populations of people in relatively close contact. Crowds have sufficient numbers of people who have not yet contracted the disease and gained immunity. The crowd disease is sustained by spreading among pockets of people in an area before circulating back through previously affected regions when there is a group of susceptible young people. Scientist Jared Diamond and colleagues propose that crowd diseases are directly related to domestic animals.

It wasn’t until 11,000 years ago that people domesticated animals and developed agricultural practices. Animals such as pigs, horses, sheep, goats and cattle helped these societies transition from small groups of hunter-gatherers to a more stationary way of life. For the first time in human history, substantial population growth, cities and crowds followed the acquisition of reliable protein sources in the form of meat and milk.

It is Diamond’s theory that animal agriculture provided a large, close-knit human population to allow crowd diseases to emerge, while large groups of domestic animals living in close association with people provided the source of these infection agents. The animal germs may have passed directly from the domestic animals to people through repeated, frequent contact. As well, domestic animals could also have functioned as a mixing vessel for infectious agents found in wildlife and passed them along through their close contact with people.

Whichever way they arose, these germs successfully transitioned from their primary animal focus to specifically targeting people. Once established and woefully unencumbered by the modern infection control methods of quarantine, sanitation and vaccination, crowd diseases changed the course of human history.

Historians often consider the specific role infectious disease has played in shaping major historical events. Among these, the most well known is the European conquest of North America. Infections such as smallpox swept through First Nations populations well ahead of invading armies. Untold numbers of these people succumbed to Old World illnesses to which they had no immunity. With their populations decimated, Europeans invaded and colonized.

Diamond’s intriguing microbial history lesson also highlights shocking knowledge gaps. Specifically, he points out that we know little about the specific origins of many important human infectious diseases. This is problematic because reservoirs could be ticking along in nature without our knowledge.

A solid grasp of precisely which animals these crowd diseases originated from could inform present-day monitoring efforts for emerging diseases. It might also provide clues as to how new germs develop the characteristics of a crowd disease, including efficient transmission between people.

The germ theory of disease, the discovery of antibiotics, widespread vaccination and eradication of smallpox have allowed civilization to enjoy a short lull in the importance of infectious diseases. However, we are currently in an age of unprecedented infectious disease emergence, mainly from wildlife reservoirs. It might be pertinent to reflect on and further study Diamond’s take on disease emergence while continuing to look forward to the next big threat.

For more on this fascinating topic, read Diamond’s book, Guns, Germs and Steel: The Fates of Human Societies.


Dr. Jamie L. Rothenburger, DVM, MVetSc, DACVPs
Department of Pathobiology, Ontario Veterinary College
University of Guelph
50 Stone Road, Guelph, Ontario, Canada N1G 2W1
e-mail: jamie.rothenburger@gmail.com