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Carl Zimmer
AIR-BORNE
The Hidden History of the Life We Breathe

Good day and welcome to IAQ Radio+ episode 756 blog. This week we welcomed Carl Zimmer, author of Airborne to discuss his important book on the aerobiome and airborne disease transmission. This book traces the history of airborne disease transmission and introduces us to the people whose shoulders we stand on.

Carl Zimmer is the author of fifteen books about science. His latest book is Air-Borne: The Hidden History of the Life We Breathe. Zimmer writes the "Origins" column for the New York Times. His writing has earned a number of awards, including the Stephen Jay Gould Prize, awarded by the Society for the Study of Evolution. During the Covid-19 pandemic, he contributed to the coverage that won the New York Times the public service Pulitzer Prize in 2021. Three of his books have been named Notable Books of the Year by the New York Times Book Review. His book She Has Her Mother's Laugh won the 2019 National Academies Communication Award. The Guardian named it the best science book of 2018.

Zimmer is a familiar voice on radio programs such as Radiolab and Professor Adjunct at Yale University. He is, to his knowledge, the only writer after whom both a species of tapeworm and an asteroid have been named.

Nuggets mined from today's episode:

What led to your writing this book?
Carl explained that his interest in airborne microorganisms was sparked during the COVID-19 pandemic while working at the New York Times. He became fascinated by the debate over how the virus spreads and the eventual consensus that it is airborne. This led him to explore the broader field of aerobiology and the concept of the aerobiome, which encompasses all life in the air from indoor spaces to the stratosphere. Carl's book, "Airborne," covers the history of aerobiology, including early pioneers like Louis Pasteur, as well as more recent developments and the implications for human health and our understanding of the atmosphere.
In the early days before the advent of computers, DNA sequencing pioneering scientists sought to understand how disease spread. The great Irish potato famine

was blamed on miasma. “The miasma theory (also called the miasmic theory) is an abandoned medical theory held that diseases such as cholera, chlamydia, or plague—were caused by a *miasma* (μίασμα, Ancient Greek for 'pollution'), a noxious form of "bad air", also known as night air. The theory held that epidemics were caused by miasma, emanating from rotting organic matter. Though miasma theory is typically associated with the spread of contagious diseases, some academics in the early nineteenth century suggested that the theory extended to other conditions as well, e.g. one could become obese by inhaling the odor of food. The miasma theory was advanced by Hippocrates in the fourth century BC and accepted from ancient times in Europe and China. The theory was eventually abandoned by scientists and physicians after 1880, replaced by the germ theory of disease: specific germs, not miasma, caused specific diseases. However, cultural beliefs about getting rid of odor made the clean-up of waste a high priority for cities. It also encouraged the construction of well-ventilated hospital facilities, schools and other buildings.” Wikipedia

The book also discusses the dark side of scientific research into the development of biological weapons.

Airborne TB Transmission Pioneers- Carl discussed the work of William and Mildred Wells, who made significant contributions to understanding airborne disease transmission in the 1930s. He highlights their groundbreaking tuberculosis experiment at Loch Raven Veterans Hospital, which demonstrated that TB could be transmitted through the air. Despite this breakthrough, the medical community remained skeptical about airborne transmission of other diseases, partly due to misinterpretations of Wells's work and long-held assumptions about disease spread.

The Wells model describes the situation where one or more infected people are sharing a room (and so the room air) with other people who are susceptible to infection. It makes predictions for the probability that a susceptible person will become infected. The prediction is that infection is more likely for small poorly ventilated rooms, and if the infected person is highly infectious.

The Wells nailed down the basics: How to make water and food safe, how to make the air safe, and experimented with UV lights to kill Tuberculous (TB) virus in order to make the air safe.

Air Quality and Health Discussion-Life's Constant Release into the Air- Carl Zimmer discussed the fascinating discovery of how much life is constantly being released

into the air from various sources, including the ground, plants, and ocean waves. Did you know that bacteria eat clouds? He explained that this process changes one's perspective on how the planet "breathes" and releases life into the atmosphere.

Finding the balance.
Finding a balance between protecting ourselves from dangerous pathogens and allowing beneficial exposure to the aerobiome, especially for children's developing immune systems. He suggests that early exposure to diverse microbes, such as those from pets or outdoor environments, may help prevent allergies and immune disorders later in life.

Not all diseases are airborne
Cholera is a waterborne disease. Yellow fever and malaria are spread by animals (mosquitos). Sexually transmitted disease is spread person to person.

Fred Meier – A government scientist who got it in his head in the early 1930s to soar into the clouds and hold out Petri dishes stuck to wooden handles. Even with these crude tools, Meier managed to find some life in the air. He enlisted other scientists in his efforts, and in 1937 he gave the endeavor the name it bears today: aerobiology. Although Meier regularly made headlines in the 1930s, few people recognize his name today. That's because his career came to an untimely end, turning Meier, in the words of one scientist, into the martyr of aerobiology.

Airborne Disease Expert Interviews
Carl discussed his experience interviewing experts for his book on airborne disease. He mentions having good luck reaching out to people, including some who admitted to previously underestimating airborne transmission. Carl noted the challenge of speaking directly with officials from public health agencies like WHO and CDC due to their communication protocols.

He highlights Donald Milton from the University of Maryland as a particularly interesting and helpful interviewee, describing Milton's work on influenza transmission using a device called "Gesundheit II". Carl also explains how Milton's early observations of COVID-19 cases in Wuhan led him to suspect airborne transmission. https://bwhclinicalandresearchnews.org/2021/02/03/ed-nardell-decades-dedicated-to-air-disinfection/

Coronavirus
Covid was not the first Coronavirus. Coronavirus was discovered in the 1960s. Originally Coronavirus was thought to just cause colds. It was an emerging infection people in China were getting sick with fatal pneumonia SARS. A new emerging disease resulting in 800 fatalities. In 2012- MERS coronavirus emerged and was traced to camels in the Middle East. The virus survived in hospitals in patients with weak immune systems.

RoundUp

Carl Zimmer's final comments:

- People rarely document why they dismiss ideas.
- Antibiotics are great; however, they indiscriminately kill both pathogenic and beneficial microbes disrupting the microbiome.
- We aren't as ready for disease X as we could and should be.

Z-Man signing off

Trivia Question
How many gallons of air does the average adult draw in everyday?

Answer:
2000 gallons

Answered by: John Lapotaire, Indoor Air Quality Solutions, Sanford, FL