



RITA R. COLWELL

1934, UNITED STATES

Aquatic microbiologist and scientific administrator, known for her research on waterborne infectious diseases and its impacts on global health. She was a pioneer in the study of cholera.

First researcher in the U.S. to develop a computer program to analyze bacteriological data (1960's), and founder of the bioinformatics company CosmosID® devoted to Next-Generation Sequencing technologies (2008).

Author of > 800 publications and 19 books, and producer of the award-winning film *Invisible Seas*.

She received many recognitions, including the National Medal of Science of the US (2006) and the Stockholm Water Prize (2010).

HERSTORY

Rita was the first female Director of the U.S. National Science Foundation. She is well-known for her efforts to increase the participation of women and other underrepresented groups in science and technology.

VIBRIO CHOLERAEE: THE PATHOGEN CAUSING CHOLERA

Until the late 1970s, it was believed that *Vibrio cholerae*, the causative agent of cholera, could not survive outside the human intestine longer than several days. Colwell discovered that *Vibrio cholerae* was present in the waters of Chesapeake Bay.

Certain bacteria, as *Vibrio* species, can lay dormant in unfavorable conditions, and return to normal function when conditions become favorable again. These dormant bacteria were hiding among the plankton, and attached to copepods.



A microscopic view of a female, cholera-carrying copepod. Source: Dr. Rita Colwell & Anwarul Huq

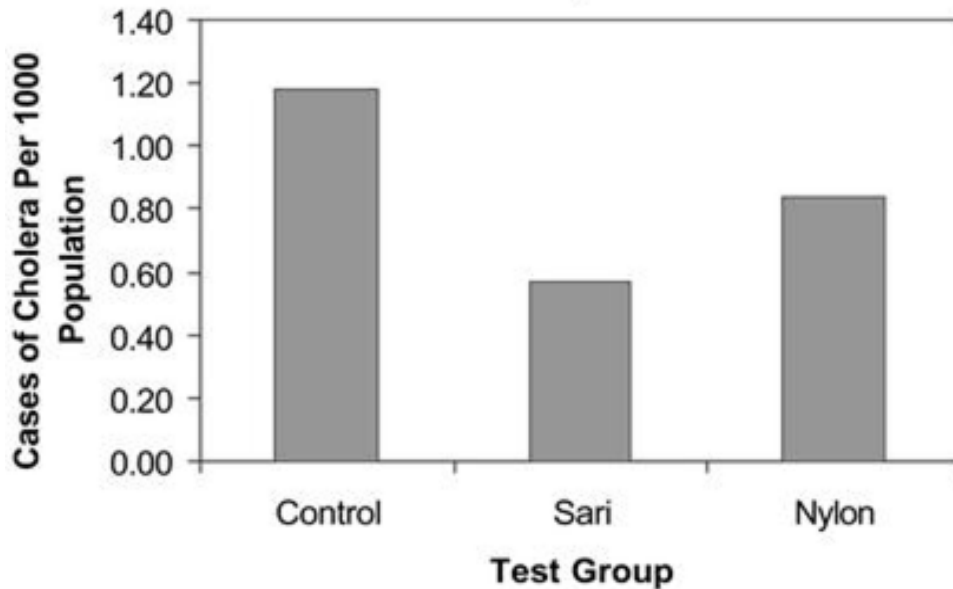
The association between *Vibrio cholerae* and plankton explained the occurrence of sporadic and erratic cholera epidemics.

Thereafter, cholera epidemics could be related on a global scale to climate and weather phenomena, as well as to the global distribution of host plankton.

FIGHTING CHOLERA

Colwell has made major contributions to global health, especially in developing regions (Bangladesh, and Central and South America) by:

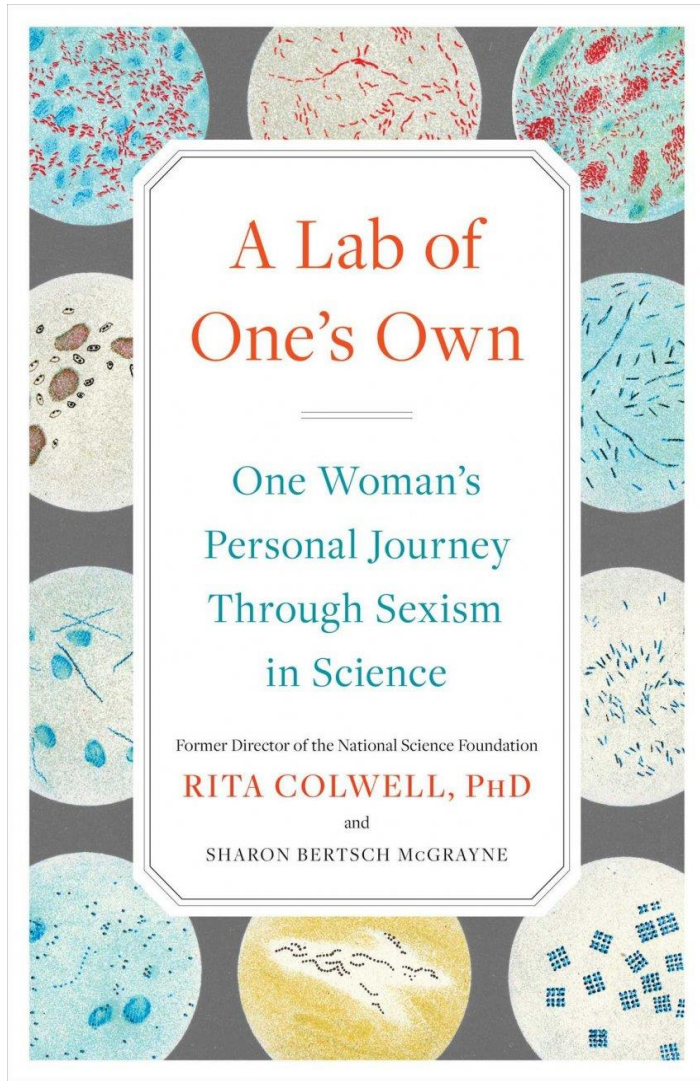
- Monitoring the spread of cholera: observation of weather, surface water temperature, chlorophyll concentration, and precipitation patterns.
- Developing low-cost filtration methods to prevent infection, thus reducing the spread of cholera.



Example: reduction in the cases of cholera in Bangladesh using low-cost methods: folded sari cloth or nylon mesh filters, which were placed over water pots to acquire safe drinking water from their local water ways.

Comparison of cholera cases among control, sari filtration, and nylon filtration groups of villages.
Rita R. Colwell et al. (2003). PNAS.

A LAB OF ONE'S OWN



"We don't waste fellowships on women."

Those were the words that Rita was told when she first applied for a graduate fellowship in bacteriology.

This book documents all Colwell has seen and heard over her 60 years in science, from sexual harassment to dark systems that kept women from leading professional organizations or publishing their work.

"As the story of my life as a scientist, this book tells the human side of this history. It tells what it's like for a woman to go into a field so dominated by men that women were rendered invisible" Rita R. Colwell

Rita R. Colwell & Sharon Bertsch McGrayne.
(2020). A lab of one's own.

RELEVANT CONTRIBUTIONS

Colwell, R. R., Kaper, J., Joseph, S. W. (1977). *Vibrio cholerae*, *Vibrio parahaemolyticus*, and other vibrios: occurrence and distribution in Chesapeake Bay. *Science*, 198, 394–396.

Colwell, R. R., Huq, A. (1994). Environmental reservoir of *Vibrio cholerae*. The causative agent of cholera. *Annals of the New York Academy of Sciences*, 740, 44–54.

Colwell, R. R. (1996). Global climate and infectious disease: the cholera paradigm. *Science*, 274, 2025–2031.

Lipp, E. K., Huq, A., **Colwell, R. R.** (2002). Effects of global climate on infectious disease: the cholera model. *Clinical Microbiology Reviews*, 15, 757–770.

Colwell, R. R., et al. (2003). Reduction of cholera in Bangladeshi villages by simple filtration. *Proceedings of the National Academy of Sciences*, 100, 1051–1055.

LOOKING
FOR MORE?

You can find more information about her story and research at:

https://en.wikipedia.org/wiki/Rita_R._Colwell

<https://www.umiacs.umd.edu/people/rita-colwell>

https://www.nsf.gov/news/speeches/colwell/rc01_anatlesson/tsld001.htm

Colwell, R. R., McGrayne, S. B. (2020). *A Lab of One's Own: One Woman's Personal Journey Through Sexism in Science*. Simon & Schuster, New York.