The Evolution of Microbial Diagnostics

Since the advent of Louis Pasteur's germ theory in the 1860s, finding quick and accurate ways of identifying disease-causing pathogens has remained a priority for microbiologists worldwide. When Robert Koch created his postulates in 1884, in-vitro cultivation of microbes quickly became the gold standard microbial diagnostic method. But it was a slow and time-intensive process, so the need for more advanced methods persisted. Fortunately, great progress has been made in this field in recent decades—progress that has transformed the speed and accuracy of diagnostic microbiology today.

1970s

DNA-Based Testing

The concept of nucleic acid-based amplification technologies (NAATs) began formulation in the 1970s. However, as highlighted by Najafov and Hoxhaj in their book, *PCR Guru*, it was in the 1980s that the polymerase chain reaction (PCR) was created. Research has shown that this milestone permitted highly sensitive and specific detection of microbes using host DNA, and therefore eliminated the need for in-vitro cultures in clinical microbial diagnostics.

"The detection and identification of bacteria present in natural and industrial ecosystems are now entirely based on molecular systems that detect microbial RNA or DNA. Culture methods were abandoned in the 1980s because direct observations showed that less than 1% of the bacteria in these systems grew on laboratory media."

- J.W. COSTERTON, CENTER FOR GENOMIC SCIENCES, FATHER OF BIOFILM RESEARCH.

1990s/2000s

Paradigm Shift in Scientific Understanding

The recognition of the importance of biofilms dates as far back as the 1940s, but it was in the 1990s that a real shift in scientific understanding of biofilms and their role in accurate diagnostics became apparent. The 1990 opening of the Center for Biofilm Engineering at Montana State University, for example, served as a powerful example of the formation of a scientific consensus on the significance of biofilms.

2000s

Next Generation Sequencing (NGS)

The development of NGS in the 2000s moved microbial diagnostics firmly into the 21st century. With the ability to sequence entire bacterial genomes in a single sequence run or copy specific genes of interest—and even sequence the entire human genome in just one day, as noted by U.K. researchers Behjati and Tarpey—NGS was truly an industry game-changer. Most importantly, the data obtained from NGS provided a much-needed way for clinicians to obtain information on microbial resistance and virulence, as noted by Deurenberg et al in research published in the *Journal of Biotechnology.*

2008

MicroGen DX starts delivering NGS services in human healthcare

In 2008, innovative molecular diagnostic laboratory MicroGen DX developed an approach that combined a proprietary bioinformatics system and NGS to detect infectious diseases with high levels of sensitivity and specificity.

2017

MicroGen Vet offers NGS services from MicroGen DX to veterinarians

In 2017, MicroGen Vet launched into the veterinary market and became the exclusive reseller of NGS services from MicroGen DX to the global veterinary markets, including equine, small animal, livestock and exotic/zoo segments.

2019 and Beyond

What's Next?

Beginning in 2019, MicroGen Vet plans to expand into global markets and to add biofilmatic products to its portfolio.