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## Modified Atmosphere Controlled System An introduction to anaerobes



Anaerobic microbiology can be traced back to the mid-1600s and in its early years was rooted in a clinical setting

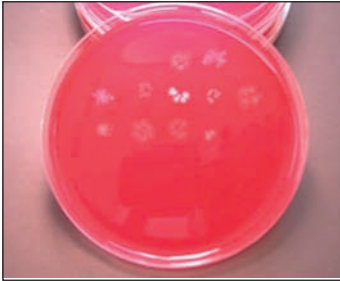
An anaerobe can be described as bacteria that grow better in the absence rather than the presence of air

The origins of anaerobic microbiology are often considered to have begun with Pasteur, but in fact go as far back as the 17th century and the discoveries of Antoni Van Leeuwenhoek.

One of the problems that anaerobic microbiologists are faced with is to agree what an anaerobe is. Over the years, microbiologists have had a lot of trouble defining the term.

Many definitions have been put forward and, whilst perhaps lacking the detail one would like to see in a definition, the most pragmatic of all is perhaps: *'an organism for which anaerobic cultivation methods give optimum growth and for which oxygen is inhibitory'*. Indeed, it is and was progress in anaerobic cultivation methods that opened up the world of anaerobic microbiology to the routine laboratory.





In 1969, Loesche further divided the obligate anaerobes into moderate and strict anaerobes. Moderate anaerobes were described as those organisms able to tolerate oxygen levels in the range 2-8%. These are considered to be able to survive exposure to air for several hours on an agar plate without loss of viability, but require an anaerobic environment to multiply (eg *Bacteriodes fragilis*, *Porphyromonas melaninogenicus* and some *Clostridium* spp). Strict anaerobes are considered as not being capable of growing in the presence of more than 0.5% oxygen, and are killed after exposure to air for only a few minutes (eg *Treponema denticola*, *Selenomonas ruminatum*, *Clostridium novyi* type B, *Peptostreptococcus* spp).



Developments in anaerobic microbiology can be attributed to three distinct but equally important strands. The first was rooted in clinical microbiology and the search to understand the causative organisms implicated in infectious disease.

The second strand in the development of anaerobic microbiology has its origins in more recent times, with the pioneering work of Hungate, who developed methods to study the complex rumen ecosystem (Hungate, 1966).



The third and final strand is linked with both the clinical and ruminant initiatives and relates to the technical developments which have brought anaerobic culture systems within the reach of all microbiology laboratories.

Whilst the development of anaerobic jars proved to be a major advancement it was not until the advent of anaerobic workstations that the microbiologist could easily process, culture and examine samples without exposing them to atmospheric oxygen. It is well established that anaerobe isolation rates are significantly increased through the use of anaerobic workstations. Wren (1977) working at the London Hospital showed an increase in isolation rate of anaerobes from 9.7% when using anaerobic jars opened at both 24 and 48 hours for examination, to 28.1% with jars left for 48 hours before being opened and to 35.7% when using an anaerobic workstation. Wren concluded that “uninterrupted anaerobic incubation for 48h substantially increases the yield of anaerobic isolates”.



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