Experiment 20	**Sampling of Atmospheric Microorganisms**
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Reading	Chapters in BBOM 10th: 25.11 BBOM : Madigan M.T., J.M. Martinko and J. Parker: "Brock - Biology of Microorganisms", 10th Edition (2003), Prentice Hall.
Objectives	• Sampling of microbes from the atmosphere • Sampling of indoor and outdoor air from selected sampling sites • Use of selective solid growth media for airborne microorganisms
Background	Airborne biological particles are called bioaerosols. Generally, bioaerosols are generated as droplets or particles of different sizes. Air serves as a mode of transport for the dispersal of bioaerosols from one location to another. Composition and concentrations of microbes in the bioaerosol vary with the source and the dispersal in the air until deposition. Possible sources comprise fresh and marine surface waters, soils, plants, and animals. It has to be noted that infectious microorganisms can be dispersed as aerosols. Microorganisms released into the air are often single units (e.g. spores) or associated with particles in the range of 0.3 to 100µm. Transport and ultimate settling of a bioaerosol are affected by its physical properties (size, density, shape) and environmental parameters (air currents, humidity, temperature). The objective of bioaerosol sampling is the efficient removal and collection of biological particles from the air. The three principal collection methods used in quantitative bioaerosol sampling are impaction, impingement, and filtration. Impaction separates particles from the air stream by depositing them onto solid surfaces such as adhesives or agar plates. Impingement is similar to impaction; however, the collection medium is liquid such as a buffer solution. Filtration achieves the particle separation from the air stream by passage through a porous medium, usually a membrane filter. There is a wide variety of commercially available bioaerosol samplers. The selection of the sampler depends on a number of factors such as sampler performance, expected bioaerosol concentration, and analysis method. For our purpose, the MAS-100 Eco sampler (MBV AG, Littau) will be used. This model has been specially developed for the food and beverage industries. The instrument can be used whenever air has to be monitored. The use of standard 100 mm Petri dishes and the low initial costs of the MAS-100 Eco makes this product very attractive.
Literature	Hurst et al. (1997) Manual of Environmental Microbiology. ASM, Washington

www Links	http://www.aerobiology.net/resources.html http://www.mbv.ch/Luftkeimsammler.htm
Practical work	We will collect air samples from different indoor and outdoor locations.
Materials and Experimental Protocols	Operation of air sampler MAS-100 Eco: 1) Turn on instrument 2) Open lid 3) Mount Petri dish with specified pre-maid growth medium 4) Close lid 5) Set appropriate volume and delay 6) Press start 7) Open cover 8) Close cover after sampling 9) Open lid and remove Petri dish. Incubate dish at 30°C.
Experiences gained	Overview on air sampling Operation and maintenance of an air sampler (MAS-100 Eco)
Timing	90 min
Reporting	Note in a table: Group number, sample number, date, time, location, volume sampled, growth medium
Questions to be answered	What are the principles of air sampling? How is a specific sampler operated?
Outlook	Clearly, no single sampler and sampling protocol is likely to be adequate for all bioaerosols in their diverse environments. Microbial bioaerosols present special difficulties because of the potential conflicts between their efficient sampling as particles and as viable entities. Establishing performance standards for bioaerosol samplers and sampling is essential. The potential for adverse environmental and human health effects resulting from indoor and outdoor bioaerosol exposure has prompted enhanced interest in aerobiology, especially with respect to bioterroristic incidences.