



**Aerobiology Instruction and Research**

**Introductory  
Fungal Spore Identification  
and  
Pollen Identification**

**Including Information on Bioaerosol Samplers**

**A 4 1/2-Day Workshop**

Amherst, Massachusetts  
21-25 July 2008

Faculty:

Michael L. Muilenberg, M.S. (co-director)  
Christine A. Rogers, Ph.D. (co-director)



**Organized by A.I.R.**



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### **Introductory Fungal Spore Identification and Pollen Identification Workshop**

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#### Introduction

The ability to visually identify pollen and fungal spore taxa is a highly specialized skill. It takes commitment and time in order to develop the competence to accurately identify the wide variety of airborne pollen and fungal spore types and differentiate them from other biological and non-biological particles. Our experience in managing pollen and spore certification programs has shown us that individuals gain greater competence in a shorter amount of time if they are given intensive instruction in both the biological aspects and hands on technical skills required for spore identification. We therefore offer this workshop which will be conducted over 4 and one half days to allow ample time to describe and demonstrate a variety of pollen and spore types, as well as allow registrants to scan and identify these particles from air sample slides and tape samples. There will be ample time to address any questions about pollen and spore identification as well as sampling instruments.

A microscope will be provided to each participant for their use during the identification workshops. Participants are also encouraged to bring their own sample “unknowns” (air samples or bulk samples) for assistance with identification.

#### Workshop Description – Introductory Pollen Identification (2 days)

This course is designed to help the beginning pollen analyst learn the necessary fundamentals, including: microscopy, flowering-plant reproductive biology, pollen morphology, sampling methods, analytical techniques and reporting of recoveries. While geared toward beginners, the workshop will also allow those who have counted for a few months, or even a year, to expand their knowledge and improve their skills. Instruction will be in the form of lecture, demonstration, and individual study of reference material and actual air-sample slides. This intensive two-day session will allow ample time for one-on-one instruction and questions.

Upon completion of the workshop, participants will have the necessary skills to prepare samples for analysis, accurately count and identify a variety of pollen types, and calculate airborne concentrations. These skills will be useful for those intending to monitor airborne pollen concentrations but also provide the necessary fundamentals for those interested in other research, including indoor and outdoor bioaerosol studies.

## Workshop Description – Introductory Fungal Spore Identification (2 ½ days)

This course is designed to help the “novice” fungal spore analyst learn necessary aeromycology fundamentals, including: microscopy, fungal reproduction, spore morphology, and learn to identify common spore types. This workshop is geared toward beginners, but will also allow those who have counted for a few months to a year to expand their knowledge and improve their skills. Registrants will learn to identify characteristics of a number of ascospores, basidiospores, and mitospores (asexually formed spores). In addition to identification, aerobiological aspects will also be discussed (concentrations, seasonality, etc.). The bioaerosol sampler portion of the workshop will concentrate on Hirst-type Sampler (Burkard spore traps), Air-O-Cells and other impaction-type spore traps. Topics covered will include: set up of the samplers, application of adhesives to impaction surfaces (Burkard slides, or drums), mounting the recoveries for microscopic analysis, counting particles and reporting data, as well as maintenance of the equipment. Instruction will be in the form of lecture, demonstration, and individual study of reference material and actual air-sample slides. This intensive two and one half day workshop will allow ample time for one-on-one instruction and questions.

Upon completion of the introductory workshop, participants will have the necessary skills to set up and operate different types of bioaerosol sampling equipment and be familiar with the advantages and disadvantages of each, prepare samples for analysis, accurately count and identify a variety of spore types, and calculate airborne concentrations. These skills will be useful for those intending to analyze, monitor, or study indoor or outdoor airborne spore concentrations.

Faculty: Dr. Rogers and Mr. Muilenberg are partners of Aerobiology Instruction and Research, LLC, (A.I.R.) and are also members of the Aerobiology group, Department of Public Health, University of Massachusetts-Amherst.

**Michael L. Muilenberg**, M.S. (co-director). UMass Senior Research Fellow.

Mr. Muilenberg has extensive experience in the set-up, operation, evaluation, and theory of aerobiological sampling equipment. He is a partner in A.I.R. and has broad knowledge of both pollen and fungal spore identification. He has taught identification workshops for over 25 years, including for the American Academy of Allergy Asthma and Immunology (AAAAI), the American College of Asthma Allergy and Immunology (ACAAI), the University of Michigan Medical School, the PanAmerican Aerobiology Association, and with other organizations. He was in charge of the quality control portion of the AAAAI Network for over 10 years, is currently Sec/Treas (former President) of the Pan-American Aerobiology Association, and is on the Board of Directors of the Pan-American Certification Board, setting up a program to certify spore and pollen analysts.

**Christine A. Rogers**, Ph.D. (co-director). UMass Assistant Professor, Adjunct Asst. Prof., Harvard School of Public Health.

Dr. Rogers studied temporal and spatial aspects of airborne pollen and pollen forecasting for her doctorate at the University of Toronto and has been counting and identifying airborne particles since 1985. She is a partner in A.I.R. and has taught pollen identification

at the AAAAI and ACAAI Aeroallergen Identification Workshops for several years. She joined the group at Harvard School of Public Health in 1998 and took a leading role in the Aeroallergen Network quality control program. She is currently Assistant Professor in Public Health at University of Massachusetts. She is President of the International Association for Aerobiology and on the Board of Directors of the Pan-American Aerobiology Certification Board.

### When

The Workshop will be held Monday, 21 July 2008, beginning at 9:00 a.m., through 1:00 p.m. on 25 July 2006. See the complete schedule below. Those interested only in pollen identification may take the first two days of the workshop (21 and 22 July) and those interested only in fungal spore identification may attend only the last 2 ½ days (23-25 July).

### Where

The Workshop will be held at the Campus Center of the University of Massachusetts at 1 Campus Center Way, Amherst, MA 01003. For information about the Campus Center or the University, see the Conference Services website at [www.aux.umass.edu/conferenceservices/](http://www.aux.umass.edu/conferenceservices/); in the menu bar at the bottom left of the home page is a campus map which you might find helpful. The meeting room is on the eighth floor of the Campus Center. For information when you arrive at the Campus Center, contact the front desk of the hotel or the info desk on level 2.

### Registration

The registration fee is \$1100 for the Introductory Fungal Spore Identification and Pollen Identification Workshop. In addition to four and one half days of instruction, registrants will receive a syllabus, an informative aeromycology/ID book (Mycology of the Air), and a box of reference slides of known pollen and spore types. One can register for only the pollen portion of the workshop (\$500 for 2 days) or for only the fungal spore portion of the workshop (\$700 for 2 ½ days).

### Accommodations

Please make your own arrangements for accommodations. A block of rooms is being held at the Campus Center Hotel which is on the campus of the University of Massachusetts. Sleeping room rates are \$82/night (\$114 for Friday night) which includes continental breakfast, and free high speed internet. For reservations, call 413 549-6000 x7714; use the code SPHW7C for the room discount. Or reserve a room online ([www.aux.umass.edu/hotel](http://www.aux.umass.edu/hotel)). Rooms will be held until 1 July 2008. Other hotels are available within a few miles of the campus.

For more information contact Mr. Muilenberg at 617 504-7215 or 413 545-3052, or Dr. Rogers 413 545-3051.

We look forward to hearing from you!

## Workshop Schedule

subject to change

### Monday, 21 July 2008

9:00-9:15	Introductions, Overview
9:15-10:30	Principles of airborne particle collection, sampler types. Demos.
10:30-10:45	Break
10:45-11:30	Hands-on Experience (prep. of rods, slides, drums, sample processing, etc.)
11:30-12:00	Microscope use
12:00-1:15	Lunch (provided)
1:15-1:45	Introduction to Pollen: biology, ecology. Pollen Identification: morphology
1:45-3:30	Reference slides; Identification of common types.
3:30-4:30	Counting methods, calculations from raw counts to particle concentration
4:30-5:00	Microscopy; pollen morphology

### Tuesday, 22 July 2008

8:30-10:15	Microscopy and Pollen Morphology
10:00-10:15	Break
10:15-12:00	Pollen Characteristics and the use of Dichotomous Keys
12:00-1:15	Lunch (on your own)
1:15-1:30	Microscopy and Pollen Morphology
1:30-2:30	“Unknown” prepared slides
2:30-2:45	Break
2:45-4:00	Microscopy and Pollen Morphology
4:00-5:15	Pollen unknowns, air sample slides
5:00	Adjourn

### Wednesday, 23 July 2008

9:00-9:15	Introductions
9:15-10:30	Intro. to fungal taxonomy/morphology
10:30-10:45	Break
10:45-12:00	Microscopy: taxonomy (classes)
12:00-1:00	Lunch (Box lunch provided)
1:00-1:45	Mitospores: types of spore formation, morphology
1:45-2:30	Microscopy: mitospore morphology
2:30-2:45	Break
2:45-4:00	Lecture/Microscopy: mitospores
4:00-5:00	Sampling: Air-O-Cell, Allergenco-D, counting, concentrations

### Thursday, 24 July 2008

8:30-9:15	Ascomycetes; morphology, ecology, aerobiology
9:15-10:00	Microscopy: ascospore morphology
10:00-10:15	Break
10:15-12:00	Basidiomycetes: spore formation, ecology, morphology
12:00-1:30	Lunch (on your own)
1:30-2:00	Microscopy: basidiospore morphology
2:30-2:45	Break
2:45-4:30	Tape samples. Field trip.
4:30-5:30	Lab – field collections. Questions
	(continued)

**Friday, 25 July 2008**

- 8:30-9:30      Lecture/Microscopy:  
Basidiomycetes: rusts, smuts
- 9:30-10:00    Microscopy: identification of spore  
“unknowns”, air sample slides
- 10:00-10:15    Break
- 10:15-10:45    Lecture/Microscopy:  
Zygomycetes/Oomycetes
- 11:15-12:00    Air sample slides; unknowns
- 12:00-12:30    Outdoor fungal concentrations,  
temporal and spatial variability
- 12:30-1:00     Questions and summary,  
evaluations;  
Adjourn

