

Event-Segmented Collection and Identification of Bioaerosols in a Busy Dental Clinic

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A new high-efficiency bioaerosol sampling device [ASAP™ Model 2800 Airborne Sample Analysis Platform] was made available from Rupprecht & Patashnick Co. to the NYSTAR-EQS team at the University at Buffalo, for independent evaluation within a busy dental clinic.

The ASAP device incorporates exchangeable Integrated BioAerosol Smart Sample [iBASS™] cartridges containing sterile polyurethane foam [PUF] material on which the sampler collects ambient particles.

Samples are taken for one hour, for each of 8 hours. An additional cartridge is concurrently exposed for the entire 8-hour sampling period to develop a cumulative specimen. A sterile PUF within a closed polymer tube is included in each cartridge, to serve as a negative control for each cartridge run.

A direct roll-plating technique was developed to transfer and culture collected viable microbes to nutrient and Tryptic Soy Agar [TSA].

The sampler was placed in the 99-chair, 3rd floor dental clinic at UB's School of Dental Medicine, and set for **daily, automatic operation for 8 hours** [1230 – 2030 hrs].

Results from the ASAPtm Model 2800 were compared with other impaction-based collection techniques, using multiple-attenuated internal reflection infrared spectroscopy, scanning electron microscopy, and energy-dispersive X-ray analysis.

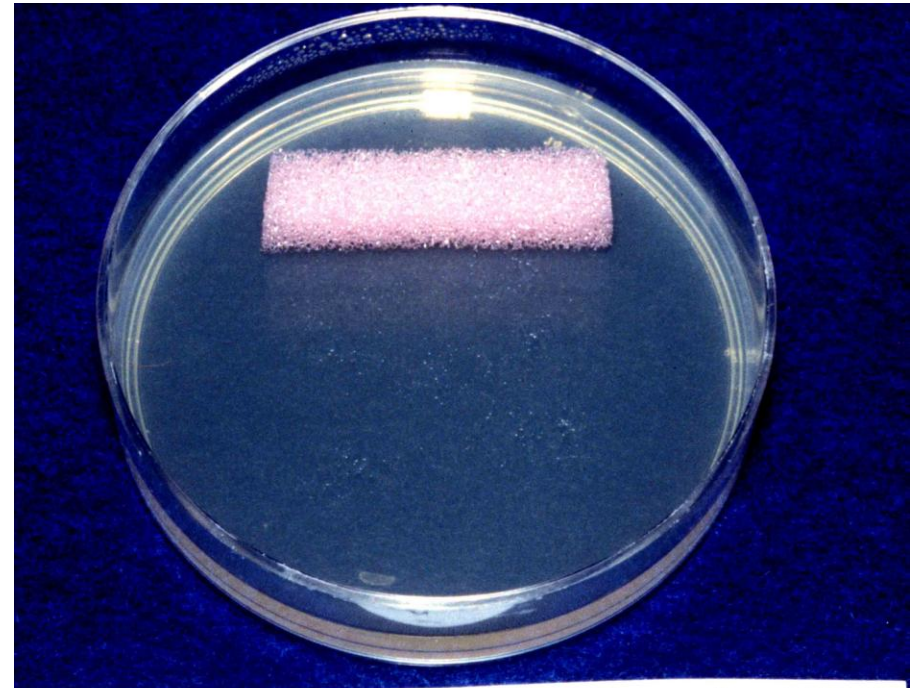
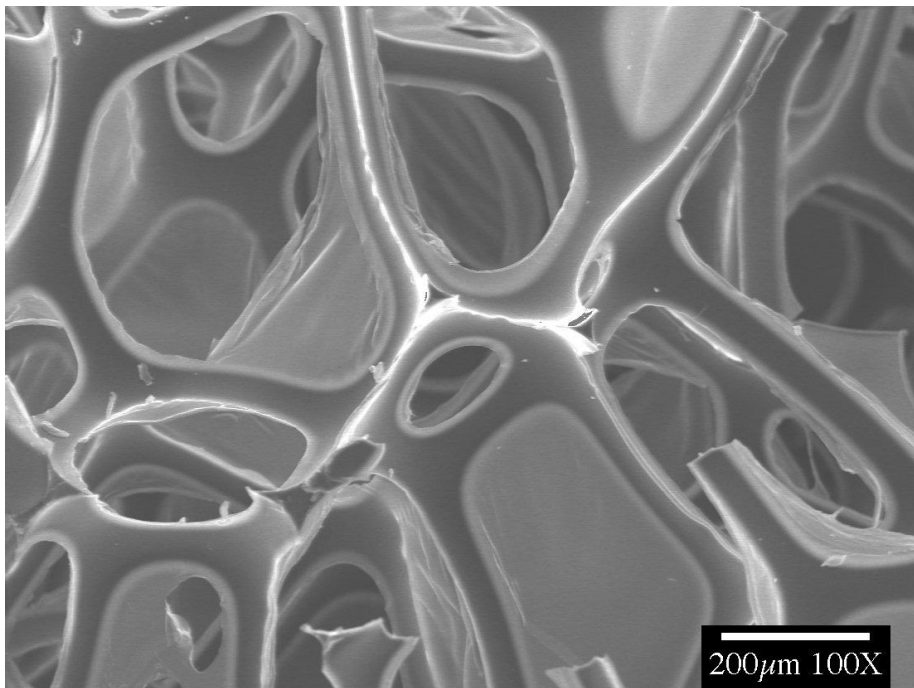
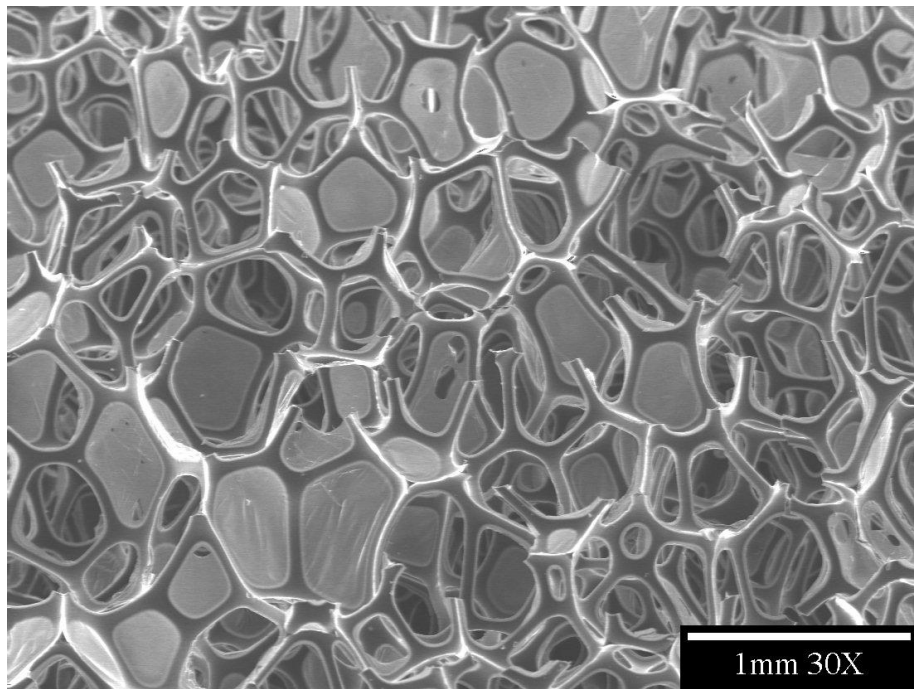
ASAPtm unit on the bench in the dental clinic



Squire Hall –
Clinical Building, UB
School of Dental
Medicine



**Scanning electron
micrographs of “PUF”
[polyurethane foam]
sample collection surface
in the iBASS™ cartridge**



Control PUF from dental clinic study,
after 72hr incubation on TSA



1-hr sample (Hour 3 of 8) in dental clinic [16sep2004]



1-hr sample (Hour 7 of 8) in dental clinic (clinic closed during hours 5-8) [16sep2004]



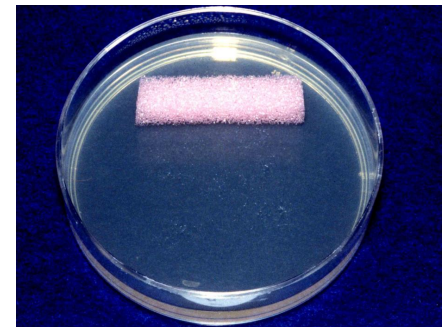
Cumulative 8-hr sample in dental clinic [16sep2004]

Microbial growth from ASAP™ “PUF”:

Hour 3 – during busy clinic hour

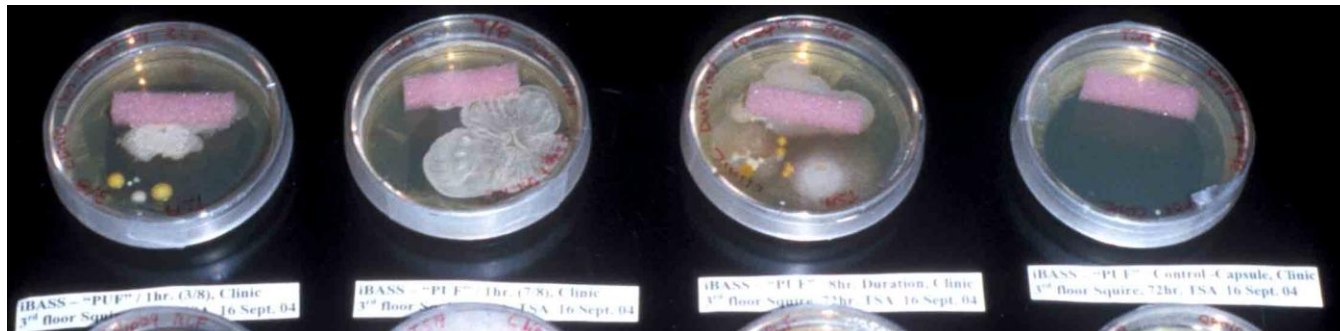
Hour 7 – after clinic closed (evening); dominated by fungal outgrowth

Cumulative 8 hrs – combined bacterial and fungal outgrowths

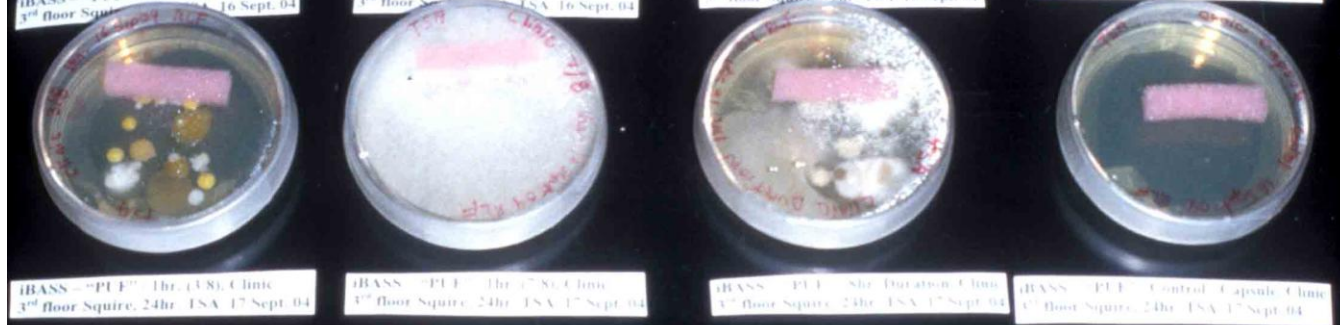


negative control

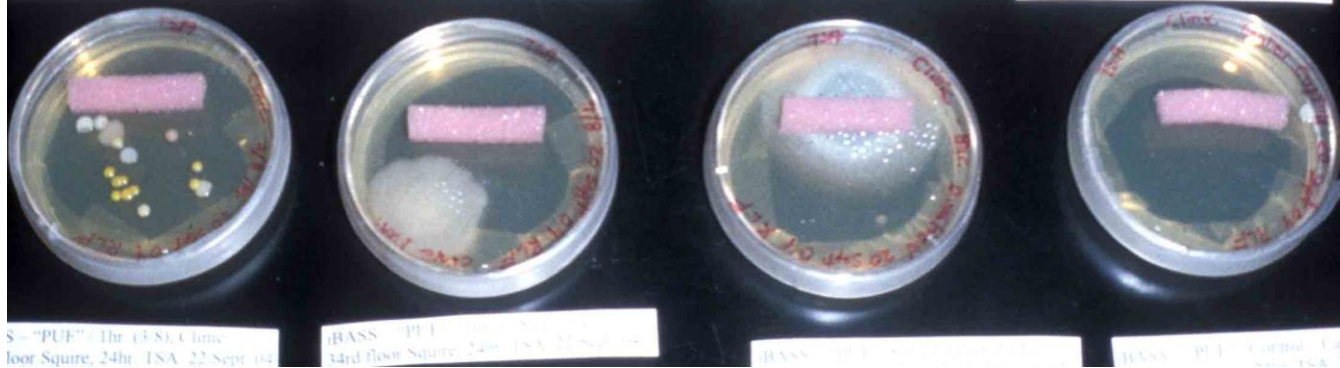
**Sampling
Day 1**



Day 2



Day 3



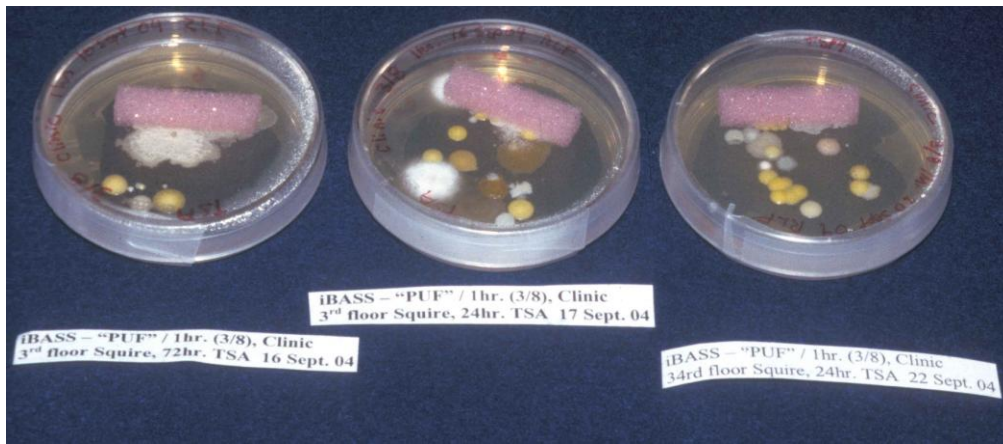
afternoon
(clinic open)

evening
(clinic closed)

cumulative

control

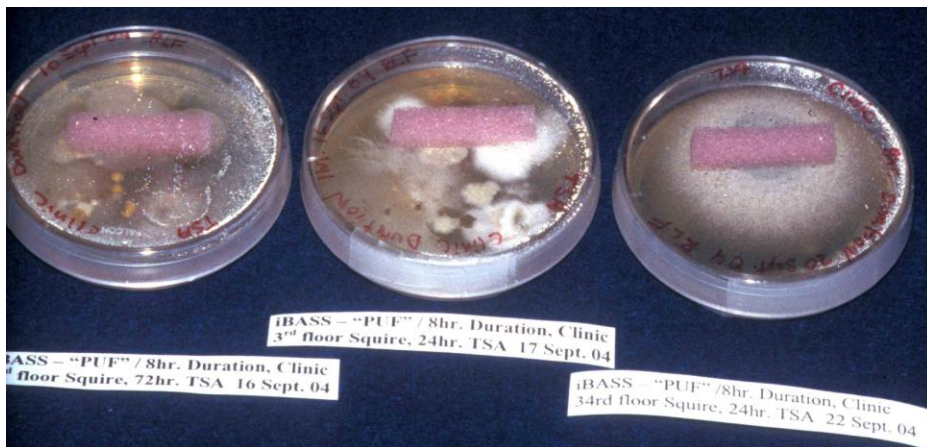
Late culture stages of microbial outgrowths on dental clinic air samples. Fungal growth apparently inhibits bacterial activity in the cumulative specimens.



Predominantly bacterial outgrowth is noted for ASAP™ "PUF" specimens collected during active clinic hours.

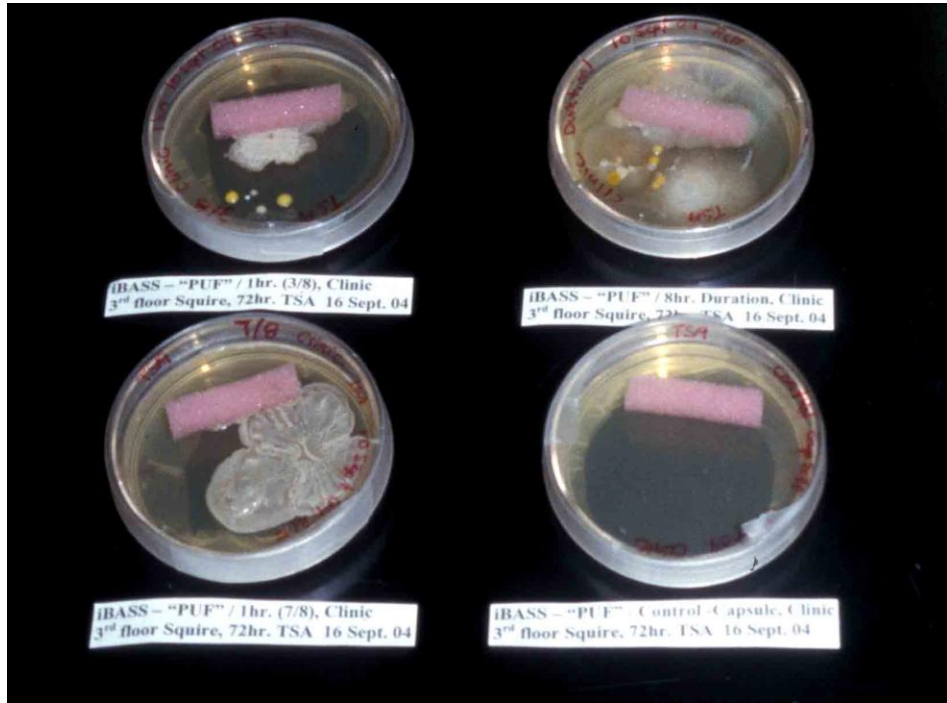


Predominantly fungal outgrowth is noted for ASAP™ "PUF" specimens collected during hours when clinic was closed.

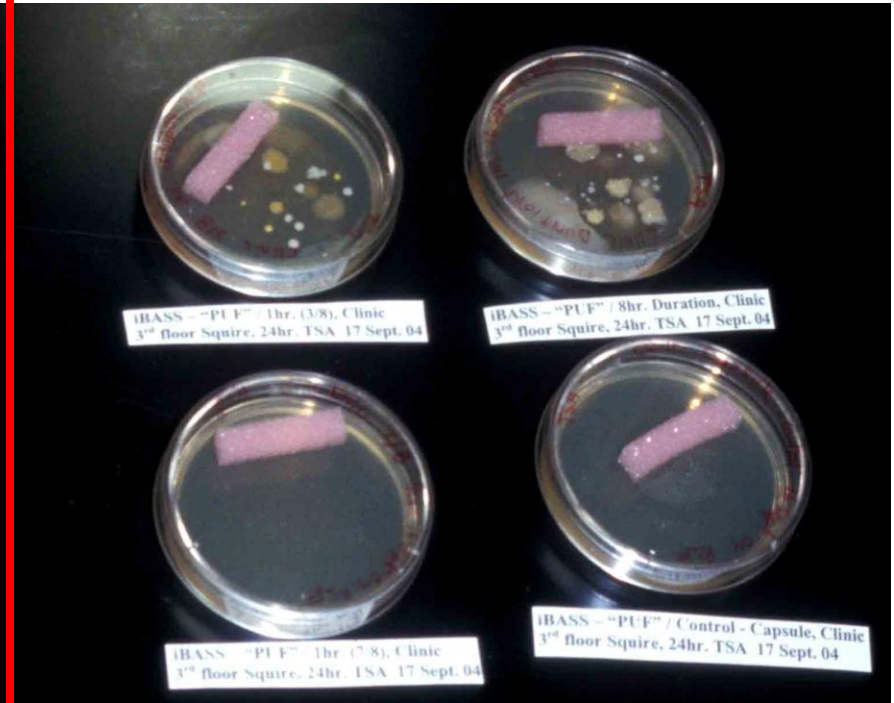


8-hour cumulative specimens show dominance of late-hours fungal growth, over bacteria-seeded samples also exposed earlier to busy clinic activity.

72-hour culture period



24-hour culture period



3-4pm busy

1-9pm
cumulative

7-8pm closed

neg.control

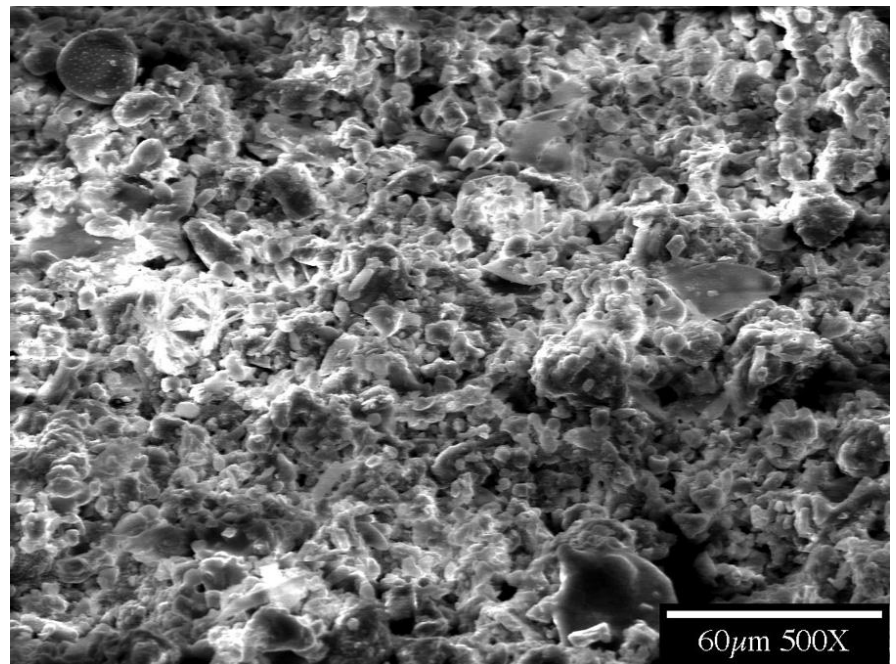
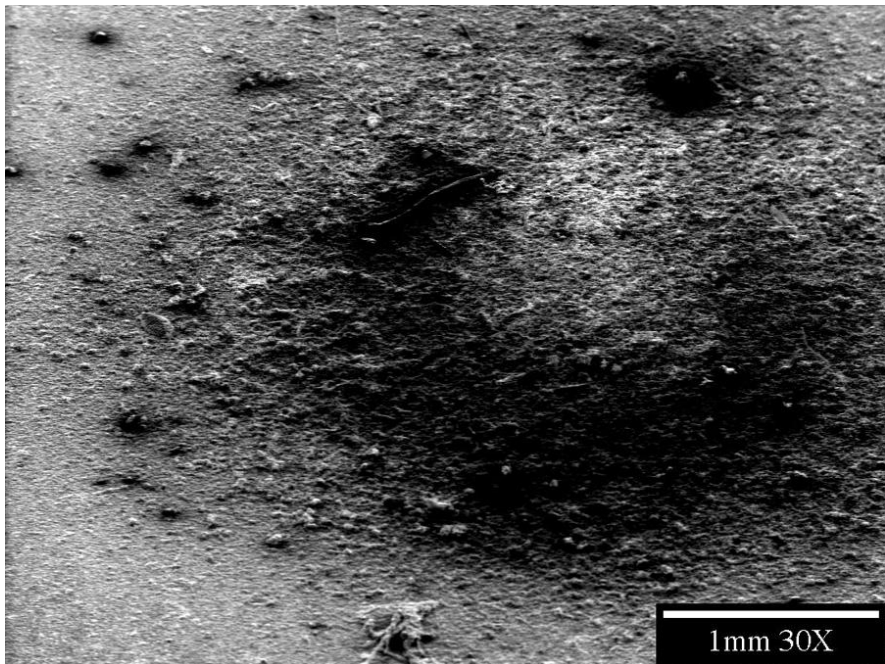
3-4pm busy

1-9pm
cumulative

7-8pm closed

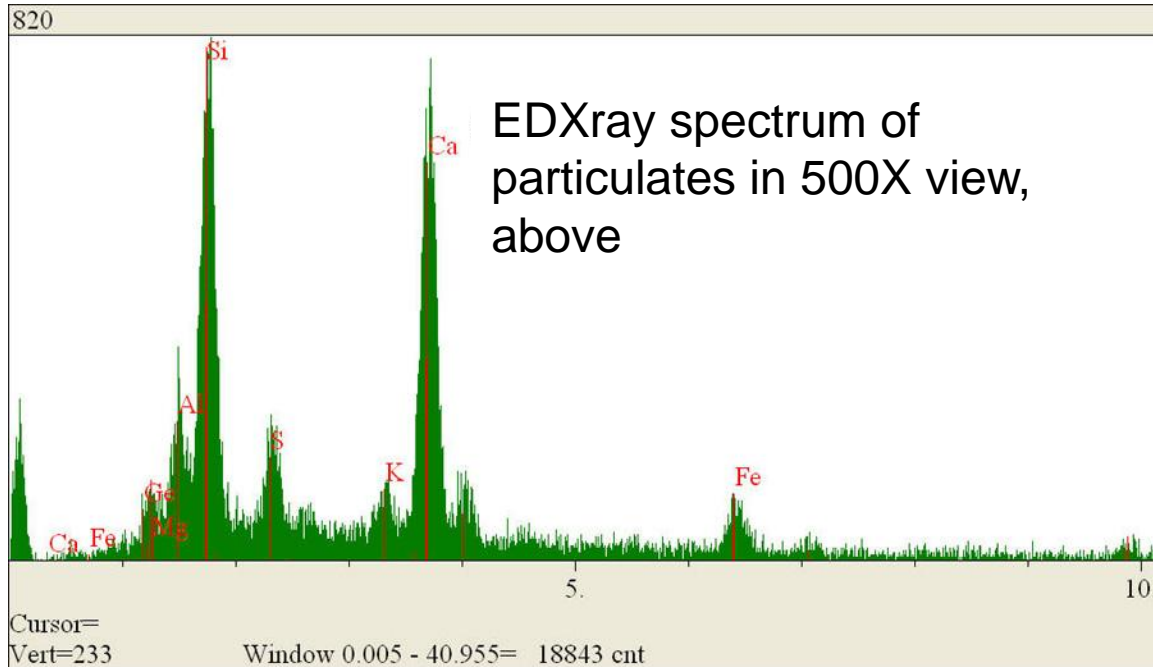
neg.control

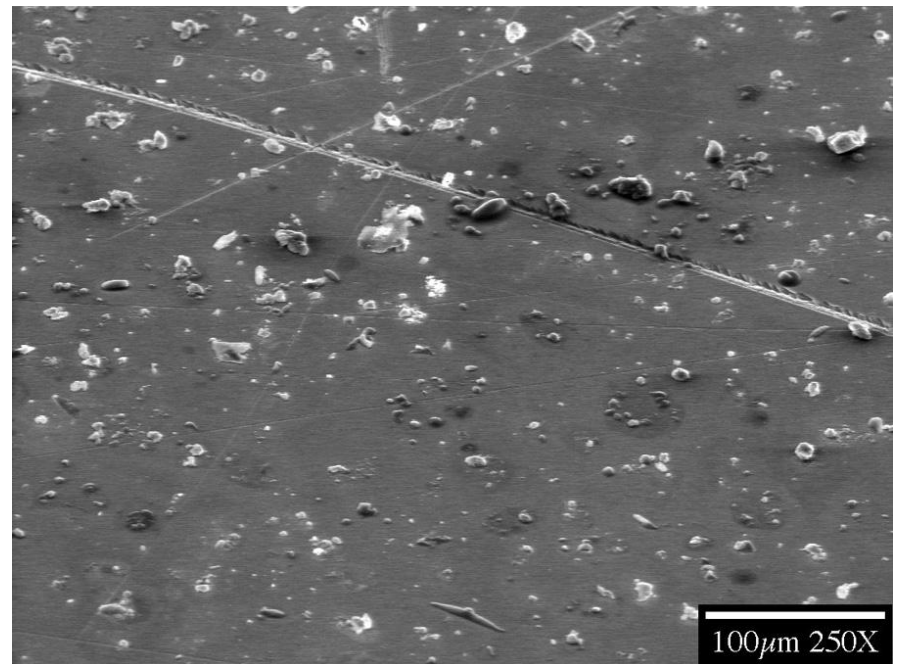
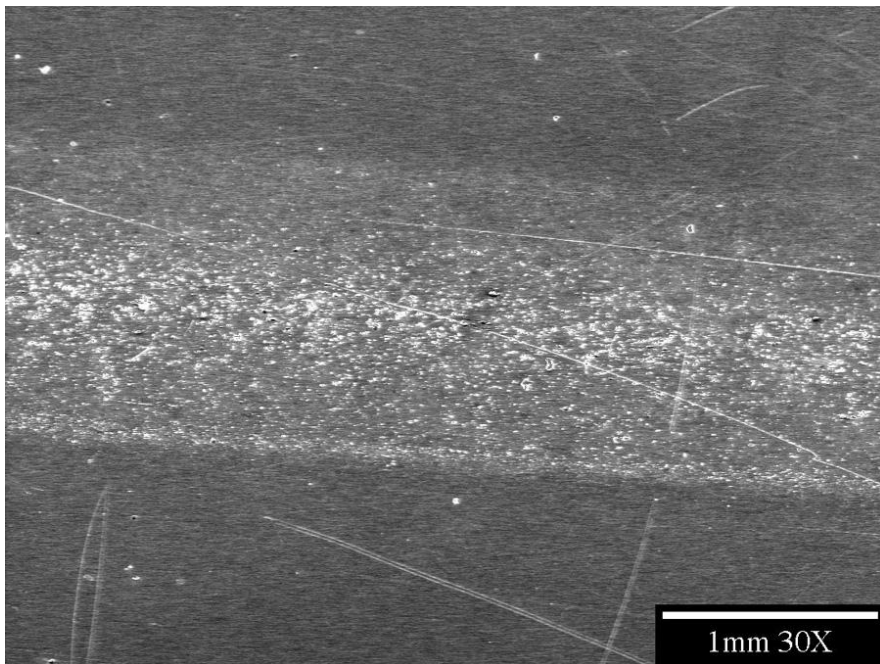
ASAP™ “slices” of microbial contamination during busy dental clinic operations v. closed clinic conditions. *Also note:* More microbial outgrowth appeared by 72-hr culture period than at the 24-hr observation of the cultures.



air impactor sample*
[300 liters/min]
adjacent to and over
same 8-hour period as
ASAPtm sample

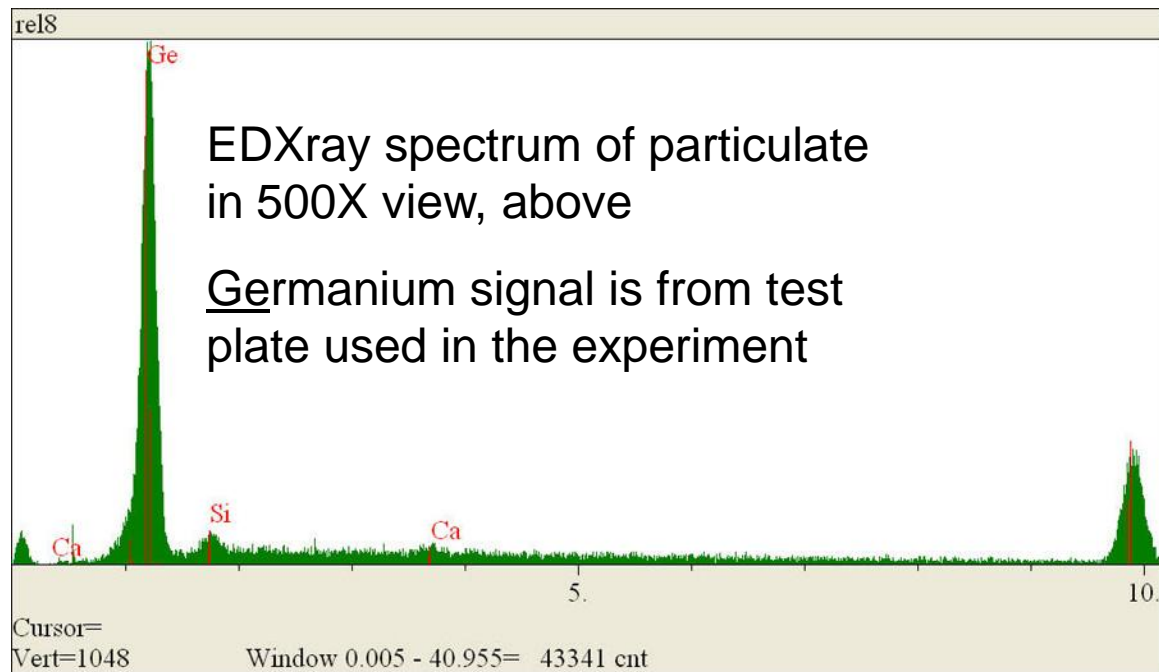
*Note: outdoor air sample

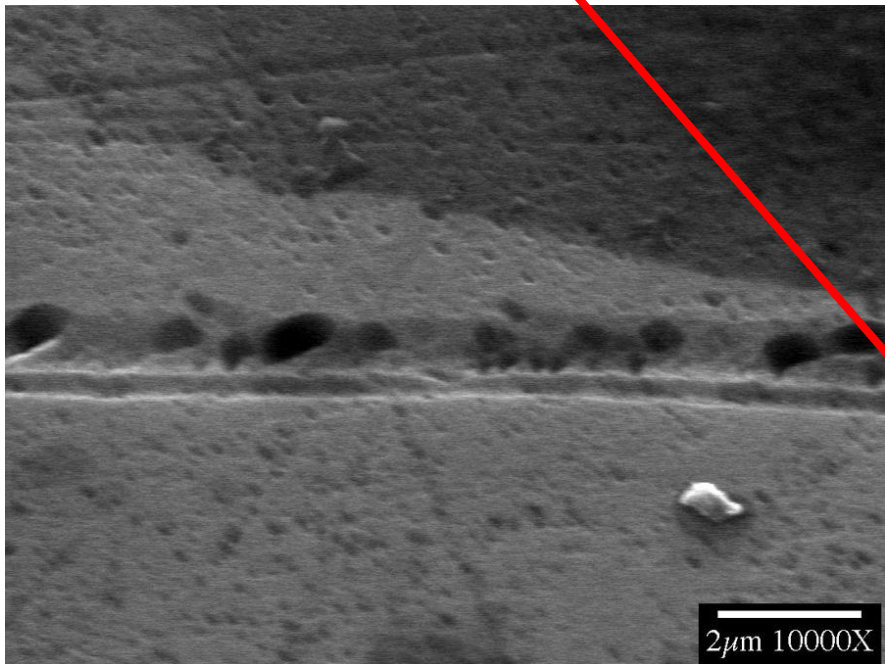
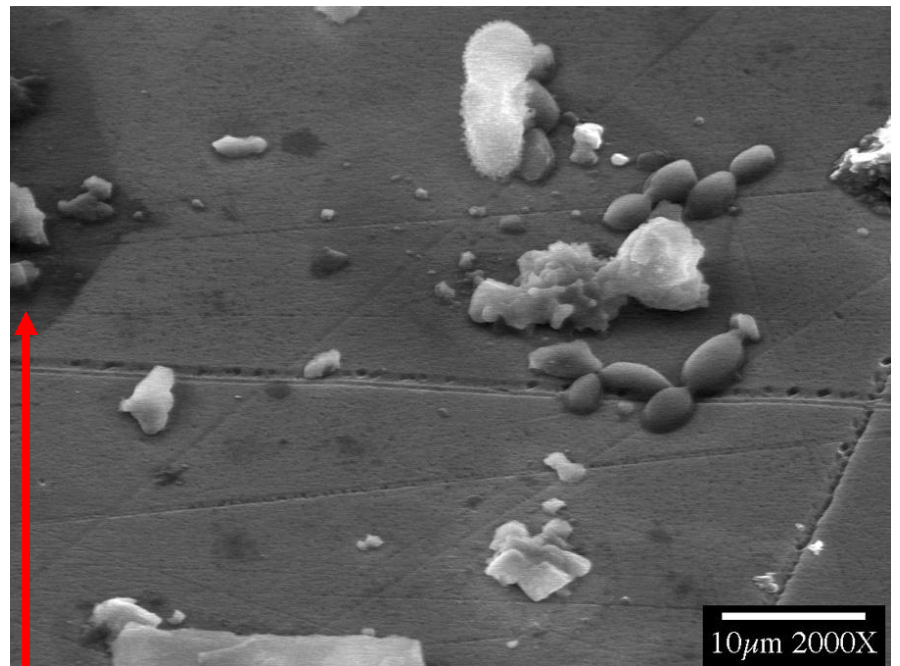
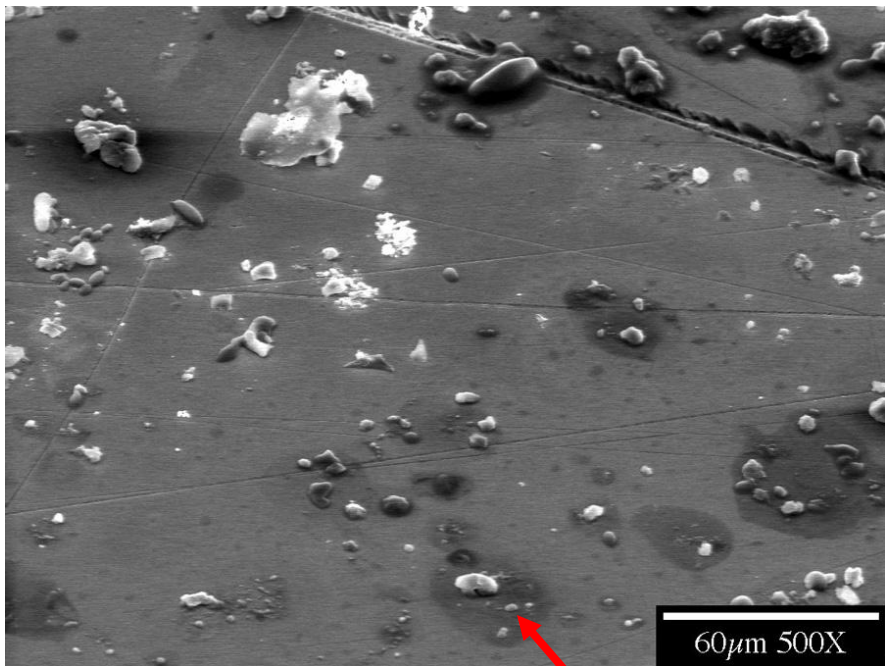




ASAPtm sample *
[200 liters/min]
adjacent to and over
same 8-hour period as
other air impactor
sampler.

*Note: outdoor air sample

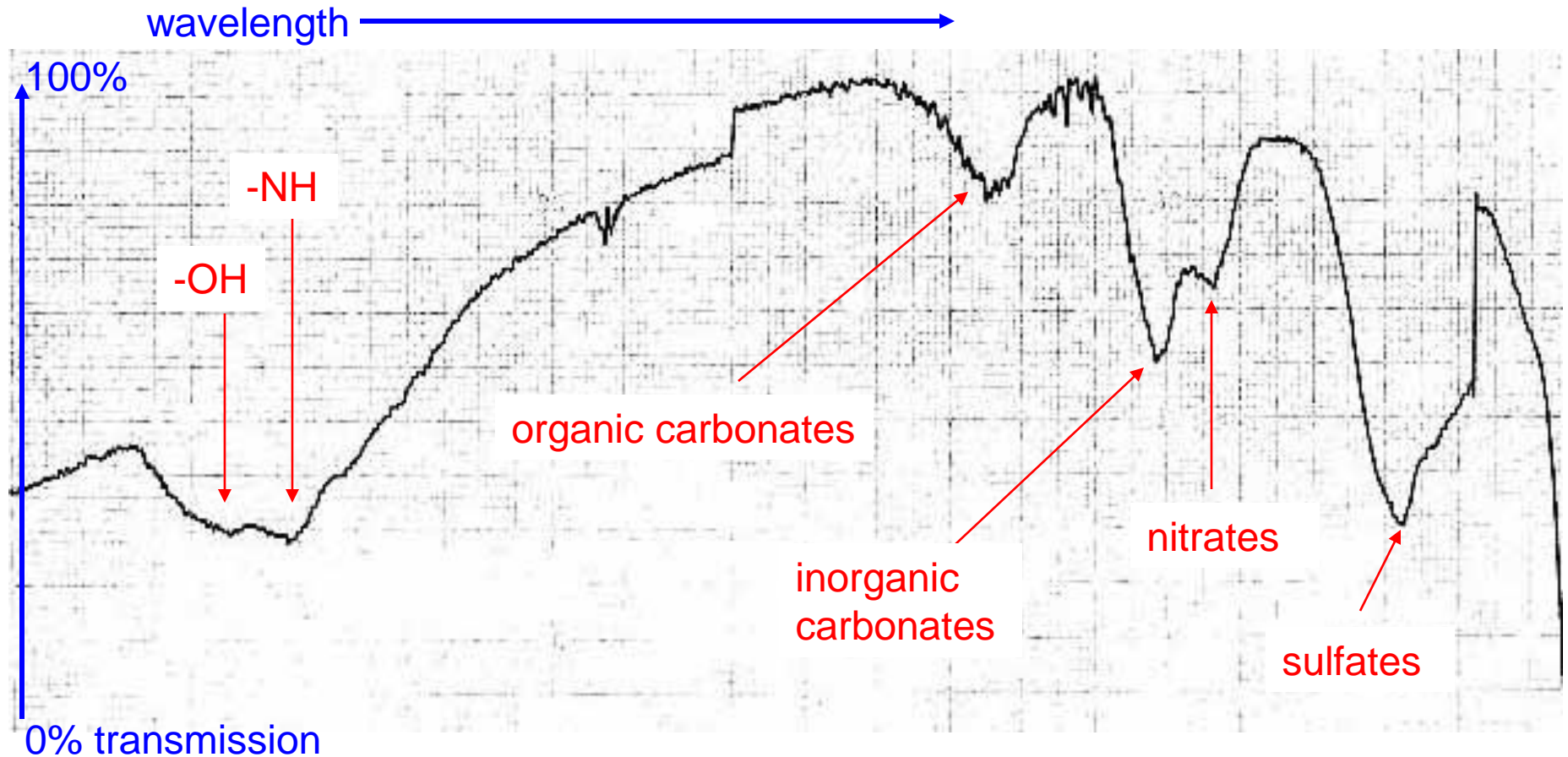




Additional views of the 8-hr outdoor air sample collected by the ASAPtm onto a germanium test plate.

Darker "halos" around some particles indicate organic matter.

Internal reflection infrared spectrum of respirable particulates collected on a semiconductor test plate for 8 hours by another air sampler, concurrent with adjacent ASAPtm sampling.



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