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# EXPANDED FUNGAL REPORT <sup>TM</sup>

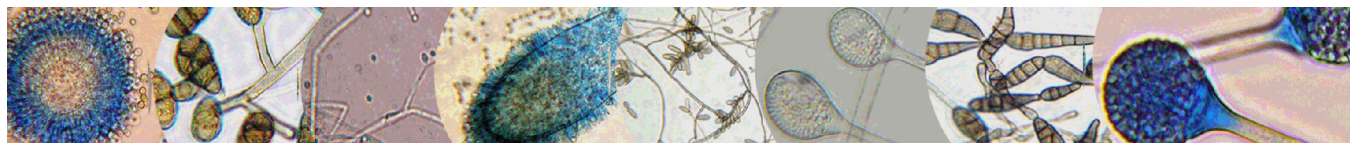
## Prepared Exclusively For

Holland CSD  
103 Canada St.  
Holland, NY 14080  
Phone:716-537-8261

**Report Date:** 8/30/2018  
**Project:** Holland Middle School  
**EMSL Order:** 141804478



Environmental Testing Cert #2845.24



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## EMSL Analytical, Inc.

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**Attn:** Jay Peplin  
Holland CSD  
103 Canada St.  
Holland, NY 14080

EMSL Order: 141804478  
Customer ID: HCSD25  
Collected: 8/15/2018  
Received: 8/16/2018  
Analyzed: 8/30/2018

**Proj:** Holland Middle School

### 1. Description of Analysis

#### Analytical Laboratory

EMSL Analytical, Inc. (EMSL) is a nationwide, full service, analytical testing laboratory network providing Asbestos, Mold, Indoor Air Quality, Microbiological, Environmental, Chemical, Forensic, Materials, Industrial Hygiene and Mechanical Testing services since 1981. Ranked as the premier independently owned environmental testing laboratory in the nation, EMSL puts analytical quality as its top priority. This quality is recognized by many well-respected federal, state and private accrediting agencies, such as AIHA-LAP, LLC's EMLAP and proficiency testing providers such as AIHA, LLC's EMPAT programs, and assured by our high quality personnel, including many Ph.D. microbiologists and mycologists.

EMSL is an independent laboratory that performed the analysis of these samples. EMSL did not conduct the sampling or site investigation for this report. The samples referenced herein were analyzed under strict quality control procedures using state-of-the-art microbiological methods. The analytical methods used and the data presented are scientifically and legally defensible.

The laboratory data is provided in compliance with AIHA-LAP, LLC policy modules and ISO-IEC 17025 guidelines for the particular test(s) requested, including any associated limitations for the methods employed. These data are intended for use by professionals having knowledge of the testing methods necessary to interpret them accurately.



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### Air Samples - Spore traps:

Spore traps are commercially available sampling devices that capture airborne particles on an adhesive slide. Air is pulled through the device using a vacuum pump. Spores, as well as other airborne particles, are impacted on the collection adhesive. Using spore trap collection methods has inherent limitations. These collection methods are biased towards larger spore sizes.

The analysis for total spore counts is a direct microscopic examination and does not include culturing or growing the fungi. Therefore, the results include both viable and non-viable spores. Some fungal groups produce similar spore types that cannot be distinguished by direct microscopic examination alone (i.e., *Aspergillus/Penicillium*, and others). Other spore types may lack distinguishing features that aid in their identification. These types are grouped into larger categories such as Ascospores or Basidiospores.

Fungal spores are identified and grouped by morphological characteristics including color, shape, septation, ornamentation, and fruiting structures (if present) which are compared to published mycological identification keys and texts. EMSL reports provide spore counts per cubic meter of air to three significant figures. Please note that each spore category is reported to three significant figures. Due to rounding and the application of three significant figures the sum of the individual spore numbers may not equal the total spore count on the report. EMSL does not maintain responsibility for final volume concentrations (counts/m<sup>3</sup>) since this volume is provided by the field collector and can not be verified by EMSL.

EMSL analyzes spore traps using phase contrast microscopy. There is a wide choice of collection devices (Air-O-Cell, Micro-5, Burkhard, etc.) on the market. Differences in analytical method may exist between spore trap devices.

Spore trap results are reported in spores per cubic meter of air. Due to the other airborne particles collected with the spores, EMSL reports a background particle density. Background density is an indication of overall particulate matter present on the sample (i.e. dust in the air). High background concentrations may obscure spores such as the *Penicillium/Aspergillus* group. The rating system is from 1-5 with 1 = 1 - 25% of the background obscured by material, 2 = 26 - 50%, 3 = 51 - 75%, 4 = 76% - 99%, 5 = 100% or overloaded. A background rating of 4 or higher should be regarded as a minimum count since the actual concentrations may be higher than those reported. EMSL will not be held responsible for overloading of samples. Sample volumes are left to the discretion of the company or persons conducting the fieldwork.

Skin fragment density is the percentage of skin cells making up the total background material, 1 = 1 - 25%, 2 = 26 - 50%, 3 = 51 - 75%, 4 = 76-100%. Skin fragment density is considered an indication of the general cleanliness in the area sampled. It has been

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estimated that up to 90% of household dust consists of dead skin cells.

### 2. Analytical Results

See attached data reports and charts.

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## Spore Trap ASSESSMENT Report™ Air-O-Cell™ Analysis of Fungal Spores & Particulates (Methods MICRO-SOP-201, ASTM D7391)

Particle Identification	Raw Count	(Count/m³)	% of Total	Interpretation Guideline	
141804478-0001	Alternaria (Ulocladium)	1	20	0.3	Acceptable   
	Ascospores	57	1200	19	Acceptable 
<b>Client Sample ID</b>	Aspergillus/Penicillium	-	-	-	
081518-01	Basidiospores	48	1000	15.9	Acceptable  
	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
<b>Location</b>	Cladosporium	175	3690	58.5	Acceptable 
MS Library	Curvularia	-	-	-	
	Epicoccum	-	-	-	
<b>Sample Volume (L)</b>	Fusarium	-	-	-	
150	Ganoderma	11	230	3.6	Acceptable  
	Myxomycetes++	7	100	1.6	ELEVATED  
	Pithomyces++	1*	7*	0.1	Acceptable  
<b>Sample Type</b>	Rust	-	-	-	
Inside	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
<b>Comments</b>	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	3	60	1	Slightly Elevated 
	Torula-like	-	-	-	
	<b>Total Fungi</b>	<b>303</b>	<b>6307</b>	<b>100</b>	Acceptable
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	


Analytical Sensitivity 600x: 21 counts/cubic meter  
Analytical Sensitivity 300x \*: 7\* counts/cubic meter


Skin Fragments: 1 1 to 4 (low to high)  
Fibrous Particulate: 1 1 to 4 (low to high)  
Background: 3 1 to 4 (low to high); 5 (overloaded)


**Acceptable** Concentration at or below background


**Slightly Elevated** Concentration above background

**ELEVATED** Concentration 10X or more above background

 Not commonly found growing indoors, spores likely come from outside.

 Spores reported to be able to cause allergies in individuals.

 Potential for mycotoxin production exists with these fungi.

 These fungi are considered water damage indicators.

Bipolaris++ = Bipolaris / Drechslera / Exserohilum  
Myxomycetes++ = Myxomycetes / Smut / Periconia

Christopher Goulah, Microbiology Manager  
or Other Approved Signatory

Initial report from: 08/30/2018 12:14:14

Samples received in good condition unless otherwise noted. High levels of background particulate can obscure spores and other particulates, leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.

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Proj: Holland Middle School

## Spore Trap ASSESSMENT Report™ Air-O-Cell™ Analysis of Fungal Spores & Particulates (Methods MICRO-SOP-201, ASTM D7391)

Particle Identification	Raw Count	(Count/m³)	% of Total	Interpretation Guideline	
141804478-0002	Alternaria (Ulocladium)	-	-		
	Ascospores	33	700	32.4	Acceptable
Client Sample ID	Aspergillus/Penicillium	8	200	9.3	Slightly Elevated
081518-02	Basidiospores	18	380	17.6	Acceptable
	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
Location	Cladosporium	35	740	34.3	Acceptable
MS Rm 121 - Music	Curvularia	-	-	-	
	Epicoccum	-	-	-	
Sample Volume (L)	Fusarium	-	-	-	
	Ganoderma	7	100	4.6	Acceptable
150	Myxomycetes++	1	20	0.9	Slightly Elevated
	Pithomyces++	-	-	-	
Sample Type	Rust	-	-	-	
Inside	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
Comments	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	1	20	0.9	Acceptable
	<b>Total Fungi</b>	<b>103</b>	<b>2160</b>	<b>100</b>	Acceptable
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	

Analytical Sensitivity 600x: 21 counts/cubic meter  
Analytical Sensitivity 300x \*: 7\* counts/cubic meter

Skin Fragments: 2 1 to 4 (low to high)  
Fibrous Particulate: 1 1 to 4 (low to high)  
Background: 3 1 to 4 (low to high); 5 (overloaded)

- Acceptable** Concentration at or below background
- Slightly Elevated** Concentration above background
- ELEVATED** Concentration 10X or more above background

- Not commonly found growing indoors, spores likely come from outside.
- Spores reported to be able to cause allergies in individuals.
- Potential for mycotoxin production exists with these fungi.
- These fungi are considered water damage indicators.

Bipolaris++ = Bipolaris / Drechslera / Exserohilum  
Myxomycetes++ = Myxomycetes / Smut / Periconia

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Particle Identification	Raw Count	(Count/m <sup>3</sup> )	% of Total	Interpretation Guideline	
141804478-0003	Alternaria (Ulocladium)	2	40	0.5	Acceptable   
	Ascospores	47	990	13	Acceptable 
<b>Client Sample ID</b>	Aspergillus/Penicillium	76	1600	21.1	ELEVATED 
081518-03	Basidiospores	74	1600	21.1	Acceptable  
	Bipolaris++	2	40	0.5	Slightly Elevated   
	Chaetomium	-	-	-	
<b>Location</b>	Cladosporium	130	2740	36.1	Acceptable 
MS Auditorium	Curvularia	-	-	-	
	Epicoccum	-	-	-	
<b>Sample Volume (L)</b>	Fusarium	-	-	-	
150	Ganoderma	22	460	6.1	Acceptable  
	Myxomycetes++	5	100	1.3	ELEVATED  
	Pithomyces++	1	20	0.3	Acceptable  
<b>Sample Type</b>	Rust	-	-	-	
Inside	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
<b>Comments</b>	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	-	-	-	
	<b>Total Fungi</b>	<b>359</b>	<b>7590</b>	<b>100</b>	Acceptable
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	

Analytical Sensitivity 600x: 21 counts/cubic meter  
Analytical Sensitivity 300x \*: 7\* counts/cubic meter

Skin Fragments: 1 1 to 4 (low to high)  
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Particle Identification	Raw Count	(Count/m³)	% of Total	Interpretation Guideline	
141804478-0004	Alternaria (Ulocladium)	1	20	0.4	Acceptable   
	Ascospores	73	1500	27	Acceptable 
<b>Client Sample ID</b>	Aspergillus/Penicillium	4	80	1.4	Slightly Elevated 
081518-04	Basidiospores	36	760	13.7	Acceptable  
	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
<b>Location</b>	Cladosporium	141	2980	53.6	Acceptable 
MS Rm 106 E2B	Curvularia	-	-	-	
	Epicoccum	-	-	-	
<b>Sample Volume (L)</b>	Fusarium	-	-	-	
150	Ganoderma	9	200	3.6	Acceptable  
	Myxomycetes++	1	20	0.4	Slightly Elevated  
	Pithomyces++	-	-	-	
<b>Sample Type</b>	Rust	-	-	-	
Inside	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
<b>Comments</b>	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	-	-	-	
	<b>Total Fungi</b>	<b>265</b>	<b>5560</b>	<b>100</b>	Acceptable
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	

Analytical Sensitivity 600x: 21 counts/cubic meter  
Analytical Sensitivity 300x \*: 7\* counts/cubic meter

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Particle Identification	Raw Count	(Count/m³)	% of Total	Interpretation Guideline	
141804478-0005	Alternaria (Ulocladium)	1	20	0.5	Acceptable   
	Ascospores	47	990	24.6	Acceptable 
<b>Client Sample ID</b>	Aspergillus/Penicillium	-	-	-	
081518-05	Basidiospores	42	890	22.1	Acceptable  
	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
<b>Location</b>	Cladosporium	97	2000	49.8	Acceptable 
MS Rm 221	Curvularia	-	-	-	
	Epicoccum	-	-	-	
<b>Sample Volume (L)</b>	Fusarium	-	-	-	
150	Ganoderma	7	100	2.5	Acceptable  
	Myxomycetes++	-	-	-	
	Pithomyces++	1	20	0.5	Acceptable  
<b>Sample Type</b>	Rust	-	-	-	
Inside	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
<b>Comments</b>	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	-	-	-	
	<b>Total Fungi</b>	<b>195</b>	<b>4020</b>	<b>100</b>	<b>Acceptable</b>
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	

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Analytical Sensitivity 300x \*: 7\* counts/cubic meter

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Samples analyzed by EMSL Analytical, Inc. Depew, NY A2LA Accredited Environmental Testing Cert #2845.24

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# EMSL Analytical, Inc.

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Attn: Jay Peplin  
Holland CSD  
103 Canada St.  
Holland, NY 14080

EMSL Order: 141804478  
Customer ID: HCSD25  
Collected: 8/15/2018  
Received: 8/16/2018  
Analyzed: 8/30/2018

Proj: Holland Middle School

## Spore Trap ASSESSMENT Report™ Air-O-Cell™ Analysis of Fungal Spores & Particulates (Methods MICRO-SOP-201, ASTM D7391)

Particle Identification	Raw Count	(Count/m <sup>3</sup> )	% of Total	Interpretation Guideline	
141804478-0006	Alternaria (Ulocladium)	10	210	0.8	
	Ascospores	221	4660	18.3	
<b>Client Sample ID</b>	Aspergillus/Penicillium	-	-	-	
081518-06	Basidiospores	118	2490	9.8	
	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
<b>Location</b>	Cladosporium	826	17400	68.2	
MS Exterior Wood Shop	Curvularia	-	-	-	
	Epicoccum	1	20	0.1	
<b>Sample Volume (L)</b>	Fusarium	-	-	-	
150	Ganoderma	29	610	2.4	
	Myxomycetes++	1*	7*	0	
	Pithomyces++	4	80	0.3	
<b>Sample Type</b>	Rust	-	-	-	
Background	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
<b>Comments</b>	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	1	20	0.1	
	<b>Total Fungi</b>	<b>1211</b>	<b>25497</b>	<b>100</b>	
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	1*	7*	-	

Analytical Sensitivity 600x: 21 counts/cubic meter  
Analytical Sensitivity 300x \*: 7\* counts/cubic meter

Skin Fragments: 1 1 to 4 (low to high)  
Fibrous Particulate: 1 1 to 4 (low to high)  
Background: 3 1 to 4 (low to high); 5 (overloaded)

- Not commonly found growing indoors, spores likely come from outside.
- Spores reported to be able to cause allergies in individuals.
- Potential for mycotoxin production exists with these fungi.
- These fungi are considered water damage indicators.

Bipolaris++ = Bipolaris / Drechslera / Exserohilum  
Myxomycetes++ = Myxomycetes / Smut / Periconia

Christopher Goulah, Microbiology Manager  
or Other Approved Signatory

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Client Sample ID	Particle Identification	Raw Count	(Count/m <sup>3</sup> )	% of Total	Interpretation Guideline
141804478-0007	Alternaria (Ulocladium)	-	-	-	
	Ascospores	-	-	-	
081518-07	Aspergillus/Penicillium	-	-	-	
	Basidiospores	-	-	-	
Blank	Bipolaris++	-	-	-	
	Chaetomium	-	-	-	
	Cladosporium	-	-	-	
	Curvularia	-	-	-	
Sample Volume (L)	Epicoccum	-	-	-	
	Fusarium	-	-	-	
	Ganoderma	-	-	-	
Sample Type	Myxomycetes++	-	-	-	
	Pithomyces++	-	-	-	
	Rust	-	-	-	
Blank	Scopulariopsis/Microascus	-	-	-	
	Stachybotrys/Memnoniella	-	-	-	
Comments	Unidentifiable Spores	-	-	-	
	Zygomycetes	-	-	-	
	Polythrincium	-	-	-	
	Torula-like	-	-	-	
	<b>Total Fungi</b>	-	<b>None Detected</b>	-	
	Hyphal Fragment	-	-	-	
	Insect Fragment	-	-	-	
	Pollen	-	-	-	

Analytical Sensitivity 600x: 0 counts/cubic meter  
Analytical Sensitivity 300x \*: 0\* counts/cubic meter

Skin Fragments: 1 1 to 4 (low to high)  
Fibrous Particulate: 1 1 to 4 (low to high)  
Background: 1 1 to 4 (low to high); 5 (overloaded)

- Acceptable** Concentration at or below background
- Slightly Elevated** Concentration above background
- ELEVATED** Concentration 10X or more above background

- Not commonly found growing indoors, spores likely come from outside.
- Spores reported to be able to cause allergies in individuals.
- Potential for mycotoxin production exists with these fungi.
- These fungi are considered water damage indicators.

Bipolaris++ = Bipolaris / Drechslera / Exserohilum  
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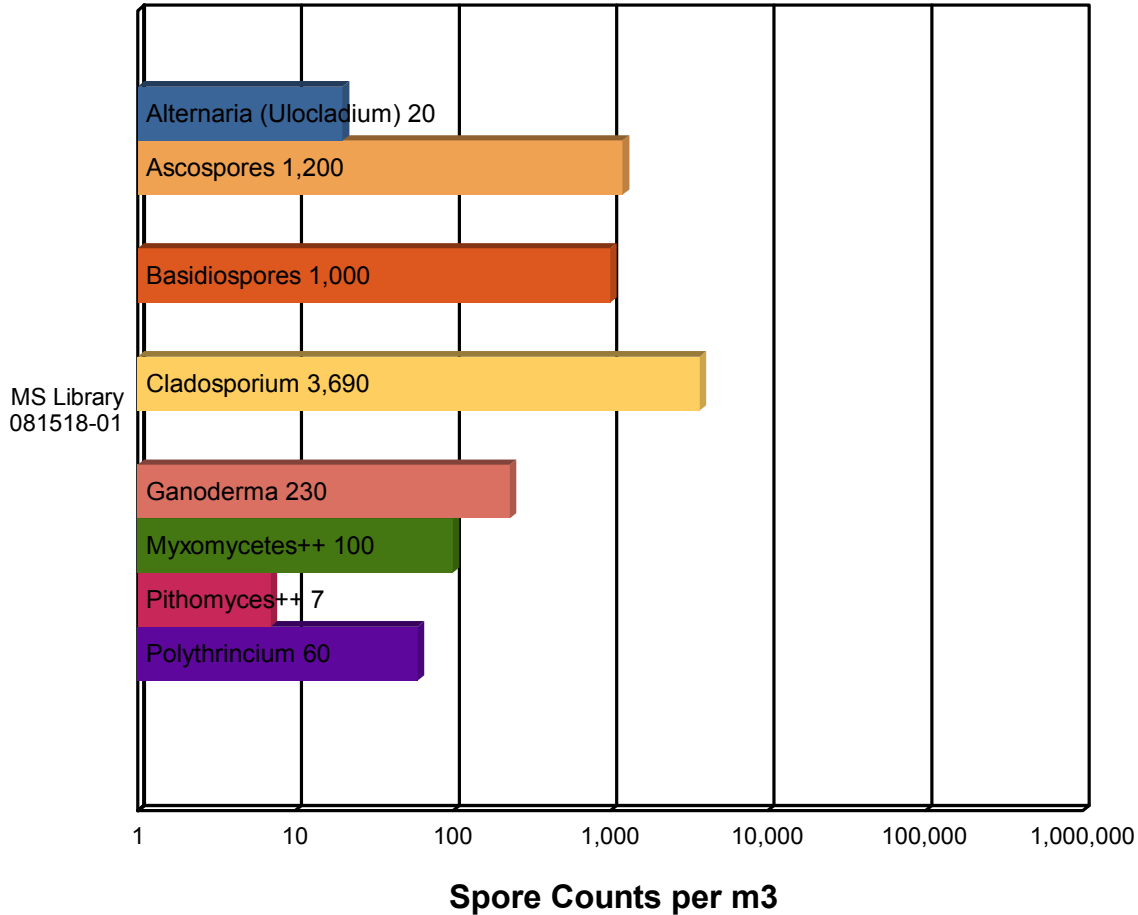
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## Spore Trap Report: Total Counts



Alternaria (Ulocladium)	Ascospores	Aspergillus/Penicillium
Basidiospores	Bipolaris++	Cladosporium
Epicoccum	Ganoderma	Myxomycetes++
Pithomyces++	Polythrincium	Torula-like

\* The chart is displayed using a logarithmic scale. Bar size is not directly proportional to the number of spores.

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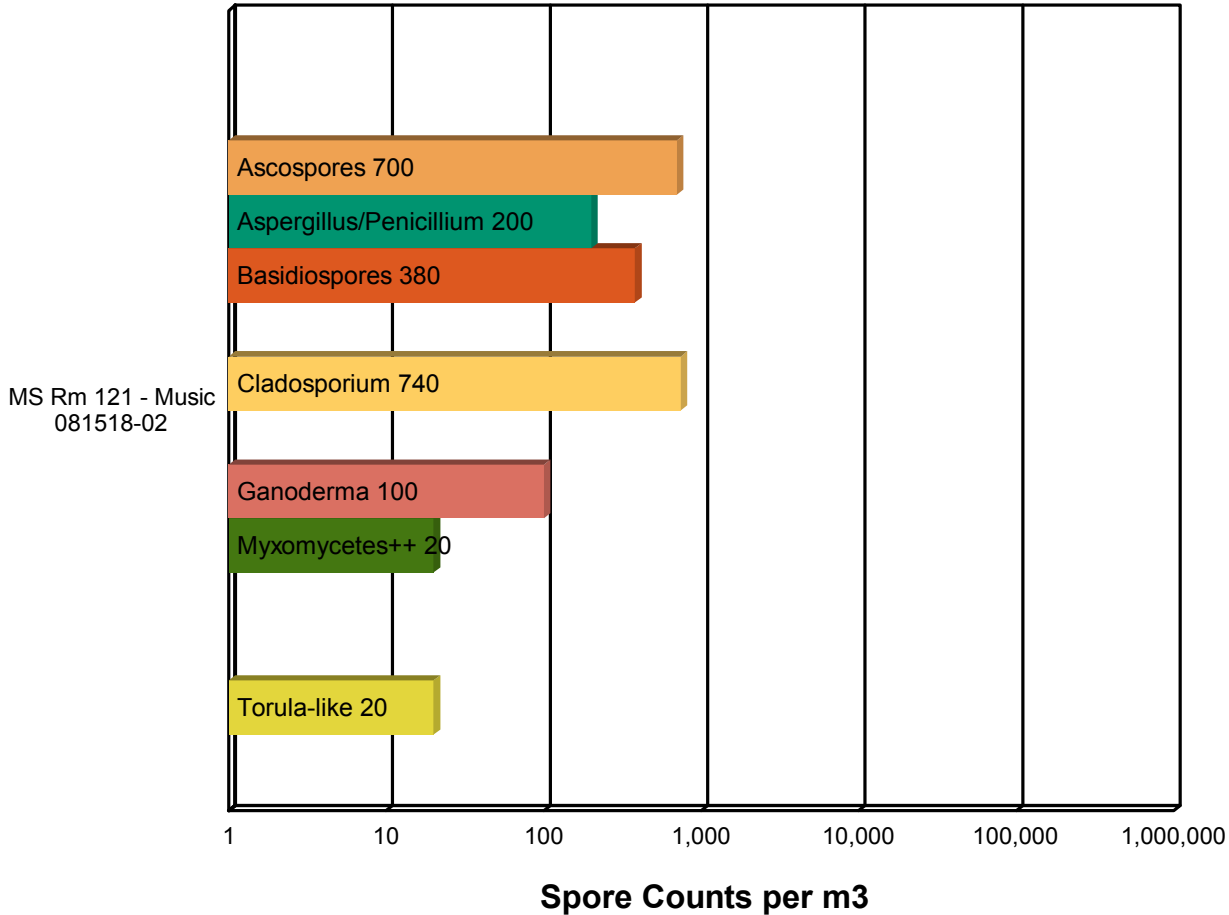
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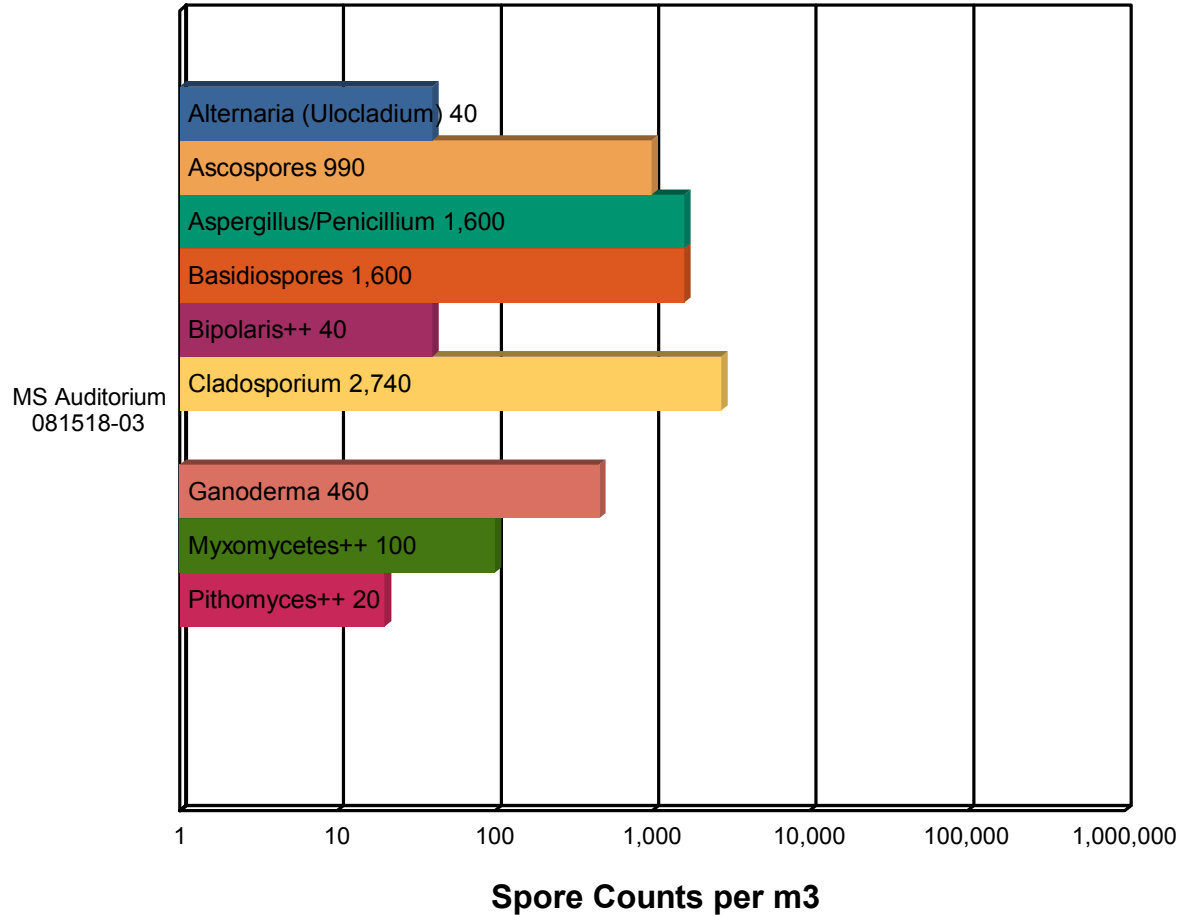
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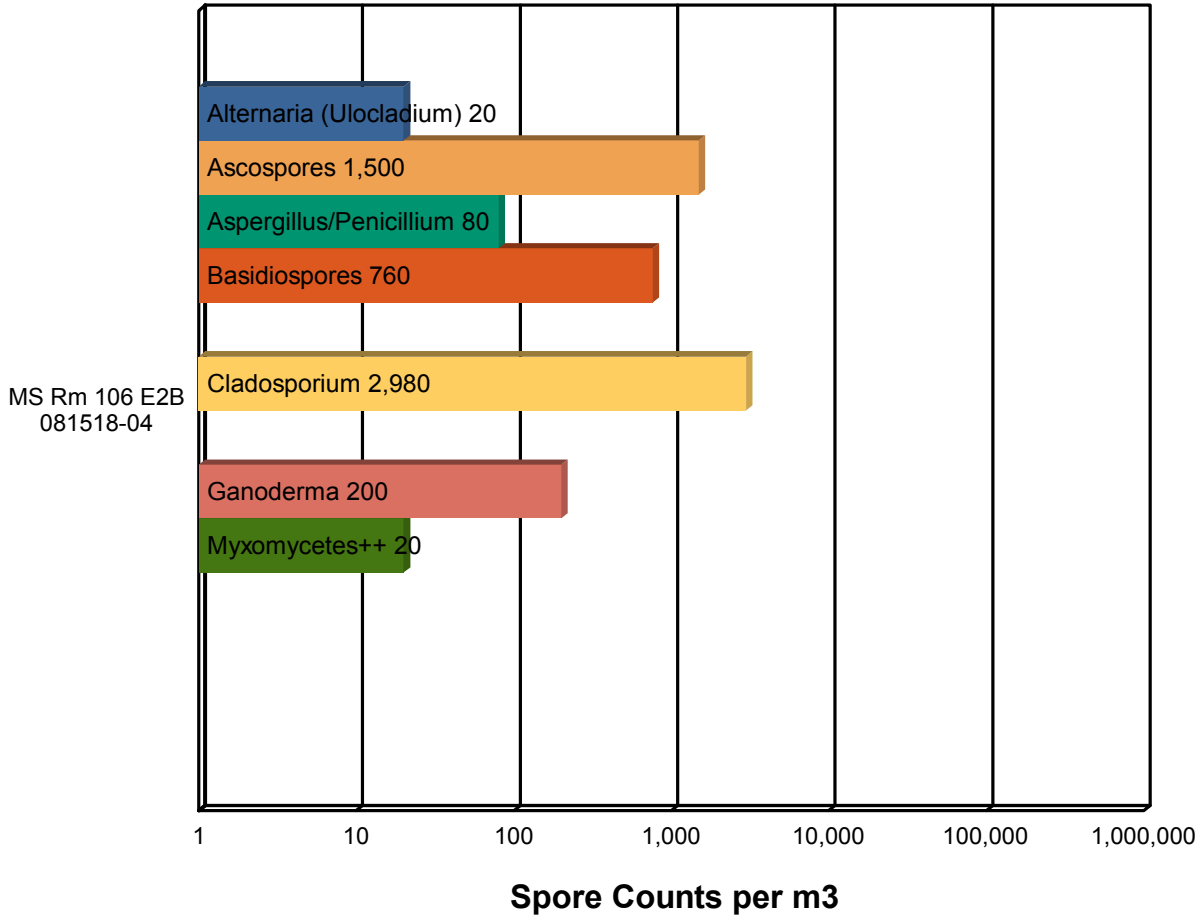
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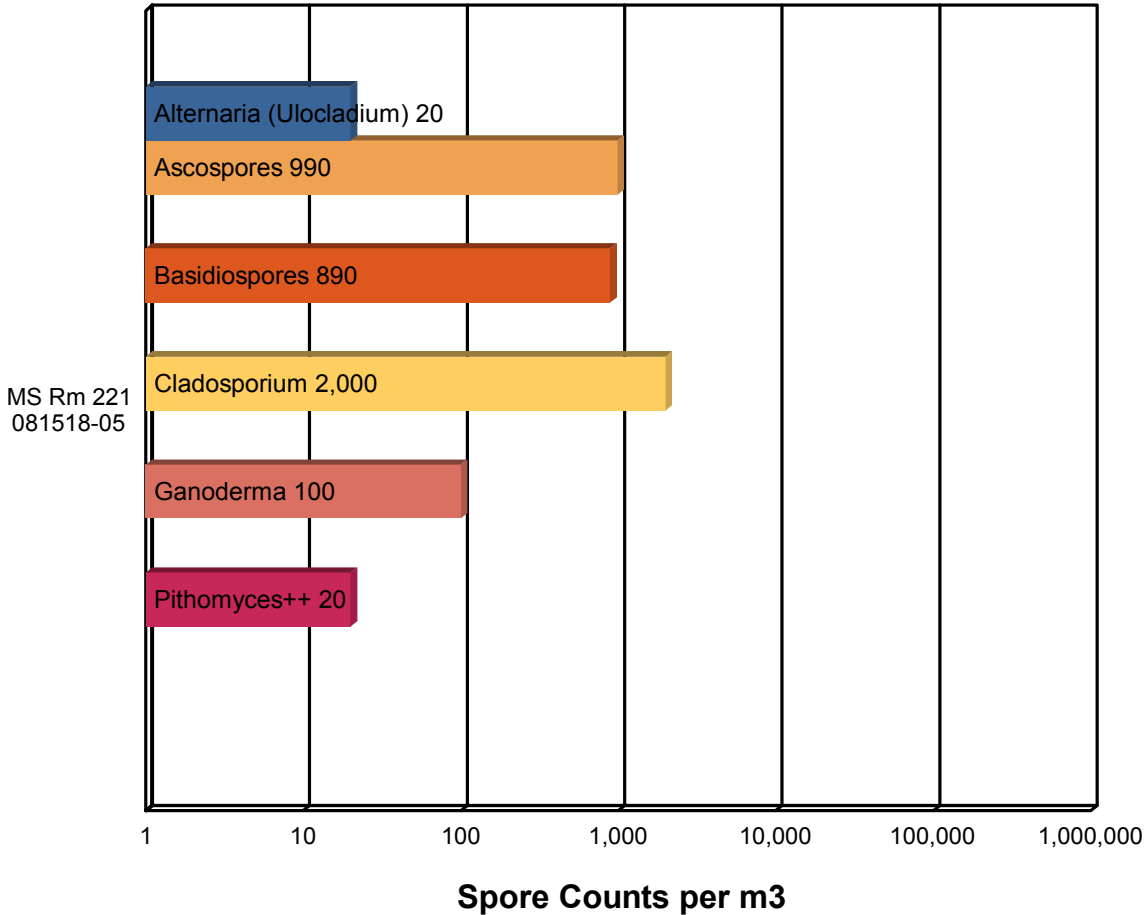
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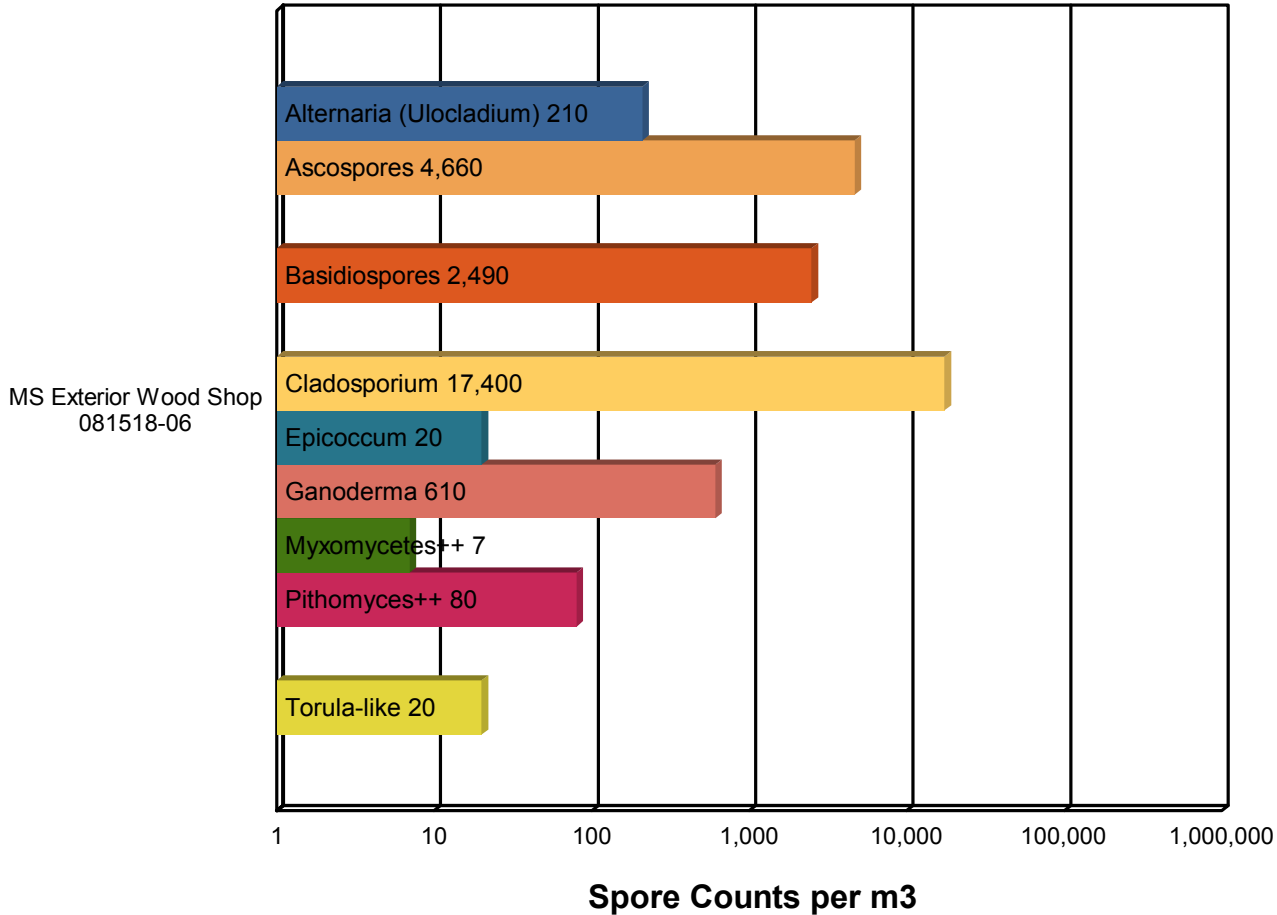
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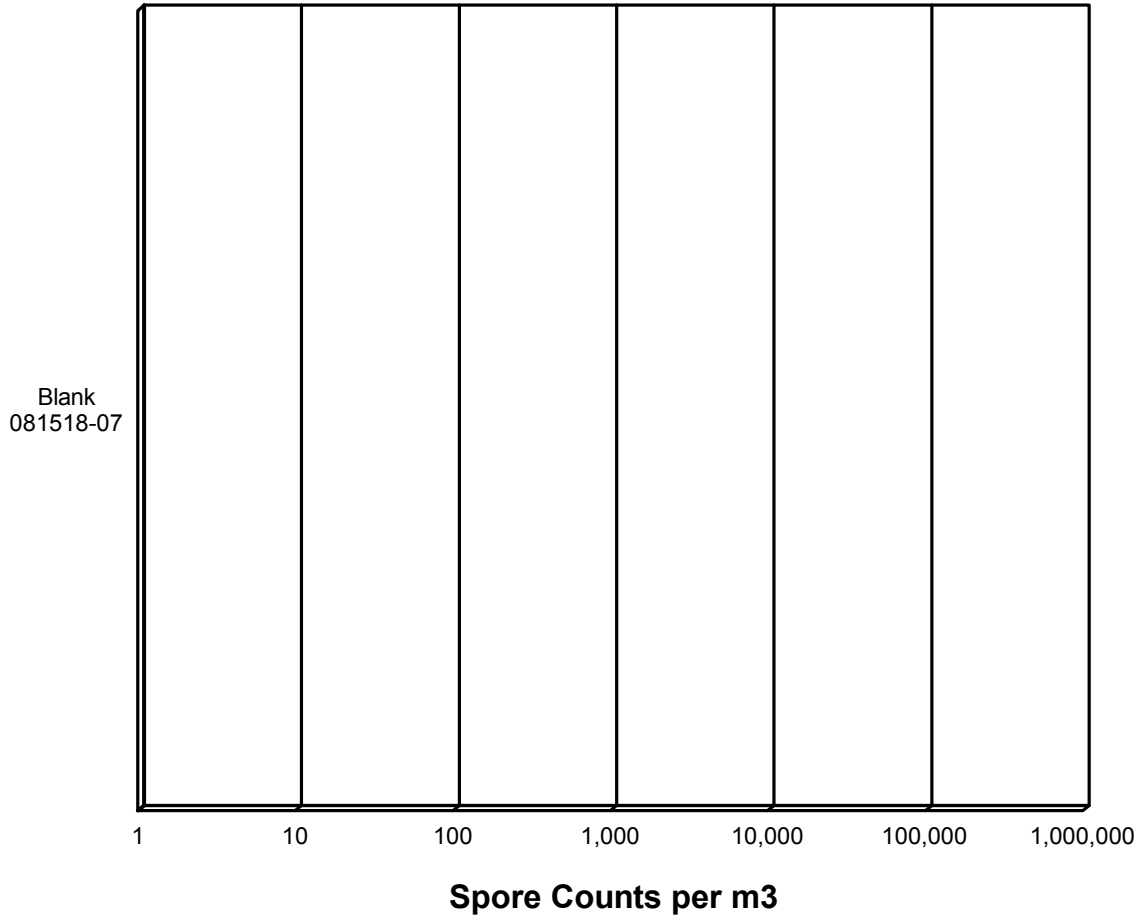
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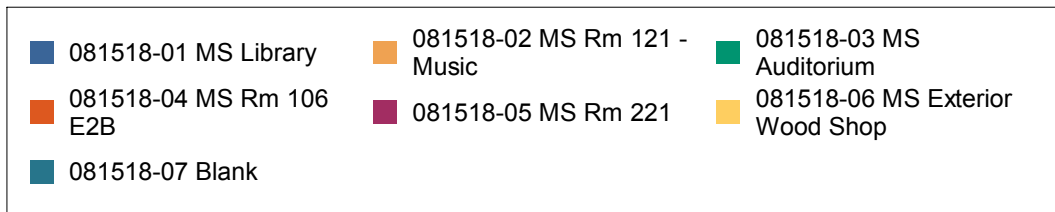
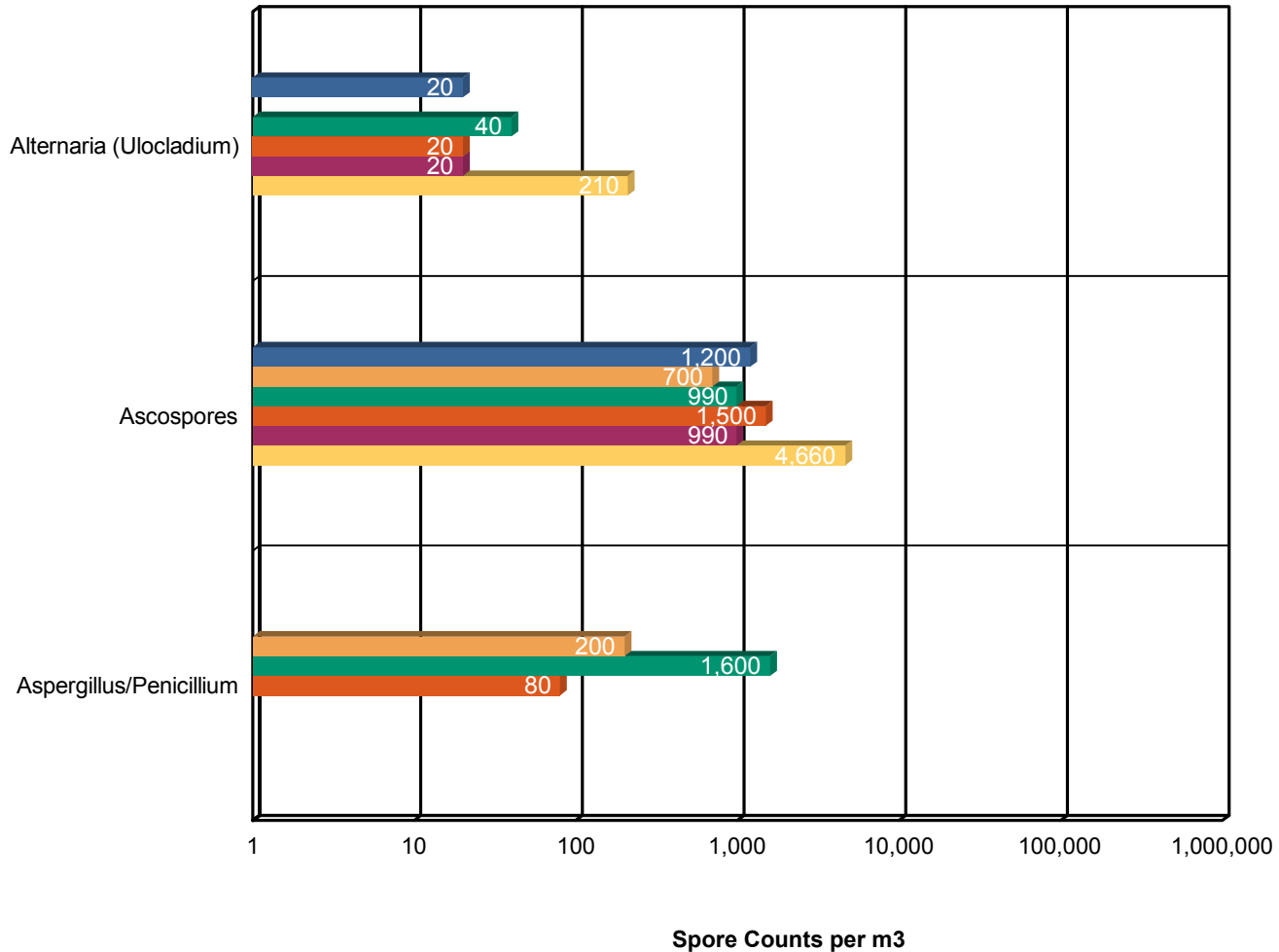
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## Background Comparison Chart



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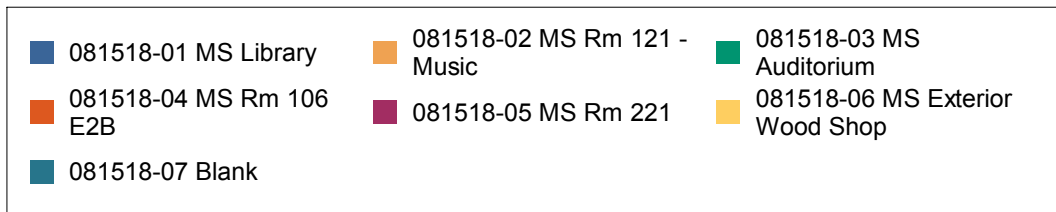
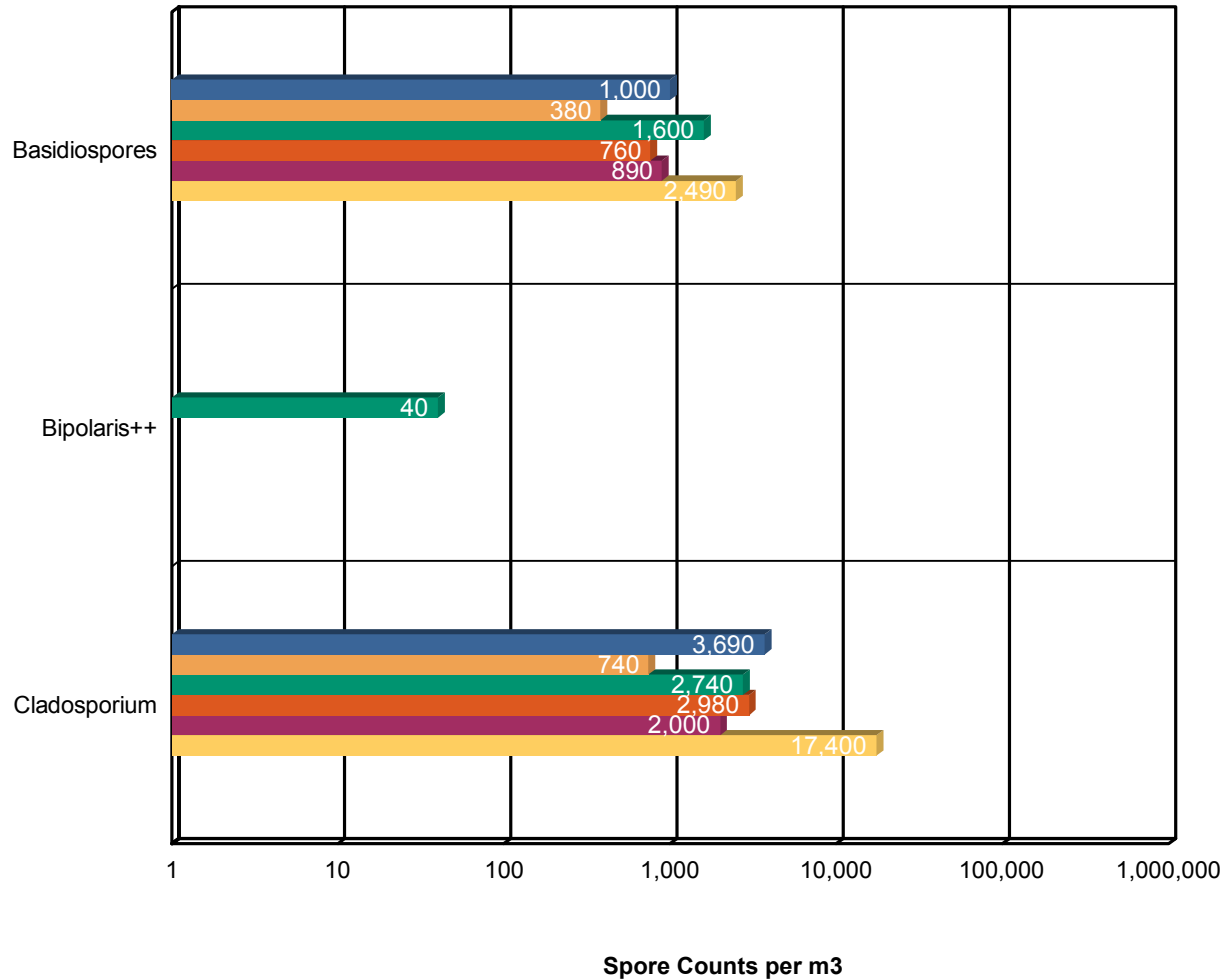
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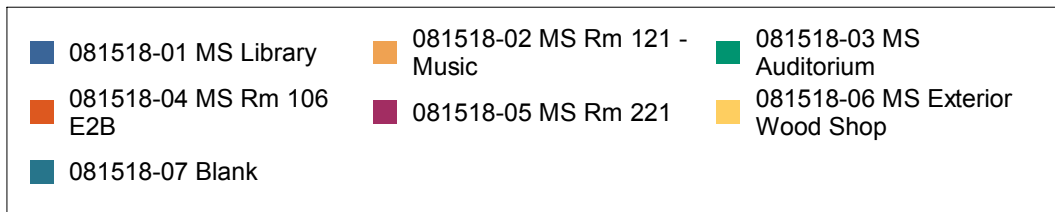
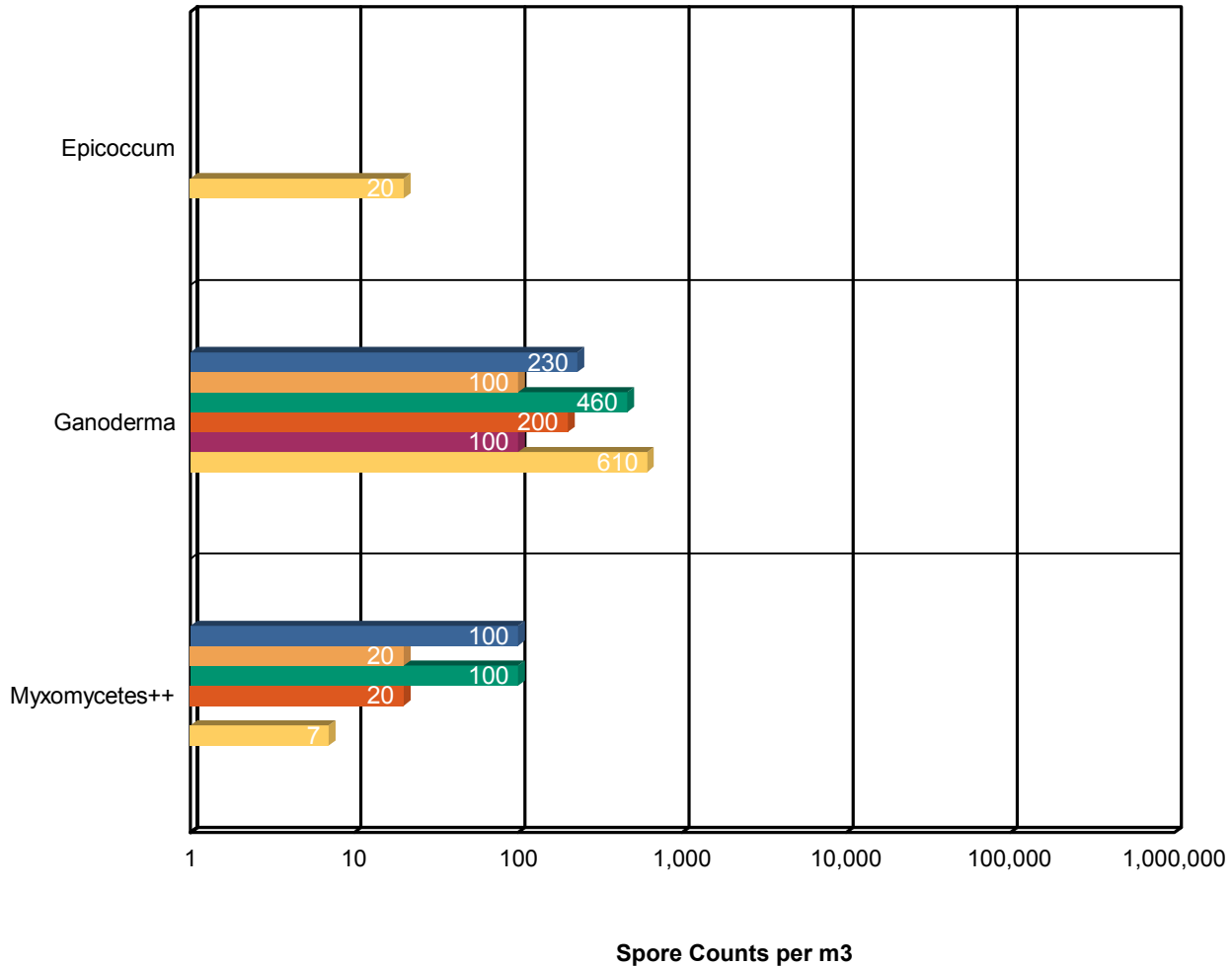
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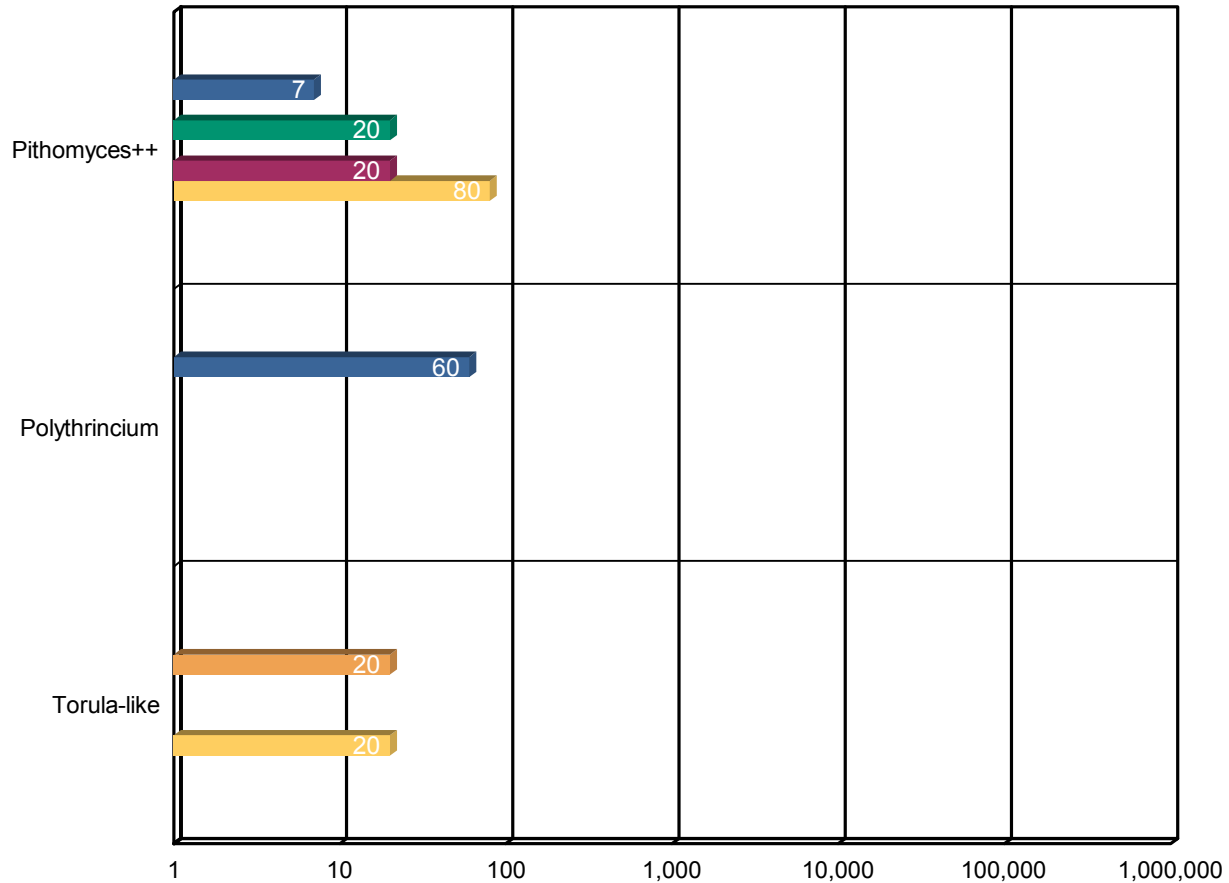
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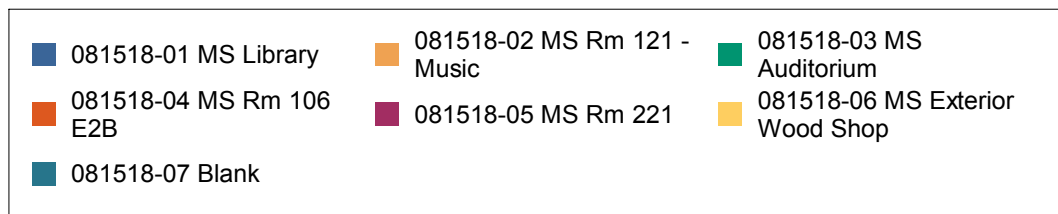
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## Background Comparison Chart



Spore Counts per m3



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### 3. Understanding the Results

EMSL Analytical, Inc. is an independent laboratory, providing unbiased and scientifically valid results. These data represent only a portion of an overall IAQ investigation. Visual information and environmental conditions measured during the site assessment (humidity, moisture readings, etc.) are crucial to any final interpretation of the results. Many factors impact the final results; therefore, result interpretation should only be conducted by qualified individuals. The American Conference of Governmental Industrial Hygienists (ACGIH) has published a good reference book covering sampling and data interpretation. It is entitled, Bioaerosols: Assessment and Control, 1999.

Fungal spores are found everywhere. Whether or not symptoms develop in people exposed to fungi depends on the nature of the fungal material (e.g., allergenic, toxic, or infectious), the exposure level, and the susceptibility of exposed persons. Susceptibility varies with the genetic predisposition (e.g., allergic reactions do not always occur in all individuals), age, pre-existing medical conditions (e.g., diabetes, cancer, or chronic lung conditions), use of immunosuppressive drugs, and concurrent exposures. These reasons make it difficult to identify dose/response relationships that are required to establish "safe" or "unsafe" levels (i.e., permissible exposure limits).

It is generally accepted in the industry that indoor fungal growth is undesirable and inappropriate, necessitating removal or other appropriate remedial actions. The New York City guidelines and EPA guidelines for mold remediation in schools and commercial buildings define the conditions warranting mold remediation. Always remember that water is the key. Preventing water damage or water condensation will prevent mold growth.

This report is not intended to provide medical advice or advice concerning the relative safety of an occupied space. Always consult an occupational or environmental health physician who has experience addressing indoor air contaminants if you have any questions.



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## 4. Glossary of Fungi

<b>ALTERNARIA(ULOCLADIUM)</b>	
<b>Allergic Potential</b>	Type I allergies (hay fever, asthma), Type III (hypersensitivity pneumonitis)
<b>Industrial Uses</b>	Biocontrol of weed plants ·Biocontrol fungal plant pathogens.
<b>Mode of Dissemination</b>	Wind
<b>Natural Habitat</b>	Common saprobe and pathogen of plants. Typically found on plant tissue, decaying wood, and foods. Soil . Air outdoors.
<b>Other Comments</b>	Many species of Ulocladium have been renamed as Alternaria . Alternaria spores are one of the most common and potent indoor and outdoor airborne allergens. Additionally, Alternaria sensitization has been determined to be one of the most important factors in the onset of childhood asthma. Synergy with Cladosporium or Ulocladium may increase the severity of symptoms
<b>Potential or Opportunistic Pathogens</b>	Phaeohyphomycosis {causing cystic granulomas in the skin and subcutaneous tissue}. In immunocompetent patients, Alternaria colonizes the paranasal sinuses, leading to chronic hypertrophic sinusitis
<b>Potential Toxins Produced</b>	Alternariol (AOH) . Alternariol monomethylether (AME). Tenuazonic acid (TeA). Altenuene (ALT). Alttoxins (ATX)
<b>References</b>	Alternaria redefined. J. Woudenberg et al., Studies in Mycology. Volume 75, June 2013, Pages 171-212
<b>Suitable Substrates in the Indoor Environment</b>	Indoors near condensation (window frames, showers), House dust (in carpets, and air). Also colonizes building supplies, computer disks, cosmetics, leather, optical instruments, paper, sewage, stone monuments, textiles, wood pulp, and jet fuel
<b>Water Activity</b>	Aw =0.85-0.88 (water damage indicator)

<b>ASCOSPORES</b>	
<b>Allergic Potential</b>	Depends on genus and species.
<b>Industrial Uses</b>	
<b>Mode of Dissemination</b>	Forcible ejection or passive release and dissemination by wind or insects.
<b>Natural Habitat</b>	Everywhere in nature.
<b>Other Comments</b>	Ascospores are the result of sexual reproduction and produced in a saclike structure called an ascus. All ascospores belong to members of the Phylum Ascomycota, which encompasses a plethora of genera worldwide.
<b>Potential or Opportunistic Pathogens</b>	Depends on genus and species.
<b>Potential Toxins Produced</b>	
<b>Suitable Substrates in the Indoor Environment</b>	
<b>Water Activity</b>	

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## ASPERGILLUS/PENICILLIUM

<b>Allergic Potential</b>	Type I (hay fever, asthma) · Type III (hypersensitivity)
<b>Industrial Uses</b>	Many depending on the species
<b>Mode of Dissemination</b>	Wind · Insects
<b>Natural Habitat</b>	Plant debris · Seed · Cereal crops
<b>Other Comments</b>	Spores of Aspergillus and Penicillium (including others such as Acremonium, Talaromyces, and Paecilomyces) are small and spherical with few distinguishing characteristics. They cannot be differentiated or speciated by non-viable impaction sampling methods. Some species with very small spores may be undercounted in samples with high background debris.
<b>Potential or Opportunistic Pathogens</b>	Possible depending on the species.
<b>Potential Toxins Produced</b>	
<b>Suitable Substrates in the Indoor Environment</b>	Grows on a wide range of substrates indoors · Prevalent in water damaged buildings · Foods (blue mold on cereals, fruits, vegetables, dried foods) · House dust · Fabrics · Leather · Wallpaper · Wallpaper glue
<b>Water Activity</b>	Aw=0.75-0.94

## BASIDIOSPORES

<b>Allergic Potential</b>	Type I allergies (hay fever, asthma) · Type III (hypersensitivity pneumonitis)
<b>Industrial Uses</b>	Edible mushrooms are used in the food industry.
<b>Mode of Dissemination</b>	Forcible ejection. Wind currents.
<b>Natural Habitat</b>	Forest floors. Lawns · Plants (saprobes or pathogens depending on genus)
<b>Other Comments</b>	Basidiospores are the result of sexual reproduction and formed on a structure called the basidium. Basidiospores belong to the members of the Phylum Basidiomycota, which includes mushrooms, shelf fungi, rusts, and smuts.
<b>Potential or Opportunistic Pathogens</b>	Depends on genus.
<b>Potential Toxins Produced</b>	Amanitins. monomethyl-hydrazine. muscarine. ibotenic acid. psilocybin.
<b>Suitable Substrates in the Indoor Environment</b>	Depends on genus. Wood products
<b>Water Activity</b>	Unknown.

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## BIPOLARIS

Allergic Potential	Hay fever, asthma. Allergic and chronic invasive sinusitis
Free moisture required for mold growth	Unknown
Mode of Dissemination	Wind
Natural Habitat	Plant saprophyte. Plant pathogen of many plants, causing leaf rot, crown rot, and root rot on warm season turf grasses
Other Comments	Includes Bipolaris, Drechslera, and Exserohilum.
Potential or Opportunistic Pathogens	Invasive sinusitis, disseminated mycoses, peritonitis, keratitis, phaeohyphomycosis
Potential Toxins	Can potentially produce sterigmatocystin.
Suitable Substrates in the Indoor Environment	House plants, indoor building materials

## CLADOSPORIUM

Allergic Potential	Type I (asthma and hay fever).
Industrial Uses	Produces 10 antigens.
Mode of Dissemination	Air
Natural Habitat	Dead plant matter. Straw. Soil. Woody plants
Potential or Opportunistic Pathogens	Edema. keratitis. onychomycosis. pulmonary infections. Sinusitis.
Potential Toxins Produced	Cladospurin and Emodin.
Suitable Substrates in the Indoor Environment	Fiberglass duct liner. Paint. Textiles. Found in high concentration in water-damaged building materials.
Water Activity	Aw 0.84-0.88

## EPICOCCUM

Allergic Potential	Hay fever, asthma
Mode of Dissemination	Wind
Natural Habitat	A worldwide saprophytic fungi, being isolated from dead plant material and soil.
Potential or Opportunistic Pathogens	Unknown
Suitable Substrates in the Indoor Environment	Paper, textiles
Water Activity	0.86-0.90

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<b>GANODERMA</b>	
<b>Allergic Potential</b>	Ganoderma species are known to cause allergies in people on a worldwide scale.
<b>Industrial Uses</b>	Biopulping of wood for the paper industry. Potential medicinal use due to: 1. Inhibition of Ras dependent cell transformation, 2. Antifibrotic activity, 3. Immunomodulating activity, 4. Free-radicle scavenging
<b>Mode of Dissemination</b>	Wind.
<b>Natural Habitat</b>	Grows on conifers and hardwoods worldwide, causing white rot, root rot, and stem rot.
<b>Other Comments</b>	Used in traditional Chinese medicine as an herbal supplement. It is also known as a "shelf fungus" because the fruiting body forms a stalk-less shelf on the sides of trees and logs. It is sometimes called "artists conk" because when you scratch the white pores of the fruiting body, the white rubs away and exposes the brown hyphae underneath. Thus, pictures can be produced on the fruiting body.
<b>Potential or Opportunistic Pathogens</b>	Unknown.
<b>Potential Toxins Produced</b>	
<b>Reference</b>	References: Craig, R.L., Levetin, E. 2000. Multi-year study of Ganoderma aerobiology. <i>Aerobiologia</i> 16: 75-81. <a href="http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart6_e.html">http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart6_e.html</a>
<b>Suitable Substrates in the Indoor Environment</b>	Unknown.
<b>Water Activity</b>	

<b>MYXOMYCETES++</b>	
<b>Allergic Potential</b>	Type I
<b>Free moisture required for mold growth</b>	Unknown
<b>Industrial Uses</b>	
<b>Mode of Dissemination</b>	Insects, Water, Wind
<b>Natural Habitat</b>	Decaying logs, Dead leaves , Dung , Lawns , Mulched flower beds, Lawns
<b>Other Comments</b>	Includes Myxomycetes, Smut, and Periconia.
<b>Potential or Opportunistic Pathogens</b>	Unknown
<b>Suitable Substrates in the Indoor Environment</b>	Rotting lumber

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<b>PITHOMYCES</b>	
<b>Allergic Potential</b>	Unknown
<b>Mode of Dissemination</b>	Wind
<b>Natural Habitat</b>	A worldwide saprophytic fungi, being isolated from dead plant material and soil.
<b>Other Comments</b>	Pithomyces++ includes spores of Pithomyces and Pseudopithomyces.
<b>Potential or Opportunistic Pathogens</b>	Mycosis in immunocompromised patients
<b>Suitable Substrates in the Indoor Environment</b>	Paper
<b>Water Activity</b>	Requires high moisture for spore germination

<b>POLYTHRINCIUM</b>	
<b>Allergic Potential</b>	Allergenic potential in this genus is not well understood, and is currently being studied.
<b>Natural Habitat</b>	Leaves
<b>Potential Opportunist or Pathogen</b>	Unknown
<b>Potential Toxins Produced</b>	
<b>Suitable Substrates in the Indoor Environment</b>	

<b>TORULA-LIKE</b>	
<b>Allergic Potential</b>	Hay fever, asthma
<b>Mode of Dissemination</b>	Wind
<b>Natural Habitat</b>	A worldwide saprophytic fungi, being isolated from dead plant material and soil.
<b>Other Comments</b>	Spore appear morphologically similar to Torula but cannot be positively identified because of limitations of spore trap samples.
<b>Potential or Opportunistic Pathogens</b>	Unknown
<b>Suitable Substrates in the Indoor Environment</b>	Wood, paper, wicker furniture, baskets
<b>Water Activity</b>	Unknown

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### 5. References and Informational Links

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### Books

- Bioaerosols: Assessment and Control. Janet Macher, Ed., American Conference of Governmental Industrial Hygienists, Cincinnati, OH 1999.
- Exposure Guidelines for Residential Indoor Air Quality. Environmental Health Directorate, Health Protection Branch, Health Canada, Ottawa, Ontario, 1989.
- Fungal Contamination in Public Buildings: Health Effects and Investigation Methods. Health Canada, Ottawa, Ontario, 2004.
- IICRC: S500 Standard and Reference Guide for Professional Water Damage Restoration. 3rd Edition, Institute of Inspection, Cleaning, and Restoration Certification, Vancouver, WA, 2006

IICRC: S520 Standard and Reference Guide for Professional Mold Remediation. 1st Edition, Institute of Inspection, Cleaning, and Restoration Certification, Vancouver, WA, 2004

- Field Guide for the Determination of Biological Contaminants in Environmental Samples. 2nd Edition, American Industrial Hygiene Association, 2005.

### Consumer Links

Read the full text of AIHA's "The Facts About Mold" consumer brochure.

<http://www.aiha.org/get-involved/VolunteerGroups/Documents/Biosafety/VG-FactsAbout%20MoldDecember2011.pdf>

The Occupational Safety and Health Administration (OSHA)

<http://www.osha.gov/SLTC/molds/index.html>

CDC Mold Facts

<http://www.cdc.gov/mold/faqs.htm>

CDC Stachybotrys - Questions and answers on Stachybotrys chartarum and other molds

<http://www.cdc.gov/mold/stachy.htm>

IOM, NAS: Clearing the Air: Asthma and Indoor Air Exposures

<http://www.iom.edu/Reports/2000/Clearing-the-Air-Asthma-and-Indoor-Air-Exposures.aspx>

National Library of Medicine-Mold website

<http://www.nlm.nih.gov/medlineplus/molds.html>

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California Department of Health Services (CADOHS)

<http://www.cal-iaq.org/separator/mold-and-dampness/about-mold>

Minnesota Department of Health

<http://www.health.state.mn.us/divs/eh/indoorair/mold/index.html>

New York City Department of Health and Mental Hygiene

<http://conyers.house.gov/index.cfm/issues?p=toxic-mold>

H.R.: The United States Toxic Mold Safety and Protection Act

<http://conyers.house.gov/index.cfm/issues?p=toxic-mold>

### EPA

"Should You Have the Air Ducts in Your Home Cleaned?"

<http://www.epa.gov/iaq/pubs/airduct.html>

General information about molds and actions that can be taken to clean up or prevent a mold problem.

<http://www.epa.gov/asthma/molds.html>

"A Brief Guide to Mold, Moisture, and Your Home" - Includes basic information on mold, cleanup guidelines, and moisture and mold prevention

<http://www.epa.gov/mold/moldguide.html>

"Mold Remediation in Schools and Commercial Buildings" - Information on remediation in schools and commercial property, references for potential mold and moisture remediators.

[http://www.epa.gov/mold/mold\\_remediation.html](http://www.epa.gov/mold/mold_remediation.html)

### FEMA

"Homes That Were Flooded May Harbor Mold Problems" - Information and tips for cleaning mold.

<http://www.fema.gov/news-release/homes-were-flooded-may-harbor-mold-problems>

"Dealing With Mold & Mildew in Your Flood Damaged Home.

[http://www.fema.gov/pdf/rebuild/recover/fema\\_mold\\_brochure\\_english.pdf](http://www.fema.gov/pdf/rebuild/recover/fema_mold_brochure_english.pdf)

"Prompt Flood Cleanup Can Help Prevent Health Problems" - How to clean up in-house mold problems (not large or serious exposures).

<http://www.fema.gov/news-release/prompt-flood-cleanup-can-help-prevent-health-problems>

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### 6. Important Terms, Conditions, and Limitations

#### A. Sample Retention

Samples analyzed by EMSL will be retained for 90 days after analysis date. Storage beyond this period is available for a fee with written request prior to the initial 30 day period. Samples containing hazardous/toxic substances which require special handling will be returned to the client immediately. EMSL reserves the right to charge a sample disposal fee or return samples to the client.

#### B. Change Orders and Cancellation

All changes in the scope of work or turnaround time requested by the client after sample acceptance must be made in writing and confirmed in writing by EMSL. If requested changes result in a change in cost the client must accept payment responsibility. In the event work is cancelled by a client, EMSL will complete work in progress and invoice for work completed to the point of cancellation notice. EMSL is not responsible for holding times that are exceeded due to such changes.

#### C. Warranty

EMSL warrants to its clients that all services provided hereunder shall be performed in accordance with established and recognized analytical testing procedures and with reasonable care in accordance with applicable federal, state and local laws. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied. EMSL disclaims any other warranties, express or implied, including a warranty of fitness for particular purpose and warranty of merchantability.

#### D. Limits of Liability

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, but not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages, arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or any third party. We accept no legal responsibility for the purposes for which the client uses the test results. EMSL will not be held responsible for the improper selection of sampling devices even if we supply the device to the user. The user of the sampling device has the sole responsibility to select the proper sampler and sampling conditions to insure that a valid sample is taken for analysis. Any resampling performed will be at the sole discretion of EMSL, the cost of which shall be limited to the reasonable value of the original sample delivery group (SDG).

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