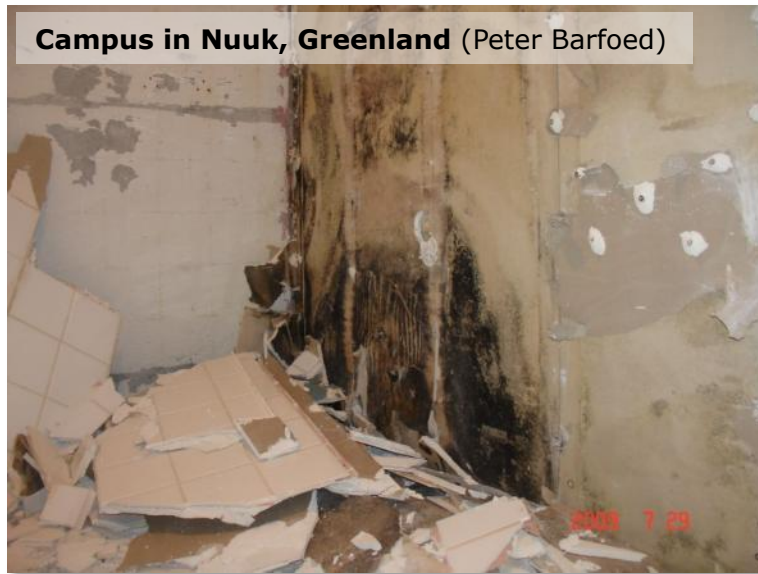


***Chaetomium* and *Stachybotrys* indoors and their metabolites**



Birgitte Andersen

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The Project

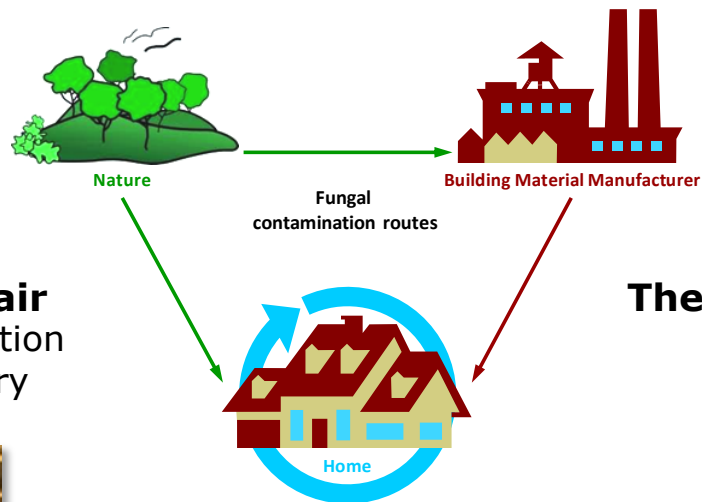


Birgitte Andersen

Natural habitats
Contamination
Growth physiology

Fungal Consortia II:
Control and Prevention
funded by

VILLUM FONDEN



Indoor air
Dissemination
Chemistry

The building envelope
Detection
Genetics



Ina Dosen



Geo Clausen



Kristian F Nielsen



Jakob B Nielsen



Anna Lewinska



Ruut Peuhkuri



Carsten Rode

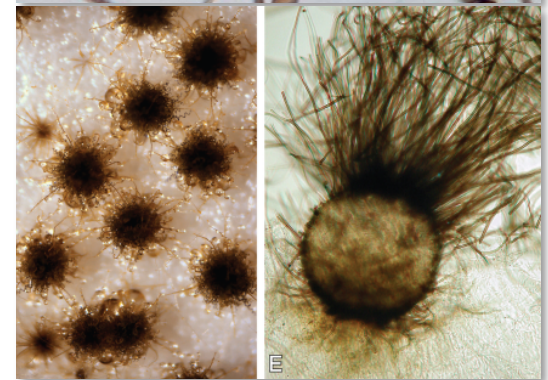
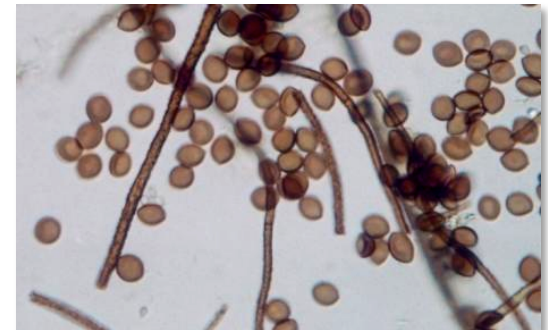
Collaboration between DTU Civil Engineering & DTU Systems Biology

Chaetomium and *Stachybotrys* in DK

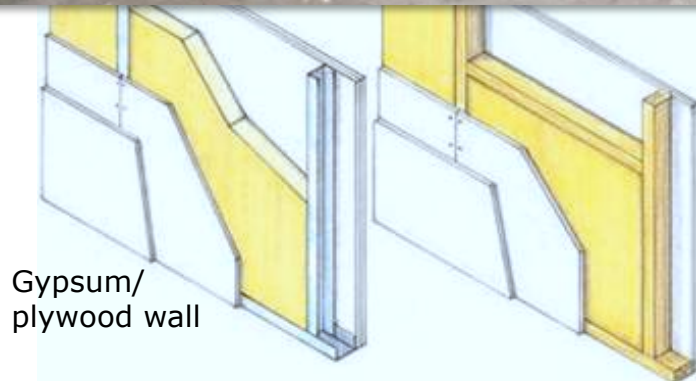


C. globosum

also common
on plywood
and OSB
(unpublished)



Frequency:*
16 % in total
25 % on concrete

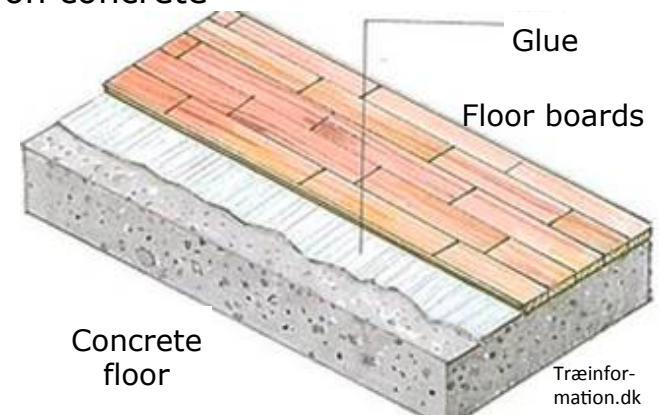


Gypsum/
plywood wall



S. chartarum

Frequency:*
4 % in total
25 % on gypsum



* Andersen et al. (2011) Appl Environ Microbiol 77: 4180–4188

Metabolome Platform at DTU

Danmarks
Tekniske Universitet



Agilent Technologies Thought Leader Lab



Head of platform: **Kristian F. Nielsen**

1 Agilent 6550 Accurate-Mass Quadrupole Time-of-Flight (Q-TOF) LC-MS system with **1200+** in-house MS/HRMS of metabolites **7500+** metabolite data in database

2 Agilent 6490 Triple Quadrupole UHPLC-MS

6 Agilent 1100 HPLC-RI-UV

2 Agilent 1100 HPLC-UV-FLD

1 Agilent GC-MS for ^{13}C analyses

1 Bruker maXis G4 Q-TOF UHPLC-MS system

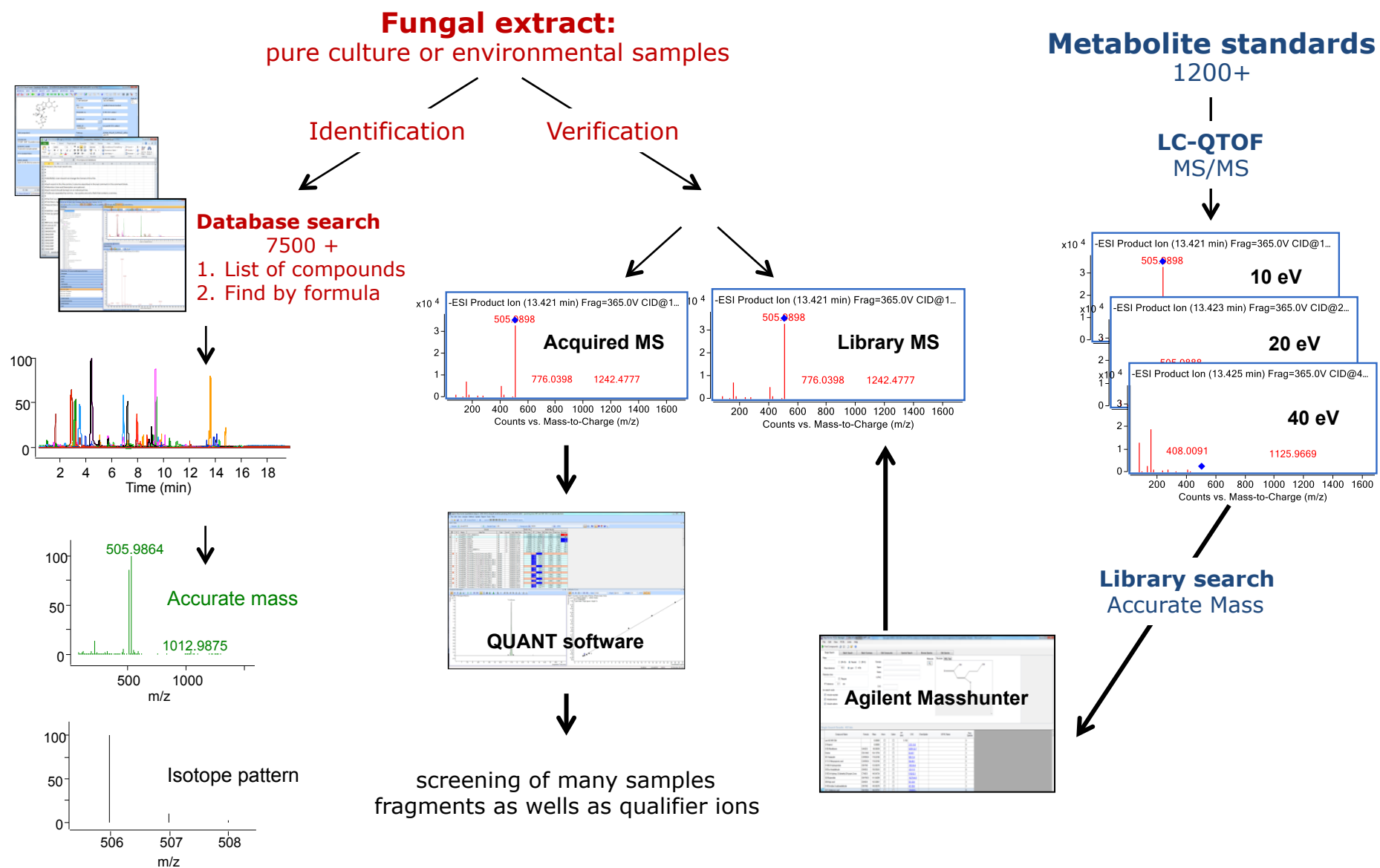
2 Dionex IC systems that can be interfaced with maXis G4 Q-TOF

1 Dionex UHPLC-UV-FLD

2 preparative HPLC-UV for purification of fungal metabolites

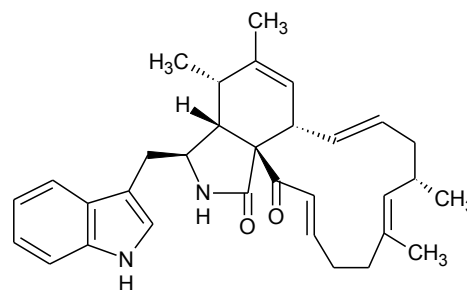
1 Thermo GC-MS system

Metabolite Library and databases

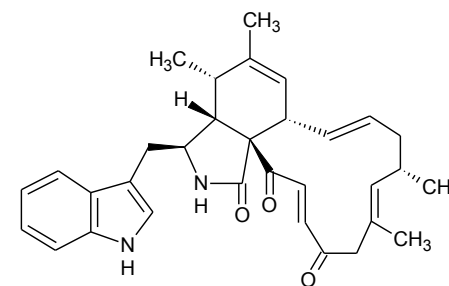


Sample 1:

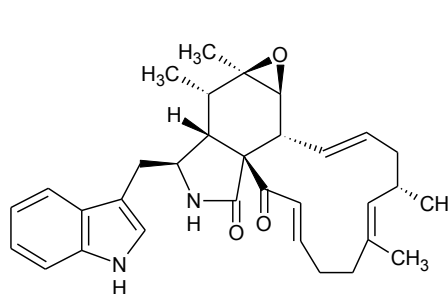
C. globosum inoculated on plywood with different wallpapers and glues



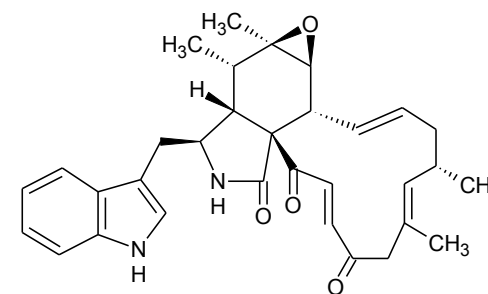
Prochaetoglobosin I



Prochaetoglobosin II



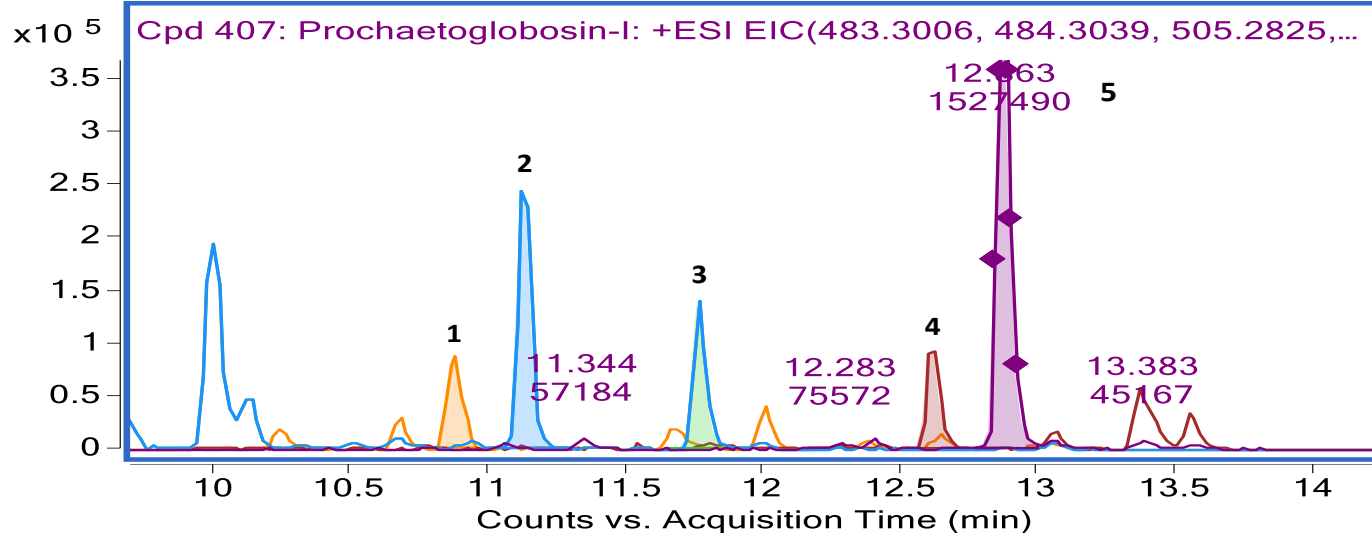
Prochaetoglobosin III



Prochaetoglobosin IV

Automated database search

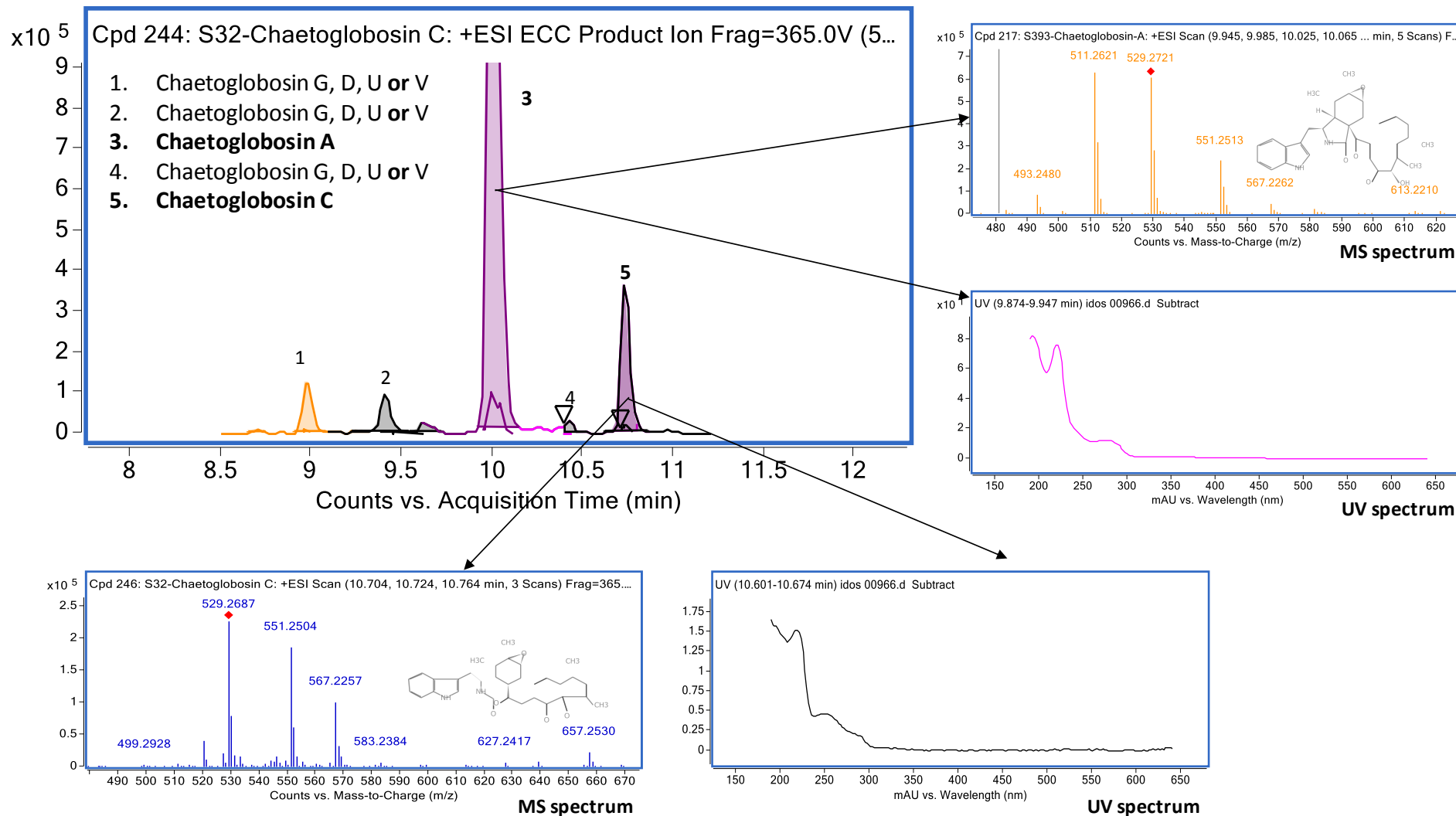
- 1) Prochaetoglobosin IV
- 2) Prochaetoglobosin III a
- 3) Prochaetoglobosin III b
- 4) Prochaetoglobosin II
- 5) Prochaetoglobosin I



Sample 1:

C. globosum inoculated on plywood with different wallpapers and glues

Library search on accurate mass for verification: + **UV-spectrum and retention time on own LC-QTOF**



Metabolite Library for *Stachybotrys*

MPF Library #	Name	Accurate mass [M+H ⁺]	RT/min
465	Satratoxin G	545.2381	7.995
466	Iso-satratoxin F	543.2225	8.837
485	Roridin L-2	531.2589	7.834
409	Satratoxin H	529.2432	8.191
1097	<i>K-76 derivative compound 6</i>	516.2956	10.040
1095	<i>K-76 derivative compound 1</i>	516.2592	8.650
462	Roridin E	515.2639	10.291
463	Roridin H	513.2483	11.508
1096	<i>K-76 derivative compound 4</i>	502.2799	9.890
1094	<i>F 1839F acid; Mer-VGF 724B; K-76 derivative compound 3</i>	488.2643	8.690
464	Verrucaric acid	485.2170	10.697
458	Atranone G	463.2326	10.104
459	Atranone H	449.2170	9.729
453	Atranone B	447.2377	10.062
1090	Stachybotryamide	430.2588	8.810
-	Spirodihydrobenzofuranlactam II	430.2588	8.860
454	Atranone C	417.2272	10.354
452	Atranone A	417.2272	9.459
460	Atranone J	405.2272	8.414
1089	Mer-NF-5003-B	405.2272	8.500
1091	F-1839-A	402.2275	8.250
456	Atranone E	387.2530	10.436
455	Atranone D	387.2530	10.074
-	Stachybotrydial	387.2166	9.970
721	Stachybotrylactam	386.2326	8.883
-	Spirodihydrobenzofuranlactam I	386.2326	8.270
461	3,4-Epoxy-6-hydroxy-dolabella-7E	319.2268	7.509
457	Atranone F	-	9.725

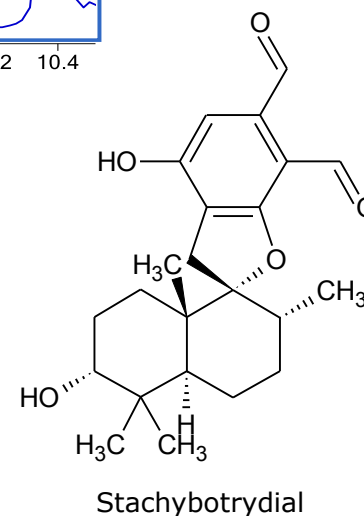
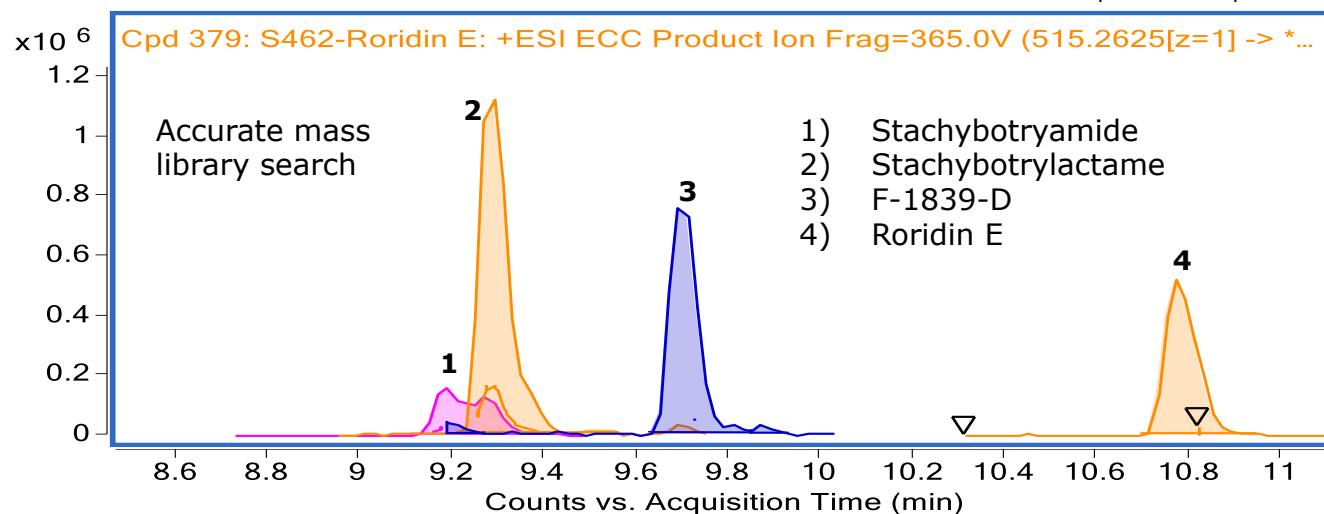
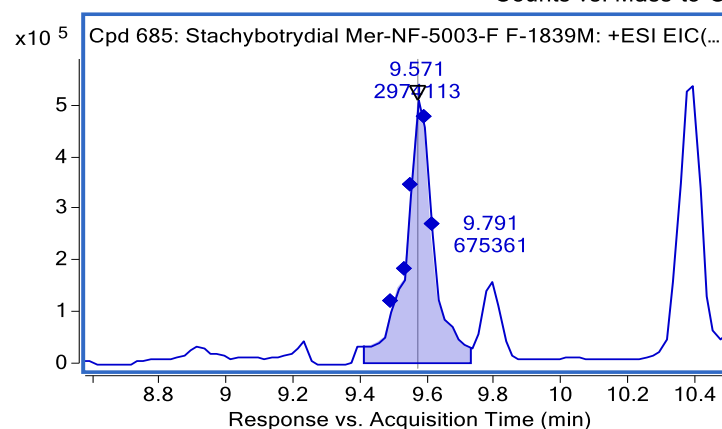
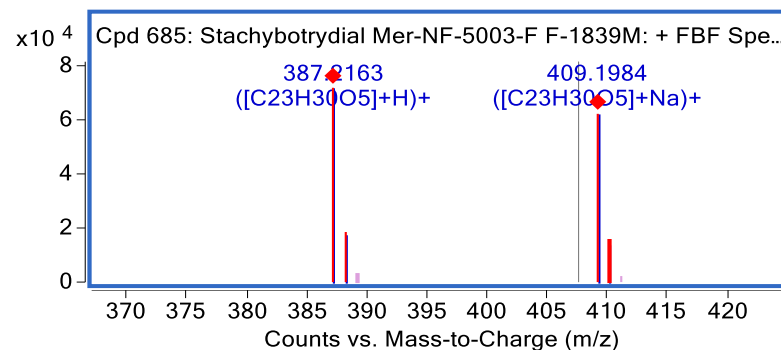
Additional data
on standards:

UV-Vis spectrum

Fragmentation
pattern

Sample 2:

Q-tip scrape from water-damaged gypsum (drywall) with *S. chartarum* in a kindergarten



Metabolites on real samples

OSB+ and **Gypsum+**: uninoculated control samples from other experiment
(16 moths at 73 %RH then 25 % H₂O by weight)

Plywood and **Drywall**: samples from water damaged buildings

	OSB +				Gypsum board +			
Fungal metabolite	paper wallpaper	wood chip wallpaper	glass fibre wallpaper	Plywood	paper wallpaper	wood chip wallpaper	glass fibre wallpaper	Drywall construction
Chaetoglobosins A + C + G, D, U or/and V	+	+	+	+	+	-	-	-
Chaetomugilins	+	+	+	-	+	+	+	-
Chaetoviridins	+	+	+	-	+	+	-	-
Cochliodons A + B	-	-	-	+	-	+	+	-
Dihydrochaetoglobosin A	-	-	+	+	-	-	-	-
Prochaetoglobosins I + II + III + IV	+	+	+	+	+	-	+	-
Chaetospirone	-	-	-	+	-	+	+	-
Chartarlactames	-	-	-	-	-	+	+	+
F-1839-E + D	-	-	+	-	+	+	+	+
Spirodihydrobenzofuran-lactame V	-	-	+	-	-	-	-	-
Stachybotryamide	-	-	-	-	-	-	-	+
Stachybotrylactame	-	-	-	-	-	-	-	+
Stachybotrydial	-	-	-	-	-	-	-	+
Roridin E	-	-	-	-	-	-	-	+
Meleagrins	-	-	-	+	-	-	-	+
Roquefortine C	-	-	-	+	-	-	-	+