A PAPER-FREE LAB

How to work in a modern lab environment

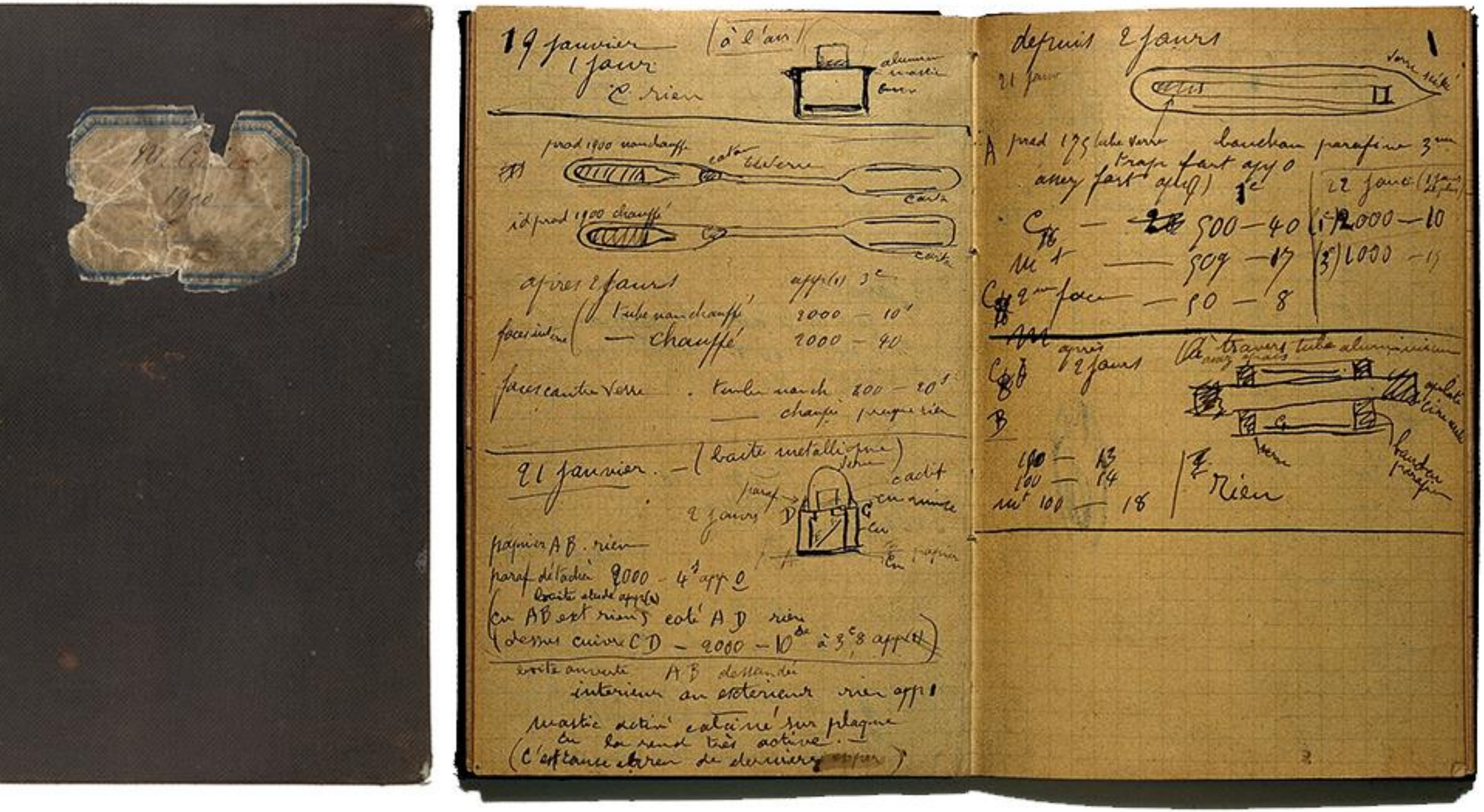
ELN workshop

14.3.2016

Joram Schimmeyer

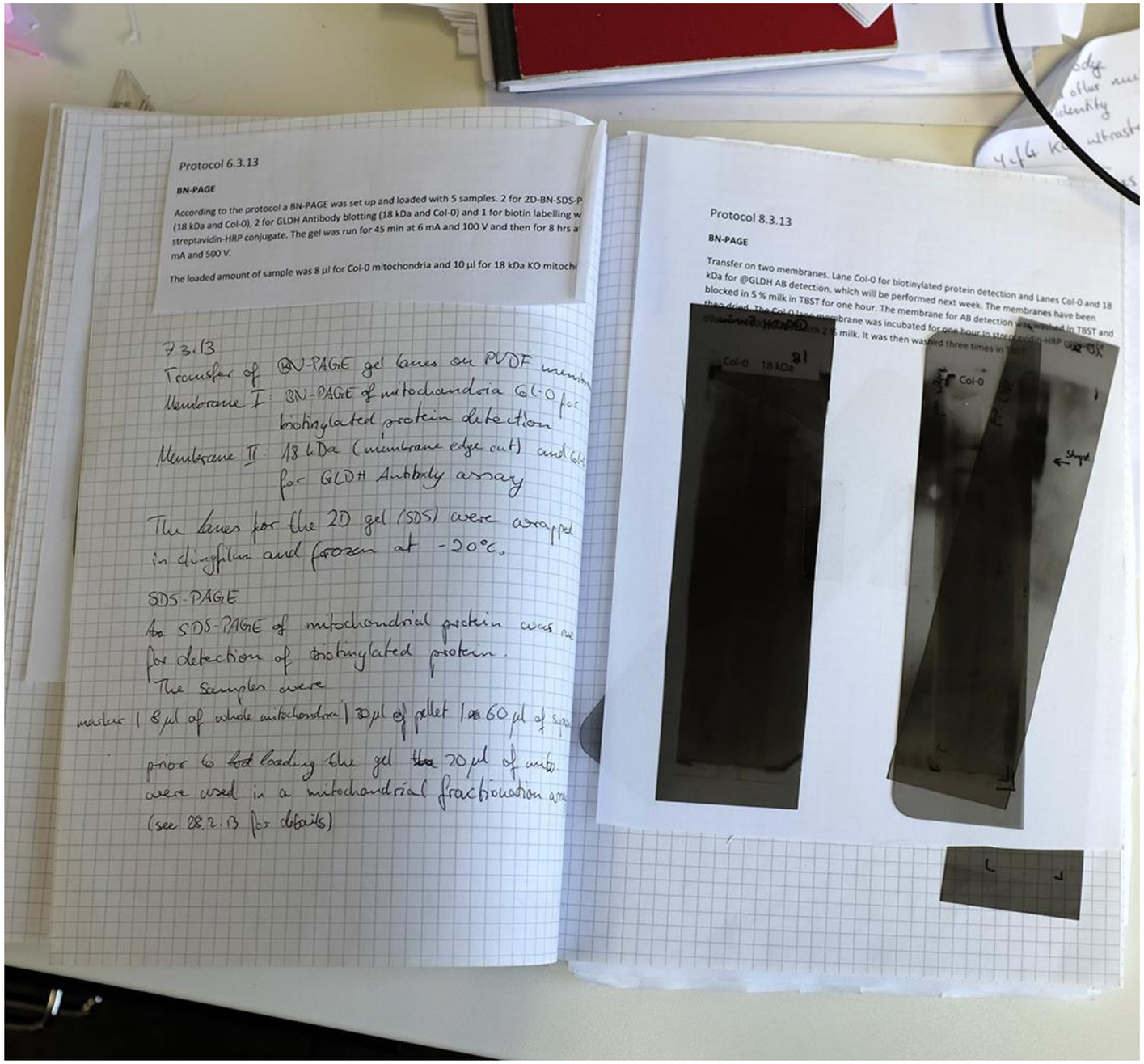
Max Planck Institute for Molecular Plant Physiology

Lab books did not change much

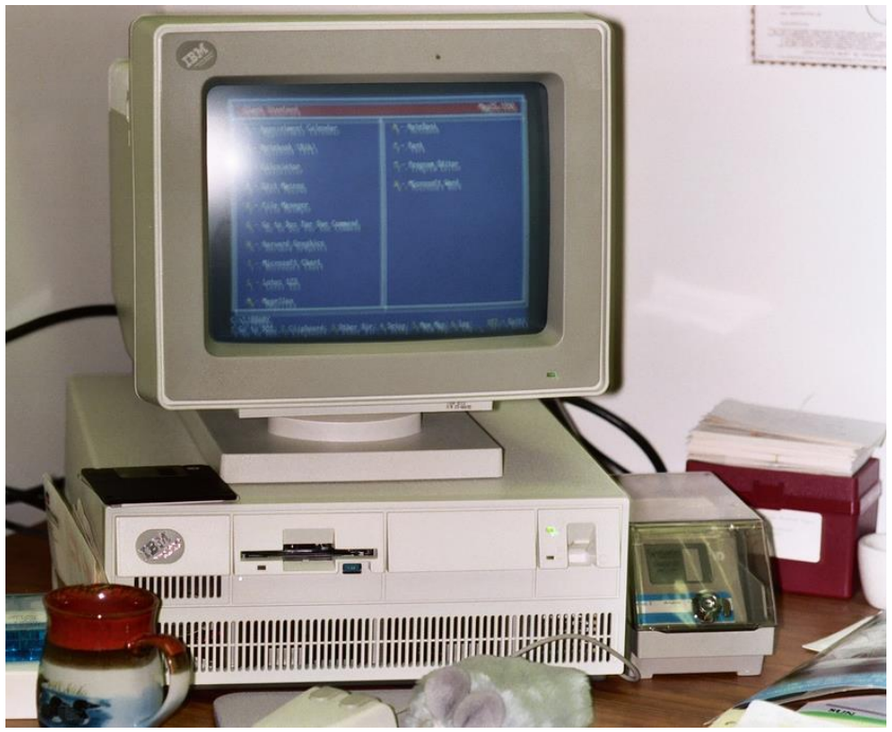


Marie Curie's lab book

http://factually.gizmodo.com/marie-curies-100-year-old-notebook-is-still-too-radioac-1615847891



Photos by
Caleb Roenigk
Fairfax Library Foundation



Photos by
Alan Light
Clive Darra

Robert Jemimus
Kārlis Dambrāns

Today, our workflows are digital.

So should be our lab books.

- 2D SDS-PAGE.doc
- 2011-12-09 CaCl2 competent cells.doc
- Bleach sterilization of Arabidopsis th.doc
- Blue-Native PAGE (BioRad).doc
- BN-PAGE for Thylakoids-20140519.doc
- BSA-Standard.xls
- Chemo-Competent cells Pau.docx
- Coomassie staining of protein gels.doc
- Dilution Table DNA.xlsx
- FastDigestionMix.xls
- Genotyping.doc
- GFP expression_outline.doc
- GFP-Expression_complete.doc
- Import + BN.doc
- Isolation of total nucleic acid from plant material.doc
- Membrane Stripping protocol GnHCl.doc.xls
- Membrane Stripping protocol.doc
- Michi Protoplasten für Grobe mit Maxi und Jen.pdf
- Midi Prep with the Kit by Machery Nagel.docx
- MiniPrep_DNA.xlsx
- mito from plants (mortar).doc
- mito from plants (mortar)_jorams-edition.doc
- Mitochondrial fractionation.doc
- Nucleic Acid isolation CTAB Pau.doc
- PCR MM Chlamy table.xlsx
- PCR MM table.xlsx
- PCR program.xlsx
- Phusion_PCR_Mastermix.xls
- Phusion_PCR_Mastermix_2.xls
- Possible suppliers for strepatavidin agarose.docx
- Protein expression.doc
- Protein extraction from plant tissues.doc
- Protoplast isolation and transient transfection.doc

	1	3.5	22
FastDigest Buffer 10x	2	7	44
Spe1	1	3.5	22
Xba1	1	3.5	22
Template DNA	5	17.5	110
water	11	38.5	242
total	**20**	**70**	**440**

	1	5	22
FastDigest Buffer 10x	2	7	44
Restriction enzyme	1	3.5	22
Template DNA	5	17.5	110
water	12	42	264
total	**20**	**70**	**440**

SCHIMM-050216-6

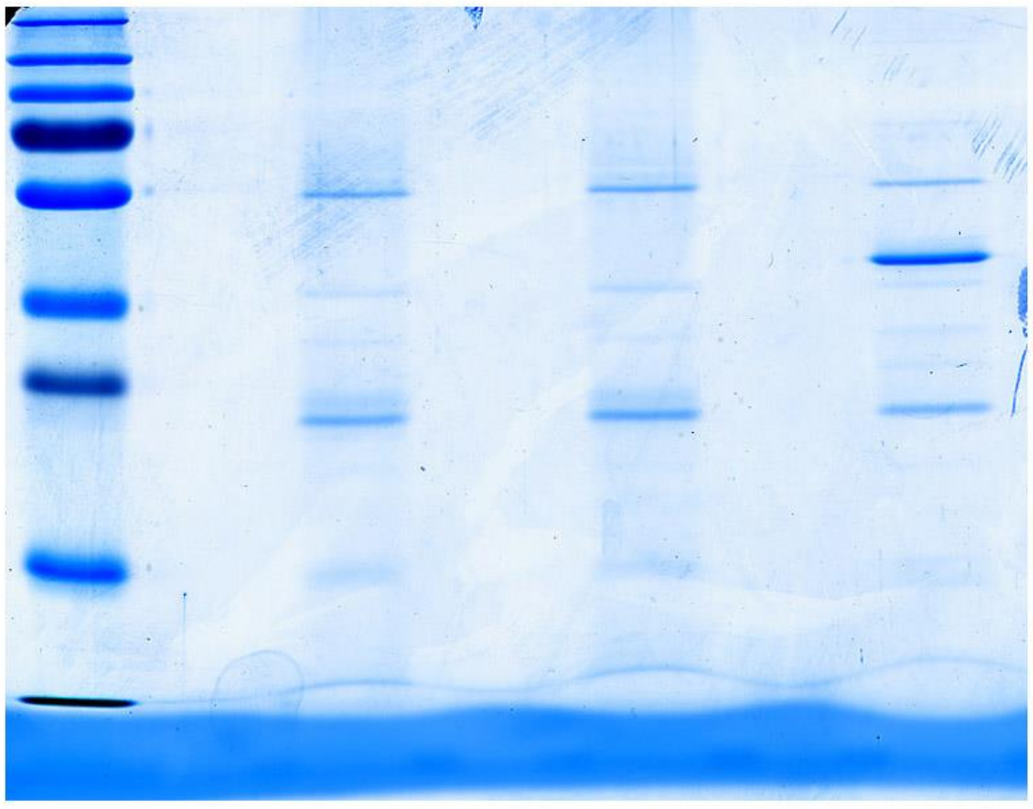
Entry date	Old location name	New location name
29/02/2016	CGWCab0710	CGWCab07
19/02/2016	CGWCab0710	CGWCab0710
16/02/2016	CGWPhy110301	CGWCab0710
08/02/2016		CGWPhy110301

Back to Overview

Collecting digital data

	Mode	750.0 nm	663.6 nm	646.6 nm	Chl. a [µg ml-1]	Chl. b [µ	Chl. a/b	Total chlorophyll	10
1	Blank-1	-0.037	-0.029	-0.028					
2	Sample-1	0.002	1.401	0.563	15.71	4.53	3.47	3056.4	
3	Sample-2	0.002	0.793	0.318	8.88	2.54	3.49	1725.5	
4	Sample-3	0.008	1.136	0.46	12.67	3.65	3.47	2465.1	
5	Sample-5	0.012	0.186	0.082	1.96	0.57	3.44	381.6	
6	Sample-6	0.012	0.145	0.065	1.49	0.42	3.51	289	
7	Sample-7	0.01	0.135	0.061	1.4	0.42	3.36	273.8	
8	Sample-8	0.011	0.129	0.059	1.32	0.39	3.39	258.4	
								300.7	
								3007 µg/ml	
9	Sample-9	0.008	0.771	0.312	8.57	2.44	3.51	1663.5	
10	Sample-10	0.007	0.772	0.312	8.58	2.44	3.52	1664.1	

Measurement readings

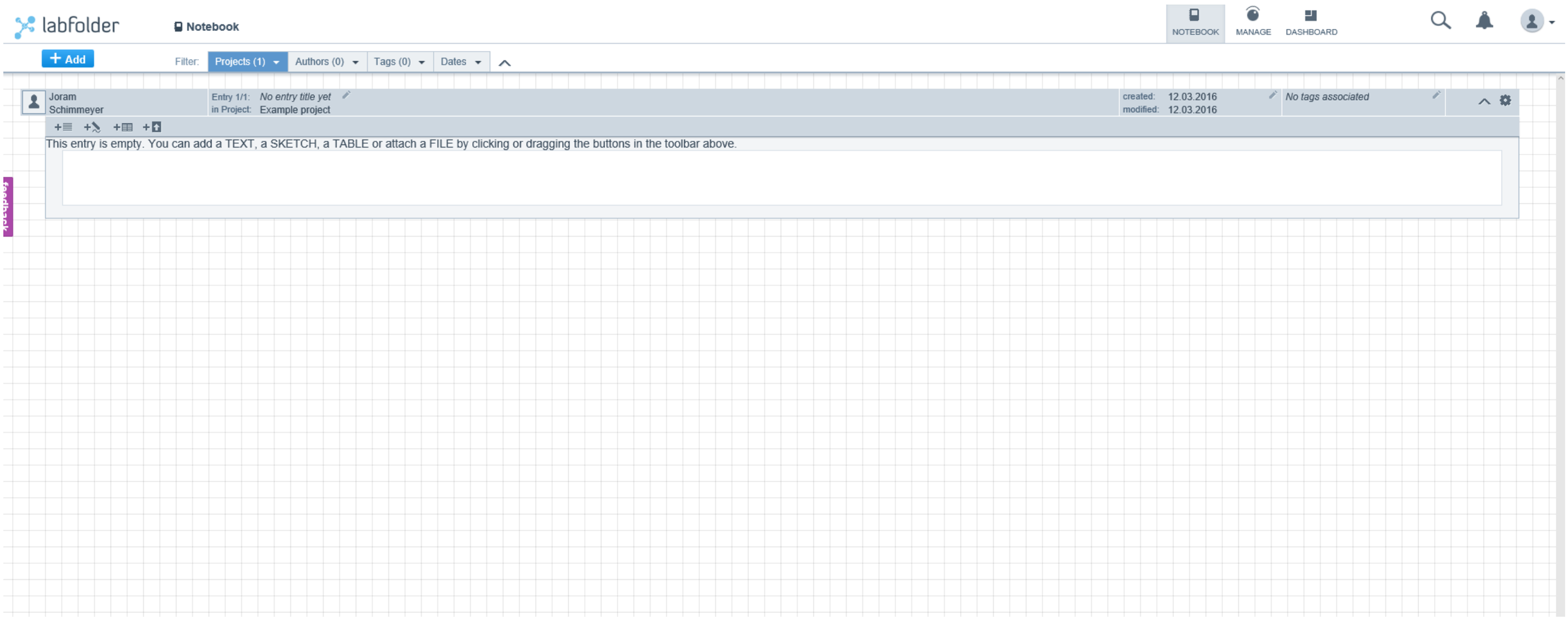


Gel images

Recording digital data

- Cloud based
- Built according to the MPG guidelines for secure handling of scientific data
- Only I can access my data
- Encrypted connection to server

Labfolder – introduction



Labfolder – basic features

Joram Schimmeyer

Entry 1/1: *No entry title yet*
in Project: Example project

created: 12.03.2016
modified: 12.03.2016

No tags associated

Co-immunoprecipitation experiment with 1 sample.
90 plants were harvested, thylakoids were extracted and the chlorophyll content per sample was measured.
Co-IP was performed with the kit by Sigma, with incubation times according to the manufacturer.

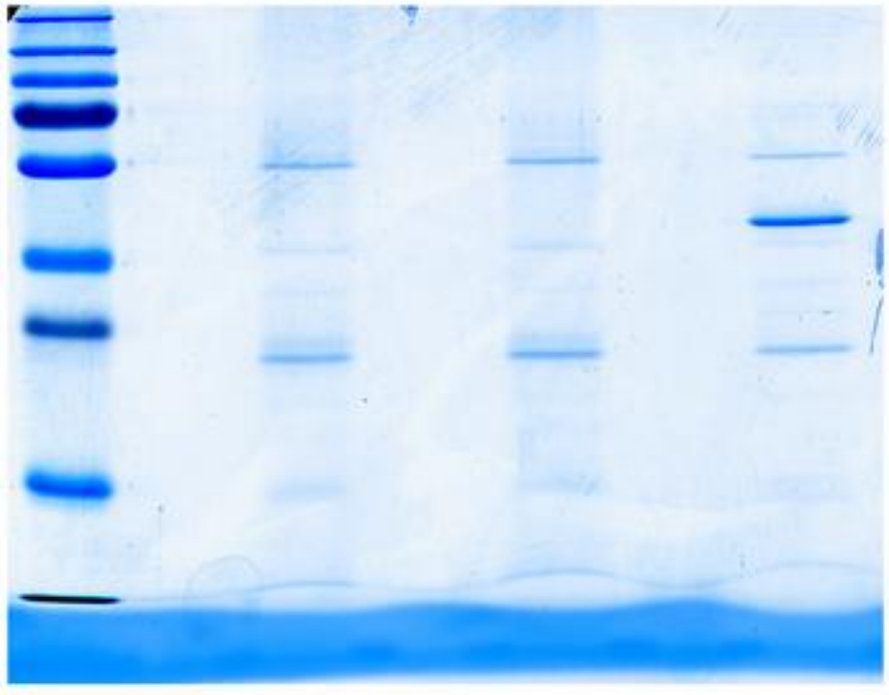
	A	B	C	D	E	F	G	H	
1	No.	Mode	750.0 nm	663.6 nm	646.6 nm	Chl. a [µg ml-1]	Chl. b [µg ml-1]	Chl. a/b	Total chlorophyll V
2	1	Blank-1	-0.037	-0.029	-0.028				
3	2	Sample-1	0.002	1.401	0.563	15.71	4.53	3.47	3056.4
4	3	Sample-2	0.002	0.793	0.318	8.88	2.54	3.49	1725.5
5	4	Sample-3	0.008	1.136	0.46	12.67	3.65	3.47	2465.1
6	5	Sample-5	0.012	0.186	0.082	1.96	0.57	3.44	381.6
7	6	Sample-6	0.012	0.145	0.065	1.49	0.42	3.51	289
8	7	Sample-7	0.01	0.135	0.061	1.4	0.42	3.36	273.8
9	8	Sample-8	0.011	0.129	0.059	1.32	0.39	3.39	258.4
10									300.7
11									3007 µg/ml
12	9	Sample-9	0.008	0.771	0.312	8.57	2.44	3.51	1663.5
13	10	Sample-10	0.007	0.772	0.312	8.58	2.44	3.52	1664.1
14									

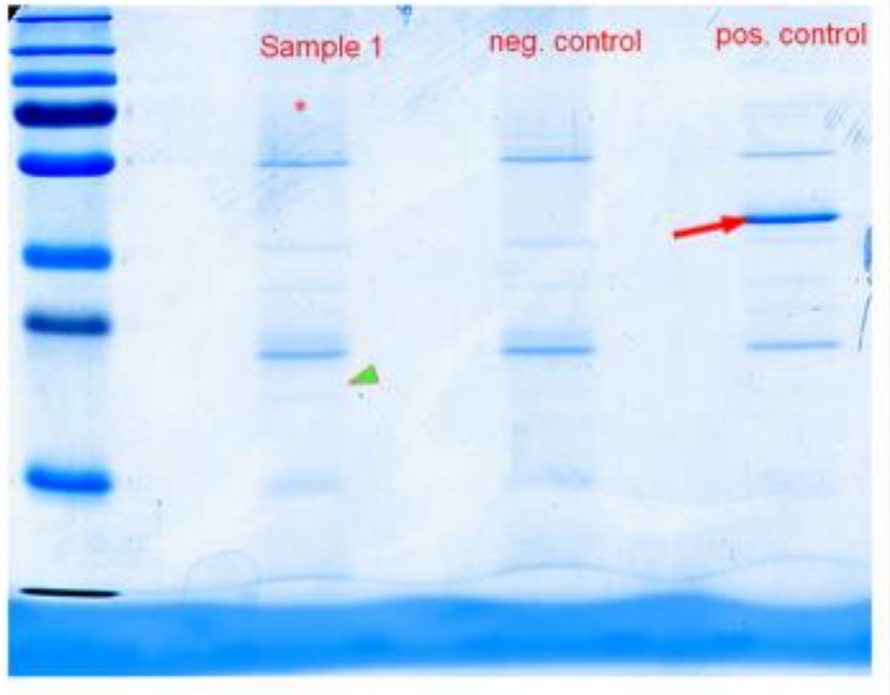
Sheet0

The samples were run on a SDS-PAGE and stained using the Coomassie staining protocol for gels. The gel was stained over night and destained in water.

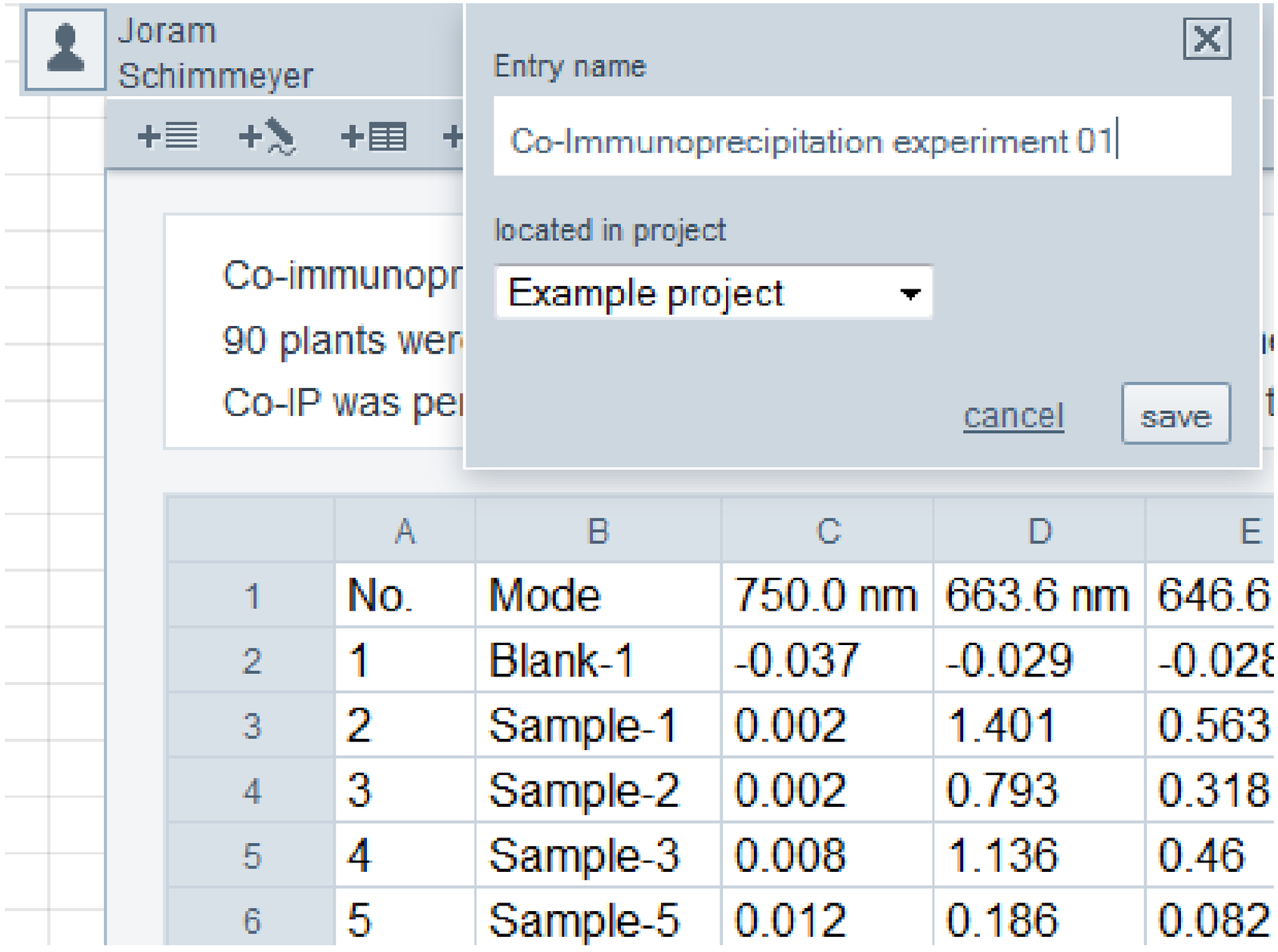
Labfolder – basic features

The samples were run on a SDS-PAGE and stained using the Coomassie staining protocol for gels. The gel was stained over night and destained in water.



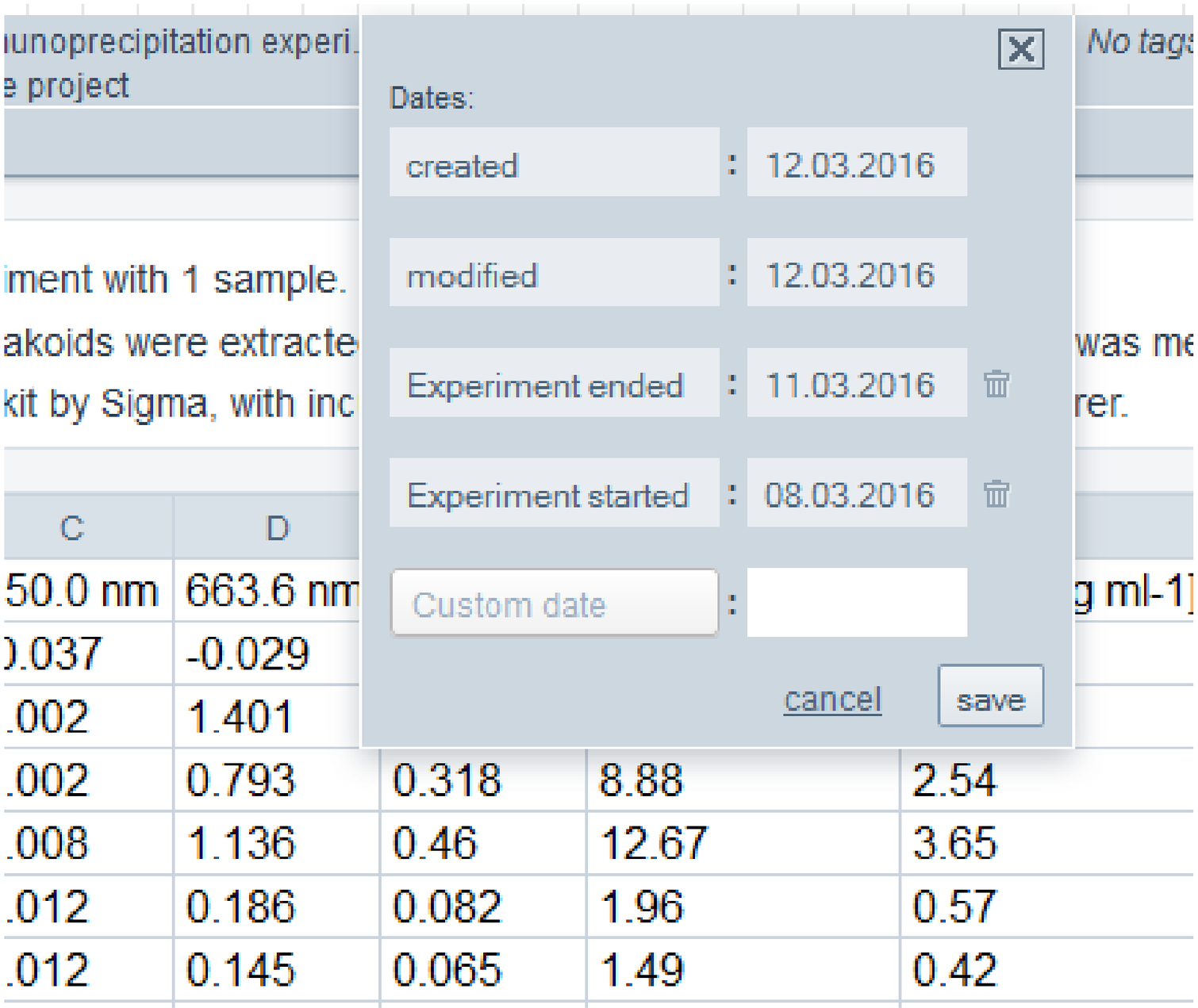


Labfolder – organisation

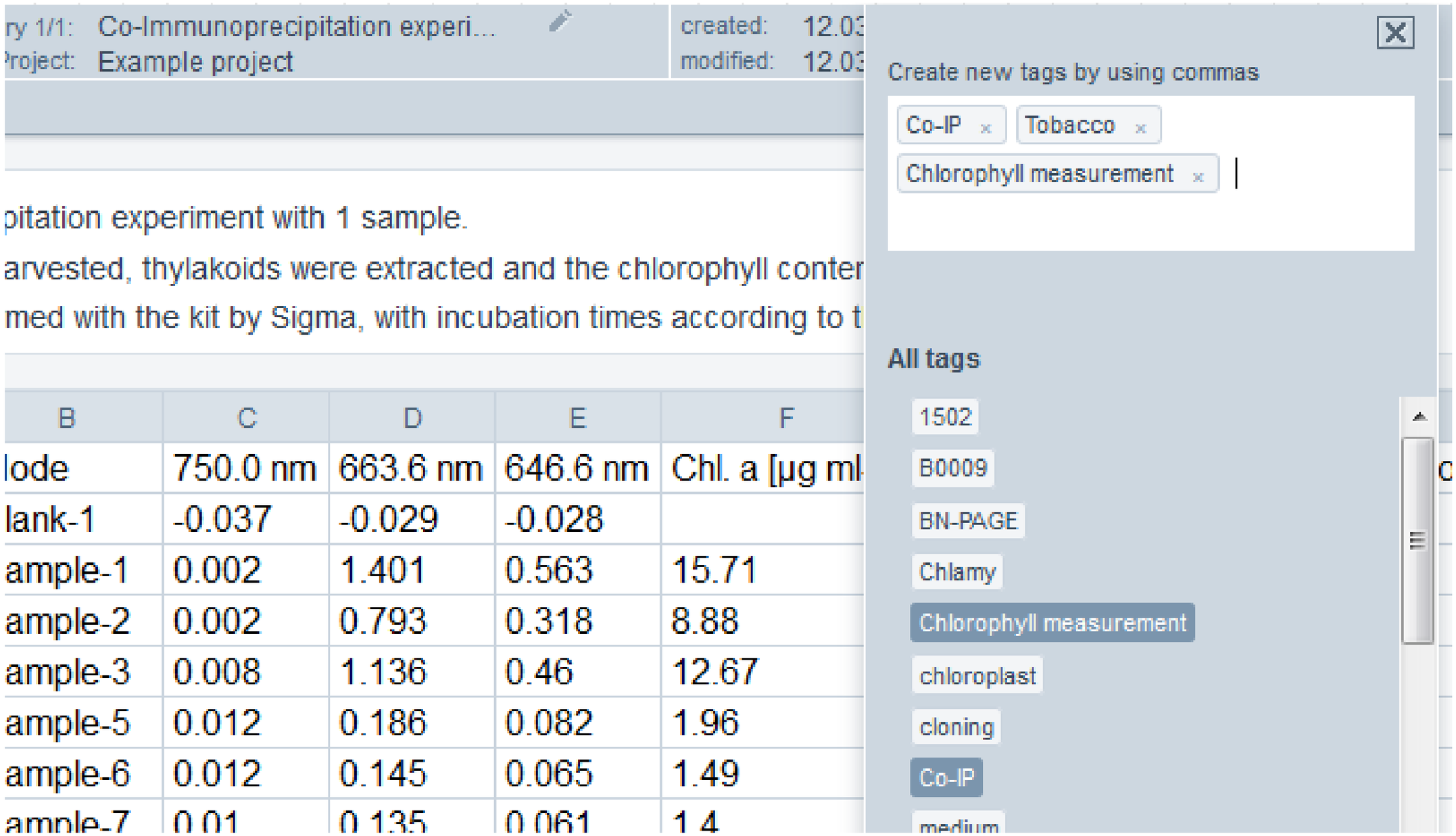


	A	B	C	D	E
1	No.	Mode	750.0 nm	663.6 nm	646.6
2	1	Blank-1	-0.037	-0.029	-0.028
3	2	Sample-1	0.002	1.401	0.563
4	3	Sample-2	0.002	0.793	0.318
5	4	Sample-3	0.008	1.136	0.46
6	5	Sample-5	0.012	0.186	0.082

Labfolder - organisation



Labfolder – organisation



Labfolder – organisation

Co-immunoprecipitation

6 search results found

13.03.2016: Example project

... **Co-immunoprecipitation** experiment with 1 sample. 90 plants were harvested, thylakoids were extracted and the chlorophyll content per sample was measured. Co-IP was performed with the kit by Sigma ...

Creating even more data

	prot_acc	prot_desc	prot_score	prot_mass	prot_matches	prot_matches_si	prot_sequence	prot_sequences_si	prot_cover	pep_query	pep_rank	pep_isbol	pep_isuniqu	pep_e
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1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	127991	1	1	1	416
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1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	148565	1	1	0	487
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1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	148579	1	1	0	487
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	148580	1	1	0	487
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	148581	1	1	0	487
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1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	154126	1	1	1	517
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	157188	1	1	1	533
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	157205	1	1	1	533
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	163866	1	1	1	563
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	163867	1	1	1	563
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168064	1	1	1	590
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168068	1	1	1	590
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168069	1	1	1	590
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168070	1	1	1	590
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1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168074	1	1	1	59
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168075	1	1	1	590
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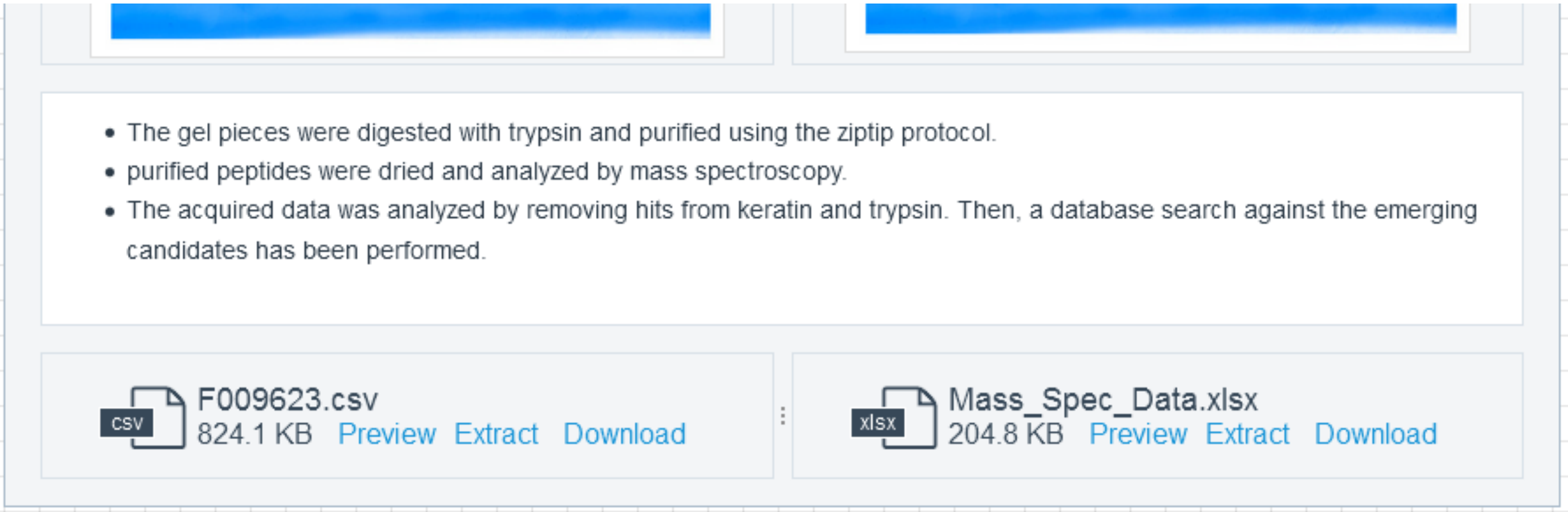
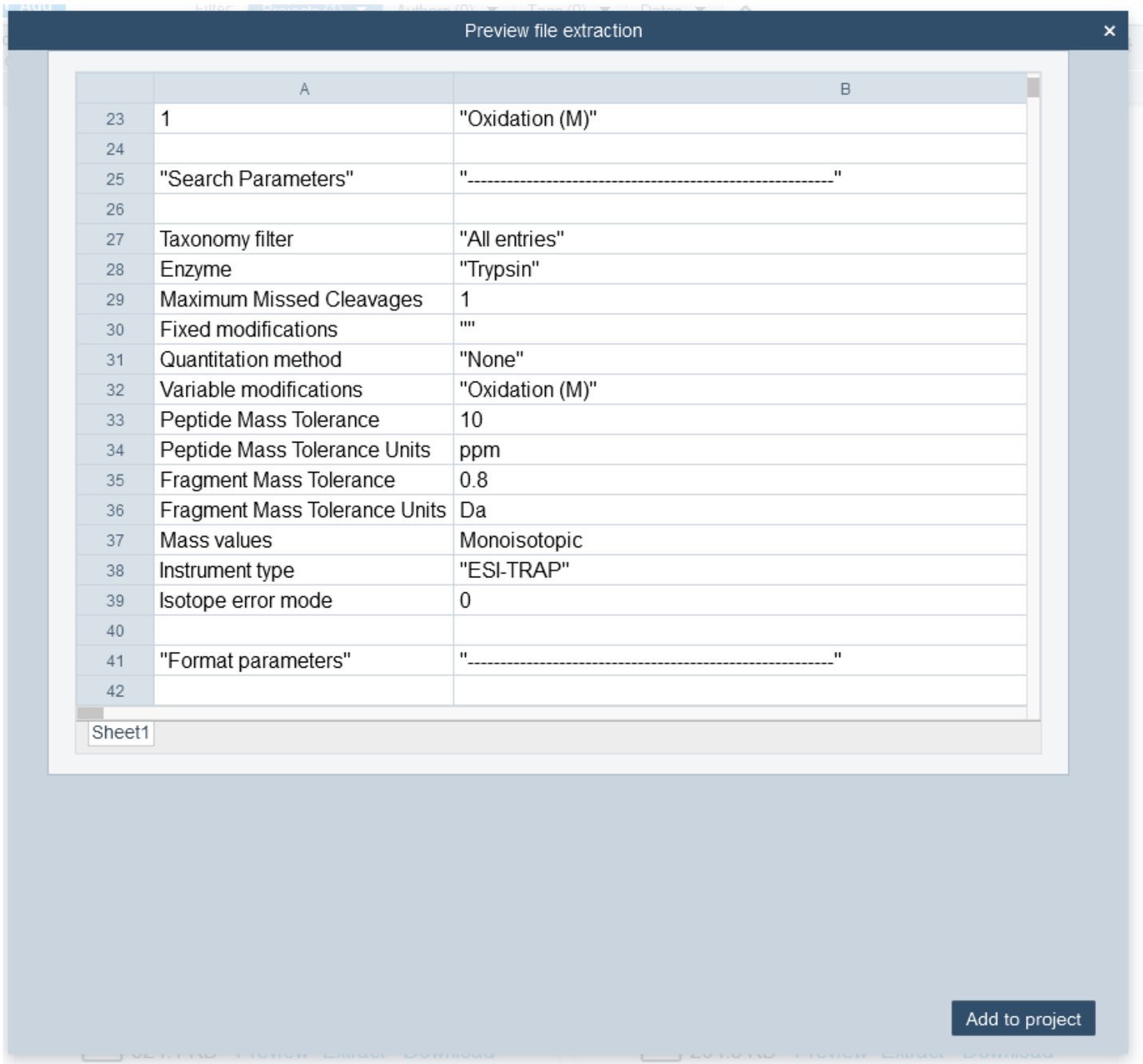
1	CON_Q6GSJ0	CON|_|_|_|Keratin 1 - Homo sapiens (Human)	2002	66027	274	274	31	31	45.3	168078	1	1	1	590

Labfolder – Record data in files



Labfolder – Recording data in files

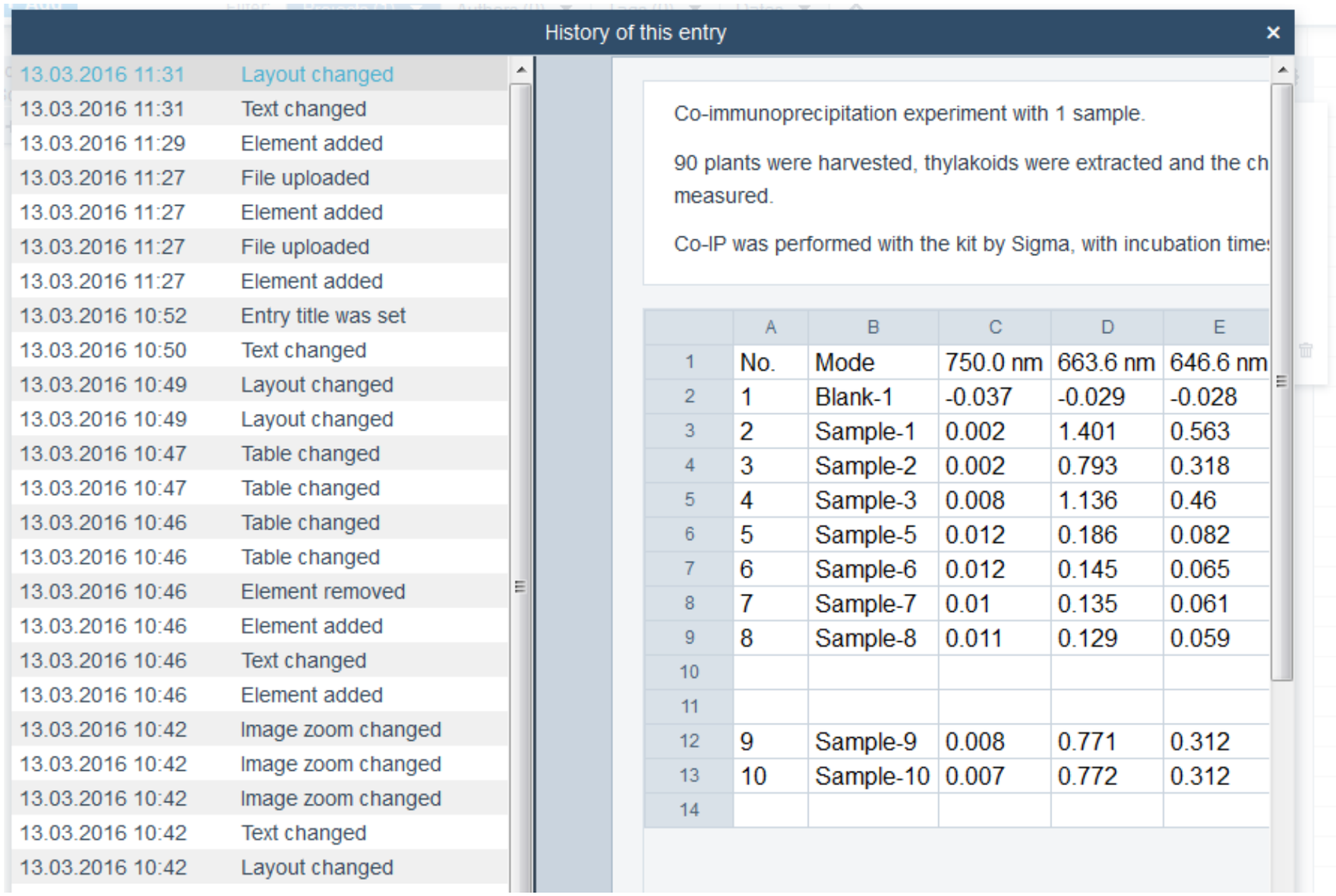


Labfolder – Additional features

1. Templates

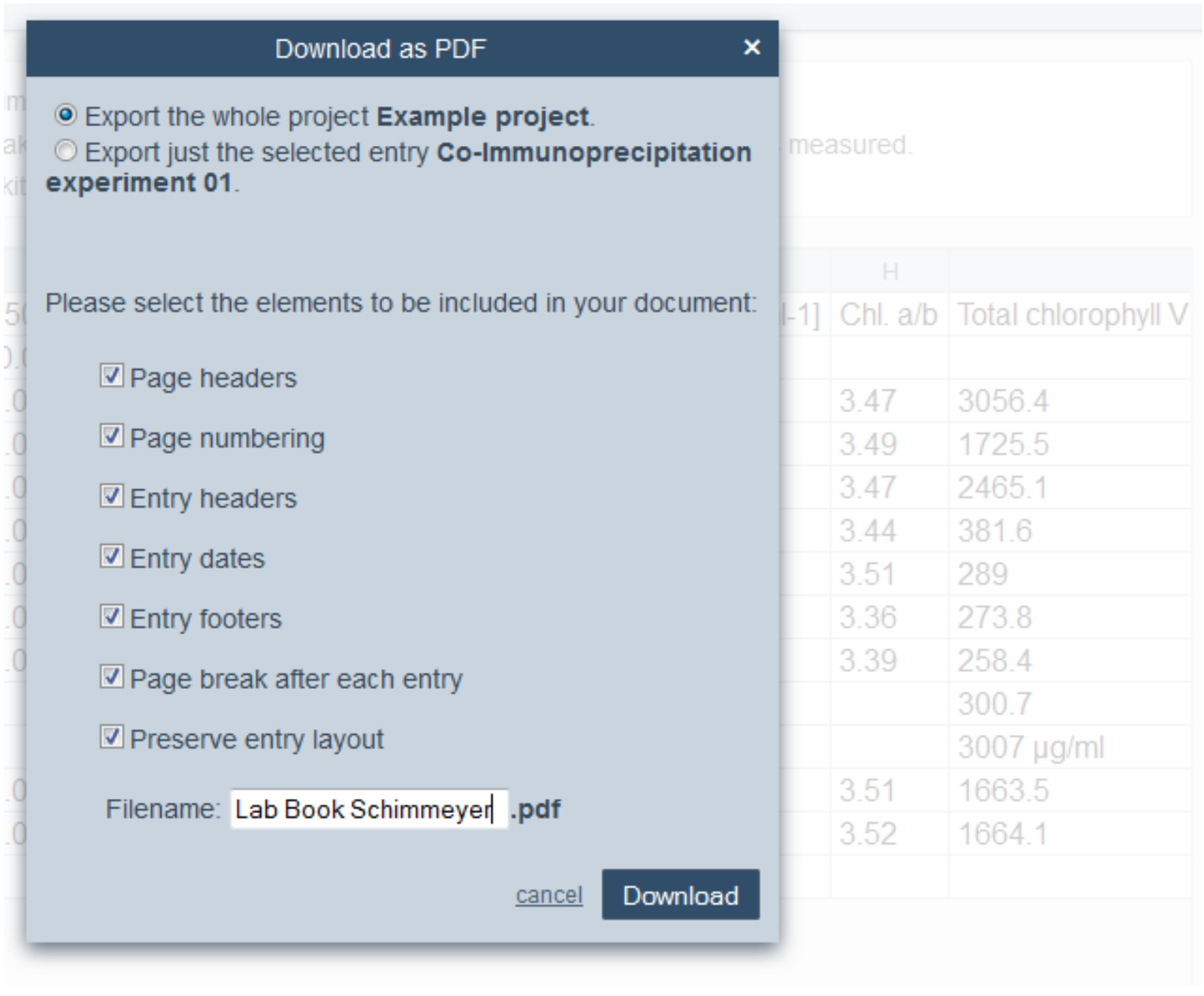
Labfolder – Additional features

2. Edit history of every entry



Labfolder – Additional features

3. Export everything to pdf



My experience

Advantages

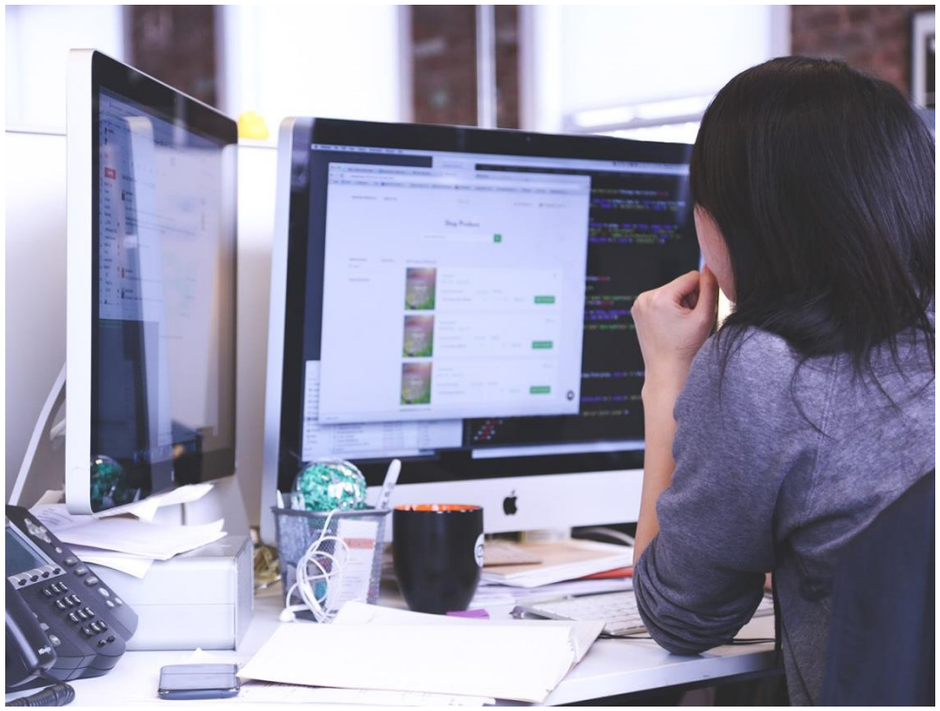
- I use an electronic lab book more efficiently than an analog lab book
- Integration of different data types is easy and straightforward
- Access from different places

Disadvantages

- Connection to external server is necessary
- Not all browsers work equally well

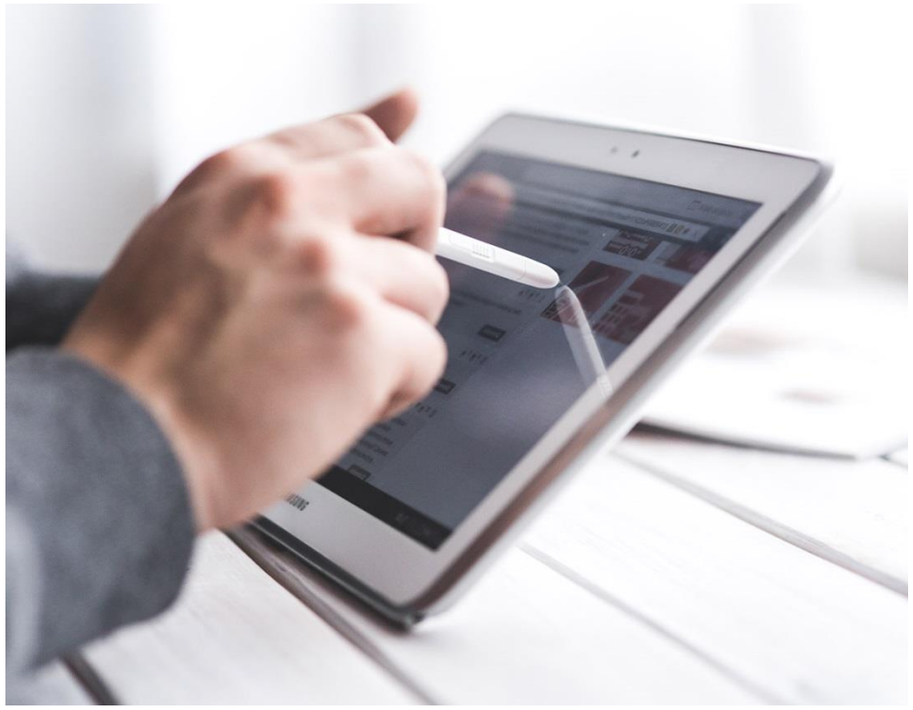
Where do we go from here?

Where do we go from here?



Protocols
Instructions

Recorded data
Sample details



Stationary computer
Plan experiments
Analyse experiments

Mobile computer
Perform experiments
Record experiments

Where do we go from here?

Where do we go from here?

Summary

- We create a lot of digital data
- It is now possible to record this data digitally
- A digital lab book holds many advantages
- Labfolder is one solution to document your work
- The integration of modern technology holds many opportunities to improve our workflow

Thank you for your attention

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