



Metadata Annotation in the Scientific Context

Fundamentals of Scientific Metadata: Why Context Matters



You should start
your project with
repeating your
collaborator's
results





You should start your project with **repeating** your collaborator's results



The Publication

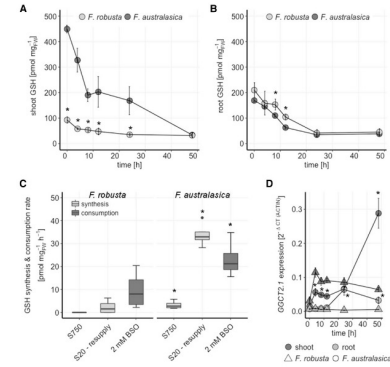


Figure 4. GSH turnover in *F. robusta* and *F. australisica*. GSH concentrations in shoots (A) and roots (B) of 20-d-old seedlings of *F. robusta* (C_1) and *F. australisica* (C_2) in a time course of 48 h after transfer to medium supplemented with 2 mM BSO. Data are presented as means and SEM, $n = 4$. C, GSH synthesis was analyzed in 20-d-old seedlings exposed to low sulfate (20 µM sulfate; S20) or adequate sulfate (750 µM sulfate; S750) for 4 d by resupply with 0.2 mM [³S]sulfate solution for 4 h. GSH consumption rate is calculated from A at 4 h after treatment with 2 mM BSO. Data are shown as box plot (25%–75%) the line represents median, and the whiskers represent 1.5 IQR, $n = 4$. D, Transcript levels of GSH:TSF in shoots and roots of 20-d-old seedlings in a time course of 48 h after transfer to medium supplemented with 2 mM BSO. Data are presented as means and SEM, $n = 4$. Asterisks represent significant differences between *F. robusta* and *F. australisica* at $P < 0.05$ Student's *t* test.

to higher GSH synthesis are therefore likely to be involved in the adjustment of S supply and GSH homeostasis of C_1 plants.

Partitioning of S in Shoots and Roots of *Flavaria* Species

To test the significance of the root for S metabolism in the context of the evolution of C_1 photosynthesis, the five species were grown under full nutrient and low S conditions. Total S, sulfate and low M, thiols were determined in shoots and roots (Supplemental Fig. S7). Whereas total S and sulfate did not show any clear patterns relative to photosynthetic type, Cys, and GSH

at full nutrition. To better understand the partitioning of S in the different species, the relative portions of total S in sulfate, Cys, and GSH were calculated (Fig. 5). In the shoots of fully nourished *Flavaria* species, the fraction of total S occupied by inorganic sulfate was relatively stable at 50%–70%. However, in the roots, the fraction of inorganic sulfate was higher in the C_2 species. Exposure to S deficiency reduced the sulfate pool in the shoots and roots of *F. robusta*, *F. limaris*, *F. anomala*, and *F. palmieri* to 3.5%–16%. The C_1 species *F. australisica* suffered little loss of relative sulfate pool in shoots, but showed a strong decrease in roots. The increase in GSH fractions of total S in shoots and roots



You should start your project with **repeating** your collaborator's results



The Data

21.5	21.6	20.8	20.2	20.8	21.0	21.6	20.8	21.2	21.1	
61.3	60.7	44.8	46.2	49.2	49.1	49.3	48.0	40.1	41.3	
18.0	15.8	15.3	14.0	14.4	15.3	15.4	14.6	14.8	14.0	
16.7	16.8	16.3	17.6	18.3	17.6	17.5	18.3	17.9	17.7	
20.2	20.6	20.1	20.0	19.7	19.9	19.6	20.3	20.6	20.0	
22.0	22.0	21.8	23.4	21.7	23.1	23.4	23.5	26.0	24.2	
23.3	23.1	23.7	25.7	27.3	29.4	30.3	29.9	27.5	25.9	
29.3	28.3	28.1	27.6	27.7	31.0	34.6	35.7	36.0	35.7	
24.0	23.3	23.8	24.7	26.1	26.7	27.2	27.3	29.2	28.6	
18.8	19.0	18.5	18.5	19.2	19.3	19.1	18.1	18.5	17.7	
				31.1	32.6	32.6	29.9	29.3	29.1	
25.9	26.0	25.5	24.9	25.0	28.1	29.9	28.5	28.3	28.7	
25.4	25.2	23.3	23.5	24.6	24.6	27.1	27.8	27.4	28.9	
42.2	35.1	34.2	37.9	38.2	40.1	36.2	35.1	32.7	30.9	28.5
35.9	28.7	28.3	29.6	34.0	33.1	32.5	30.8	27.3	29.3	
16.5	15.9	15.5	17.8	17.1	16.8	18.4	19.0	19.0	18.5	
31.4	29.4	28.2	29.6	29.9	31.5	33.5	34.8	31.8	28.2	26.3
19.5	19.7	20.1	20.3	21.2	22.1	23.1	24.0	23.8	22.4	
16.0	15.7	14.9	15.1	15.1	15.7	15.0	15.9	16.5	16.4	
17.8	16.7	20.6	19.1	18.9	19.2	18.5	18.8	19.2	18.3	
39.5	34.4	30.5	27.8	27.8	27.2	26.7	25.8	24.7	23.4	
25.0	25.0	26.0	24.9	25.3	24.4	25.3	27.5	27.5	26.6	
	47.0	44.2	43.0	41.5	40.9	43.2	41.9	40.3	37.4	
17.1	17.1	18.5	17.1	18.3	19.3	19.6	20.4	20.4	19.2	
26.7	21.4	20.6	19.6	20.6	20.6	20.5	19.8	18.4	18.4	
17.1	17.4	17.4	16.9	16.9	17.9	17.2	16.0	17.3	16.8	



The Documentation



198 NBL Laboratoriums

Max: 11111111111111111111
Punkte: 1000

KH: Wasche-Pulver E10H
0.1mm 4500 rpm

RV: Camy 1-3000
p1: not HUCO's Res. Resens

RS: 1 2 3 4
S: 5 5 5 5
DM: 0.5 0.5 0.5 0.5
DMS: 1 1 1 1
M: 0.5 0.5 0.5 0.5

RV: 1 2 3 4
S: 5 5 5 5
DM: 0.5 0.5 0.5 0.5
DMS: 1 1 1 1
M: 0.5 0.5 0.5 0.5

Sp: Sp Sp Sp Sp

p1: not HUCO's Res. Resens

• M. 27 C. 1000

Sample 07.03.03: This is a 2.7mm slice of the sample, oriented by making it again. It is not set upright from time, and this, not sample, is to confirm analysis.

Results:

Concl: (1) multiplicity is confirmed. (2) It looks like it's not the same before or after rotation, because of multiple banding and peaks. (3) The multiplicity was not proven because in 1.7mm sample, they are same but influence is imposed by V-center, a few millibars of the channel.

Sample: SWS sp 2 probe (022003) shows electron...

Monya Baker

„More than 70 % of researchers have tried and failed to reproduce another scientist’s experiments.

More than half have failed to reproduce their own experiments. “

Quote: Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* 533, 452 – 454 (2016). <https://doi.org/10.1038/533452a>

Image: <https://www.booksmith.com/event/bindery-launch-katie-burke-urban-playground-what-kids-say-about-living-san-francisco>

Slightly better – lab notes



	A	B	C	D	E
1	t	ax	<u>ay</u>	<u>az</u>	<u>scr</u>
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



someRandomFileName.csv

Slightly better – lab notes



	A	B	C	D	E
1	t	ax	ay	az	scr
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
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19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



20220228_recordingData.csv

2022-02-28
Gotham City, New Jersey, USA
Flight of the bat
weather: more clouds than sun, 11°C, 74% humidity,
1023 mbar, SSW, 17 km/h
recording device strapped to upper arm

Slightly better – lab notes



	A	B	C	D	E
1	t	ax	ay	az	scr
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



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Slightly better – lab notes



	A	B	C	D	E
1	t	ax	ay	az	scr
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
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15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



20220228_recordingData.csv

LAB NOTES IV

LAB NOTES III

LAB NOTES II

LAB NOTES I

2022-02-28

Gotham City, New Jersey, USA

Flight of the bat

weather: more clouds than sun, 11°C, 74% humidity,

1023 mbar, SSW, 17 km/h

recording device strapped to upper arm

Slightly better – lab notes



	A	B		
1	t	ax		
2	0	0.3931		
3	0.01	0.3957		
4	0.04	0.4138		
5	0.05	0.4415481	-0.1512702	-0.4325229
6	0.06	0.4741173	-0.1488177	-0.434583
7	0.08	0.5021		
8	0.1	0.5247		
9	0.11	0.5421		
10	0.14	0.5506		
11	0.15	0.5538726	-0.1	
12	0.16	0.5534802	-0.2	
13	0.17	0.5527935	-0.1	
14	0.2	0.558189	-0.1	
15	0.21	0.5764356	-0.1	
16	0.22	0.589581	-0.1	
17	0.25	0.6049827	-0.1	
18	0.26	0.619992	-0.1	
19	0.27	0.6320583	-0.2191554	-0.4092732
20	0.3	0.6392196	-0.2279844	-0.3975993
21	0.31	0.6465771	-0.2317122	-0.3908304
22	0.32	0.6583491	-0.2291616	-0.3950487
23	0.34	0.6725736	-0.2220984	-0.4050549



- some kind of documentation



- unstructured
- hard to find
- separated from data
- hard to share / only in the possession of the experimentator
- frequently hard to read

ingData.csv

LAB NOTES IV

LAB NOTES III

2022-02-28

11°C, 76% humidity

recording device strapped to upper arm

Even better – Readme style metadata



	A	B	C	D	E
1	t	ax	ay	az	scr
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



20220228_recordingData.csv

Even better – Readme style metadata



	A	B	C	D	E
1	<u>t</u>	<u>ax</u>	<u>ay</u>	<u>az</u>	<u>scr</u>
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.04	0.4138839	-0.1547037	-0.429678	0
5	0.05	0.4415481	-0.1512702	-0.4325229	0
6	0.06	0.4741173	-0.1488177	-0.434583	0
7	0.08	0.5021739	-0.1521531	-0.4285008	0
8	0.1	0.5247369	-0.1669662	-0.420849	0
9	0.11	0.5421987	-0.1813869	-0.4160421	0
10	0.14	0.5506353	-0.1947285	-0.4094694	0
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



20220228_recordingData.csv



20220228_recordingData_Readme.txt

```
Open [v] [f] 20220228_trainingObject_Readme.txt [Save] [≡] [x]
~/Documents/(AS-9)/HMC/HubInfo_T1...of-Scientific-Metadata/material

1 trainingObject.csv
2
3
4 The data describes the biomechanical acceleration and screams detected of a test person during
5 the ride of the roller coaster "Flight of the Bat" in Gotham City.
6
7 The data was collected by Bruce Wayne and Selina Kyle (Institute for Vigilance and Nightly Motion
8 - Justice League) on 2022-02-28 in Gotham City, New Jersey.
9 Weather conditions were optimal for the measurement, 11°C, more clouds than sun, 74% humidity,
10 SSW wind with 17 km/h velocity.
11
12 Test person:
13 The test person (male) is 5'11 tall and weighs 187 lbs.
14
15 Recording procedure:
16 The test person strapped the recording device (iPhone X) with a running armband to the left upper
17 arm and activated the biomechanical acceleration and scream detection of the application Physics
18 Toolbox Suite by Vleyra Software.
19 During the ride, the test person was instructed to grasp the seat handles tightly to avoid
20 excessive movement of the arm. The test person was seated in row 18 on the outer left (seat 37).
21
22 Recorded variables:
23 "t" describes the ride time at which measurements were taken upon activating the recording.
24 "ax" describes the biomechanical acceleration of the test person on the x axis in m/s2.
25 "ay" describes the biomechanical acceleration of the test person on the y axis in m/s2.
26 "az" describes the biomechanical acceleration of the test person on the z axis in m/s2.
27 "scr" is a boolean indicating a detected scream of the test person.]
```


Even better – Readme style metadata



	A	B	C	D	E	
1	t	a				
2		0				
3		0.01				
4		0.04				
5		0.05				
6		0.06				
7		0.08				
8		0.1				
9		0.11				
10		0.14				
11		0.15				
12		0.16				
13		0.17				
14		0.2	0.558189	-0.1908045	-0.4121181	0
15		0.21	0.5764356	-0.1865862	-0.4162383	0
16		0.22	0.589581	-0.18639	-0.4258521	0
17		0.25	0.6049827	-0.1941399	-0.4243806	0
18		0.26	0.619992	-0.206991	-0.4192794	0
19		0.27	0.6320583	-0.2191554	-0.4092732	0
20		0.3	0.6392196	-0.2279844	-0.3975993	0
21		0.31	0.6465771	-0.2317122	-0.3908304	0
22		0.32	0.6583491	-0.2291616	-0.3950487	0
23		0.34	0.6725736	-0.2220984	-0.4050549	0

 Flight of the bat

Results

 20220228_recordingData_Readme.txt



Even better – Readme style metadata



	A	B			
1	t	ax			
2	0	0.3931			
3	0.01	0.3957			
4	0.04	0.4138			
5	0.05	0.4415481	-0.1		
6	0.06	0.4741173	-0.1		
7	0.08	0.5021739	-0.1		
8	0.1	0.5247369	-0.1		
9	0.11	0.5421987	-0.1		
10	0.14	0.5506353	-0.1		
11	0.15	0.5538726	-0.203067	-0.4057416	0
12	0.16	0.5534000	-0.2035575	-0.4056425	0
13	0.17	0.5527			
14	0.2	0.558			
15	0.21	0.5764			
16	0.22	0.589			
17	0.25	0.6049827	-0.1		
18	0.26	0.619992	-0		
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



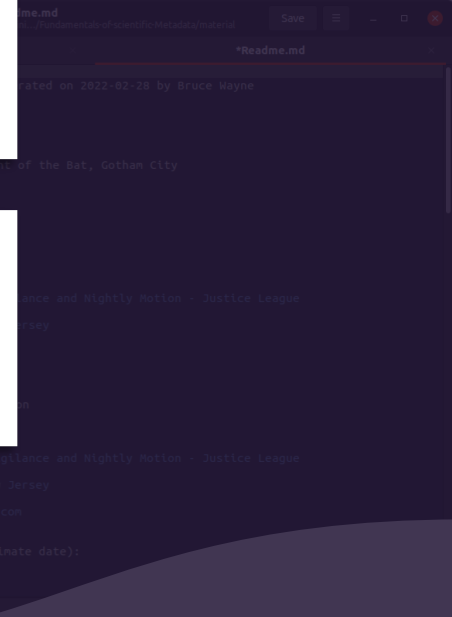
- documentation linked to the data
- locally searchable
- Readme file can be shared with the data
- increased readability



- unstructured
- subjective information
- only keyword search possible

dingData.csv

dingData_Readme.txt



Even better – Readme style metadata



	A	B	C	D	E
1	t	ax	ay	az	scr
2	0	0.3931848	-0.1593144	-0.4178079	0
3	0.01	0.3957354	-0.15696	-0.4242825	0
4	0.02	0.3982860	-0.15451	-0.4307571	0
5	0.03	0.4008366	-0.15206	-0.4372317	0
6	0.04	0.4033872	-0.14961	-0.4437063	0
7	0.05	0.4059378	-0.14716	-0.4501809	0
8	0.1	0.524802	-0.1961019	-0.4098618	0
9	0.11	0.5427935	-0.1961019	-0.4098618	0
10	0.14	0.5506189	-0.1908045	-0.4121181	0
11	0.15	0.553802	-0.1865862	-0.4162383	0
12	0.16	0.5534802	-0.2035575	-0.4056435	0
13	0.17	0.5527935	-0.1961019	-0.4098618	0
14	0.2	0.558189	-0.1908045	-0.4121181	0
15	0.21	0.5764356	-0.1865862	-0.4162383	0
16	0.22	0.589581	-0.18639	-0.4258521	0
17	0.25	0.6049827	-0.1941399	-0.4243806	0
18	0.26	0.619992	-0.206991	-0.4192794	0
19	0.27	0.6320583	-0.2191554	-0.4092732	0
20	0.3	0.6392196	-0.2279844	-0.3975993	0
21	0.31	0.6465771	-0.2317122	-0.3908304	0
22	0.32	0.6583491	-0.2291616	-0.3950487	0
23	0.34	0.6725736	-0.2220984	-0.4050549	0



20220228_recordingData.csv



readme.txt



https://ordo.open.ac.uk/articles/dataset/Template_for_a_README_file_for_data_uploads/13332743/1

Link in Episode!



Questions?



DISCLAIMER

This slide deck is part of the Lesson

**Fundamentals of Scientific Metadata:
Why Context Matters**

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