Supplementary Data:

To perform the bootstrap procedure for the chemical exposure data, random samples of residuals or approximate errors from the model fitted in equation {1} were selected. Bootstrap responses were then generated by adding these residuals to the fitted values from the model. This procedure is called bootstrapping residuals (Efron, Bradley, and Tibshirani, R.J. (1993) An introduction to the bootstrap. New York: Chapman & Hall) Equation {1} was then refit to the bootstrapped data.

This procedure was repeated 200 times for each experiment. Empirical quantiles for the 200 bootstrap parameter estimates were used to calculate 95% confidence intervals and BMCL values presented in Supplemental Tables 1 and 2. For some bootstrapped datasets, the model parameters failed to converge, and additional bootstrap samples were generated. The actual numbers of bootstrap samples needed to create 200 bootstrap parameter estimates are given in Supplemental Tables 1 and 2. The value for the model error in the fit of the Hill function, Sigma, is shown. Larger values of sigma often corresponded to higher rates of non-convergence of model parameters. Also provided is the p-value for the chi-squared statistic comparing the fitted Hill model from equation {1} to the null or mean model.

Supplemental Table 1

Estimated EC50s and 95% bootstrap confidence intervals, as well as BMCs and bootstrap BMCLs for 12 chemicals based on 3 repetitions of the *C. elegans* reproduction assay

Chemical	Strain	EC50	Bootstrap EC50 95% CI	BMC	Bootstrap BMCL	Sigma	actual number of bootstrap samples	p-value
Diquat	myo2	0.76	(0.66, 0.86)	0.06	0.03	54.91	216	7.71E-13
		0.8	(0.69, 0.91)	0.05	0.02	58.09	210	1.24E-12
		0.68	(0.49, 0.88)	0.06	0.01	112.98	229	3.59E-09
EMS	N2	4.66	(4.19, 5.12)	3.77	2.83	173.69	282	7.05E-09
		4.67	(4.35, 4.99)	4.12	3.41	110.04	430	5.84E-10
		4.77	(4.54, 5.00)	4.03	3.43	132.27	352	1.75E-11
Caffeine	myo2	8.9	(7.58, 10.22)	1.85	1.10	62.91	204	6.47E-12
		12.65	(11.28, 14.02)	3.43	2.10	57.03	206	7.54E-13
		8.74	(7.16, 10.32)	2.09	1.15	99.04	206	5.98E-11
Methadone	N2	0.21	(0.19, 0.22)	0.06	0.04	76.76	266	9.20E-13
		0.27	(0.26, 0.29)	0.06	0.04	61.19	236	4.90E-14
		0.38	(0.34, 0.42)	0.06	0.03	93.42	233	9.27E-11
Parathion	myo2	2.17	(2.01, 2.32)	1.31	1.02	69.95	224	1.14E-13
		1.22	(1.07, 1.36)	0.43	0.26	69.85	216	1.09E-12
		1.14	(1.08, 1.20)	0.69	0.56	47.76	252	2.44E-15
Paraquat	N2	1.68	(1.08, 2.28)	0.29	0.06	166.14	213	1.72E-07
		1.74	(1.47, 2.01)	0.98	0.64	112.6	232	4.96E-10
		2.35	(2.01, 2.69)	0.46	0.24	67.61	214	5.24E-11

Ascorbic acid	N2	1.35	(1.27, 1.43)	0.82	0.66	85.87	229	6.97E-12
		1.7	(1.63, 1.78)	1.21	1.03	60.68	263	1.07E-11
		1.49	(1.40, 1.58)	1.02	0.82	74.43	257	1.07E-10
Acetic acid	myo2	1.04	(1.01, 1.07)	0.88	0.78	60.99	247	2.38E-13
		0.96	(0.92, 1.00)	0.68	0.58	58.19	308	8.38E-14
		1.18	(1.15, 1.21)	0.89	0.81	34.08	268	1.11E-16
Cadmium	N2	185.69	(169.92, 201.46)	168.96	137.54	124.4	344	8.92E-09
		175.96	(158.08, 193.85)	132.28	95.28	131.21	213	4.13E-09
		192.16	(186.53, 197.80)	153.69	136.99	49.33	208	7.89E-14
	myo2	112.79	(108.87, 116.71)	80.61	71.58	59.26	205	4.55E-15
		118.74	(112.26, 125.22)	89.38	76.77	77.92	208	1.28E-12
		120.58	(116.55, 124.62)	72.42	62.89	46.55	205	1.22E-15
DMSO	N2	3.36	(3.12, 3.59)	1.91	1.44	71.15	221	2.94E-10
		2.94	(2.79, 3.10)	2.06	1.62	61.45	230	1.12E-11
		1.98	(1.67, 2.29)	0.85	0.52	115.52	222	7.45E-09
	myo2	2.56	(2.48, 2.65)	1.48	1.25	36.93	214	7.66E-15
		2.48	(2.41, 2.55)	1.42	1.21	32.69	223	5.55E-16
		2.23	(2.04, 2.42)	1.17	0.84	83.41	208	4.02E-11

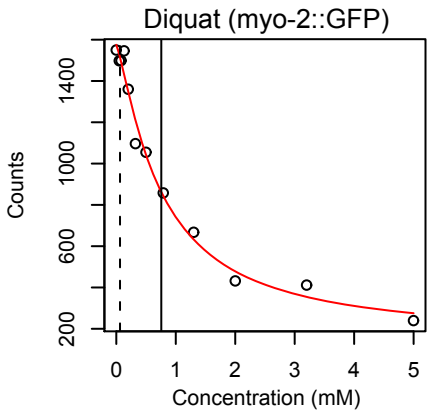
Supplemental Table 2

Estimated BMpHs and 95% bootstrap upper confidence limits, as well as pH50s and 95% bootstrap confidence intervals for two acids based on 3 repetitions of the *C. elegans* reproduction assay

Acid	Strain	BMpH	Boostrap BMpH 95% upper limit	ph50	Boostrap pH50 95% CI	sigma	Actual number of bootstrap samples	p-value
Acetic	myo2	4.55	4.64	4.41	(4.37, 4.45)	131.19	201	8.97E-09
		4.65	4.70	4.45	(4.43, 4.47)	53.68	202	9.69E-14
		4.51	4.54	4.37	(4.36, 4.38)	29.28	202	1.11E-16
Ascorbic	N2	4.26	4.53	3.70	(3.62, 3.78)	94.23	209	6.47E-10
		3.73	3.83	3.37	(3.34, 3.40)	51.42	202	4.34E-11
		4.47	4.82	3.81	(3.70, 3.93)	75.24	203	3.81E-10

Supplemental Figure Legend

Supplemental Figure 1. Effect of all chemicals on *C. elegans* reproduction. Total number of offspring plotted against chemical concentration of wild-type or *myo-2::GFP* strains for all experiments. The solid, black vertical lines represent a 50% reduction in the total number of offspring (EC_{50}). The dashed, black vertical lines represent the BMC, below which the reproductive rate is not significantly affected by chemical.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Counts
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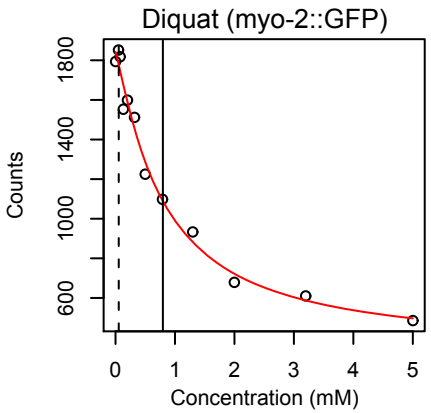
1400
0
1
2
3
4
5
Concentration (mM)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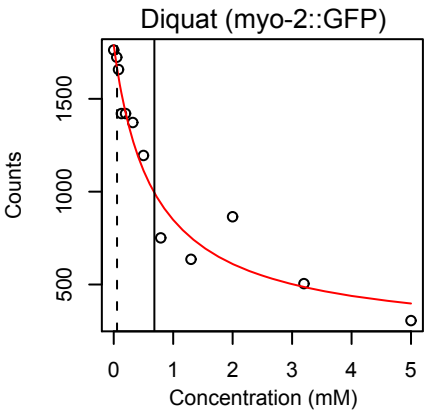
4
5
Concentration (mM)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Counts
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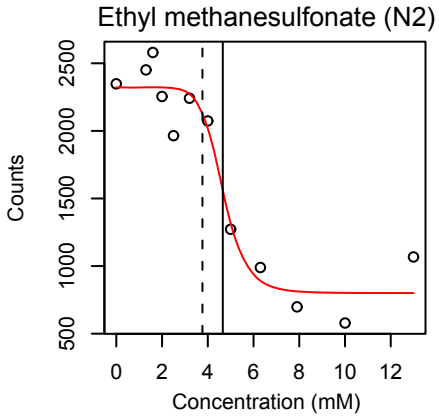
0
1
2
3
4
5
Concentration (mM)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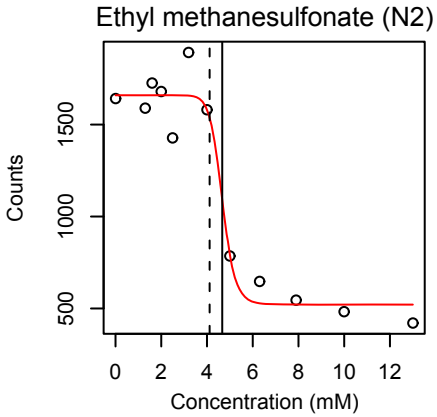
8
10
12
Concentration (mM)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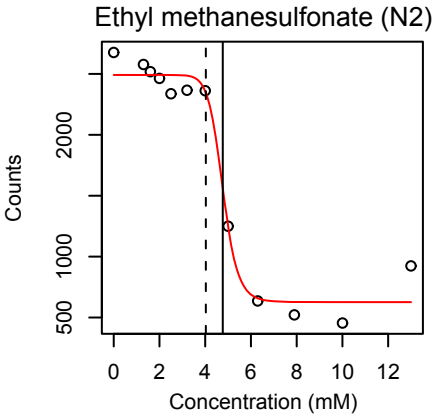
Concentration (mM)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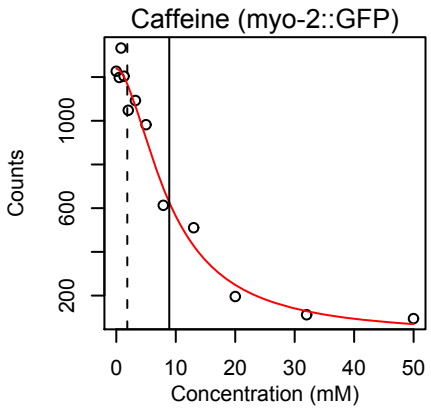
8
10
12
Concentration (mM)


Caffeine (myo-2::GFP)
Counts
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0
10
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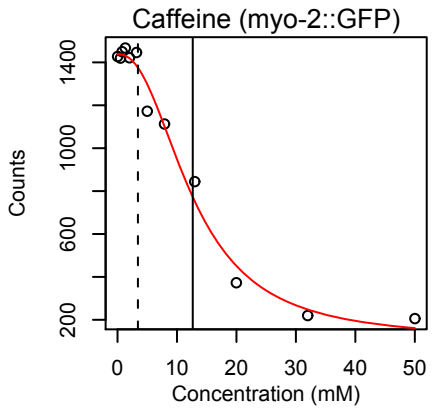
30
40
50
Concentration (mM)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30
40
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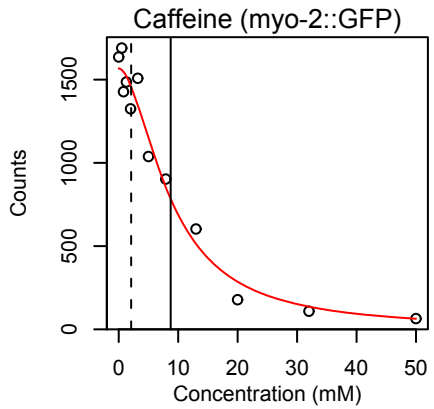
Concentration (mM)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1000
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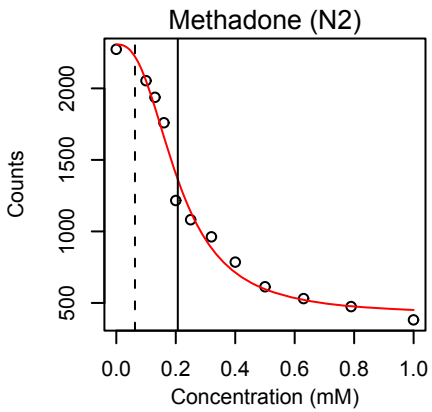
0
10
20
30
40
50
Concentration (mM)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0.4
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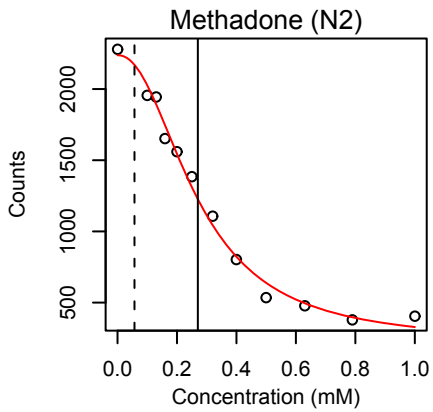
1.0
Concentration (mM)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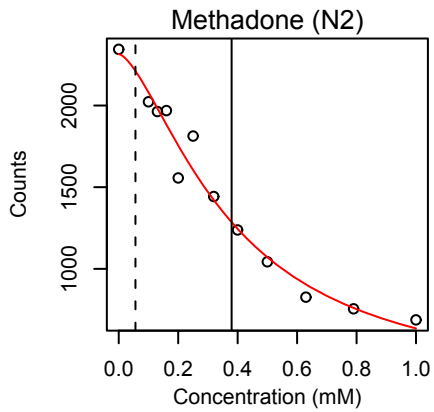
0.6
0.8
1.0
Concentration (mM)


Methadone (N2)
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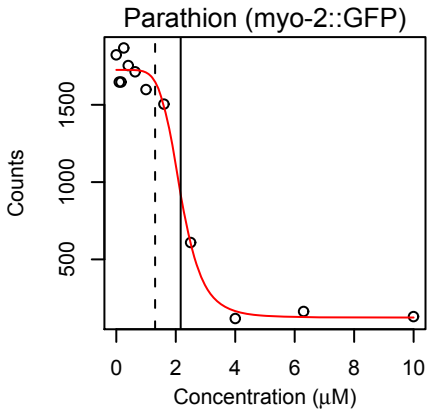
1500
2000
0.0
0.2
0.4
0.6
0.8
1.0
Concentration (mM)


Parathion (myo-2::GFP)
Counts
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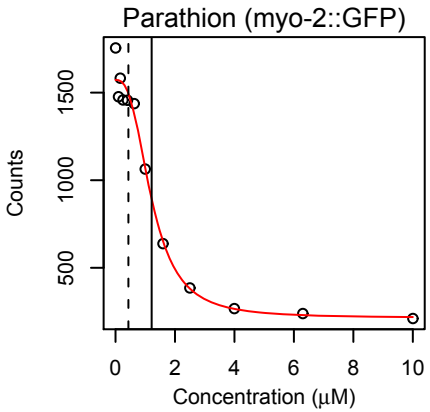
1500
0
2
4
6
8
10
Concentration (µM)


Parathion (myo-2::GFP)
Counts
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8
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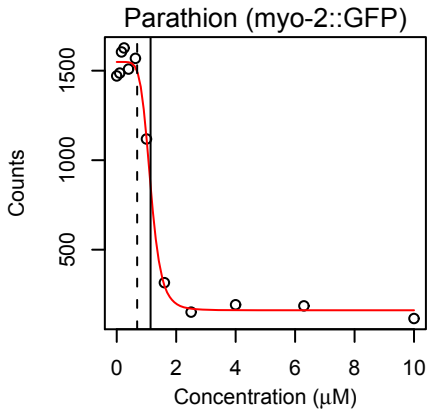
Concentration (µM)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Counts
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8
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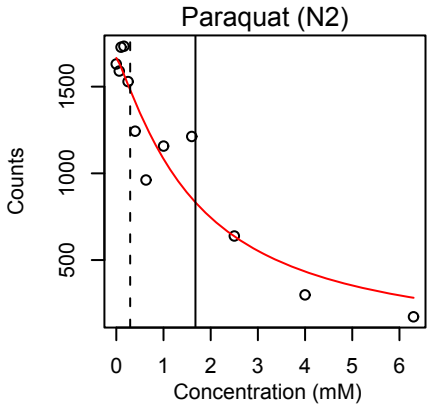
Concentration (µM)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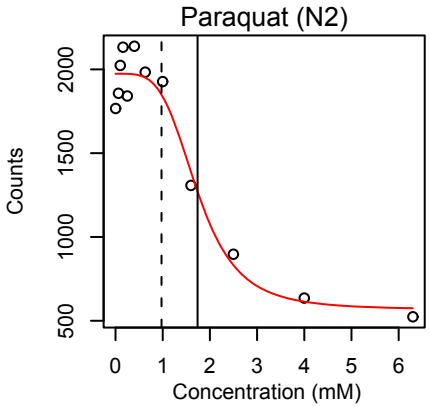
Concentration (mM)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4
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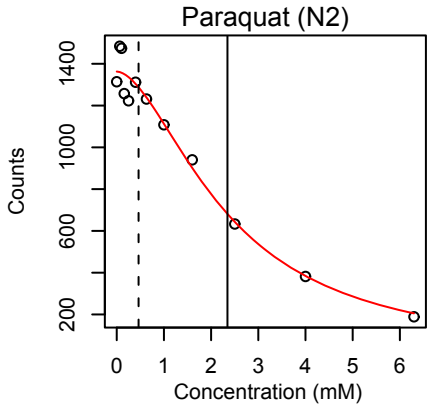
6
Concentration (mM)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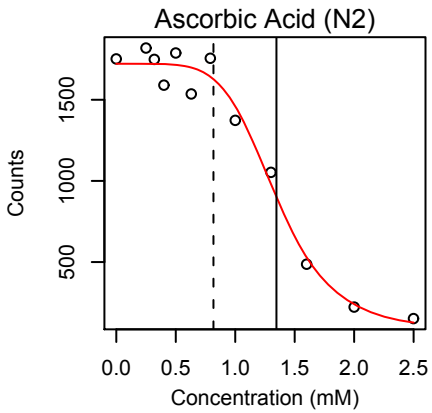
3
4
5
6
Concentration (mM)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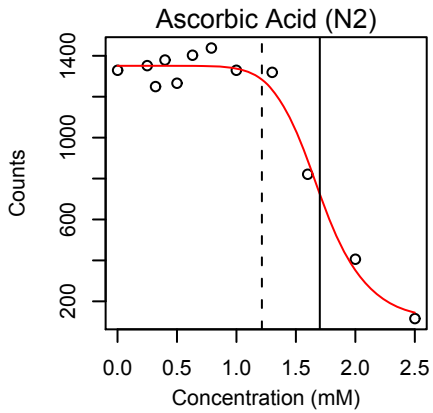
2.5
Concentration (mM)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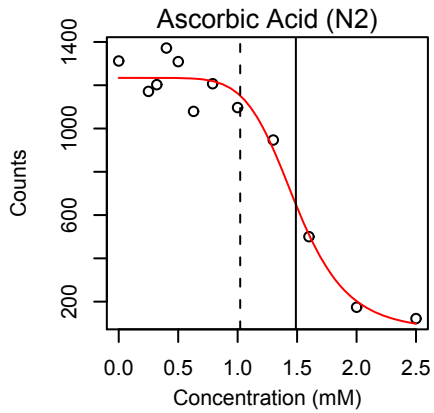
1.0
1.5
2.0
2.5
Concentration (mM)


Ascorbic Acid (N2)
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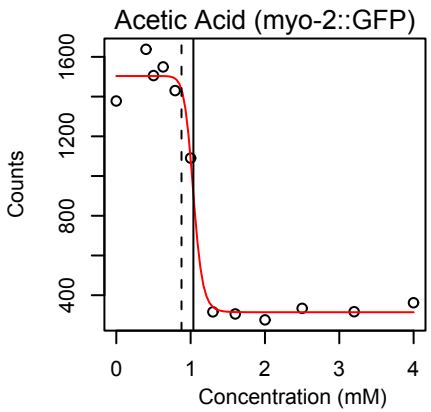
2.0
2.5
Concentration (mM)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1600
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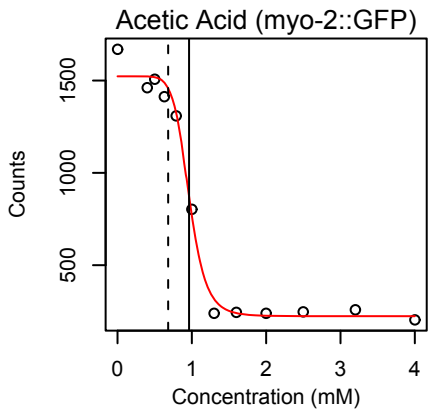
2
3
4
Concentration (mM)


Acetic Acid (myo-2::GFP)
Counts
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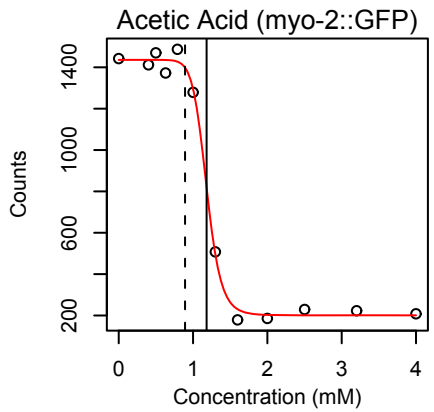
1000
1500
0
1
2
3
4
Concentration (mM)


Acetic Acid (myo-2::GFP)
Counts
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1400
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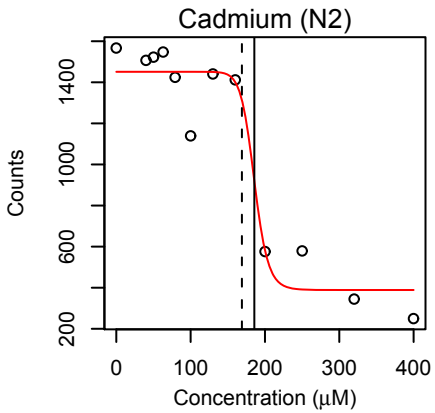
1
2
3
4
Concentration (mM)


Cadmium (N2)
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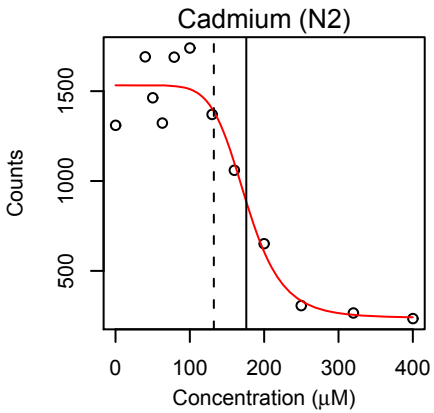
300
400
Concentration (µM)


Cadmium (N2)
Counts
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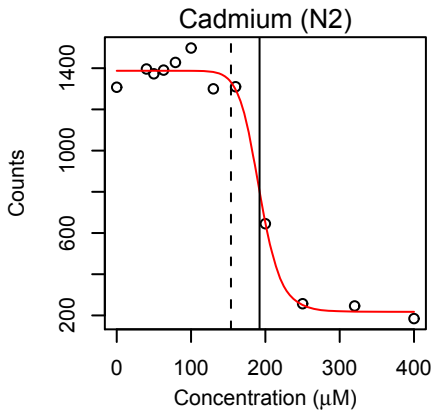
100
200
300
400
Concentration (µM)


Cadmium (N2)
Counts
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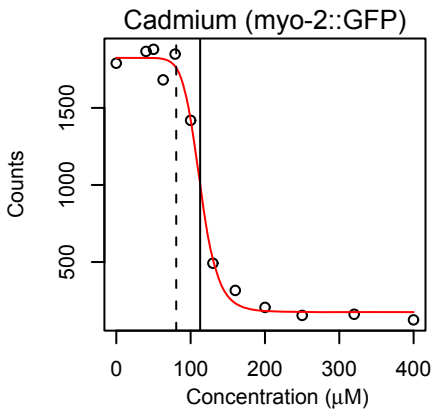
600
1000
1400
0
100
200
300
400
Concentration (µM)


Cadmium (myo-2::GFP)
Counts
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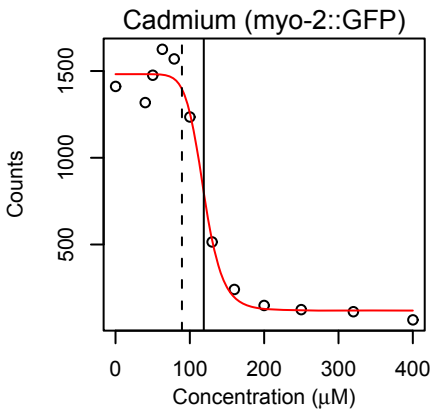
400
Concentration (µM)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Counts
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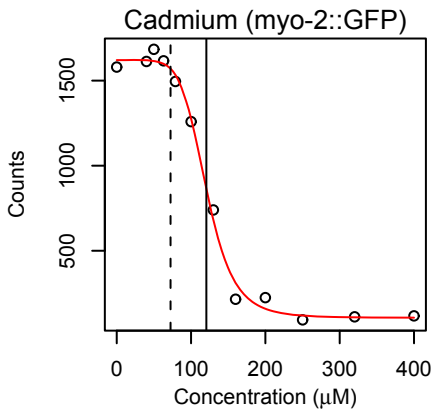
300
400
Concentration (µM)


Cadmium (myo-2::GFP)
Counts
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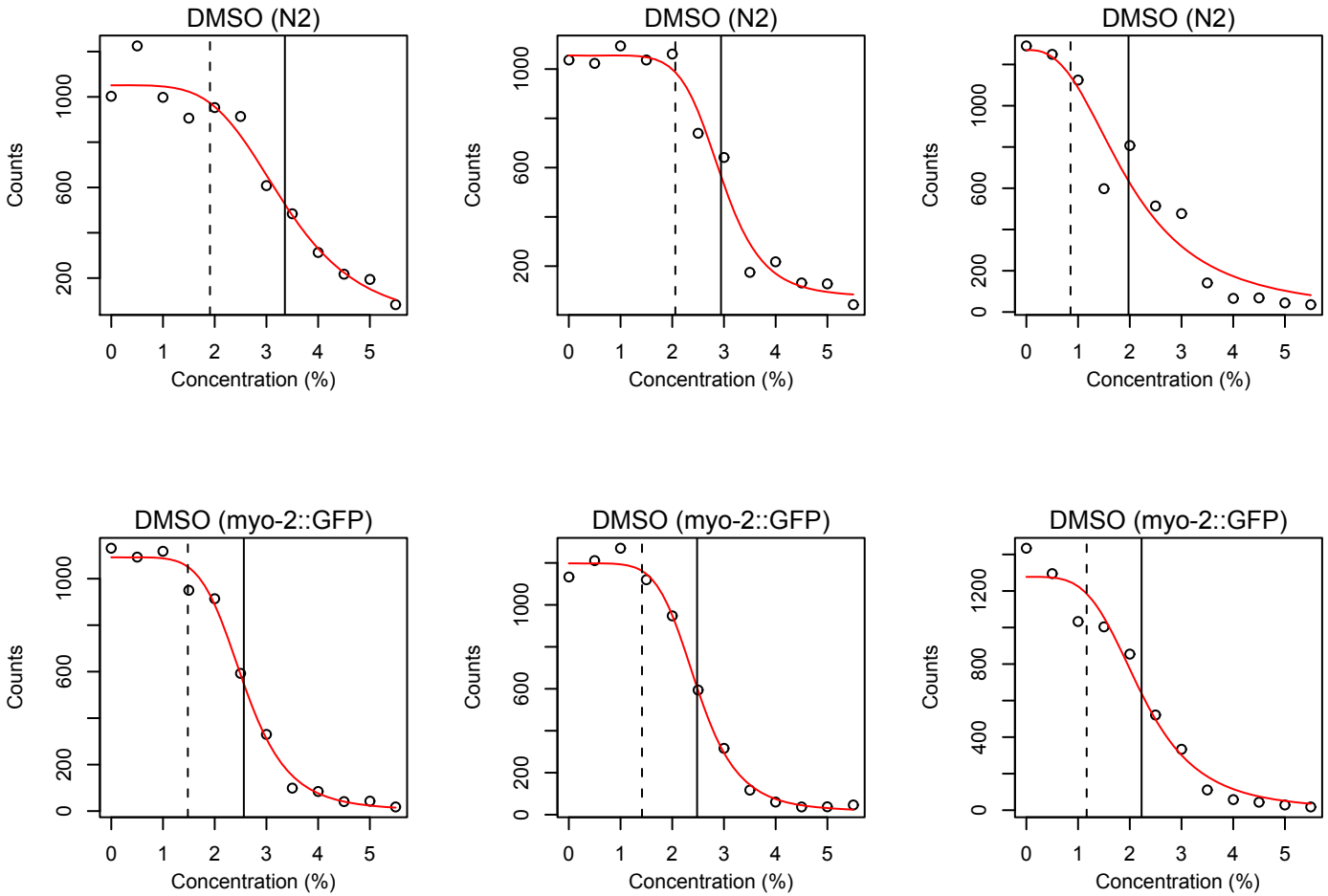
1000
1500
0
100
200
300
400
Concentration (µM)


DMSO (N2)
Counts
Concentration (%)
DMSO (N2)
Counts
Concentration (%)
DMSO (N2)
Counts
Concentration (%)
DMSO (myo-2::GFP)
Counts
Concentration (%)
DMSO (myo-2::GFP)
Counts
Concentration (%)
DMSO (myo-2::GFP)
Counts
Concentration (%)