

## **Eye malformation baseline in *Scinax fuscovarius* larvae populations that inhabit agroecosystem ponds in southern Brazil**

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### **Supplementary material**

**Table S1.** Teratogens known to cause eye malformations. To elaborate this table was performed a search covering all publications until December 2016, using the following search terms: malformation OR abnormalities AND tadpole OR amphibian AND eye OR ocular, were applied in the scientific search engines ScienceDirect, Google Scholars and Scopus. Bibliographies of selected articles were also used to search for additional studies. Studies included in the review table met, (1) when several studies pointed to a same teratogen, just the one/s which include malformations descriptions were included, and (2) when a teratogen was pointed by an unique study it was including even without malformations description. A (Anophtalmia), Ap (Aphakia), As (Asymetries in eye formation), Ca (Cataracts), Co (chorodial or iris Coloboma), C.d (Corneal dystrophy), Cy (Cyclopia), Cys (corneal Cyst), E (Edema), H (Hypopigmentation,including depigmentation), He (Hernia), HY (Hyperpigmentation), M (Microphthalmia), M.l (Misplaced lens), M.g (Misshapen globe) and N-d (Non-described).

Teratogens	Eye malformations	Species / developmental phase	Reference
<b>CHEMICALS</b>			
Atrazine, Chlorpyrifos and Monosodium Methanearsonate (Asses in mixture)	A	Hyla chrysoscelis / tadpoles	Britson and Threlkeld, 1999
Polychlorinated biphenyls	Co, H, M and M.g	Xenopus laevis / tadpoles	Gutleb et al. 1999
Sodium fluoride	M	Xenopus laevis / embryos	Goh and Neff, 2003
Trinitrotoluene	M and M.g	Xenopus laevis / embryos	Saka, 2004
Dichlorodiphenyltrichloroethane	M and M.g	Xenopus laevis / embryos	Saka, 2004
4-amino-2,6-dinitrotoluene	M and M.g	Xenopus laevis / embryos	Saka, 2004
2-amino-4,6-dinitrotoluene	M and M.g	Xenopus laevis / embryos	Saka, 2004
Bisphenol A	Ap, M and H	Xenopus laevis / embryos	Kazunobu et al. 2009 San-Segundo et al. 2013
Cypermethrin	N.d	Hypsiboas pulchellus / tadpoles	Agostini et al. 2010
Glyphosate	A and M	Discoglossus pictus / embryos Xenopus laevis / embryos	Paganelli et al. 2010 Wagner et al. 2017 (on-line in 2016)
Tributyltin	Ap, Ca, E, H and M		

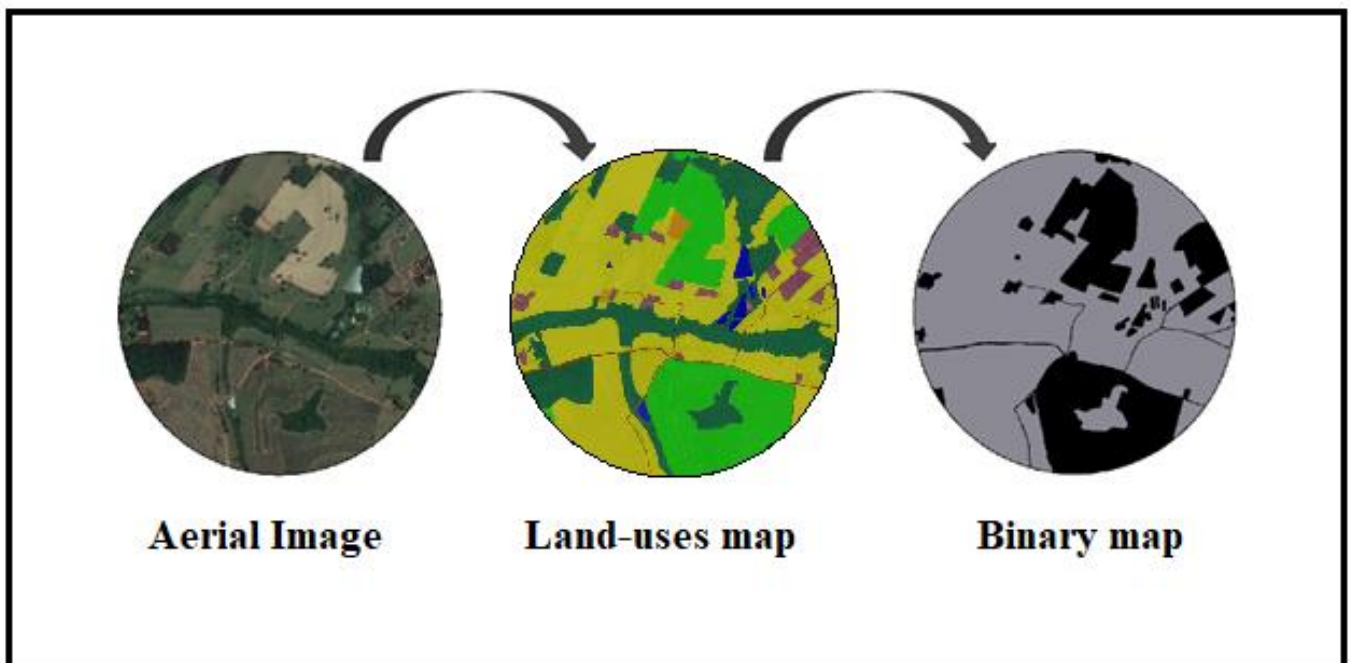
		Xenopus laevis / embryos Xenopus tropicalis / tadpoles	Liu et al. 2012 Hu et al. 2015
Methylparaben	N.d	Xenopus laevis / embryos	San-Segundo et al. 2013
Chlorpyrifos	M	Xenopus laevis / embryos	San-Segundo et al. 2013
Antagonist of retinoid X receptor (UVI3003)	H and M.g	Xenopus tropicalis / embryos	Zhu et al. 2014a
Alitretinoin	A, H and M	Xenopus tropicalis / embryos	Zhu et al. 2014b
Triphenyltin	Ca, E and M	Xenopus laevis / embryos	Hu et al. 2015
Pyraclostrobin	Ca, E and M	Xenopus laevis / embryos	Hu et al. 2015
Perfluorohexanoic	N.d	Xenopus laevis / embryos	Kim et al. 2015
Perfluoroheptanoic	N.d	Xenopus laevis / embryos	Kim et al. 2015
Tributyl phosphate	N.d	Xenopus tropicalis / embryos	Zhang et al. 2016
Tricresyl phosphate	N.d	Xenopus tropicalis / embryos	Zhang et al. 2016
Tris (2-chloroisopropyl) phosphate	N.d	Xenopus tropicalis / embryos	Zhang et al. 2016
Tris (1,3-dichloro-2-propyl) phosphate	N.d	Xenopus tropicalis / embryos	Zhang et al. 2016
Pyraclostrobin	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Picoxystrobin	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Azoxystrobin	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Fludioxonil	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Folpet	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Bixafen	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Tebuconazole	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Myclobutanil	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Isopyrazam	Ca and M	Xenopus tropicalis / embryos	Li et al. 2016a
Dimethyl phthalate	As, B.s, Cy and M	Silurana tropicalis / tadpoles	Mathieu-Denoncourt et al. 2016
Monomethyl phthalate	As, B.s, Cy and M	Silurana tropicalis / tadpoles	Mathieu-Denoncourt et al. 2016
Dicyclohexyl phthalate	As, B.s, Cy and M	Silurana tropicalis / tadpoles	Mathieu-Denoncourt et al. 2016

Butachlor	N.d	Xenopus laevis / embryos	Li et al. 2016b
<b>METALS</b>			
Cadmium	Co, H, M, M.g and M.l	Xenopus laevis /embryos	Sunderman et al. 1991
Cobalt	Co, H, M, M.g and M.l	Xenopus laevis / tadpoles	Plowman et al. 1991
Nickel	Ca, Co, Cys, H, He and M	Xenopus laevis / embryos	Hopfer et al. 1991 Hauptman et al. 1993
Chromium	N.d	Triturus vulgaris meridionalis / embryos	Calevro et al. 1998
Lead	Cys and He	Pelophylax nigromaculata / tadpoles	Huang et al. 2014
Selenium	B.s, Co, E, M and M.l	Xenopus laevis / embryos	Massé et al. 2015
<b>RADIATIONS</b>			
UV radiation (UV-A, UV-B and visible)	An, C.d, Hy and M	Bufo boreas boreas / tadpoles Rana pipens / tadpoles	Worrest and Kimeldorf, 1976 Ankely et al. 2002
GSM-like radiofrequency	C, Co and M	Xenopus laevis / embryos	Boga et al. 2016

**Table S2.** Dredge of the Linear Mixed Effects (LME) models predicting the relationship between frequencies of eye malformations in *Scinax fuscovarius* tadpoles and different local, contamination and landscape descriptors. Int = Intercept; DNS = shortest distance between ponds and nearest sugarcane crop; MD = maximum water depth of ponds; SAT = proportion of areas with potential presence of teratogens within circular buffers with a radius of 1 km centered on each pond; SS = calculated based on the proportion of sugarcane crops within circular buffers with a radius of 1 km centered on each pond; TCP = total concentration of pesticides in ponds; df = degrees of freedom; logLik = Log-Likelihood; AICc = corrected Akaike's Information Criteira;  $\Delta$ AICc = delta AICc; wAICc = weights of AICc; NULL = model without a predictor variable (considering only intercept). Models ranked by AICc.

Model	Int	DNS	MD	SAT	SS	TCP	df	logLik	AICc	$\Delta$ AICc	wAICc
1	0.1039						3	8.612	-9.5	0	0.742
5	0.1039			0.06726			4	8.445	-5.8	3.7	0.117
3	0.1039		-0.05567				4	7.636	-4.2	5.31	0.052
9	0.1039				0.03994		4	6.864	-2.7	6.86	0.024
17	0.1039					-0.03532	4	6.695	-2.3	7.2	0.02
7	0.1039		-0.06221	0.07285			5	8.371	-1.7	7.77	0.015
2	0.1039	-0.02469					4	6.395	-1.7	7.8	0.015
21	0.1039			0.06708		-0.03496	5	6.554	1.9	11.4	0.002
11	0.1039		-0.06523		0.05195		5	6.546	1.9	11.42	0.002
4	0.1039	-0.05008	-0.07307				5	6.351	2.3	11.81	0.002
13	0.1039			0.08271	-0.02097		5	6.341	2.3	11.83	0.002
6	0.1039	0.02424		0.08177			5	6.273	2.5	11.96	0.002
18	0.1039	-0.05293				-0.06016	5	5.374	4.3	13.76	0.001
25	0.1039				0.04782	-0.0439	5	5.281	4.4	13.95	0.001
19	0.1039		-0.04944			-0.01563	5	5.27	4.5	13.97	0.001
10	0.1039	0.001747			0.04106		5	4.624	5.8	15.26	0
15	0.1039		-0.0616	0.07655	-0.0051		6	6.043	7.6	17.06	0
8	0.1039	-0.00489	-0.06366	0.07005			6	5.932	7.8	17.28	0
23	0.1039		-0.05735	0.07235		-0.0121	6	5.806	8	17.53	0
20	0.1039	-0.0657	-0.06199			-0.04148	6	4.633	10.4	19.88	0
12	0.1039	-0.0262	-0.07144		0.03623		6	4.454	10.7	20.24	0
29	0.1039			0.07261	-0.0075	-0.03358	6	4.375	10.9	20.4	0
22	0.1039	-0.00229		0.0657		-0.03604	6	4.369	10.9	20.41	0
27	0.1039		-0.05672		0.05442	-0.02251	6	4.264	11.1	20.62	0
14	0.1039	0.02048		0.08827	-0.01188		6	4.181	11.3	20.78	0
26	0.1039	-0.0318			0.02944	-0.05553	6	3.364	12.9	22.42	0
16	0.1039	-0.00727	-0.06343	0.07439	-0.00785		7	3.709	17.8	27.29	0
24	0.1039	-0.01729	-0.05954	0.06216		-0.0194	7	3.628	17.9	27.45	0
31	0.1039		-0.05727	0.07342	-0.00146	-0.01186	7	3.525	18.1	27.66	0
28	0.1039	-0.04477	-0.06189		0.02914	-0.03693	7	2.578	20	29.55	0
30	0.1039	-0.00474		0.07072	-0.00881	-0.03558	7	2.268	20.7	30.17	0
32	0.1039	-0.01905	-0.05941	0.06585	-0.00646	-0.0191	8	1.427	29.1	38.66	0

**Figure S1.** Schematic overview of the maps' construction of the circular buffer areas of 1 km radius that surround each of the ponds. Land-use maps with multiple categories and, derived from them, Binary maps. The binary maps reclassified the categories reflected in the land-use maps into two categories: Land-uses with potential presence of teratogens (in black), which includes those associated with human activities that use or emit potential teratogens into the environment such as agriculture (sugarcane (light green) and other cultures (orange)), forestry (blue-green), waterbodies (blue), urban areas (purple) and linear structures (brown); and Land-uses virtually free of teratogens (in grey), which includes riparian forests (dark green) and pastures (yellow). The creation of the maps was done using Google Earth Pro v7.1.8.3036.



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