Supplementary Material

Table S1. Mass spectrum acquisition conditions for the analyzed compounds.

Compound Name	Precursor Ion	MS1 Resolution	Product Ion	MS2 Resolution	RT	Left RT delta	Right RT delta	Dwell	CE
Organochlorines									
BHC alpha	181	LowRes	145	LowRes	7.66	0.2	0.2	65.88218	15
BHC alpha	181	LowRes	109	LowRes	7.66	0.2	0.2	65.88218	30
BHC beta	181	LowRes	145	LowRes	8.05	0.2	0.2	43.67644	15
BHC beta	181	LowRes	109	LowRes	8.05	0.2	0.2	43.67644	30
Lindane	181	LowRes	145	LowRes	8.2	0.2	0.2	40.825	15
Lindane	181	LowRes	109	LowRes	8.2	0.2	0.2	40.825	30
BHC delta	181	LowRes	145	LowRes	8.53	0.2	0.2	60.26567	15
BHC delta	181	LowRes	109	LowRes	8.53	0.2	0.2	60.26567	30
Heptachlor	271.9	LowRes	236.8	LowRes	9.35	0.2	0.2	38.01189	25
Heptachlor	271.9	LowRes	116.9	LowRes	9.35	0.2	0.2	38.01189	40
Aldrin	264.9	LowRes	192.9	LowRes	9.97	0.2	0.2	38.48896	35
Aldrin	262.9	LowRes	192.9	LowRes	9.97	0.2	0.2	38.48896	35
Aldrin	262.9	LowRes	190.9	LowRes	9.97	0.2	0.2	38.48896	35
Heptachlor epoxide	352.9	LowRes	281.9	LowRes	10.68	0.2	0.2	99.27393	20
Heptachlor epoxide	352.9	LowRes	262.8	LowRes	10.68	0.2	0.2	99.27393	25
Endosulfan alpha	240.9	LowRes	205.9	LowRes	11.3	0.2	0.2	38.63604	15
Endosulfan alpha	240.9	LowRes	136	LowRes	11.3	0.2	0.2	38.63604	40
p,p′-DDE	317.8	LowRes	248	LowRes	11.64	0.2	0.2	35.30754	15
p,p′-DDE	315.8	LowRes	246	LowRes	11.64	0.2	0.2	35.30754	15
p,p′-DDE	246.1	LowRes	176.2	LowRes	11.64	0.2	0.2	35.30754	30
Dieldrin	262.9	LowRes	192.9	LowRes	11.75	0.2	0.2	62.57407	40
Dieldrin	262.9	LowRes	190.9	LowRes	11.75	0.2	0.2	62.57407	35
Endrin	262.9	LowRes	193	LowRes	12.15	0.2	0.2	40.87271	35
Endrin	262.9	LowRes	190.9	LowRes	12.15	0.2	0.2	40.87271	35
Endosulfan beta	195	LowRes	159	LowRes	12.3	0.2	0.2	31.24553	10
Endosulfan beta	195	LowRes	125	LowRes	12.3	0.2	0.2	31.24553	25
p,p′-DDD	235	LowRes	199.1	LowRes	12.39	0.2	0.2	26.49147	20
p,p′-DDD	235	LowRes	165.1	LowRes	12.39	0.2	0.2	26.49147	25
Endrin aldehyde	249.9	LowRes	214.9	LowRes	12.63	0.2	0.2	43.74618	35
Endrin aldehyde	249.9	LowRes	141.9	LowRes	12.63	0.2	0.2	43.74618	40
Endosulfan sulfate	271.9	LowRes	236.9	LowRes	13.05	0.2	0.2	40.78856	20
Endosulfan sulfate	271.9	LowRes	116.9	LowRes	13.05	0.2	0.2	40.78856	40
p,p′-DDT	235	LowRes	199.1	LowRes	13.07	0.2	0.2	43.56157	20
p,p′-DDT	235	LowRes	165.1	LowRes	13.07	0.2	0.2	43.56157	30
Methoxychlor	227.1	LowRes	212.01	LowRes	14.05	0.2	0.2	99.24142	15
Methoxychlor	227.1	LowRes	169.1	LowRes	14.05	0.2	0.2	99.24142	20

Organophosphates									
Mevinphos	127	LowRes	109	LowRes	5.63	0.2	0.2	99.28089	10
Mevinphos	127	LowRes	95	LowRes	5.63	0.2	0.2	99.28089	15
Ethoprop	158	LowRes	114	LowRes	7	0.2	0.2	99.27679	5
Ethoprop	158	LowRes	97	LowRes	7	0.2	0.2	99.27679	15
Cadusafos	213	LowRes	73	LowRes	7.4	0.2	0.2	74.08138	10
Cadusafos	158	LowRes	97	LowRes	7.4	0.2	0.2	74.08138	15
Diazinon	304	LowRes	178.9	LowRes	8.33	0.2	0.2	40.77306	15
Diazinon	178.9	LowRes	121	LowRes	8.33	0.2	0.2	40.77306	28
Methyl chlorpyrifos	288	LowRes	93	LowRes	9.11	0.2	0.2	60.21099	26
Methyl chlorpyrifos	286	LowRes	271	LowRes	9.11	0.2	0.2	60.21099	26
Methyl parathion	263	LowRes	109	LowRes	9.18	0.2	0.2	38.01416	10
Methyl parathion	263	LowRes	79	LowRes	9.18	0.2	0.2	38.01416	35
Methyl pirimiphos	305	LowRes	180	LowRes	9.52	0.2	0.2	52.43653	5
Methyl pirimiphos	290	LowRes	151	LowRes	9.52	0.2	0.2	52.43653	15
Malathion	173.1	LowRes	117	LowRes	9.77	0.2	0.2	33.82244	10
Malathion	173.1	LowRes	99	LowRes	9.77	0.2	0.2	33.82244	15
Chlorpyrifos	196.9	LowRes	168.9	LowRes	9.89	0.2	0.2	28.47469	15
Chlorpyrifos	196.9	LowRes	107	LowRes	9.89	0.2	0.2	28.47469	40
Parathion	291	LowRes	109	LowRes	9.94	0.2	0.2	30.13447	10
Parathion	139	LowRes	109	LowRes	9.94	0.2	0.2	30.13447	10
Fenamiphos	303.1	LowRes	154	LowRes	11.29	0.2	0.2	38.40262	20
Fenamiphos	303.1	LowRes	80	LowRes	11.29	0.2	0.2	38.40262	40
Ethion	231	LowRes	175	LowRes	12.38	0.2	0.2	24.99639	5
Ethion	231	LowRes	129	LowRes	12.38	0.2	0.2	24.99639	25
Triazophos	161	LowRes	134	LowRes	12.62	0.2	0.2	25.26145	5
Triazophos	161	LowRes	106	LowRes	12.62	0.2	0.2	25.26145	10
Triphenyl phosphate (internal standard)	325.9	LowRes	233	LowRes	13.39	0.2	0.2	40.77881	27
Triphenyl phosphate (internal standard)	325.9	LowRes	169	LowRes	13.39	0.2	0.2	40.77881	30

Table S2. Method validation parameters.

Pesticides	Linearity (R^2)	LOD (µg/g)	LOQ (µg/g)	Accuracy (% Recovery)	Precision (% CV)
Organochlorines					
BHC alpha	0.9999	0.001	0.002	96.72 ± 5.65	5.84
BHC beta	0.9994	0.003	0.009	99.33 ± 4.48	4.51
Lindane	0.9984	0.001	0.004	104.86 ± 14.07	13.42
Heptachlor epoxide	0.9997	0.001	0.003	97.84 ± 4.29	4.38
Endosulfan alpha	0.9998	0.001	0.004	98.90 ± 5.27	5.29
p,p´- DDD	0.9991	0.0003	0.001	97.74 ± 4.66	4.77
Dieldrin	0.9997	0.001	0.002	99.99 ± 4.56	4.70
Endrin	0.9997	0.011	0.032	95.89 ± 5.69	5.94
Endosulfan beta	0.9983	0.004	0.012	99.59 ± 5.27	5.29
p,p´- DDE	0.9989	0.001	0.002	96.78 ± 4.58	4.73
Heptachlor	0.9988	0.001	0.004	101.20 ± 45.69	5.62
BHC delta	0.9982	0.003	0.009	94.18 ± 8.87	9.42
Aldrin	0.9999	0.001	0.003	97.42 ± 4.43	4.55
Endosulfan sulfate	0.9916	0.006	0.018	91.35 ± 13.03	14.26
p,p´- DDT	0.9913	0.004	0.013	103.00 ± 10.56	10.25
Methoxychlor	0.9992	0.004	0.013	104.22 ± 7.37	7.07
Organophosphates					
Mevinphos	0.9964	0.0017	0.0050	95.01 ± 14.09	14.83
Ethoprop	0.9987	0.0006	0.0017	93.44 ± 7.24	7.25
Cadusafos	0.9989	0.0004	0.0013	93.53 ± 6.81	7.28
Diazinon	0.9999	0.0006	0.0019	94.78 ± 5.87	6.20
Chlorpyrifos methyl	0.9984	0.0048	0.0143	93.22 ± 10.40	11.15
Parathion methyl	0.9990	0.0012	0.0035	96.06 ± 7.95	8.28
Pirimiphos methyl	0.9999	0.0019	0.0058	96.77 ± 5.40	5.58
Malathion	0.9980	0.0025	0.0076	94.56 ± 8.06	8.52
Fenamiphos	0.9958	0.0036	0.0107	91.81 ± 9.70	10.57
Chlorpyrifos	0.9959	0.0006	0.0018	91.11 ± 8.12	8.92
Parathion	0.9991	0.0025	0.0076	100.62 ± 5.78	5.75
Ethion	0.9999	0.0007	0.0021	93.75 ± 5.60	5.97
Triazophos	0.9952	0.0021	0.0062	92.68 ± 8.68	9.37
Validation criteria:	**$R^2 \geq 0.99$**			**70-120**	**≤ 20%**

Table S3. Concentration of OCPs in vertebrae of healthy fish (µg/g, dry weight), from the coast of San Blas, Nayarit, Mexico. Range: minimum–maximum, arithmetic mean ± standard deviation estimated from the Kaplan–Meier survival function, n: total samples, parentheses: censored samples, <LD: measurement below the detection limit [54], * Single data point, Σ: Sum of pesticides.

Species/Pesticide	*p,p´*-DDE	*p,p´*-DDD	*p,p´*-DDT	∑ DDT´s	Endrín	Endosulfán β	∑OCPs
C. raredonae	0.021±0.011 0.006-0.045 (12/0)	0.0010±0.0004 <LD-0.001 (12/10)	0.0046±0.0015 <LD-0.007 (12/9)	0.019±0.013	0.013±0.002 <LD-0.018 (12/9)	- <LD-0.001 (12/11)	0.022±0.015
A. guatemalensis	0.032±0.022	0.002±0.001	0.014±0.005		-	-	

	0.014-0.060 (4/0)	<LD-0.003 (4/2)	<LD-0.019 (4/2)	0.030-0.032	<LD-0.024* (4/3)	<LD (4/4)	0.034±0.037
A. seemanni	0.052±0.034 0.017-0.084 (3/0)	- <LD-0.002* (3/2)	0.015±0.01 <LD-0.025 (3/1)	0.049±0.046	0.069±0.092 <LD-0.161 (3/1)	- <LD-0.085* (3/2)	0.121±0.099
B. panamensis	0.017±0.008 0.007-0.021 (3/0)	- <LD (3/3)	- <LD (3/3)	0.014±0.008	- <LD (3/3)	- <LD (3/3)	0.014±0.008
N. kessleri	0.014±0.007 0.009-0.019 (2/0)	- <LD (2/2)	- <LD (2/2)	0.013±0.007	- <LD-0.015* (2/1)	- <LD (2/2)	0.017±0.018
O. altus	- 0.008* (1/0)	- <LD (1/1)	- <LD (1/1)	<LD-0.008*	- <LD (1/1)	- <LD (1/1)	<LD-0.008*
M. ectenes	- 0.011* (1/0)	- <LD (1/1)	- <LD (1/1)	<LD-0.011*	- <LD (1/1)	- <LD (1/1)	<LD-0.011*
C. caninus	- 0.005* (1/0)	- <LD (1/1)	- <LD (1/1)		- <LD (1/1)	- <LD (1/1)	<LD-0.005*
C. viridis	0.005±0.003 0.002-0.006 (2/0)	- <LD (2/2)	- <LD (2/2)	0.004±0.002	- <LD (2/2)	- <LD (2/2)	0.004±0.002
C. chanos	0.006±0.002 0.004-0.007 (2/0)	- <LD (2/2)	- <LD (2/2)	0.005±0.002	- <LD (2/2)	- <LD (2/2)	0.005±0.002
L. argentiventris	- 0.013* (1/0)	- <LD (1/1)	- <LD (1/1)	<LD-0.013*	- <LD (1/1)	- <LD (1/1)	<LD-0.013*

Table S4. Concentration of OCPs in vertebrae of malformed fish (μg/g, dry weight), from the coast of San Blas, Nayarit, Mexico. Range: minimum–maximum, arithmetic mean ± standard deviation estimated from the Kaplan–Meier survival function, n: total samples, parentheses: censored samples, <LD: measurement below the detection limit [54], * Single data point, Σ: Sum of pesticides.

Species/Pesticide	*p,p´*-DDE	*p,p´*-DDD	*p,p´*-DDT	∑ DDT´s	Endrín	Endosulfán β	∑OCPs
C. raredonae	0.067±0.044 0.008-0.129 (12/0)	0.003±0.003 LD-0.007 (12/3)	0.02±0.022 <LD-0.069 (12/6)	0.057±0.067	- <LD (12/12)	- <LD (12/12)	- 0.057±0.067
A. guatemalensis	0.185±0.11 0.040-0.271 (4/0)	0.01±0.006 0.002-0.015 (4/0)	0.066±0.064 0.008-0.153 (4/0)	0.200±0.172	- <LD (4/4)	- <LD (4/4)	0.200±0.172
A. seemanni	0.066±0.075 0.012-0.152 (3/0)	0.003±0.004 LD-0.008 (3/0)	- <LD-0.065* (3/2)	0.046±0.116	- <LD-0.012* (3/2)	- <LD-0.003* (3/2)	- 0.059±0.111
B. panamensis	0.074±0.038 0.032-0.106 (3/0)	0.004±0.002 0.001-0.005 (3/0)	0.027±0.02 0.008-0.048 (3/0)	0.090±0.058	0.07±0.093 <LD-0.162 (3/1)	- <LD (3/3)	0.132±0.137
N. kessleri	0.072±0.05 0.036-0.107	0.004±0.005 LD-0.008	- LD-0.020*	0.07±0.069	- <LD	- <LD	0.07±0.069

	(2/0)	(2/0)	(2/1)		(2/2)	(2/2)	
O. altus	- <LD-0.185* (1/0)	- <LD-0.010* (1/0)	- <LD-0.028* (1/0)	0.038±0.080	- <LD (1/1)	- <LD (1/1)	0.038±0.080
M. ectenes	- <LD-0.044* (1/0)	- <LD-0.0004* (1/0)	- <LD (1/1)	0.004±0.031	- <LD (1/1)	- <LD-0.003* (1/0)	0.004±0.024
C. caninus	- <LD-0.102* (1/0)	- <LD-0.003* (1/0)	- <LD-0.056* (1/0)	0.026±0.049	- <LD (1/1)	- <LD (1/1)	0.026±0.049
C. viridis	0.049±0.004 0.045-0.051 (2/0)	- <LD-0.001* (2/1)	- <LD (2/0)	0.048±0.003	- <LD (2/2)	- <LD (2/2)	0.054±0.007
C. chanos	0.071±0.042 0.041-0.101 (2/0)	0.003±0.002 0.001-0.004 (2/0)	0.023±0.015 0.012-0.033 (2/0)	0.088±0.041	- <LD (2/2)	- <LD (2/2)	0.88±0.41
L. argentiventris	- <LD-0.024* (1/0)	- <LD-0.0003* (1/0)	- <LD (1/1)	0.002±0.017	- <LD (1/1)	- <LD (1/1)	0.002±0.017

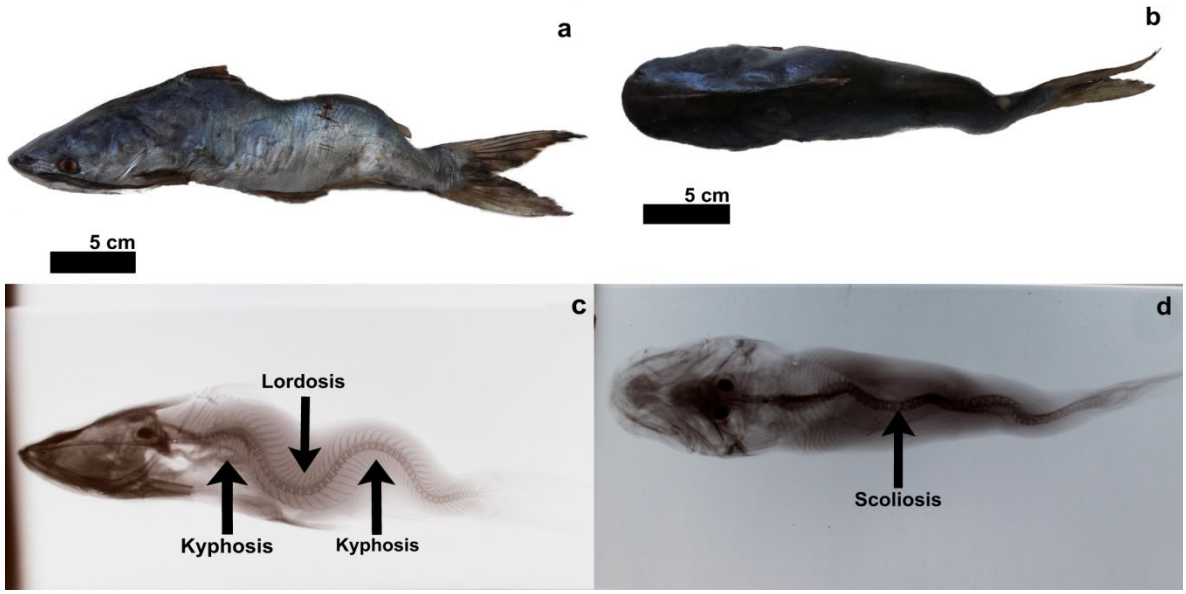


Figure S1. Malformations present in *Bagre panamensis*. a= external lateral view; b= dorsal view; c= lateral X-ray radiograph; d= dorsal X-ray radiograph. Vertebral malformations: Kyphosis, Lordosis, and Scoliosis.