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Supplementary Materials for

Unexpected reproductive fidelity in a polygynous frog

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(available at advances.sciencemag.org/cgi/content/full/6/33/eaay1539/DC1)

Movies S1 to S4

Supplementary Materials

Table S1. Guarding, territorial, and courtship behaviors performed by *Thoropa taophora* adults. Calls, visual displays, and attacks performed by monopolist males when protecting offspring and territories, and female calls and mating behaviors performed during courtship by monopolist males and dominant, secondary, and peripheral females. Occurrence of behaviors were video-captured in the Municipality of São Sebastião, São Paulo, Brazil, from October 2012 to February 2013.

Guarding, territorial, and courtship behaviors	Monopolist male ($n = 13$)	Dominant female ($n = 2$)	Secondary female ($n = 2$)	Peripheral female ($n = 2$)
Aggressive call	$n = 807$	-	-	-
Advertisement call	$n = 103$	-	-	-
Body-raising posture	$n = 105$	-	-	-
Jump-attack	$n = 148$	-	-	-
Kick	$n = 16$	-	-	-
Embrace pressing thumb thorns	$n = 9$	-	-	-
Reciprocal call	-	$n = 10$	$n = 0$	$n = 0$
Mating strategy (I)	-	$n = 35$	$n = 0$	$n = 0$
Amplexus from strategy (I)	-	$n = 35$	$n = 0$	$n = 0$
Mating strategy (II)	-	$n = 110$	$n = 19$	$n = 13$
Amplexus from strategy (II)	-	$n = 5$	$n = 0$	$n = 0$
Mating strategy (III)	-	$n = 16$	$n = 5$	$n = 5$
Chase from strategy (III)	-	$n = 14$	$n = 3$	$n = 3$
Embrace from strategy (III)	-	$n = 0$	$n = 2$	$n = 2$
Amplexus from strategy (III)	-	$n = 2$	$n = 0$	$n = 0$

Table S2. Body sizes and developmental stages for all *Thoropa taophora* larvae assigned to dominant and secondary females at each of the breeding sites sampled. All body sizes (mm) and developmental stages of tadpoles sampled from 14 females (two per breeding seep) in the Municipality of Ubatuba, São Paulo, Brazil. Offspring assigned to each female ranged from individuals recently hatched (stage 25) to others about to metamorphose (stage 41), indicating reproductive fidelity over multiple mating bouts.

1 st seep		2 nd seep		3 rd seep		4 th seep		5 th seep		6 th seep		7 th seep	
Dominant	Secondary	Dominant	Secondary	Dominant	Secondary	Dominant	Secondary	Dominant	Secondary	Dominant	Secondary	Dominant	Secondary
Stages	Sizes	Stages	Sizes	Stages	Sizes	Stages	Sizes	Stages	Sizes	Stages	Sizes	Stages	Sizes
33	5.52	25	3.42	25	3.52	25	3	34	7.49	25	3.22	30	5.76
33	6.46	25	3.73	25	3.48	28	5.85	25	3.08	39	10.51	25	3.86
33	6.84	25	3.79	25	3.51	33	6.57	25	3.08	40	11.21	26	4.4
34	7.01	27	3.73	25	3.52	33	6.08	25	3.27	41	11.61	27	4.62
34	7.07	27	4.28	25	3.54	34	6.71	25	3.43	41	11.38	27	4.7
34	7.09	27	4.73	25	3.54	34	6.5	25	3.43	41	11.08	27	4.85
34	7.5	28	4.05	25	3.57	35	7.59	25	3.48	27	4.91	43	10.38
34	7.77	28	4.17	25	3.6	25	3.49	27	5.13	27	5.13	27	5.13
35	7.39	28	4.35	25	3.72	25	3.55	27	5.26	26	5.08	36	8.67
35	7.4	29	5.04	26	3.46	25	3.59	27	5.26	26	5.14	36	9.17
35	7.64	30	5.29	26	3.5	25	3.67	27	5.65	26	5.32	39	9.92
35	7.74	31	5.28	26	3.59	25	4.1	28	5.43	26	5.59	41	Undet.
35	7.83	31	5.43	26	3.7	26	4.32	30	5.94	26	5.6	27	4.06
35	7.96	31	5.69	27	3.66	27	4.41	30	6.22	26	5.93	27	4.2
35	8.25	31	5.98	27	5.5	27	4.51	30	6.76	27	5.42	27	4.23
36	7.49	31	6.07	27	5.56	27	4.8	30	6.87	27	5.74	27	4.25
36	8.02	33	5.85	27	5.62	27	4.86	31	7.03	27	6	27	4.25
36	8.04	33	5.94	27	5.68	28	4.85	31	7.17	28	6.3	27	4.32
36	8.07	33	6.03	27	6.45	28	4.93	32	6.41	28	6.65	27	4.33
36	8.14	34	6.3	28	4.18	28	5.06	33	6.68	28	6.7	27	4.34
36	8.19	34	6.76	28	5.81	28	5.1	34	6.68	29	7.08	27	4.37
36	8.35	34	6.8	29	5.97	29	5.17	34	6.87	29	7.26	27	4.44
36	8.35	35	7.13	29	6.38	29	5.2	34	7.35	30	7.3	27	4.51
36	8.45	35	7.12	29	6.5	29	5.52	34	7.52	30	7.41	27	4.53
37	7.84	30	6.11	30	6.11	31	5.83	35	7.19	31	6.64	27	4.57
37	8.45	30	6.56	30	6.56	31	6.16	35	7.31	33	7.67	27	4.57
37	8.62	30	7.01	30	7.01	33	6.5	35	7.75	33	Undet.	27	4.57
37	8.6	31	6.12	31	6.12	33	6.54	35	7.77	34	7.84	27	4.65
37	8.84	32	6.25	34	6.72	35	7.98	35	7.98	35	8.15	27	4.69
Undet.	Undet.	32	6.76	35	7.25	36	8.47	35	8.18	27	4.69	26	4.43
Undet.	Undet.	33	6.17	36	7.91	37	8.45	36	8.95	27	4.72	26	4.47
Undet.	Undet.	33	6.5	36	8.76	37	8.51	39	9.14	27	4.73	26	4.54
Undet.	Undet.	33	6.68	37	8.73	37	8.81	39	10.22	27	4.87	26	4.6
		34	7.15	37	8.75	37	9.25	41	10.42	27	4.87	26	4.68
		34	6.45	37	8.75	37	Undet.	41	10.55	27	4.92	26	4.72
		34	7.33	38	9.18	38	8.03	41	10.8	27	4.99	26	4.84
		34	7.34	38	9.28	38	8.93	41	Undet.	28	4.35	26	4.95
		34	7.45	38	9.38	39	9.39	43	9.69	28	4.52	26	4.96
		34	7.48	38	9.47	39	9.45	45	9.95	28	4.97	26	5
		35	7.14	38	9.72	39	9.46	45	9.95	28	5.72	26	5.23
		35	7.4	38	9.72	39	9.67	28	5.79	28	5.79	26	6.04
		35	7.81	38	9.81	39	9.74	28	5.86	27	4.56	27	5.29
		35	7.81	38	10.05	39	10.41	28	6.34	27	4.56	27	5.29
		35	7.82	38	9.97	41	9.4	29	4.63	27	4.63	27	5.85
		35	7.92	39	10.05	41	9.5	30	5.84	30	5.84	27	5.94
		35	8.01	39	10.14	41	10.01	31	5.79	31	5.79	27	5.94
		35	8.01	39	10.8	41	10.01	31	6.55	31	6.55	27	5.97
		35	8.01	39	10.8	41	10.17	31	6.71	31	6.71	27	6.03
		35	8.35	39	11.43	41	10.2	31	7.26	31	7.26	27	6.19
		35	8.48	40	10.38	41	10.42	32	5.97	32	5.97	27	6.28
		36	7.6	40	10.51	41	10.48	32	6.35	32	6.35	27	6.3
		36	7.78	40	10.57	41	10.53	32	6.7	32	6.7	27	6.33
		36	7.96	40	10.66	41	10.88	32	7.01	32	7.01	27	6.37
		36	7.98	40	10.67	41	10.88	33	6.47	33	6.47	27	6.45
		36	7.98	41	11.8	41	10.9	33	6.69	33	6.69	27	6.51
		36	8.12	41	11.07	41	11.07	33	7.37	33	7.37	27	6.52
		36	8.14	41	11.28	41	11.28	33	7.38	33	7.38	27	6.52
		36	8.22	41	11.6	41	11.6	33	7.42	33	7.42	27	6.71
		36	8.29	41	11.61	41	11.61	33	7.74	33	7.74	27	6.75
		36	8.29	41	11.61	Undet.	Undet.	34	6.86	34	6.86	27	Undet.
		36	8.34	41	11.61	Undet.	Undet.	34	7.13	34	7.13	28	6.51
		36	8.54	41	11.61	Undet.	Undet.	34	7.42	34	7.42	28	6.88
		36	8.58	41	11.61	Undet.	Undet.	34	7.53	34	7.53	28	7
		36	8.66	41	11.61	Undet.	Undet.	34	7.76	34	7.76	28	7
		36	8.87	41	11.61	Undet.	Undet.	34	7.8	34	7.8	29	6.64
		37	9.04	41	11.61	Undet.	Undet.	34	7.81	34	7.81	29	6.81
		37	9.11	41	11.61	Undet.	Undet.	34	7.89	34	7.89	29	7.24
		38	8.98	41	11.61	Undet.	Undet.	35	7.48	35	7.48	30	6.76
		38	9.18	41	11.61	Undet.	Undet.	35	7.72	35	7.72	30	6.79
		38	9.71	41	11.61	Undet.	Undet.	35	7.84	35	7.84	30	7.35
		38	9.86	41	11.61	Undet.	Undet.	35	8.03	35	8.03	30	7.37
		39	10.19	41	11.61	Undet.	Undet.	35	8.07	35	8.07	31	7.18
		39	10.26	41	11.61	Undet.	Undet.	35	8.19	35	8.19	31	7.34
		39	10.36	41	11.61	Undet.	Undet.	35	8.69	35	8.69	31	7.68
		39	10.54	41	11.61	Undet.	Undet.	36	8.19	36	8.19	32	7.42
		39	9.1	41	11.61	Undet.	Undet.	36	8.26	36	8.26	32	Undet.
		39	9.18	41	11.61	Undet.	Undet.	36	8.34	36	8.34	35	7.95
		39	9.45	41	11.61	Undet.	Undet.	36	8.74	36	8.74	36	8.61
		39	9.49	41	11.61	Undet.	Undet.	36	8	36	8	39	9.51
		39	9.9	41	11.61	Undet.	Undet.	36	8.82	36	8.82	39	8.62
		40	10.12	41	11.61	Undet.	Undet.	36	8.86	36	8.86	40	9.93
		40	10.68	41	11.61	Undet.	Undet.	36	8.9	36	8.9	40	10.68
		40	10.71	41	11.61	Undet.	Undet.	36	9.06	36	9.06	40	10.71
		40	11.01	41	11.61	Undet.	Undet.	36	9.1	36	9.1	40	11.01
		40	11.31	41	11.61	Undet.	Undet.	36	9.17	36	9.17	40	11.31
		40	11.79	41	11.61	Undet.	Undet.	36	9.31	36	9.31	40	11.79
		40	9.69	41	11.61	Undet.	Undet.	36	9.32	36	9.32	40	9.69
		40	9.99	41	11.61	Undet.	Undet.	36	9.53	36	9.53	40	9.99
		41	10.21	41	11.61	Undet.	Undet.	37	8.41	37	8.41	41	10.21
		41	10.34	41	11.61	Undet.	Undet.	37	8.51	37	8.51	41	10.34
		41	10.51	41	11.61	Undet.	Undet.	37	8.9	37	8.9	41	10.51
		41	10.95	41	11.61	Undet.	Undet.	37	9.12	37	9.12	41	10.95
		41	10.99	41	11.61	Undet.	Undet.	37	9.55	37	9.55	41	10.99
		41	11.45	41	11.61	Undet.	Undet.	37	9.77	37	9.77	41	11.45
		Undet.	Undet.	38	8.92	38	8.92	38	8.92	38	8.92	38	8.92
		Undet.	Undet.	38	9.24	38	9.24	38	9.24	38	9.24	38	9.24
		Undet.	Undet.	38	9.49	38	9.49	38	9.49	38	9.49	38	9.49
		Undet.	Undet.	38	9.55	38	9.55	38	9.55	38	9.55	38	9.55
		Undet.	Undet.	38	9.71	38	9.71	38	9.71	38	9.71	38	9.71
		Undet.	Undet.	38	9.78	38	9.78	38	9.78	38	9.78	38	9.78
		Undet.	Undet.	38	9.81	38	9.81	38	9.81	38	9.81	38	9.81
		Undet.	Undet.	38	10.09	38	10.09	38	10.09	38	10.09	38	10.09
		Undet.	Undet.	39	9.77	39	9.77	39	9.77	39	9.77	39	9.77
		Undet.	Undet.	39	9.83	39	9.83	39	9.83	39	9.83	39	9.83
		Undet.	Undet.	39	9.87	39	9.87	39	9.87	39	9.87	39	9.87
		Undet.	Undet.	39	10.07	39	10.07	39	10.07	39	10.07	39	10.07
		Undet.	Undet.	39	10.4	39	10.4	39	10.4	39	10.4	39	10.4
		Undet.	Undet.	39	10.46	39	10.46	39	10.46	39	10.46	39	10.46

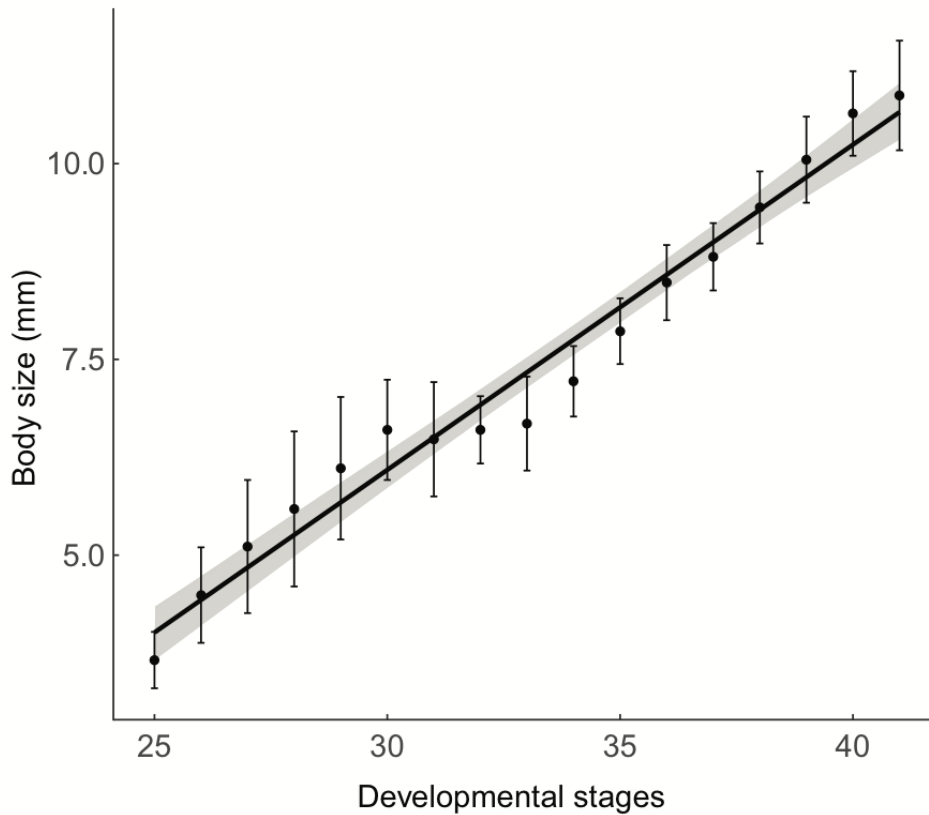


Fig. S1. Significant positive correlation between body size and developmental stage in *Thoropa taophora* larvae ($r = 0.965$, $P < 0.001$, $n = 553$). Tadpoles mothered by each female in the breeding seep vary in larval development from recently hatched to near metamorphosis, thus indicating they belong to different clutches of the same parents, a result of reproductive fidelity over multiple mating bouts. Confidence intervals (95%) are shown in grey. Black dots reflect average of body sizes and bars reflect \pm standard error values.

Movies S1 to S4

Movies S1 and S2. Monopolist male aggressively defends his breeding seep territory.

Monopolist males discourage intruders by emitting aggressive calls, sometimes also sparsely adding advertisement calls, and by displaying body-raising postures. They repel other conspecific males that invade a territory or that begin to cannibalize eggs with vigorous jump-attacks, kicks, and embraces that press keratinized spines on their thumbs against the intruder's body.

Movies S3 and S4. *Thoropa taophora* is the first amphibian in which a single-male polygynous mating system with reproductive fidelity has been confirmed with molecular parentage analyses. Monopolist males interact in courtship with two or three females at the same time, with distinct types and levels of interactions between male and each female, indicating a hierarchy among females. Females cannibalize eggs, triggering amplexus by the monopolist male.