The following supplement accompanies the article

Evolution of maternal provisioning in ophiuroid echinoderms: characterisation of egg composition in planktotrophic and lecithotrophic developers

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Supplement.

Table S1 shows details of lipid (per lipid class) and protein content in the eggs of ten ophiuroid species, four with planktotrophic development and six with lecithototrophic development. Table S2 is a summary list of current data available on the biochemistry of eggs in 56 species across the Echinodermata. Table S3 presents data on the content of diacylglycerol ether (DAGE) and triacylglycerol (TAG) in the eggs of the ophiuroids investigated here with lecithotrophic development and the ratio between these lipid classes.

Table S1 Mean egg lipid and protein content in ng on a per egg basis ± SE for four ophiuroids with planktotrophic and six ophiuroids with lecithotrophic development. AH, aliphatic hydrocarbon; WE, wax ester; ME, methyl ester; TAG, triacylglycerol; DAGE, diacylglycerol ether; ST, sterol; AMPL, acetone-mobile polar lipids; PL, phospholipid; Nd = not detected; each lipid class is also presented as percentage of total lipid content.

	PLANKTOTROPH				LECITHOTROPH					
	O.dentata	***O. resiliens***	***O. fasciata***	***O. antipodum***	***O. schayeri***	***C. canaliculata***	***C. pulchra***	***O. ramsayi***	***O.endeani***	***O. elegans***
AH	0.8 ± 0.2 6.9%	0.4 ± 0.01 3.2%	3.4 ± 0.7 10.1%	1.5 ± 0.4 3.5%	30.1 ± 3.8 2.2%	4.8 0.3%	10.7 ± 1.4 0.4%	68.0 ± 15.8 1.1%	90.3 ± 12.5 1.5%	57.0 ± 3.3 0.4%
WE	0.0	0.0	0.0	0.0	40.9 ± 3.3 3.0%	132.4 8.6%	288.6 ± 15.9 10.2%	238.6 ± 1.7 4.0%	4842.3 ± 380.9 80.9%	10413.4 ± 329.1 79.8%
ME	0.0	0.0	0.0	0.0	0.0	59.7 3.9%	106.6 ± 8.4 3.8%	147.6 ± 8.7 2.5%	0.0	0.0
TAG	4.7 ± 0.2 38.2%	5.6 ± 0.5 48.4%	10.9 ± 0.3 32.6%	11.7 ± 1.2 28.2%	Nd	Nd	Nd	Nd	Nd	932.7 ± 51.1 7.2%
DAGE / TAG	Nd	Nd	Nd	Nd	923.7 ± 41.4 67.2%	1117.0 72.8%	2102.7 ± 100.1 74.2%	4744.1 ± 58.0 79.7%	169.8 ± 30.3 2.8%	Nd
ST	0.4 ± 0.1 3.0%	0.5 ± 0.02 3.9%	2.7 ± 0.1 8.1%	2.1 ± 0.2 5.0%	29.3 ± 1.0 2.1%	29.2 1.9%	52.8 ± 4.3 1.8%	62.5 ± 8.9 1.1%	75.9 ± 10.7 1.3%	116.7 ± 5.6 0.9%
AMPL	1.7 ± 0.4 14.2%	1.1 ± 0.1 9.5%	2.0 ± 0.3 5.9%	8.6 ± 0.4 20.8%	86.1 ± 14.2 6.3%	33.5 2.2%	74.9 ± 10.9 2.6%	495.5 ± 25.8 8.3%	369.0 ± 48.1 6.2%	504.9 ± 8.5 3.9%
PL	4.6 ± 0.2 37.7%	4.0 ± 0.1 35.0%	14.4 ± 1.2 43.3%	17.6 ± 3.2 42.5%	264.2 ± 12.2 19.2%	158.5 10.3%	197.7 ± 27.8 7.0%	198.5 ± 2.2 3.3%	437.1 ± 4.6 7.3%	1018.5 ± 58.0 7.8%
Structural lipids (ST; AMPL; PL)	6.6 ± 0.5 54.9%	5.6 ± 0.1 48.4%	19.1 ± 1.0 57.3%	28.3 ± 2.7 68.3%	396.5 ± 18.4 27.6%	221.2 14.4%	324.6 ± 32.3 11.4%	756.4 ± 14.7 12.7%	1008.4 ± 9.9 14.8%	1640.1 ± 72.0 12.6%
Storage lipids (AH; WE; ME; TAG; DAGE)	5.5 ± 0.8 45.1%	5.9 ± 0.4 51.6%	14.2 ± 0.8 42.7%	13.2 ± 1.5 31.7%	1006.8 ± 49.4 72.4%	1314.0 85.6%	2519.1 ± 148.9 88.6%	5198.4 ± 81.3 87.3%	5155.5 ± 430.3 85.2%	11531.8 ± 614.2 87.4%
TOTAL lipid	12.1 ± 0.8	11.5 ± 0.5	33.4 ± 1.2	41.4 ± 4.2	1403.3 ± 63.4	1535.2	2843.7 ± 161.9	5954.9 ± 96.1	6163.9 ± 172.4	13193.5 ± 563.9
TOTAL protein (ng / egg)	72.2 ± 2.8	52.3 ± 1.0	113.8 ± 10.5	132.9 ± 8.2	1086.9 ± 46.4	1699.9	1687.6 ± 26.4	2517.2 ± 107.2	4529.0 ± 527.7	4820.7 ± 174.2

Table S2 Lipid and protein data of echinoderm eggs according to Jaeckle (1995), Sewell & Manahan (2001) expanded with recent data from Prowse et al. (2008), McAlistair & Moran (2012, 2013), Whitehill & Moran (2012) and this study.

Species	**ln egg volume (µl)**	**ln lipid content (µg/egg)**	**ln protein content (µg/egg)**	**Reference**
Arbacia punctulata	-8.5502	-4.4397	-3.7942	Jaeckle 1995
Lytechinus variegatus	-7.2075	-3.2808	-2.5096	
Asterias forbesi	-6.5177	-2.7646	-1.6296	
Strongylocentrotus droebachiensis	-6.2369	-2.1286	-1.4271	
Luidia clathata	-6.0129	-1.8643	-0.9623	
Cucumaria curata	-0.647	3.9646	4.4613	
Abatus shackletoni	1.3871	5.8371	4.9442	
Abatus cordatus	0.2974	5.3073	5.2632	
Anasterias perrieri	0.0936	5.5778	5.3816	
Anasterias rupicola	0.231	5.9151	6.275	
Abatus nimrodi	-0.1001	6.6008	5.8437	
Perknaster fuscus	2.4418	7.3475	6.3553	
Notasterias armata	2.4311	7.5959	7.0193	
Diplasterias brucei	3.1454	7.7309	7.017	
Diplasterias meridionalis	1.0318	7.6066	7.8184	
Arbacia lixula	-8.3349	-4.2687	-2.7181	George et al. 1997
Paracentrotus lividus	-7.7994	-3.8167	-2.9004	
Echinometra lucunter	-7.3698	-3.6889	-3.442	
Encope michelini	-5.2785	-0.3425	-0.9676	
Stylocidaris lineata	-7.2644	-3.1942	-3.2968	
Aspidodiadema jacobyi	-7.6211	-3.1236	-3.6497	
Archaeopneustes histrix	-6.6531	-2.3969	-2.7031	
Coelopleurus floridanus	-7.1309	-2.3969	-2.2349	
Echinaster modestus	-1.4313	4.1912	3.902	
Echinaster spinulosus	-1.1712	4.1174	2.8679	George provided data
Odontaster validus	-5.2	-1.0446	-1.2853	Sewell and Manahan (2001)
Sterechinus neumayeri	-5.69	-1.9301	-1.5563	
Evechinus chloroticus	-7.9726	-3.3700		
Patiriella regularis	-6.0323	-2.1078	-1.1482	Prowse et al. (2008)
Meridiastra mortenseni	-4.9337	-1.159	-0.1175	
Meridiastra oriens	-3.3962	1.8111	0.8584	
Meridiastra calcar	-3.2861	1.8869	1.1322	
Meridiastra gunnii	-3.1701	2.195	1.1047	
Parvulastra exigua	-3.5132	1.3633	1.5893	
Diadema antillarum	-8.6226	-4.6254	-3.917	McAlistair & Moran (2012)

Diadema mexicanum	-8.7403	-4.8159	-3.99	
Eucidaris tribuloides	-7.7517	-3.9633	-3.2597	
Eucidaris thouarsii	-7.824	-4.0118	-3.135	
Echinometra lucunter	-8.0789	-4.0687	-3.3439	
Echinometra viridis	-7.8753	-4.1734	-3.3298	
Echinometra vanbrunti	-8.6797	-4.667	-3.5099	
Echinometra lucunter	-8.1117	-4.1931	-3.2189	McAlistair & Moran (2013)
Echinometra viridis	-7.7287	-4.0456	-2.9206	
Echinometra vanbrunti	-8.4684	-4.7915	-3.5936	
Ophiocoma alexandri	-8.5823	-4.5008	-3.2189	Whitehill & Moran (2012); authors provided data
Arbacia punctulata	-8.4662	-4.3901	-3.2442	
Ophiocoma dentata	-8.5823	-4.4149	-2.6283	This study
Ophiactis resiliens	-8.2242	-4.4675	-2.9508	
Ophionereis fasciata	-7.4661	-3.4002	-2.1733	
Ophiothrix oliveri	-7.2689	-3.1835	-2.0182	
Ophionereis schayeri	-4.8361	0.3327	0.0833	
Clarcoma canaliculata	-4.6198	0.4287	0.5306	
Clarcoma pulchra	-4.3607	1.0451	0.5233	
Ophiarachnella ramsayi	-3.8659	1.7842	0.9231	
Ophiocoma endeani	-3.7709	1.7587	1.5105	
Ophiarthrum elegans	-3.5419	2.5797	1.5729	

Table S3 Diacylglycerol ether (DAGE) and triacylglycerol (TAG) content in ng on a per egg basis ± SE for five lecithotrophic developers. *C. canaliculata* has no SE as only one replicate was available. There are no data on DAGE for *Ophiarthrum elegans*.

Species	**DAGE content**	**TAG content**	**DAGE:TAG ratio**
O. schayeri	606.7 ± 28.7	532.8 ± 26.3	1.1
C. canaliculata	1282.7	78.4	16.4
C. pulchra	1795.3 ± 34.8	118 ± 9.1	15.2
O. ramsayi	8651.5 ± 632.1	240.9 ± 19.7	35.9
O. endeani	473.6 ± 33.2	256.8 ± 22.4	1.8

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