



**Supplementary Information for**  
Moonrise timing is key for synchronized spawning in coral  
*Dipsastraea speciosa*

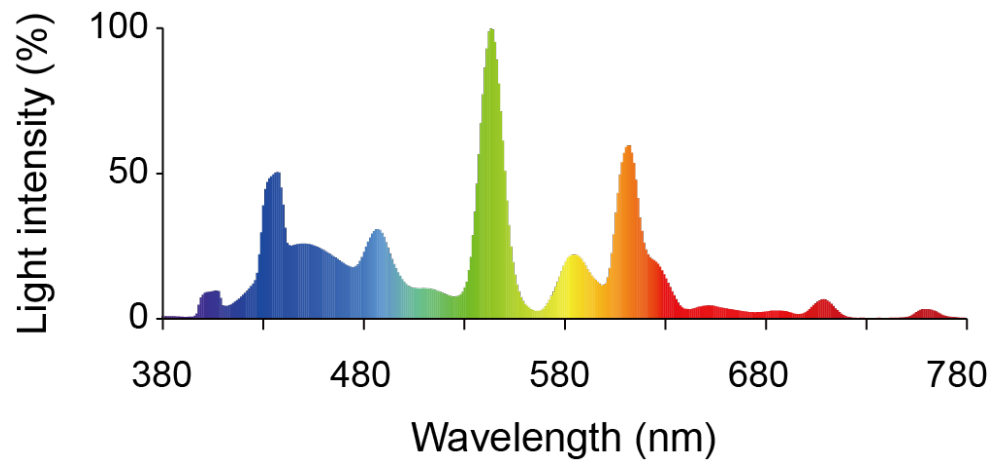
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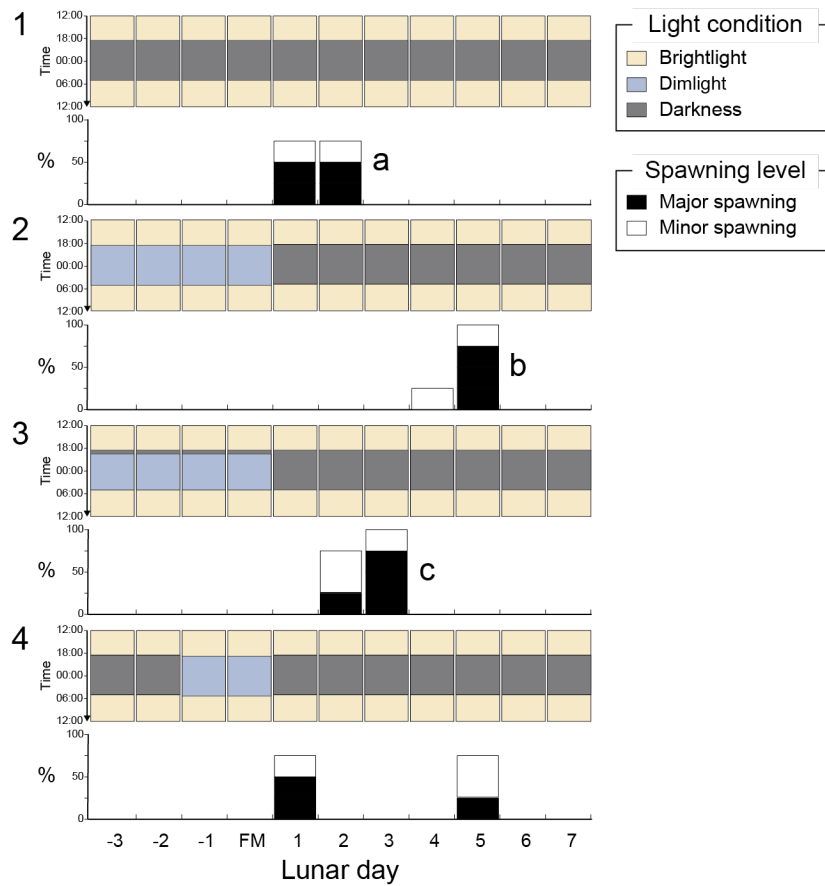
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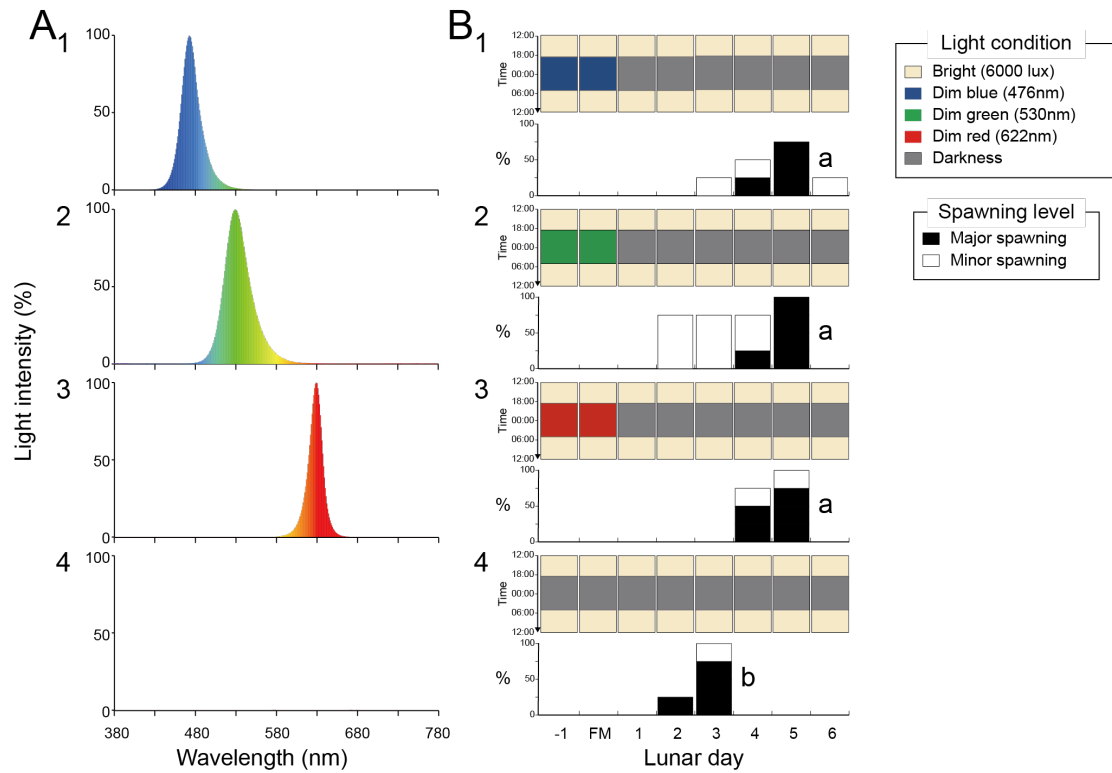
Figures S1 to S3  
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**Fig. S1.** The light spectrum used for bright (6000 lux;  $83 \mu\text{mol m}^{-2} \text{s}^{-1}$ ) and dim light ( $\sim 0.3$  lux) in the experiments. Note that  $1 \text{ lux} = 0.0138 \mu\text{mol m}^{-2} \text{s}^{-1}$  in this light spectrum.



**Fig. S2. Spawning of *Dipsastraea speciosa* under different moonlight patterns.** Fragments of *D. speciosa* were exposed to artificial moonlight [dim light (~0.3 lux)] at nighttime (18:30–05:00) with different exposure hours and nights: no light (panel 1); dim light in 18:30–05:00 for the first 4 days (panel 2); dim light in 19:30–05:00 for the first 4 days (panel 3), and dim light for the 3<sup>rd</sup> and 4<sup>th</sup> nights after the initial no light for the first two days (panel 4). Black bars indicate major spawning (> hundreds of eggs) and white bars indicate minor spawning (several eggs) in four replicate fragments. Note that the panel 1 and 2 are the same as the panel 1 and 3 in Fig. 2b, and the experiment for panel 3 and 4 were conducted together with those in Fig. 2. Different letters in the panels indicate significant differences between the treatments (ANOVA and Tukey HSD test;  $P \leq 0.001$ ). For detailed results of statistical analysis, refer to SI Appendix, Table S2. Note that data for panel 4 were excluded from the analysis due to the split spawning observed only in this treatment.



**Fig. S3. Spawning of *Dipsastraea speciosa* fragments under different spectra of artificial moonlight.** (A) Light spectrum of each treatment: blue LED light (the peak wavelength: 476 nm), green LED light (the peak wavelength: 530 nm), red LED light (the peak wavelength: 622 nm), and no light. (B) *Dipsastraea speciosa* fragments were exposed to three light spectra of artificial moonlight [blue, green and red dim light (~0.3 lux)] or no light at nighttime (18:30–05:00) for the first two days of the experiment. Black bars indicate major spawning (> hundreds of eggs) and white bars indicate minor spawning (several eggs) in four replicate fragments. Different letters in the panels in B indicate significant differences between the treatments (ANOVA and Tukey HSD test;  $P < 0.001$ ). For detailed results of statistical analysis, refer to SI Appendix, Table S2.

**Table S1.** List of (scleractinian) coral species that has been observed to spawn around last quarter moon from multiple locations around the world.

Family	Genus	Species	Spawning day (days after full moon)	Reference	Note	
Diploastreidae	<i>Diploastrea</i>	<i>heliopora</i>	4–5	1,2		
Euphylliidae	<i>Galaxea</i>	<i>fascicularis</i>	4–8*	2-6	In most of the cases	
Lobophylliidae	<i>Lobophyllia</i>	<i>hemprichii</i>	6–8	5,7		
Merulinidae	<i>Coelastrea</i>	<i>aspera</i>	3–8	4-9		
		<i>palauensis</i>	5–6	5,9		
	<i>Dipsastraea</i>	<i>favus</i>	6–7	3		
		<i>pallida</i>	4–6	3,5,6		
		<i>speciosa</i>	4–8	1,4,9		
		<i>stelligera</i>	4–7	1,2		
		<i>Favites</i>	<i>abditata</i>	4–8	1,3,4,7-10	
			<i>chinensis</i>	5–6	4,5	
			<i>contorta</i>	7–10	11	
	<i>entagona</i>		5–6	5		
	<i>magnistellata</i>		4–8	1,3,6,7		
	<i>Goniastrea</i>	<i>pentagona</i>	4–8*	1,6,8,11	In most of the cases	
		<i>valenciennesi</i>	6–9	5,8		
		<i>edwardsi</i>	4–9	1,2,4,6,9		
		<i>minuta</i>	3–6	1,12		
		<i>pectinata</i>	4–7	1,3,6,9		
		<i>retiformis</i>	4–9*	2-7,10	Spawned 1–4 days after full moon in Red Sea	
		<i>Leptoria</i>	<i>phrygia</i>	5–7	1,4,5,10	
		<i>Merulina</i>	<i>ampliata</i>	3–8	3,6,7,9,10,12	
		<i>Orbicella</i>	<i>annularis</i>	5-8	13	
<i>faveolata</i>			5-8	13		
<i>franksi</i>	4-7		13			
<i>Pectinia</i>	<i>alcicornis</i>	4–6	5,6,9			
	<i>lactuca</i>	4–6	5,12			
	<i>paeonia</i>	3–7	5,12			
<i>Platygyra</i>	<i>daedalea</i>	4–7	1,4,6,10			
	<i>lamellina</i>	4, 6, 7	4,6			
	<i>pini</i>	5, 6, 8	1,4,6,7			
	<i>ryukyuensis</i>	3–8	1,3,7,12			
	<i>sinensis</i>	3–8*	1,3-8,10,12	In most of the cases		
Poritidae	<i>Porites</i>	<i>sp.</i>	5–8	1		

Study sites and references for **Table S1**.

<b>Site</b>	<b>Latitude</b>	<b>References</b>
Kochi, Japan	32°N	8,11
Okinawa, Japan	26°N	3
Taiwan	21°–22°N	1,4
Palau	7°N	9
Singapore	1°N	12
GBR, Australia	14°S–19°S	5,6
Western Australia	20°S–24°S	7,10
Red Sea	21°–22°N	2
Caribbean	9°–23°N	13

**Table S2.** Summary of one-way blocked ANOVA and Tukey HSD pairwise comparison test for each experiment.

<b>Experiment</b>	<b>Factor</b>	<b>DF</b>	<b>F</b>	<b>p-value</b>
<b>Figure 1E</b>	Treatment	2	769	<b>&lt; 0.001</b>
	Colony (block)	3	8	<b>0.016</b>
	Residuals	6		
	<b>Tukey HSD Test</b>			
	Panel 1 - Panel 2			<b>&lt; 0.001</b>
	Panel 1 - Panel 3			<b>&lt; 0.001</b>
	Panel 2 - Panel 3			<b>&lt; 0.001</b>
<b>Figure 2B</b>	Treatment	2	96.53	<b>&lt; 0.001</b>
	Colony (block)	3	0.65	0.61
	Residuals	6		
	<b>Tukey HSD Test</b>			
	Panel 1 - Panel 2			<b>0.001</b>
	Panel 1 - Panel 3			<b>&lt; 0.001</b>
	Panel 2 - Panel 3			<b>&lt; 0.001</b>
<b>Figure 3</b>	Treatment	3	35.11	<b>&lt; 0.001</b>
	Colony (block)	3	0.92	0.47
	Residuals	9		
	<b>Tukey HSD Test</b>			
	Panel 1 - Panel 2			<b>&lt; 0.001</b>
	Panel 1 - Panel 3			<b>&lt; 0.001</b>
	Panel 1 - Panel 4			1.00
	Panel 2 - Panel 3			0.46
	Panel 2 - Panel 4			<b>&lt; 0.001</b>
	Panel 3 - Panel 4			<b>&lt; 0.001</b>
<b>Figure S2</b>	Treatment	2	186.33	<b>&lt; 0.001</b>
	Colony (block)	3	2.67	0.14
	Residuals	6		
	<b>Tukey HSD Test</b>			
	Panel 1 - Panel 2			<b>&lt; 0.001</b>
	Panel 1 - Panel 3			<b>0.001</b>
	Panel 2 - Panel 3			<b>&lt; 0.001</b>
<b>Figure S3B</b>	Treatment	3	29.1	<b>&lt; 0.001</b>
	Colony (block)	3	2.7	0.11
	Residuals	9		
	<b>Tukey HSD Test</b>			
	Panel 1 - Panel 2			0.96
	Panel 1 - Panel 3			0.96
	Panel 1 - Panel 4			<b>&lt; 0.001</b>
	Panel 2 - Panel 3			0.78
	Panel 2 - Panel 4			<b>&lt; 0.001</b>
	Panel 3 - Panel 4			<b>&lt; 0.001</b>

## SI References

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