

Supplementary Materials for  
**Temporal gene expression patterns in the coral *Euphyllia paradivisa* reveal  
the complexity of biological clocks in the cnidarian-algal symbiosis**

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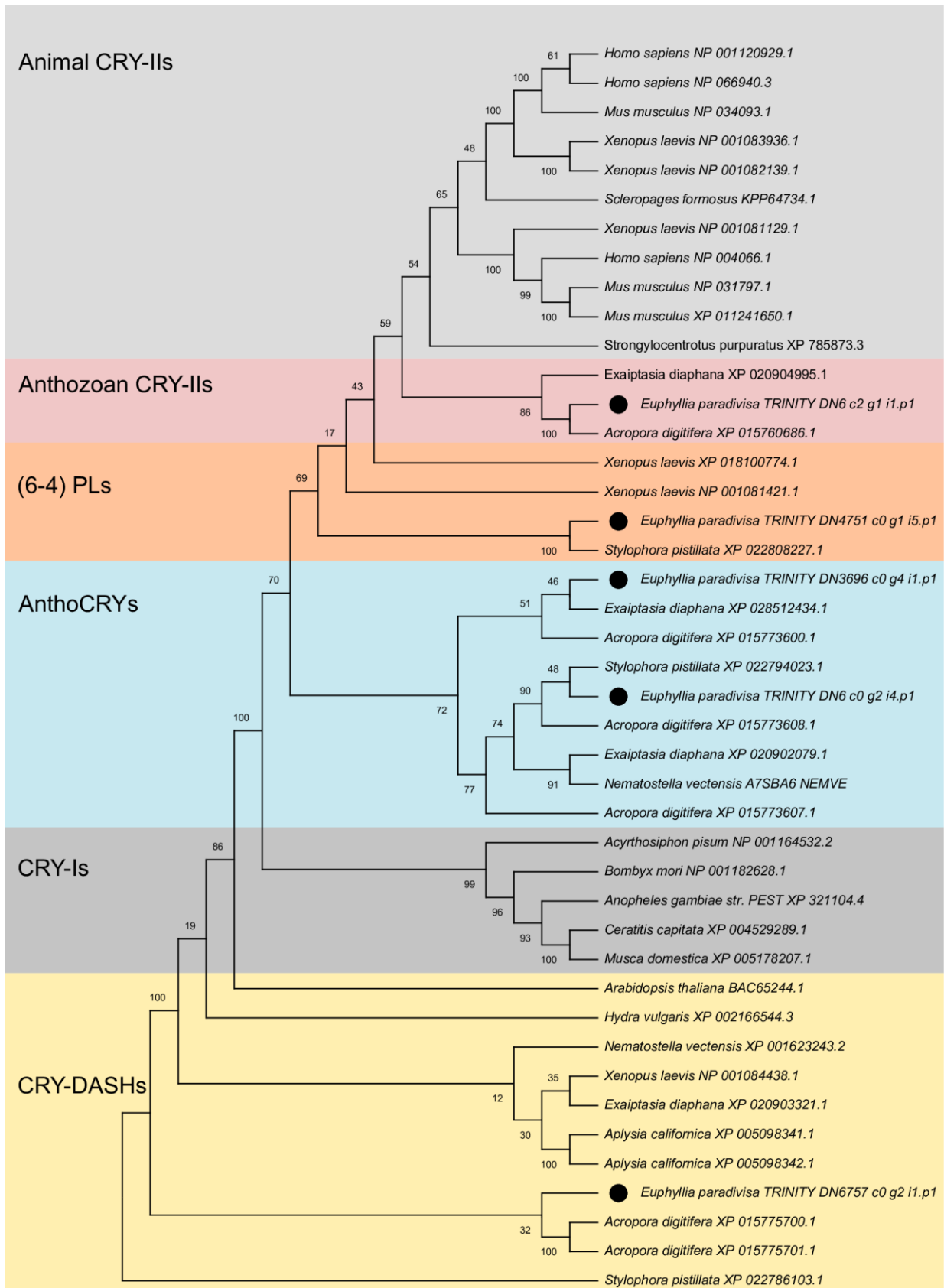
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**The PDF file includes:**

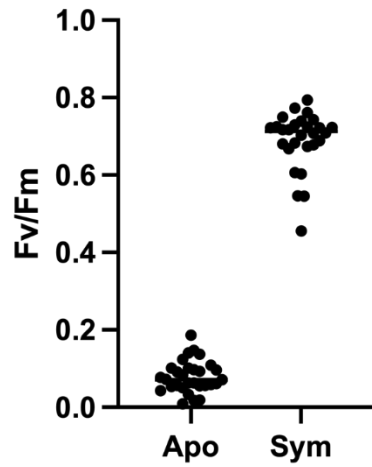
Figs. S1 and S2  
Table S1  
Legend for table S2  
Legends for data S1 to S3

**Other Supplementary Material for this manuscript includes the following:**

Table S2  
Data S1 to S3



**Fig. S1. Phylogenetic analysis of *Cry* genes.** Maximum Parsimony tree, bootstrap method with 1,000 iterations, aligned by MUSCLE codons generated using the MEGA X software version 10.0.5. Reference sequences were chosen based on Supplementary Figure 5 in Gornik et al. 2021 (27). *Euphyllia paradivisa* proteins are marked with a solid circle.



**Fig. S2. Photosynthetic quantum yield ( $F_v/F_m$ ) of *Euphyllia paradivisa* symbionts.** Measurements of representative symbiotic (Sym) and aposymbiotic (Apo) *E. paradivisa* polyps ( $n = 80$ ) were taken prior to the experiment using a diving PAM (pulse amplitude modulator) fluorometer (Walz).

Gene name	Subgroup	Period (hour)	RAIN <i>P</i> -value
<i>Cry1</i>	LDsym	24 <sup>***</sup>	1.97E-16
	DDsym	24 <sup>***</sup>	2.62E-05
	LDapo	24 <sup>***</sup>	7.40E-14
	DDapo	24 <sup>***</sup>	5.29E-05
<i>Cipc-like</i>	LDsym	24 <sup>***</sup>	3.8E-17
	DDsym	24 <sup>***</sup>	0.000000711
	LDapo	24 <sup>***</sup>	1.88E-13
	DDapo	24 <sup>**</sup>	0.001187469
<i>Hlf</i>	LDsym	24 <sup>***</sup>	1.05E-22
	DDsym	24 <sup>***</sup>	2.99E-06
	LDapo	24 <sup>***</sup>	8.10E-21
	DDapo	24 <sup>***</sup>	0.000129121
<i>Tef</i>	LDsym	24 <sup>***</sup>	1.93E-15
	DDsym	24 <sup>**</sup>	0.002730665
	LDapo	24 <sup>***</sup>	3.70E-16
	DDapo	24 <sup>***</sup>	0.00012925
<i>Hebp2</i>	LDsym	24 <sup>***</sup>	3.89E-10
	DDsym	24 <sup>***</sup>	9.40E-05
	LDapo	24 <sup>***</sup>	1.79E-17
	DDapo	24 <sup>***</sup>	0.00084787
<i>Clock</i>	LDsym	24 <sup>***</sup>	6.93E-17
	DDsym	24 <sup>*</sup>	0.033
	LDapo	24 <sup>***</sup>	3.77E-14
	DDapo	24 <sup>ns</sup>	0.349
<i>Cry2</i>	LDsym	24 <sup>***</sup>	2.52E-08
	DDsym	24 <sup>ns</sup>	0.056
	LDapo	24 <sup>***</sup>	6.85E-11
	DDapo	24 <sup>ns</sup>	0.602
<i>Casein kinase 1</i>	LDsym	24 <sup>***</sup>	4.05E-08
	DDsym	24 <sup>ns</sup>	0.085
	LDapo	24 <sup>***</sup>	6.47E-07
	DDapo	24 <sup>ns</sup>	0.186
<i>Cry-DASH</i>	LDsym	24 <sup>***</sup>	4.98E-09
	DDsym	24 <sup>ns</sup>	0.339
	LDapo	24 <sup>***</sup>	4.98E-09
	DDapo	24 <sup>*</sup>	0.011

**Table S1. RAIN results for candidate circadian clock genes of *E. paradivisa* subgroups.**

\*Asterisks indicate the power of significance: \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ ; <sup>ns</sup>not significant.

†Exact Benjamini-Hochberg corrected RAIN *P*-values.

**Table S2. 24-h to 12-h period alternations.**

List of 59 *E. paradivisa* annotated transcripts showing 24-h to 12-h period alternations between symbiotic and aposymbiotic morphs.

**Data S1. Annotation and expression patterns of rhythmic transcripts in each subgroup.**

Each subgroup: **A)** LDsym24, **B)** DDsym24, **C)** LDapo24, **D)** DDapo24, **E)** LDsym12, **F)** Dsym12, **G)** LDapo12, **H)** DDapo12.

Data S1I. Eight-way Venn diagram analysis.

**Data S2. Gaussian mixture models (GMM) clustering results.**

Data S2A. Results for rhythmic transcripts of the LDapo24, LDsym24, and DDsym24 subgroups.

Data S2B. Results for rhythmic transcripts of the LDapo12, LDsym12, and DDsym12 subgroups.

**Data S3. Functional enrichment analysis.**

Data S3A. Analysis of the rhythmic genes with a precise 24-h period of each *E. paradivisa* subgroup found in Cluster 1.

Data S3B. Analysis of the rhythmic genes with a precise 24-h period of each *E. paradivisa* subgroup found in Cluster 2.

Data S3C. Analysis of the rhythmic genes with a precise 24-h period of each *E. paradivisa* subgroup found in Cluster 3.

Data S3D. Analysis of the rhythmic genes with a precise 24-h period of each *E. paradivisa* subgroup found in Cluster 4.

Data S3E. Analysis of the rhythmic genes with a precise 12-h period of each *E. paradivisa* subgroup found in Cluster 1.

Data S3F. Analysis of the rhythmic genes with a precise 12-h period of each *E. paradivisa* subgroup found in Cluster 2.

Data S3G. GO analysis of rhythmic genes showing 12-h to 24-h period alternations between sym to apo *E. paradivisa*

Data S3H. GO analysis of rhythmic genes showing 24-h to 12-h period alternations between sym to apo *E. paradivisa*