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Supplemental Information

***C. elegans* MRP-5 Exports Vitamin B12
from Mother to Offspring
to Support Embryonic Development**

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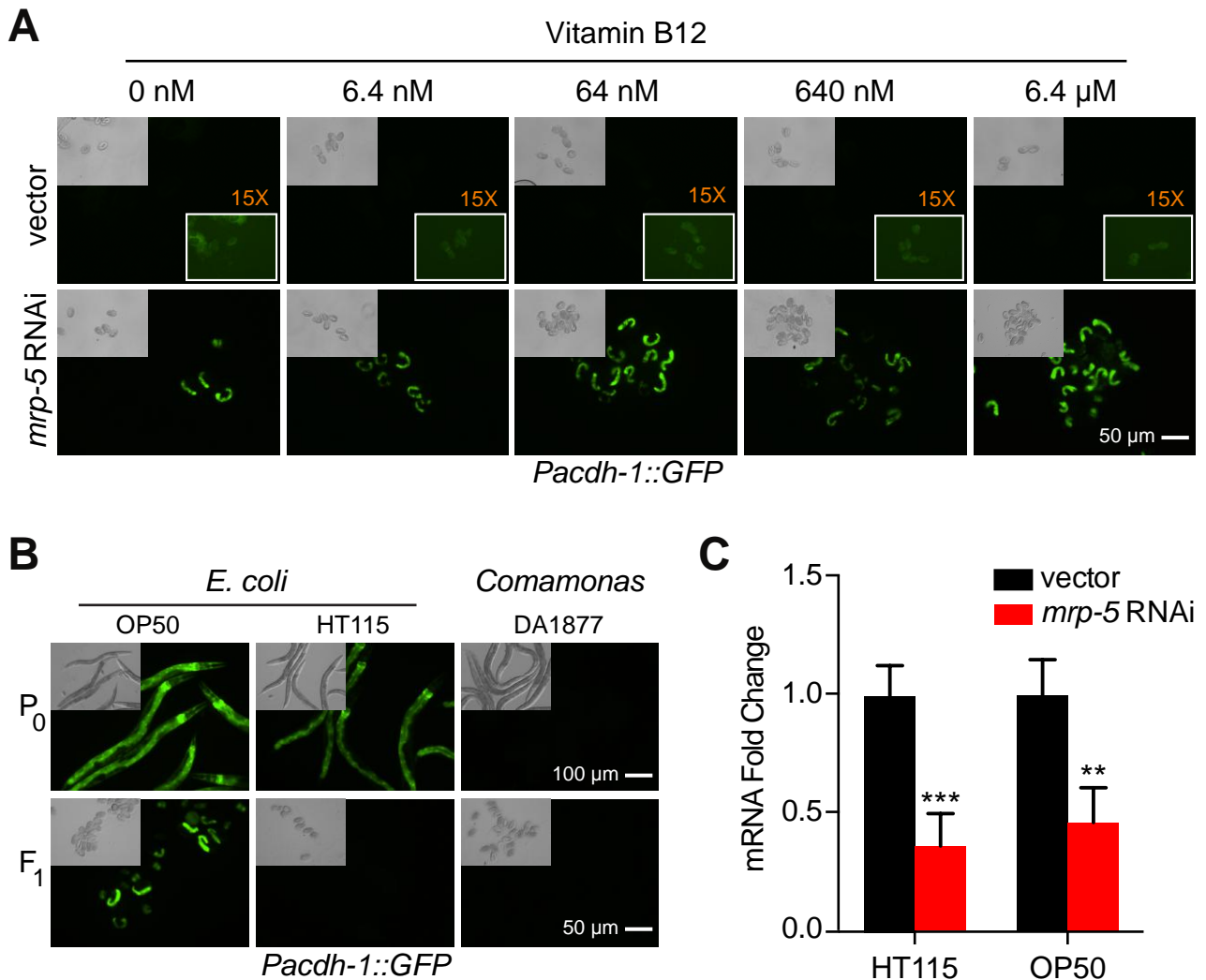


Figure S1. RNAi of *mrp-5* retains vitamin B12 in the intestine of P0 mothers, Related to Figure 1.

(A) Fluorescence and DIC microscopy images of embryos from *Pacdh-1::GFP* mothers subjected to vector control RNAi or *mrp-5* RNAi in *E. coli* HT115 and supplemented with increasing concentrations of vitamin B12. In the upper row, the inset box in the lower right indicates 15 times the exposure time. Scale bar, 50 μ m.

(B) Fluorescence and DIC microscopy images of *Pacdh-1::GFP* animals fed *E. coli* OP50, *E. coli* HT115 or *C. aquatica* DA1877 at P0 and F1 generations. Scale bars, 50 μ m for embryos and 100 μ m for adults.

(C) RT-qPCR of *mrp-5* showing similar RNAi efficiency in *E. coli* HT115 and *E. coli* OP50-fed animals relative to vector control. Error bars represent standard deviation. The p value was determined by unpaired student's t-test (***) p < 0.0001, ** p < 0.0005).

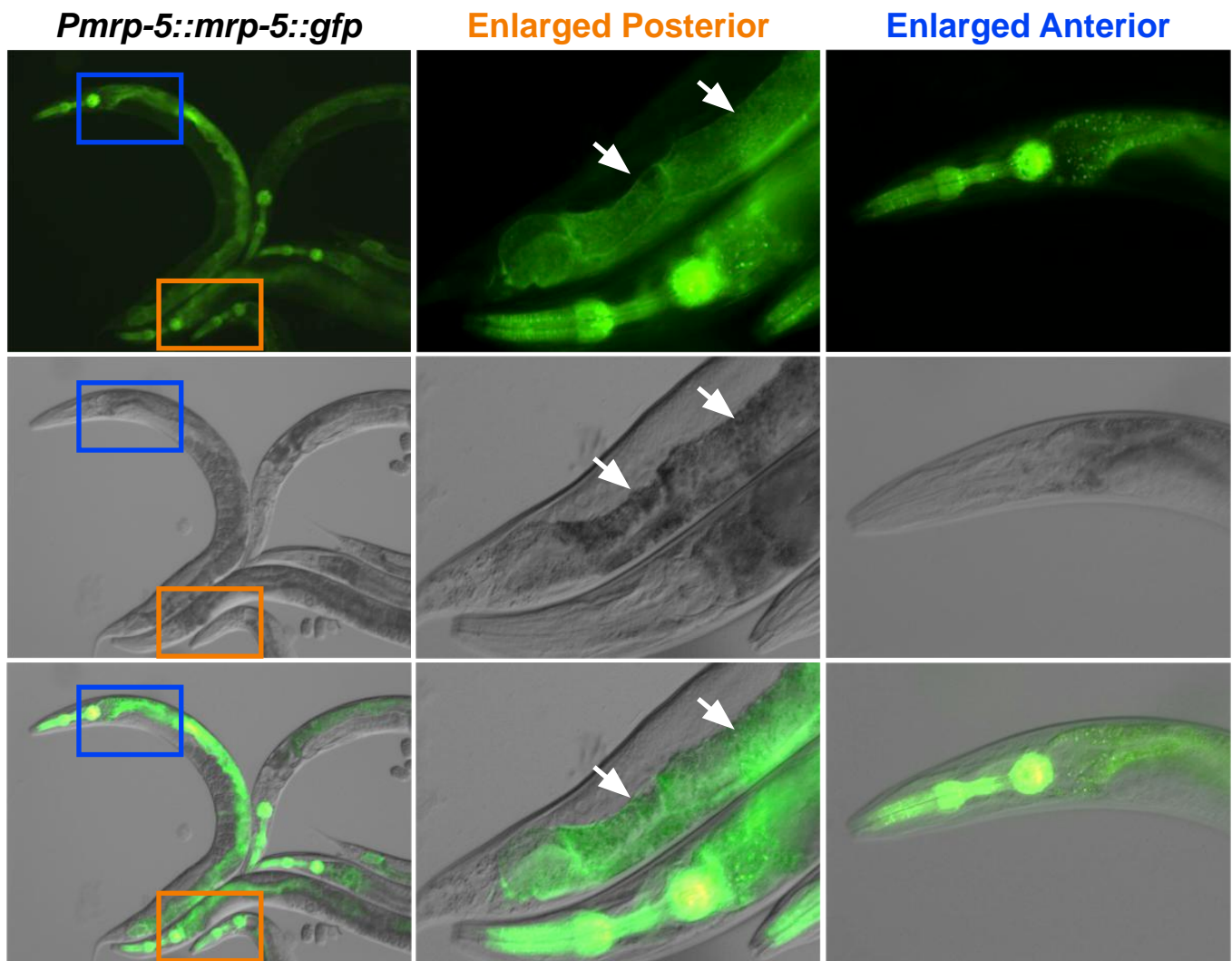


Figure S2. MRP-5 is expressed in the intestine, Related to Figure 1.

Fluorescence (top), DIC (middle), and overlay (bottom) microscopy images of GFP expression in *Pmrp-5::mrp-5::GFP* transgenic animals. The white arrowheads in the middle panels indicate intestinal cells.

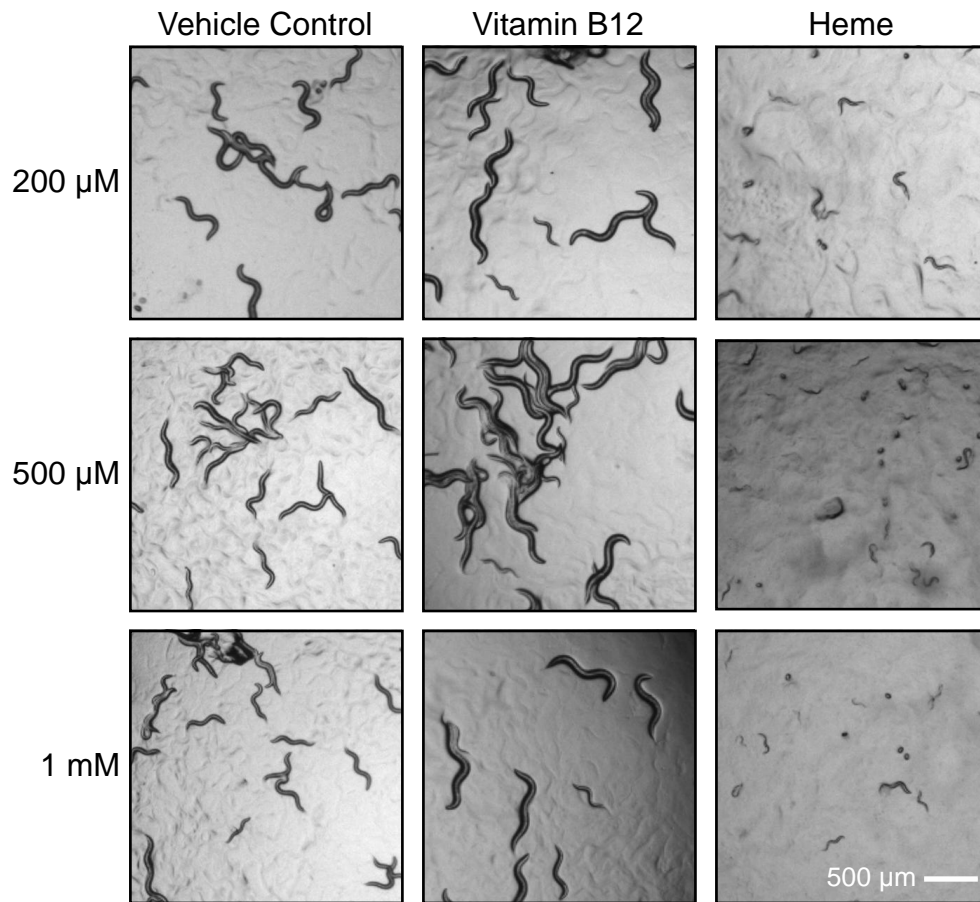


Figure S3. High doses of heme cause arrest at the L1-L2 stage, while high doses of vitamin B12 does not affect development, Related to Figure 3.

Bright field microscopy images of feeding various concentrations of heme, vitamin B12, or vehicle control (water) to wild type mothers on *E. coli* OP50 demonstrates viable offspring while developing on vitamin B12 or vehicle control, but causes larval arrest and toxicity in heme fed mothers. Scale bar, 500 μ m.

RESOURCE TABLE

REAGENT or RESOURCE	SOURCE	IDENTIFIER
Chemicals and Commercial Assays		
Adenosyl Cobalamin	Sigma Aldrich	Cat#: C0884
Hemin	Sigma Aldrich	Cat#: H9039
Glass beads	Sigma Aldrich	Cat#: G1277
Methoxyamine hydrochloride	Sigma Aldrich	Cat#: 226904
N-Methyl-N-(trimethylsilyl)trifluoroacetamide	Sigma Aldrich	Cat#: 69479
Isopropyl β -D-1 thiogalactopyranoside (IPTG)	US Biological	Cat#: I8500
TRIzol Reagent	Invitrogen	Cat#: 15596026
M-MuLV Reverse Transcriptase	NEB	Cat#: M0253S
Fast SYBR Green Master Mix	Thermo Fisher Scientific	Cat#: 4385612
RNeasy Mini Kit	Qiagen	Cat#: 74104
Bridge-It® S-Adenosyl Methionine (SAM) Fluorescence Assay Kit	Mediomics, LLC	Cat#: SKU: 1-1-1003
Experimental Models: Organisms/Strains		
<i>Caenorhabditis elegans</i> N2	Caenorhabditis Genetics Center (CGC); http://cgc.umn.edu/	N/A
<i>C. elegans</i> , wwIs24 [<i>acdh-1p::GFP + unc-119(+)</i>]	Arda <i>et al.</i> , 2010	Strain VL749
<i>C. elegans</i> , wwSi1 [<i>acdh-1p::GFP::H2B + unc-119(+)</i> II; <i>avr-14(ad1302)</i> I; <i>unc-119(ed3)</i> III; <i>avr-15(ad1051)</i> ; <i>glc-1(pk54)</i> V]	This study	Strain VL1168
<i>C. elegans</i> , +/szT1 [<i>lon-2(e678)</i> I; <i>mrp-5(ok2067)/szT1</i> X]	CGC	Strain VL1599
<i>C. elegans</i> , wwIs47 [<i>mrp5p::MRP-5::GFP + rol-6(+)</i>]	This study	
<i>Escherichia coli</i> OP50	CGC	N/A
<i>Escherichia coli</i> HT115	CGC	N/A
<i>Escherichia coli</i> OP50 RNAi compatible	Xiao <i>et al.</i> , 2015	N/A
<i>Comamonas aquatic</i> DA1877	CGC	N/A
<i>Escherichia coli</i> HT115 Ahringer RNAi Library	Kamath <i>et al.</i> , 2003	N/A
<i>Escherichia coli</i> HT115 ORFeome RNAi Library	Reboul <i>et al.</i> , 2001	N/A
Oligonucleotides		
<i>mrp-5</i> qPCR forward	This study	GACTGTCAGG GGGCTACCTA

<i>mrp-5</i> qPCR reverse	This study	AACAGCTCCAA TAACCGCGA
<i>ama-1</i> qPCR forward	This study	CGGATGGAGG AGCATCGCCG
<i>ama-1</i> qPCR reverse	This study	CAGCGGCTGG GGAAGTTGGC
Software, Algorithms and Instruments		
Eclipse Ti Inverted Microscope	Nikon	N/A
Eclipse 90i Inverted Microscope	Nikon	N/A
SpeedVac concentrator SPD111V	Thermo Fisher Scientific	N/A
FastPrep-24 bead beater	MP Biomedicals	Cat#: 116004500
ImageJ	NIH	N/A
StepOnePlus Real-Time PCR System	Applied Biosystems	Cat#: 4376600
DS Ri1 Camera	Nikon	N/A
EVOS FL Auto Imaging System	Invitrogen	N/A
FemtoJet [®] 4i electronic microinjector	Eppendorf	N/A
7890B/5977B quadrupole GC- MS	Agilent	N/A
Microinjection Arm	Narishige	N/A