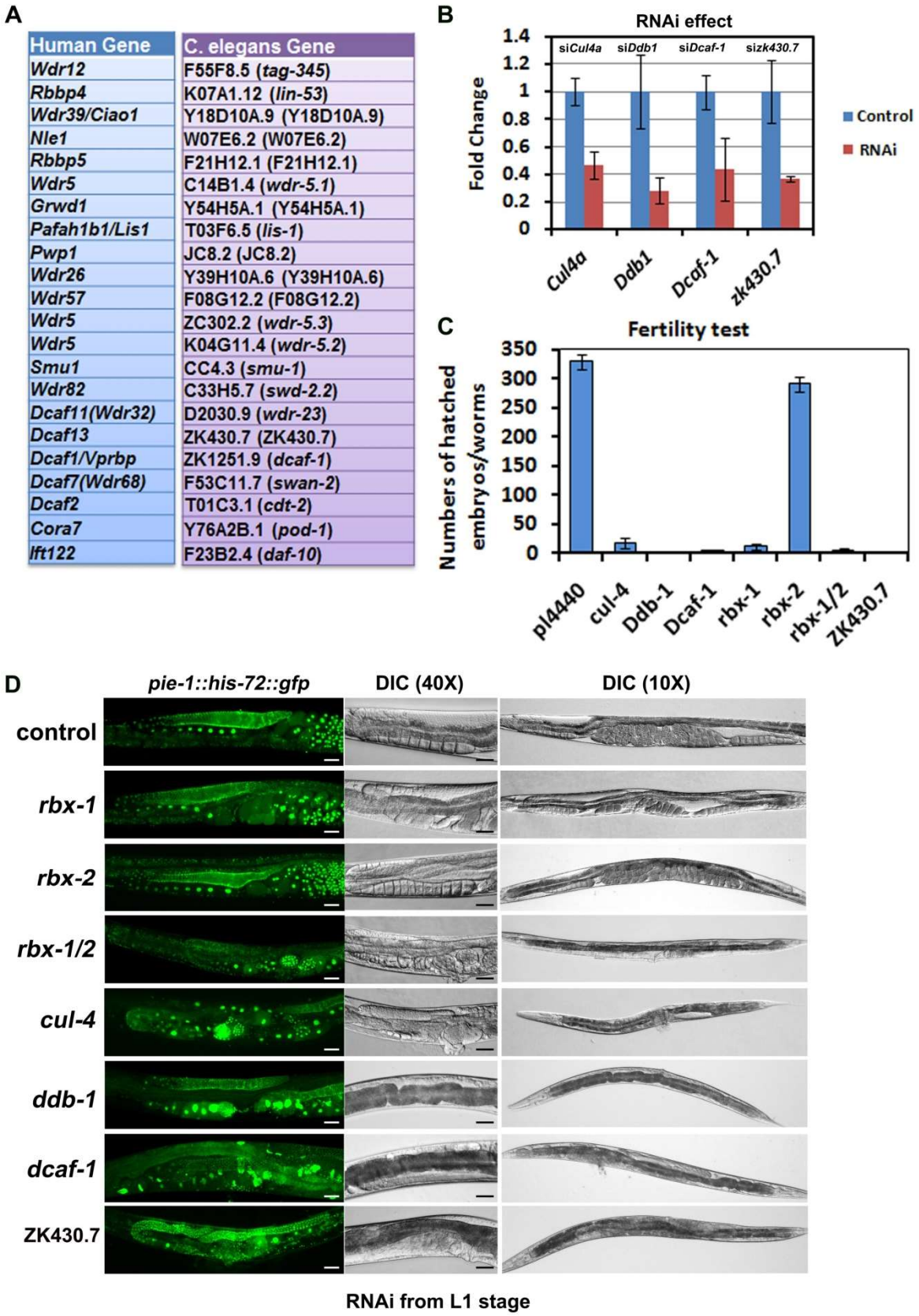
Supplementary Figures

Supplementary Figure S1

A

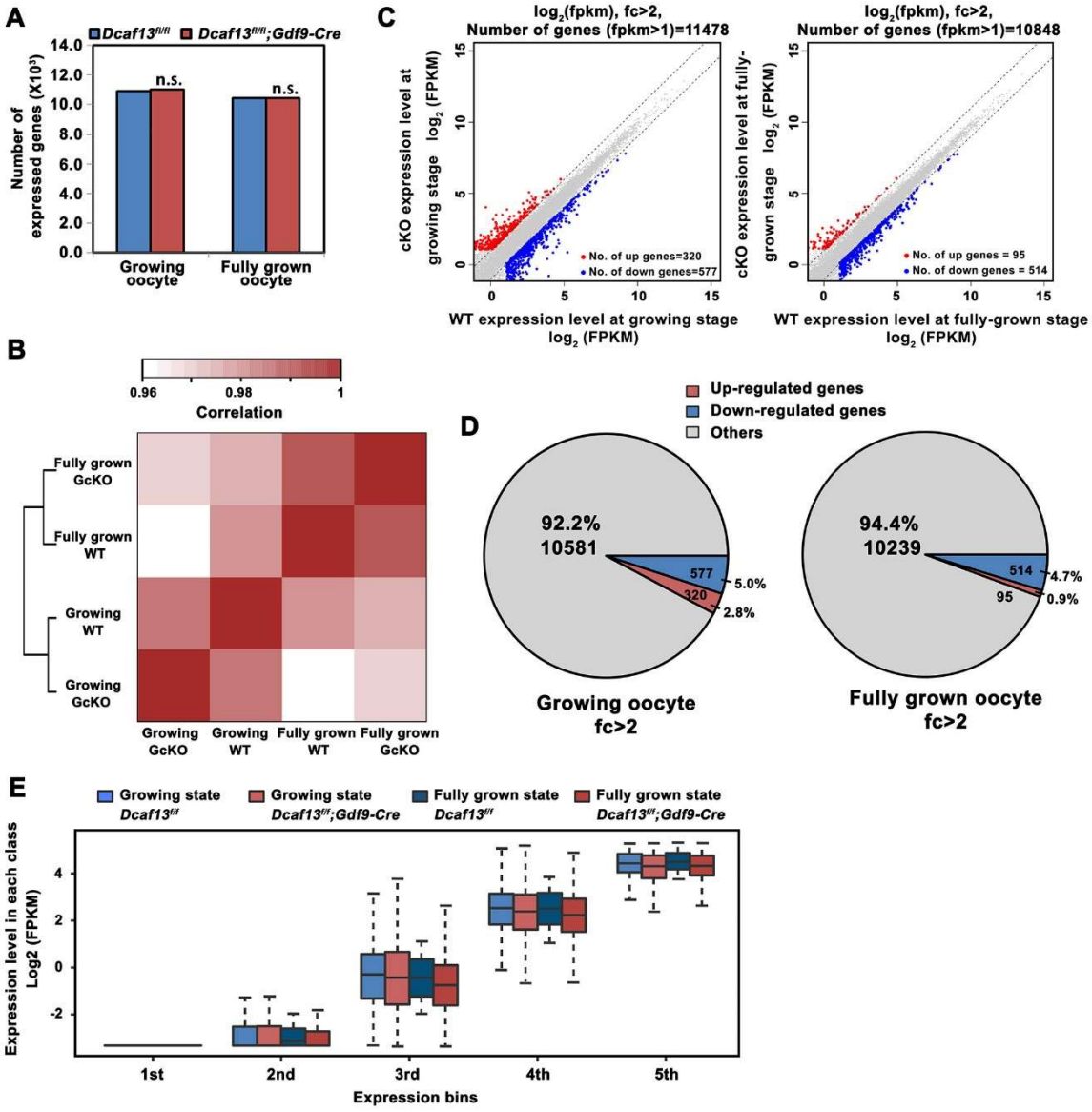
Human Gene	C. elegans Gene
Wdr12	F55F8.5 (*tag-345*)
Rbbp4	K07A1.12 (*lin-53*)
Wdr39/Ciao1	Y18D10A.9 (Y18D10A.9)
Nle1	W07E6.2 (W07E6.2)
Rbbp5	F21H12.1 (F21H12.1)
Wdr5	C14B1.4 (*wdr-5.1*)
Grwd1	Y54H5A.1 (Y54H5A.1)
Pafah1b1/Lis1	T03F6.5 (*lis-1*)
Pwp1	JC8.2 (JC8.2)
Wdr26	Y39H10A.6 (Y39H10A.6)
Wdr57	F08G12.2 (F08G12.2)
Wdr5	ZC302.2 (*wdr-5.3*)
Wdr5	K04G11.4 (*wdr-5.2*)
Smu1	CC4.3 (*smu-1*)
Wdr82	C33H5.7 (*swd-2.2*)
Dcaf11(Wdr32)	D2030.9 (*wdr-23*)
Dcaf13	ZK430.7 (ZK430.7)
Dcaf1/Vprbp	ZK1251.9 (*dcaf-1*)
Dcaf7(Wdr68)	F53C11.7 (*swan-2*)
Dcaf2	T01C3.1 (*cdt-2*)
Cora7	Y76A2B.1 (*pod-1*)
Ift122	F23B2.4 (*daf-10*)



Supplementary Figure S1: ZK430.7, the homologous gene of *Dcaf13*, is required for oogenesis in *C.elegans.*

A: The gene list showed 19 conserved DCAFs from *C.elegans* to human for RNAi screen. **B:** Quantitative real-time PCR (qRT-PCR) results showing RNAi efficiency of *cul-4*, *ddb-1*, *dcaf-1*, ZK430.7 relative to control *C.elegans*. Error bars indicate SEM. **C:** Fertility assessment of control (pl4440) and RNAi-mediated knockdown of several core components of CRL4 E3 ligase (*cul-4*, *ddb-1*, *rbx-1, rbx-2*), *dcaf-1* and *zk430.7*. The numbers of hatched embryos or larvae were counted in the next 72 h after RNAi. Error bars indicate SEM. **D:** Germlines morphologies in *Pie-1::his-72::GFP* trangene worms after RNAi of *cul-4, ddb-1, dcaf-1*, and *zk430.7*. GFP-histone H2B epifluorescence (left panels) and DIC images (middle and right panels) of *C. elegans* female gonads showed oogenesis after RNAi depletion of indicated genes. Scale bar, 10 μm.

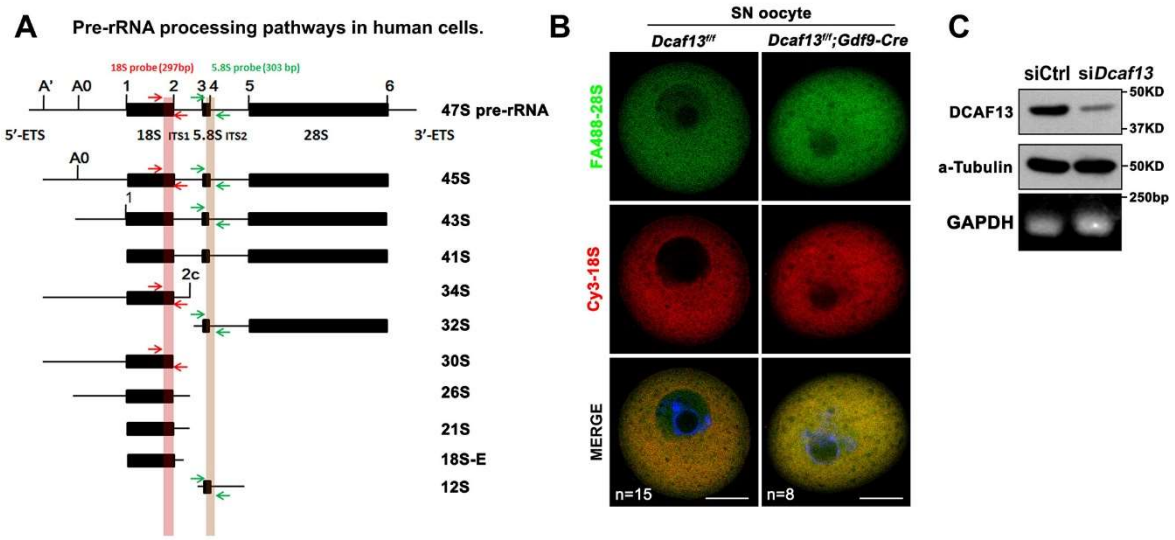
Supplementary Figure S2



Supplementary Figure S2. The level of mRNA transcripts is not altered in DCAF13-deleted oocytes

A: Bar graph showed the number of transcripts in *Dcaf13*$^{fl/fl}$ and *Dcaf13*$^{fl/fl}$*;Gdf9-Cre* oocytes at growing and fully-grown stages. **B:** Heatmap and Cluster tree showed the correlation among 4 samples including growing and fully-grown oocytes (*Dcaf13*$^{fl/fl}$ and *Dcaf13*$^{fl/fl}$*;Gdf9-Cre*). Correlation method: pearson correlation; Cluster method: complete; Correlation test: $p < 0.01$. **C:** Scatter plots of RNA-seq data illustrated transcriptional change in *Dcaf13* knocked out oocytes. The left graph for growing oocyte and the right graph for fully-grown oocyte. Genes up-regulated were shown in red dots, while down-regulated genes were shown in blue dots. Genes showing an expression difference larger than two-fold were considered differentially expressed. **D:** Pie chart presentation of the overall genomic distribution of up-regulated genes, down-regulated genes and the others. **E:** Box-plots of the whole genes expression levels in four samples. The expression value (FPKM) was divided into five groups according to their expression levels in *Dcaf13*$^{fl/fl}$ fully grown oocytes. The outliers were filtered.

Supplementary Figure S3.



Supplementary Figure S3. Schematic diagram of pre-rRNA processing pathways and probes used in human and mouse.

Pol I-transcribed premature rRNA (47S in human) precursor embedded in noncoding spacers: 5' and 3' external transcribed spacers (5' and 3' ETSs) and internal transcribed spacers 1 and 2 (ITS1 and ITS2). Then, the various rRNA intermediates were processed step by step from pre-rRNA following a pathway involving both endo- and exonucleolytic digestions at sites A0, 1, and 2 in nucleolus. **A:** Pre-rRNA processing pathways in human cells. The pink area represented the location of 18S probe and the brown area represents the location of 5.8S probe used for Northern blotting. The probes information was listed in Supplementary Table-1. **B:** Fluorescent *in situ* hybridization (FISH) of antisense oligonucleotide probes recognizing the mouse 28S rRNA (Green) and 18S rRNA (Red) in *Dcaf13*$^{fl/fl}$ and *Dcaf13*$^{fl/fl}$*;Gdf9-Cre* SN oocytes. Scale bars, 25 μm. **C:** Western blot showing DCAF13 knockdown efficiency in HeLa cells transfected with non-targeting (*siCtrl*) or *Dcaf13*-targeted siRNA (*siDcaf13*). α-Tubulin was blotted as a loading control.

Supplementary Table-1.

Primer and probe information

Genotyping primers				
Name	**Species**	**Sequence**		**Length**
Dcaf13 GP1	mouse	5’- TACTTGACTGGGTTCCAGATAC-3’		WT：212 bp (GP1+GP2) Flox:246 bp (GP1+GP2) KO: 464 bp (GP1+GP3)
Dcaf13 GP2	mouse	5’- AGTCACTTACAAACCTTATCAAAAC-3’		
Dcaf13 GP3	mouse	5’- AACCTTCATGTGCTTGTATTGT-3’		
Gdf9-Cre	mouse	FP	5’- GGTTTCTGTTGGGCTCTCAC-3’	470 bp
	mouse	RP	5’- ATCAGAGGTGGCATCCACAG-3’	
Zp3-Cre	mouse	FP	5’- AAGAACCTGATGGACATGTTCAG-3’	470 bp
	mouse	RP	5’- CTGATCCTGGCAATTTCGG-3’	
Real time-PCR primers information				
Name	**Species**	**Sequence**		**Length**
Dcaf13	Human	FP	5’- TTTCCTGTAGACAAAAGTCGAAGCA -3’	143bp
	Human	RP	5’- GCATTAGCTTTCCACAGGCG -3’	
Fbl	Mouse	FP	5’- CAAAATTGAGTACAGAGCCTGGA -3’	160bp
	Human	RP	5’- CGGGCCGACAATATCAGAGA -3’	
siRNA sense sequence information				
Name	**Species**	**Sequence**		
NC	Mouse & Human	5’- UUCUCCGAACGUGUCACGUTT -3’		

Dcaf13	Mouse & Human	5’- GUGCUUACAUCACGAGAAATT -3’
Fbl	Mouse	5’- CCTCCCAAGGTGAAGAACT -3’
	Mouse	5’- CGTCATGAAGGTGTCTTTA -3’
	Mouse	5’- CCCTGGAGAGTCTGTGTAT -3’

Oligonucleotide probes used for detection of rRNAs

Antisense probes	**Species**		**Sequence**	**Length**
5.8 S	Human	FP	5’- GCTACGCCTGTCTGAGCGTCG -3’	303 bp
	Human	RP	5’- CGGCTCTCTCTTTCCCTCTCCG -3’	
18S	Human	FP	5’- CGTCGCTACTACCGATTGGATGG -3’	297 bp
	Human	RP	5’- AACGAGCGAGCGAACGAACG -3’	
18S	Mouse	FP	5’- TGATTAAGTCCCTGCCCTTTG -3’	330 bp
	Mouse	RP	5’- CTTCTCTCACCTCACTCCAGACAC -3’	
28S	Mouse	FP	5’- CGTGTGAGTAAGATCCTCCACC -3’	492 bp
	Mouse	RP	5’- GAGTTTACCACCCGCTTTGG -3’	
Cy3-18S	Mouse	5'-Cy3-CCATTATTCCTAGCTGCGGTATCCAGGCGG-3’		
AF488-28S	Mouse	5’-Alexa Fluor 488-GAGGGAACCAGCTACTAGATGGTTCGATTA -3’		

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Supplementary Table-2.

Antibody information

Antibody Name	Company	Cat#NO.	Application
anti-FLAG	Santa Cruz	sc-807	WB (1:20,00)
anti-HA tag	CST	#3724	WB (1:20,00)
anti-DCAF13	Abcam	Ab195588	IHC(1:100) WB (1:20,00); IF(1:200)
anti-pS II	Abcam	ab5095	IF(1:200)
anti-B23	Abcam	ab10530	IF(1:200)
anti- Fibrillarin	Abcam	ab166630	IF(1:200)
anti-ERK1/2	Santa Cruz	sc-93	WB (1:10,000)
anti-FOXO1	CST	#2880S	IHC (1:100)
anti-MVH	Abcam	Ab13840	IHC (1:200)