

# Caenorhabditis elegans longevity when fed with *Bacillus subtilis* mutants

José Luis Brioso Jiménez and Andre Pires da Silva

School of Life Sciences - University of Warwick, CV4 7AL, Coventry, United Kingdom



**Keywords:** Diet, Lifespan, *C. elegans*

## ABSTRACT

### Introduction:

Diet has a strong influence on aging and lifespan. Thus, understanding the mechanisms by which diet influences lifespan has implications for age-related and diet-related diseases. *Caenorhabditis elegans* is a powerful system to study the effects of diet on lifespan because it has a short life history, a simple anatomy and can be fed a variety of bacterial species and strains (1). In this project, we will use the nematode model *C. elegans* to uncover possible dietary factors that cause changes in the activation of diet-responsive genes. We will use a transgenic *C. elegans* strain that harbours a GFP promoter fusion to *acdH-1*. This transgenic dietary sensor strain, when submitted to diet restriction (a treatment that extends lifespan (2)) has a reduced GFP expression (3). We will use *Bacillus subtilis* large deletion mutants of non essential genes as a food source to screen for factors that change the GFP expression in the sensor strain. This project will indicate which kinds of factors in the diet are important for lifespan.

### Methods:

- Generate a transgenic worm carrying two fluorescent constructs: *PacdH-1::GFP* to monitor diet sensing and *Pdop-3::RFP* to serve as standard for worm number normalization.
- Perform high-throughput screening of the fluorescent *C. elegans* strain with *B. subtilis* deletion mutants.
- If a significant variation of the diet sensor is found during the screening we will perform lifespan experiments to clarify if that diet affects the life history of the worm. If there is a noticeable change in lifespan a screen with single deletion mutants of that large deletion will be used to clarify which mutation is producing a change in life history.

### Results:

- The fluorescent strain APS9 (*vsIs33 [dop-3::RFP]* ; *wwIs24 [PacdH-1::GFP + unc-119(+)]*) was generated via sexual crossing of the strains VL749 x LX811. Heat shock treatment and RNAi of *him-14* were used to increase male ratio.
- We are currently screening the activity of *PacdH-1::GFP* when *C. elegans* is feed with single strains of the library of 250 *B. subtilis* mutants.
- Future milestones: lifespan experiments and single-deletion mutants screen.

### Conclusions:

To be determined.

## REFERENCES

- (1) Coolon JD, Jones KL, Todd TC, Carr BC, Herman MA. *Caenorhabditis elegans* Genomic Response to Soil Bacteria Predicts Environment-Specific Genetic Effects on Life History Traits. *Plos Genetics* 2009 JUN 2009;5(6):e1000503.
- (2) MacNeil LT, Watson E, Arda HE, Zhu LJ, Walhout AJM. Diet-Induced Developmental Acceleration Independent of TOR and Insulin in *C. elegans*. *Cell* 2013 MAR 28;153(1):240-252.
- (3) Van Gilst MR, Hadjivassiliou H, Yamamoto KR. A *Caenorhabditis elegans* nutrient response system partially dependent on nuclear receptor NHR-49. *Proc Natl Acad Sci U S A* 2005 SEP 20 2005;102(38):13496-13501.