

How do the cacti protect their flowers from...?

- Extreme sunlight
- Oxidative stress
- Free radicals
- Aging

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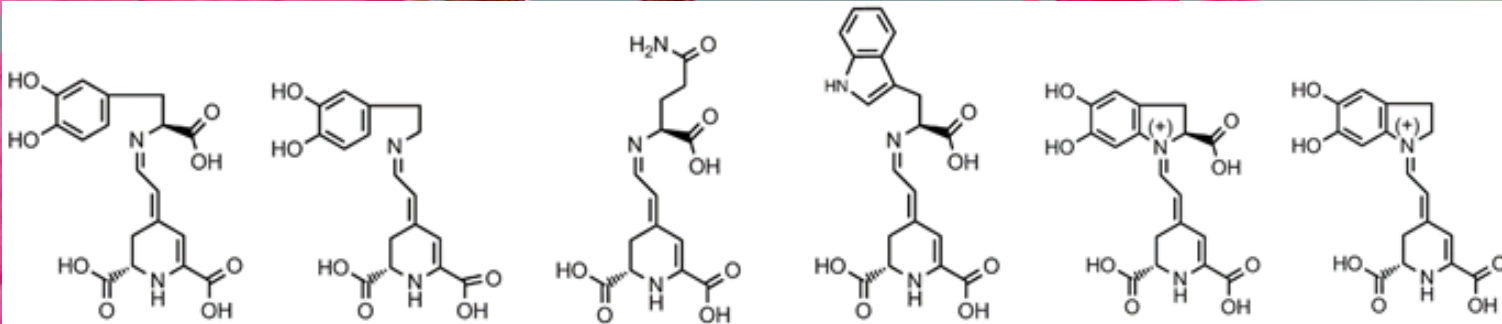
Biochemistry and Enzyme
Biotechnology group



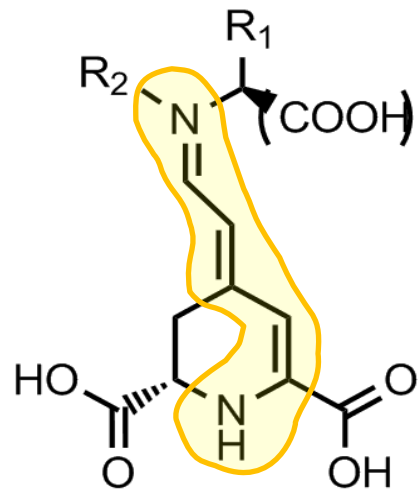
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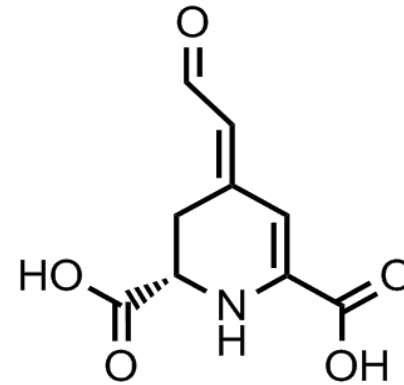
Cacti flowers do not produce anthocyanins



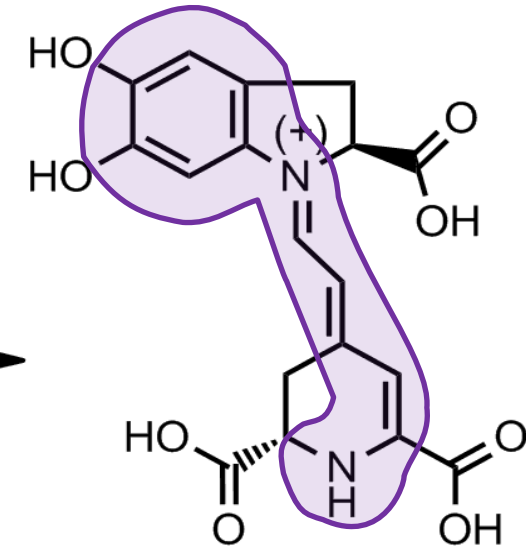
Betalains in plants of the order Caryophyllales



Betaxanthins



Betalamic acid



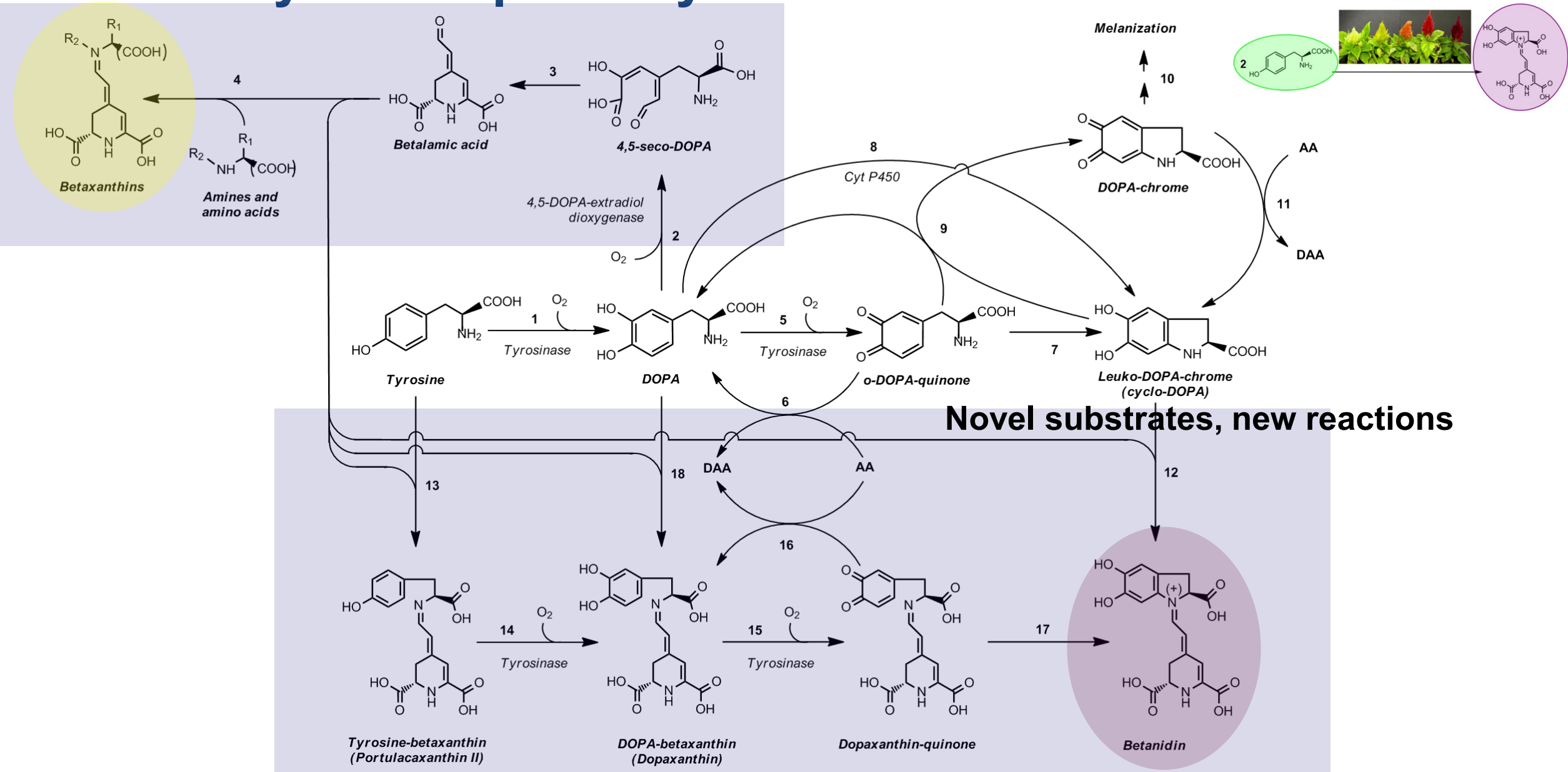
Betacyanins



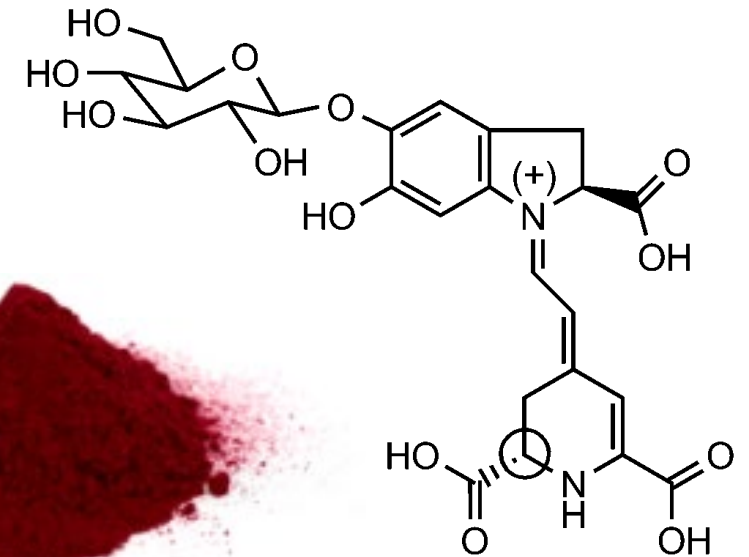
Betalamic acid as structural and chromophoric unit



Biosynthetic pathway



Betalains in cosmetics applications



- Purification, color evolution, degradation, influence of media parameters, analysis, stereochemistry.

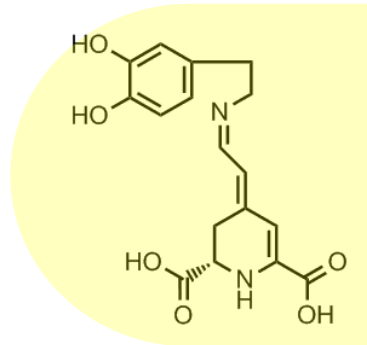


- New shades by mixing compounds of the same family.

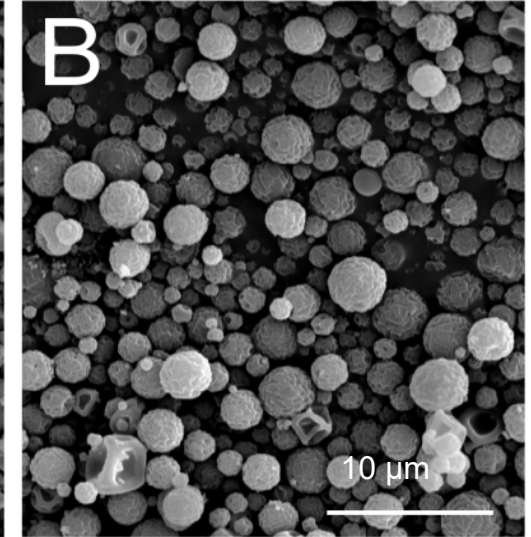
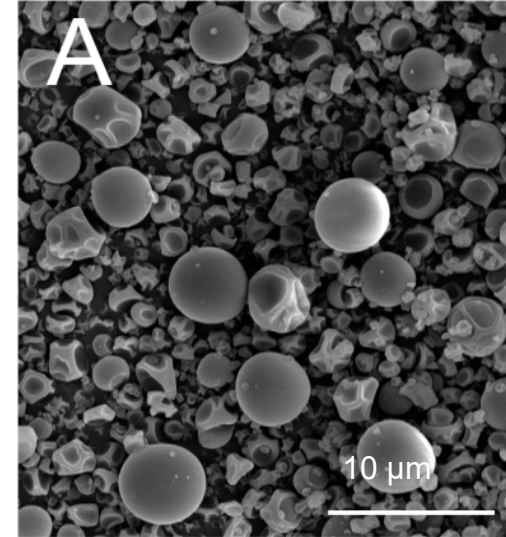
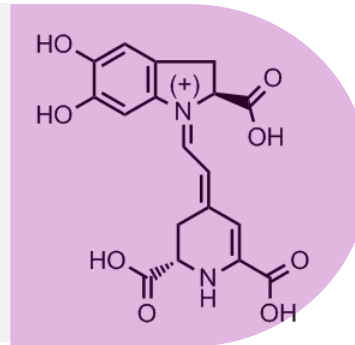


Betalains in cosmetics applications

- Stabilization by encapsulation and analysis of their properties.



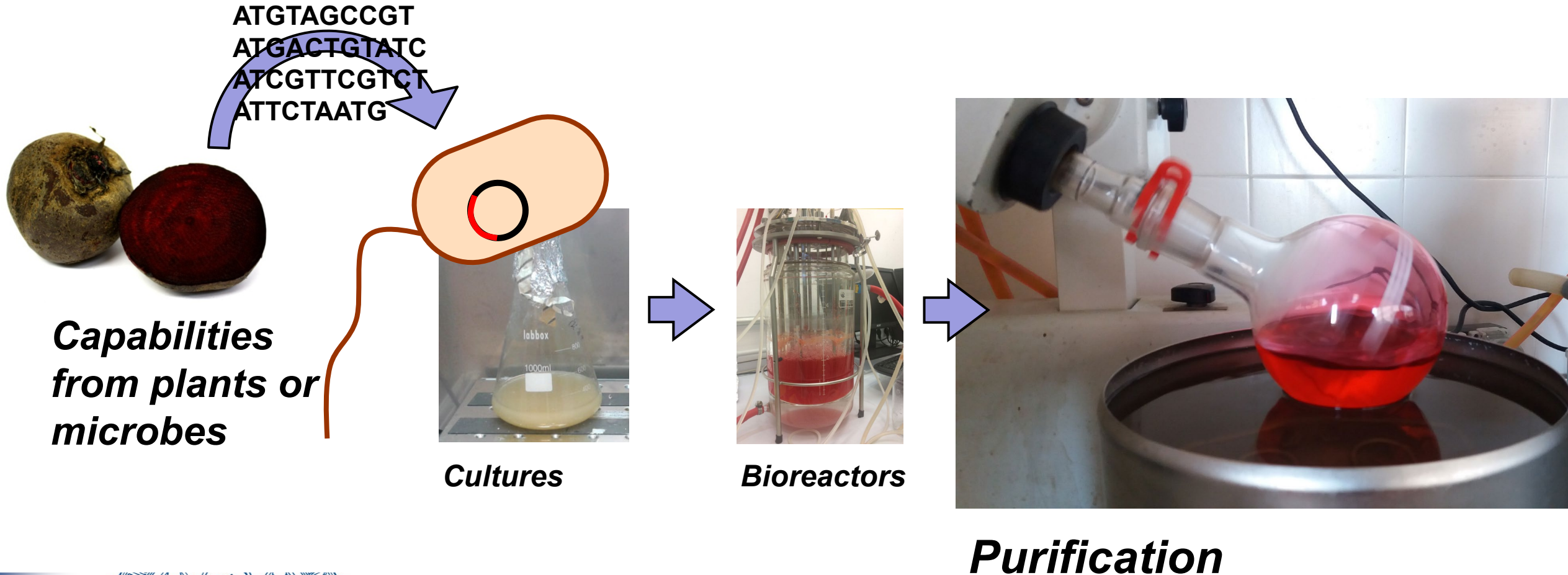
Co-encapsulation of the most bioactive betalains for stabilization.



Biotechnological applications

Producing natural and tailor-made betalains in microbial bioreactors

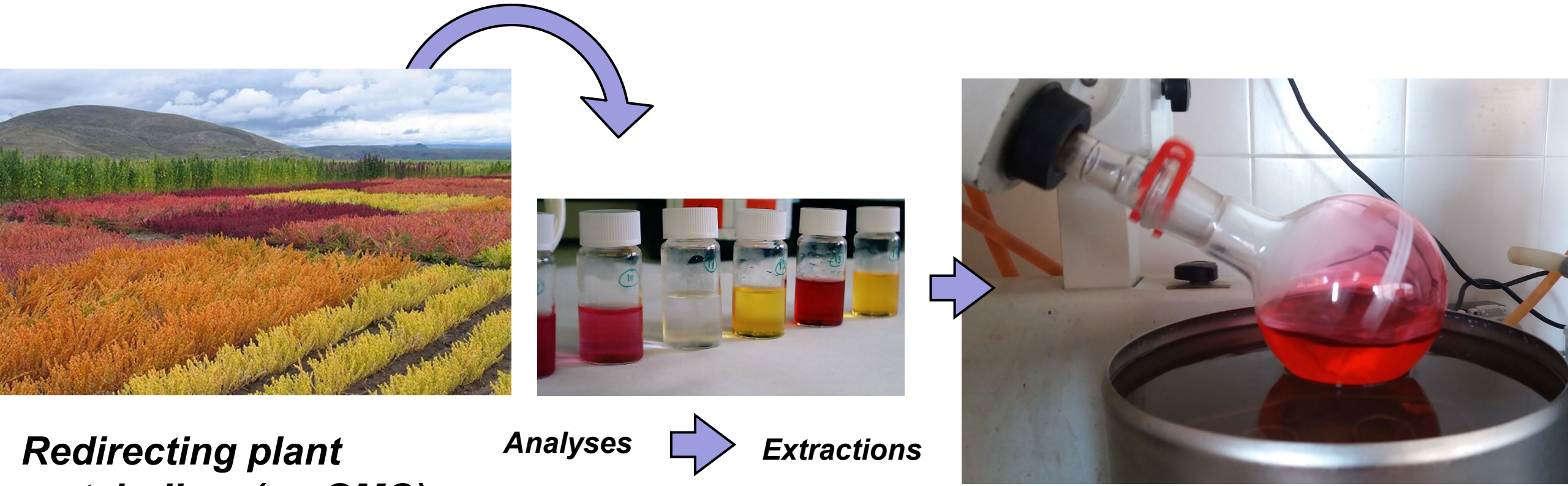
Synthesis and purification



Biotechnological applications

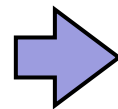
Producing natural and tailor-made betalains in plant systems

Extraction and purification



Redirecting plant metabolism (no GMO)

Analyses



Extractions

Purification



Biotechnological applications

Bioactivities *in vivo*

Filling the gap with a worm: *C. elegans*

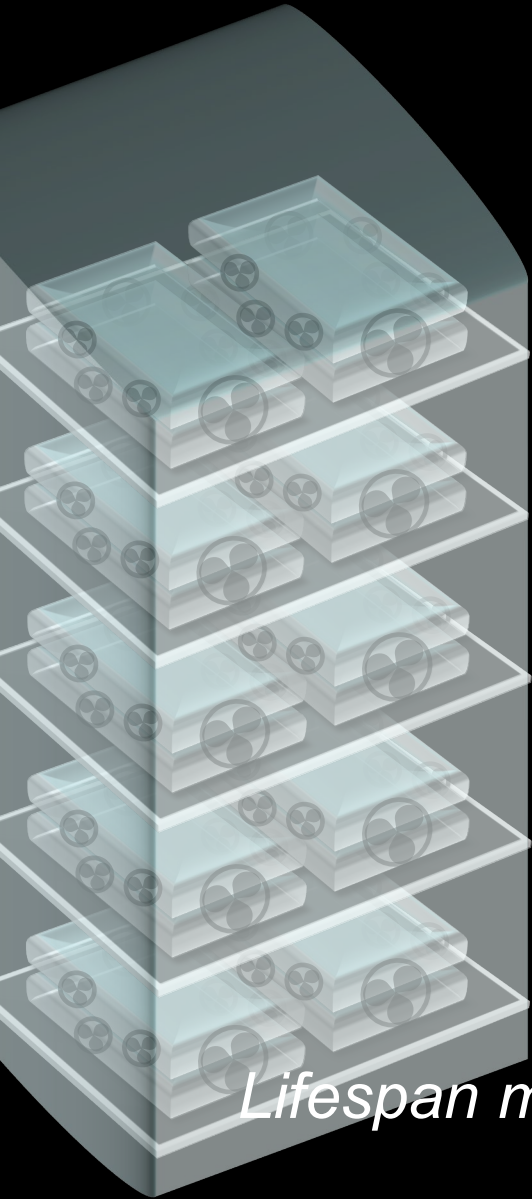
CEEA Comité Ético de Experimentación Animal



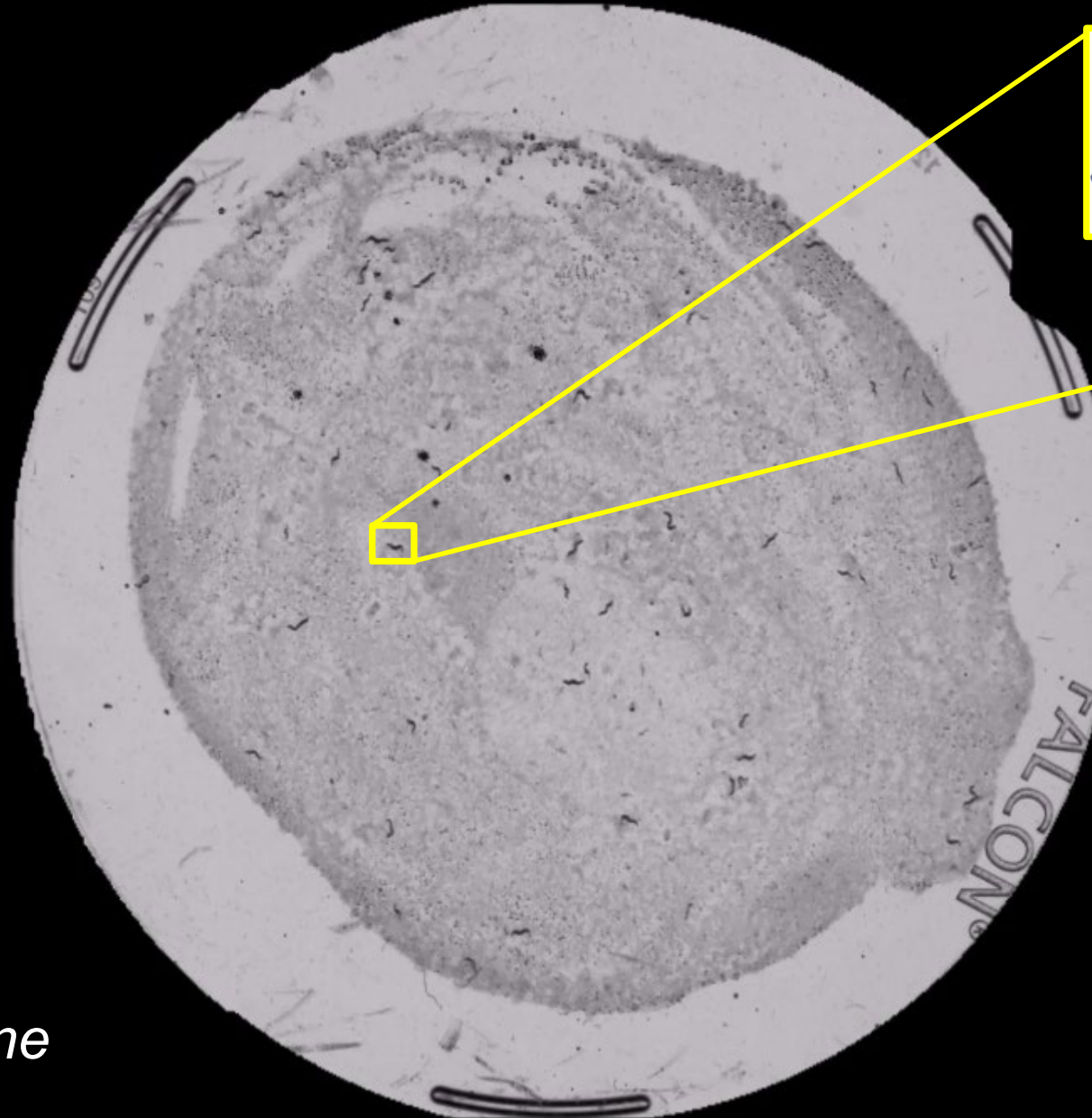
Lifespan as a measure of health-promoting potential of molecules and extracts



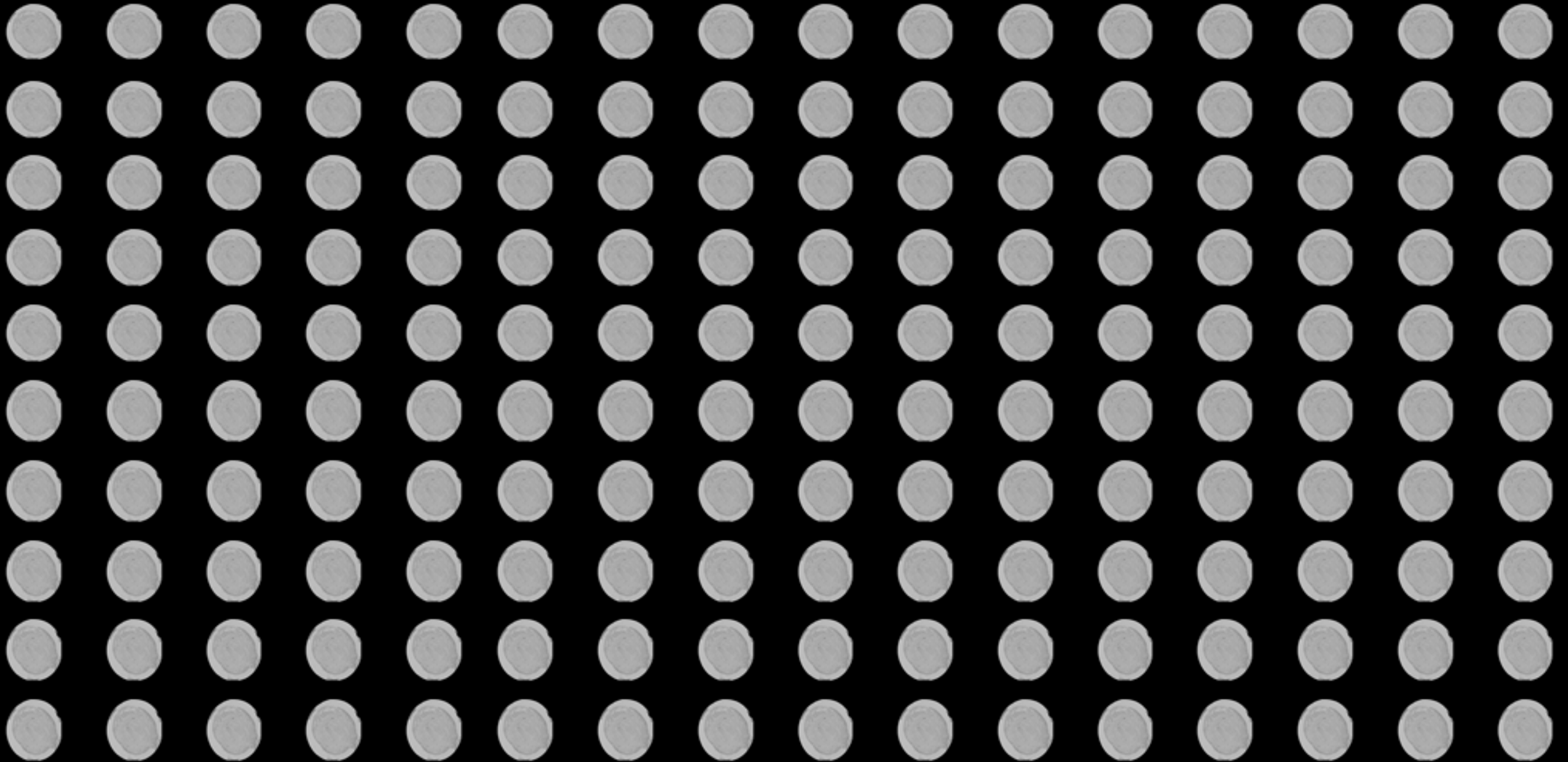
50 nematodes x 16 plates x 10 escanners x 20 days



Lifespan machine



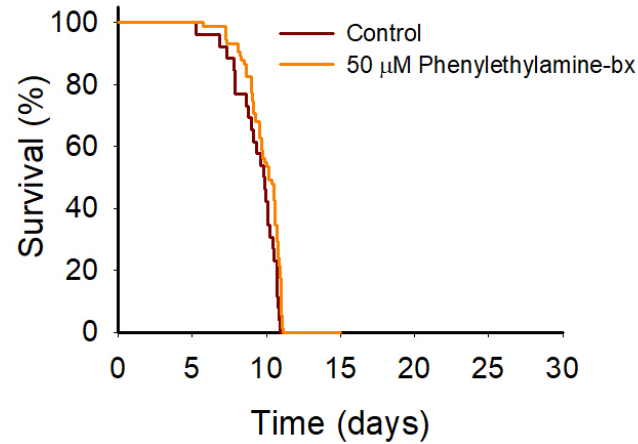
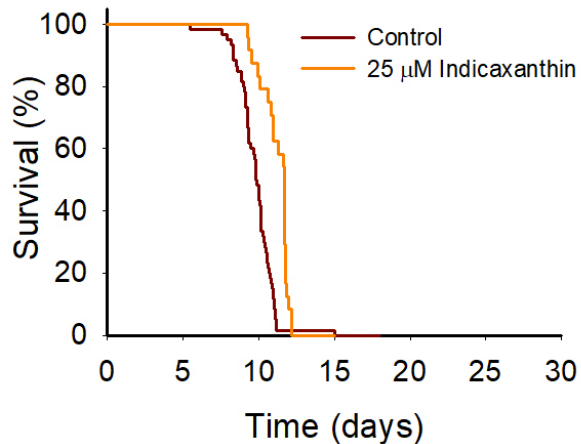
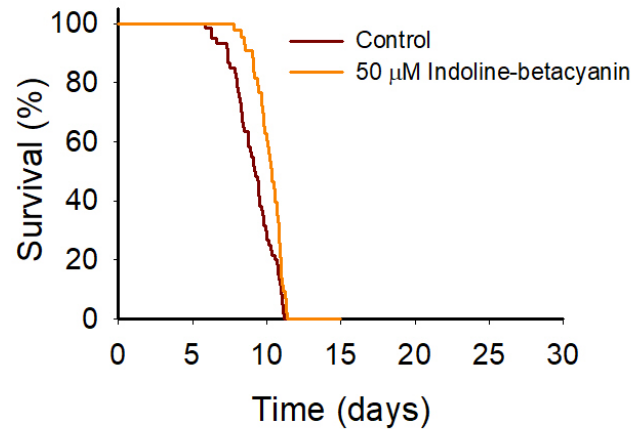
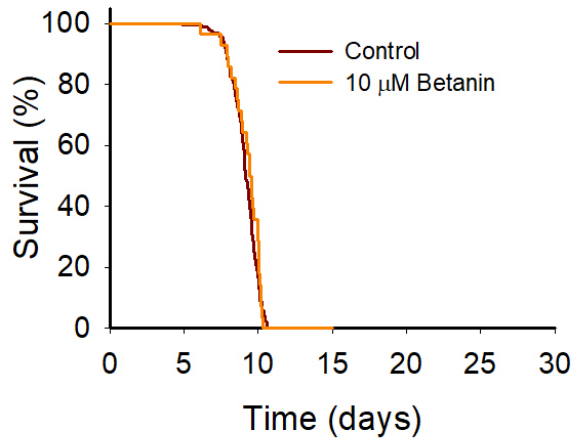
50 nematodes x 16 plates x 10 scanners x 20 days



Betalains applications

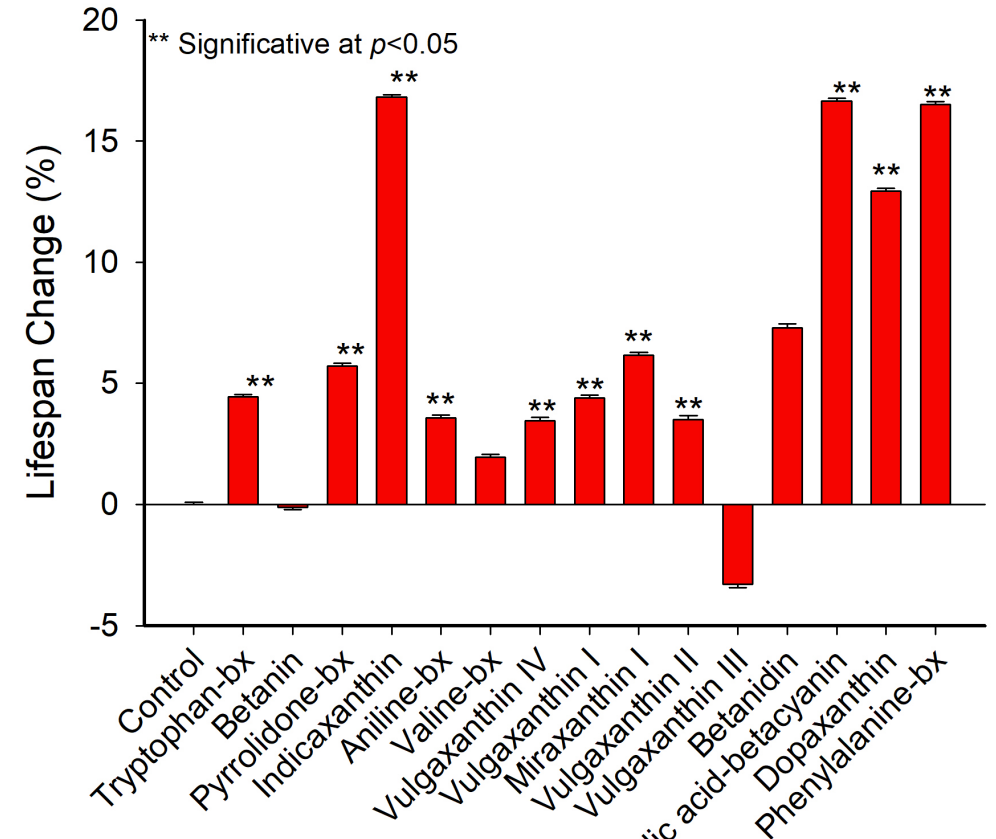
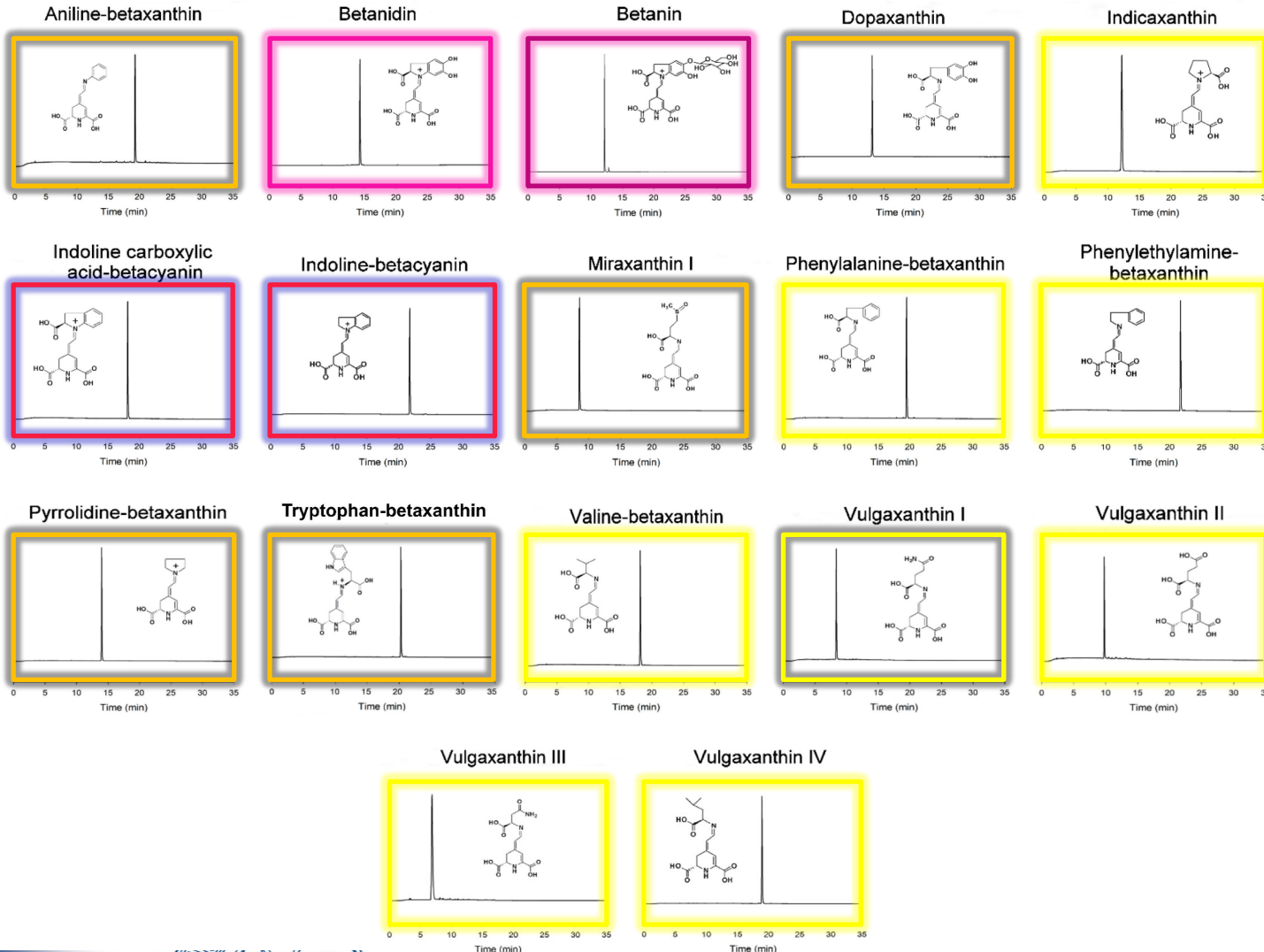
Anti-aging activity – Addition of bioactive molecules **and EXTRACTS**

Types, ranges, concentrations,...



Production + *In vivo*

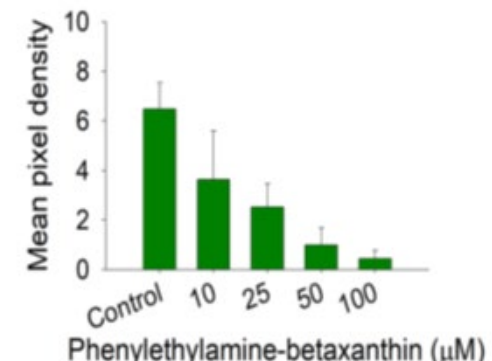
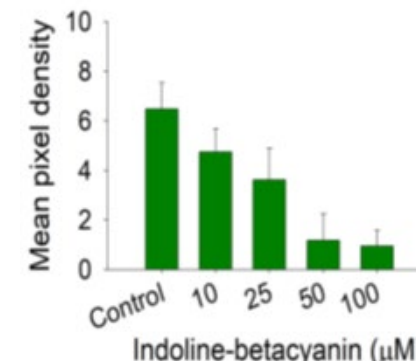
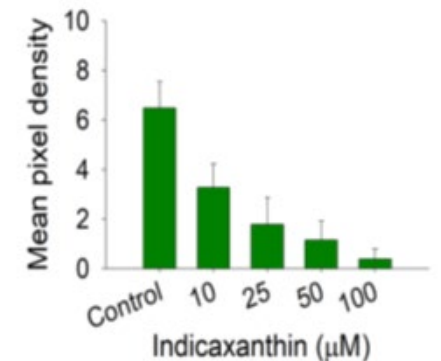
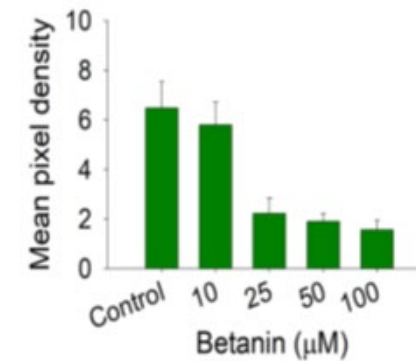
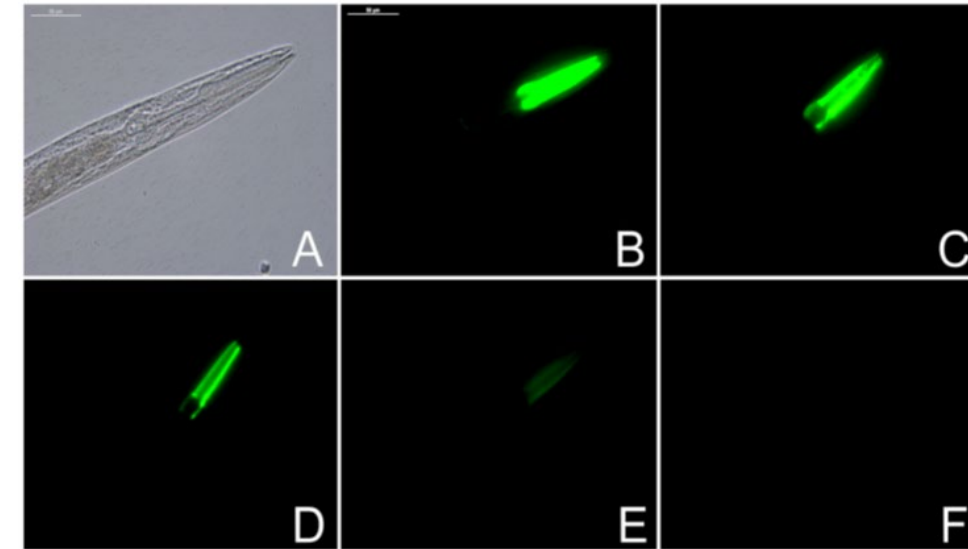
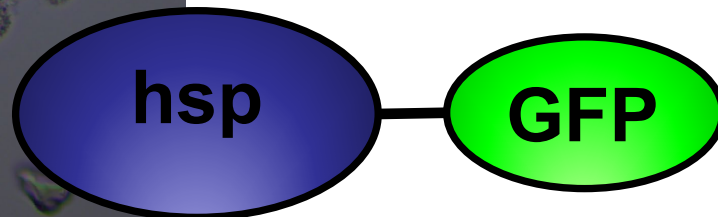
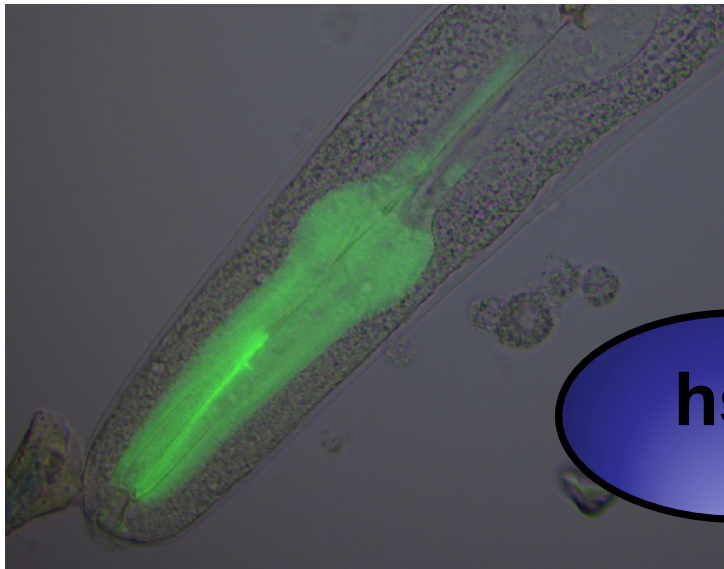
Anti-aging effects



Antioxidant activity *in vivo*

General improvement of the redox state of the animals and reduction of the induction of heat-shock proteins (hsp)

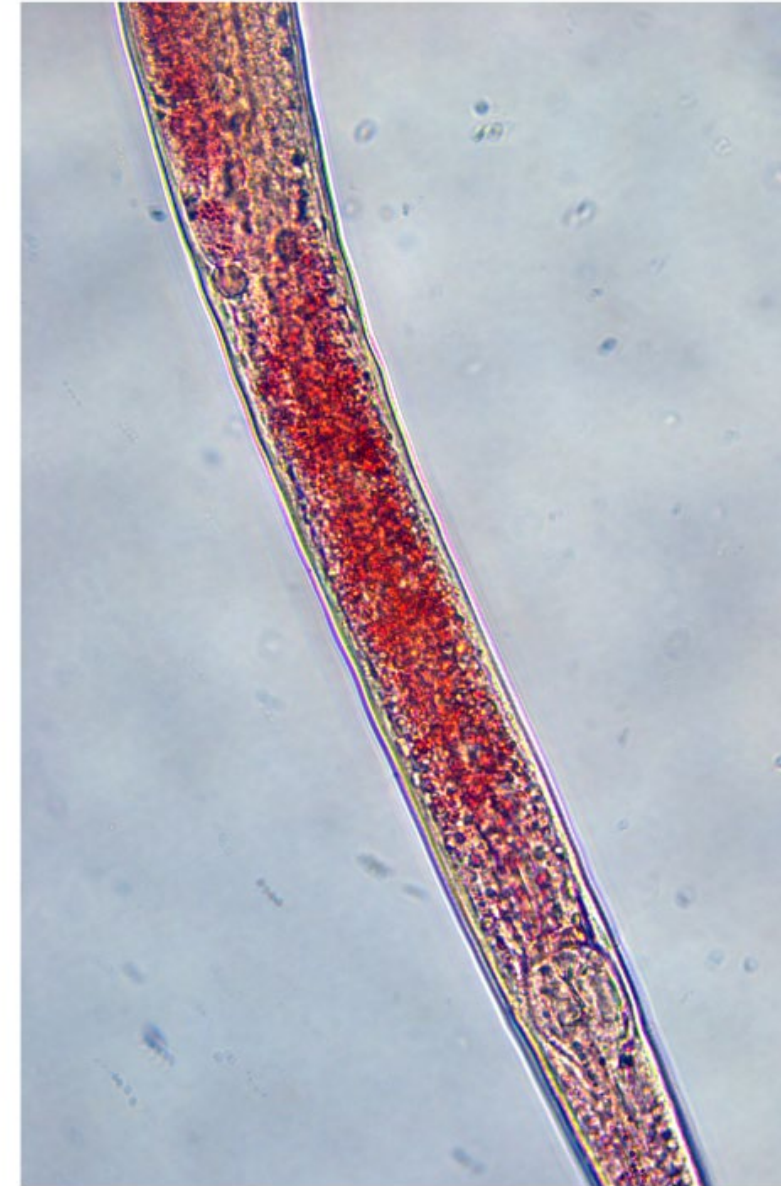
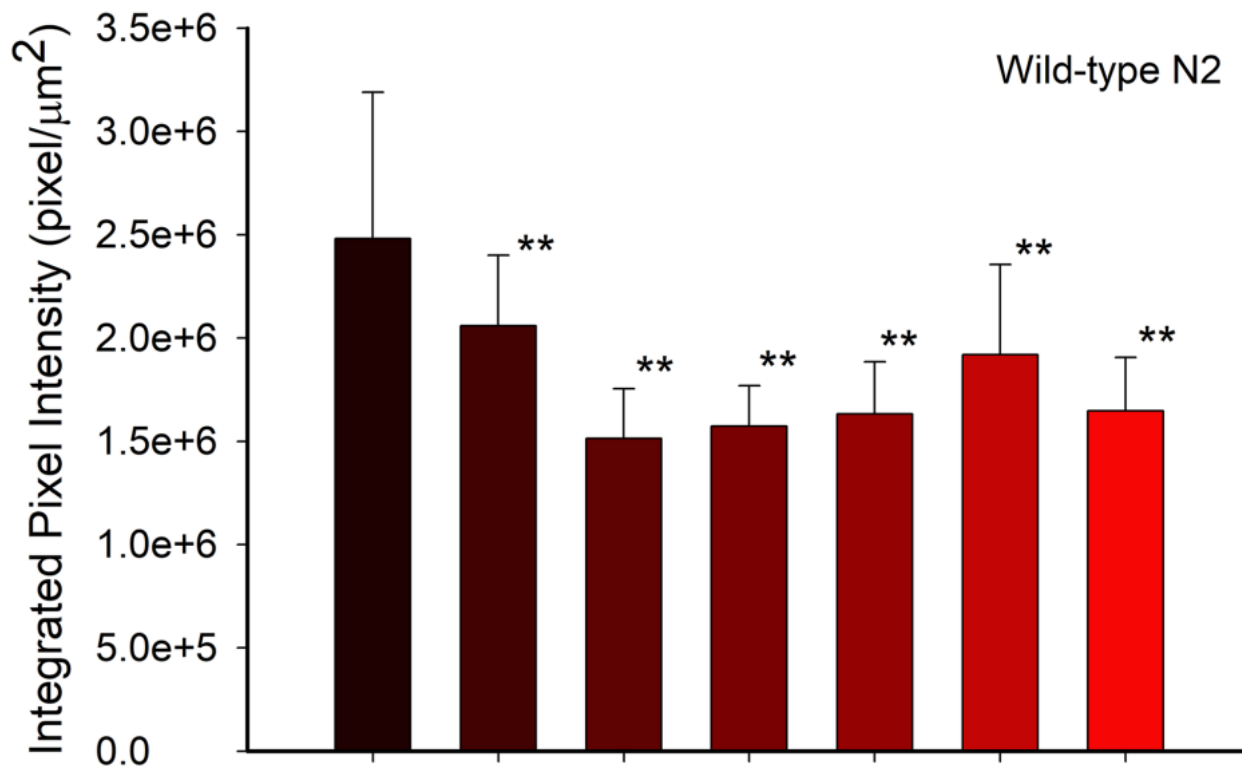
Induction of fluorescence as a response to oxidative stress and attenuation by bioactive and bioavailable molecules



Lipids accumulation *in vivo*

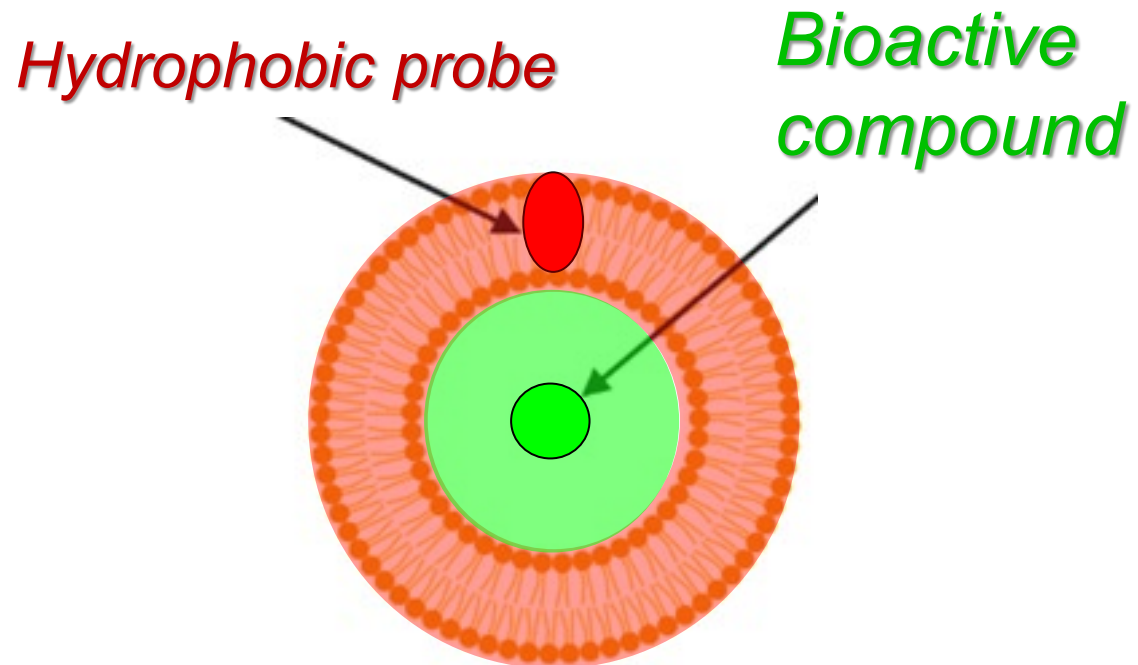
Staining procedures to “see” lipids inside the worms

- Evaluation of the effect of molecules and extracts on lipid accumulation.



Absorption experiments

Formation and characterization of liposomes loaded with bioactive compounds



Administration and vehiculization of bioactive compounds (**liposomes**)

Encapsulation of pure betalains, an other bioactive hydrophilic molecules



Betalains

Stilbenes

Flavonoids

Polyphenols

other molecules....

.... and extracts

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Biotechnology group**





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Excelencia

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Bioactive compounds laboratory

Technological offer

Plant extracts and bioactive molecules
Enhancement of stability and shelf life

Evaluation of biological activities - claims
Model animal *Caenorhabditis elegans*

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