



**GHENT
UNIVERSITY**

Bio-actieve componenten uit algen getest met het gnotobiotisch Artemia systeem

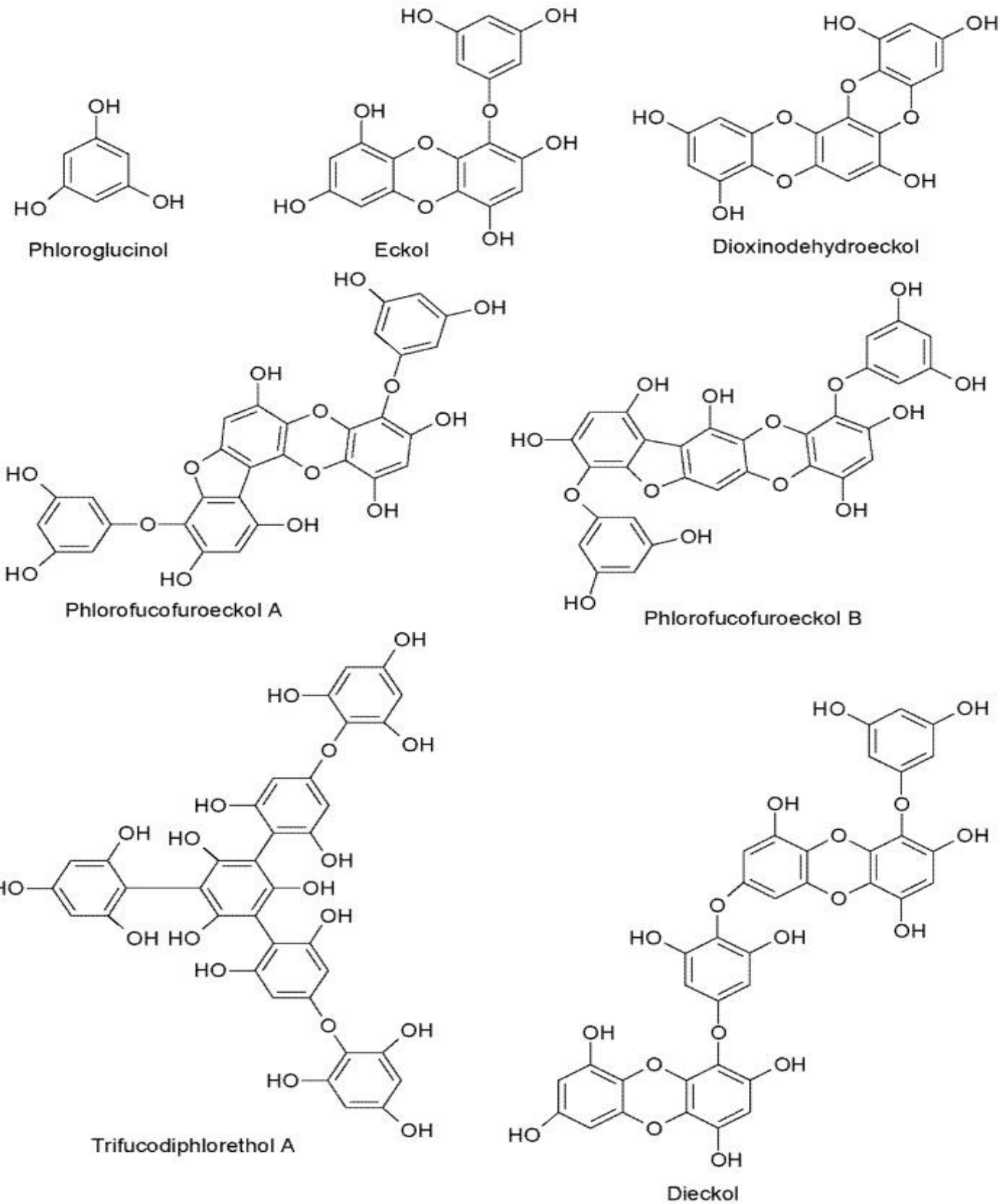
Peter Bossier, Vikash Kumar, Kartik Baruah, Tania Lourenco

Ghent University

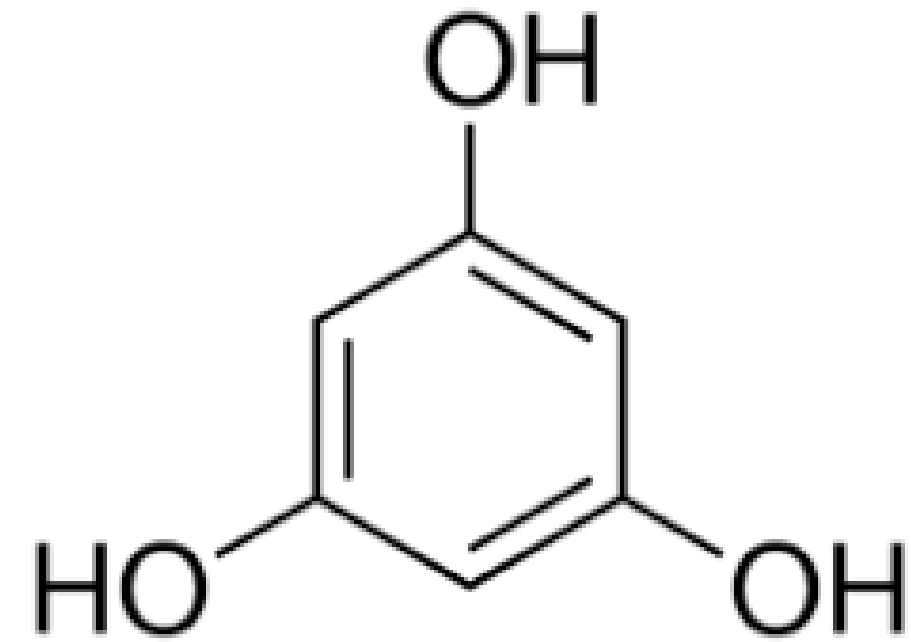
MACROALGEN: PHLOROTANNINES

- Phlorotannines zijn een groep van complexe **polymeren van phloroglucinol** (1,3,5-trihydroxybenzene) uniek bij macroalgen.
- Deze fenolische componenten zijn
 - integrale structurele componenten van de celwanden van bruinwieren,
 - belangrijke secundaire ecologische rol in
 - Bescherming tegen UV straling
 - Bescherming tegen begrazing
 - In vitro: “anti-diabetic, anti-cancer, anti-oxidation, antibacterial, radioprotective en anti-HIV eigenschappen”

PHLOROTANNINS

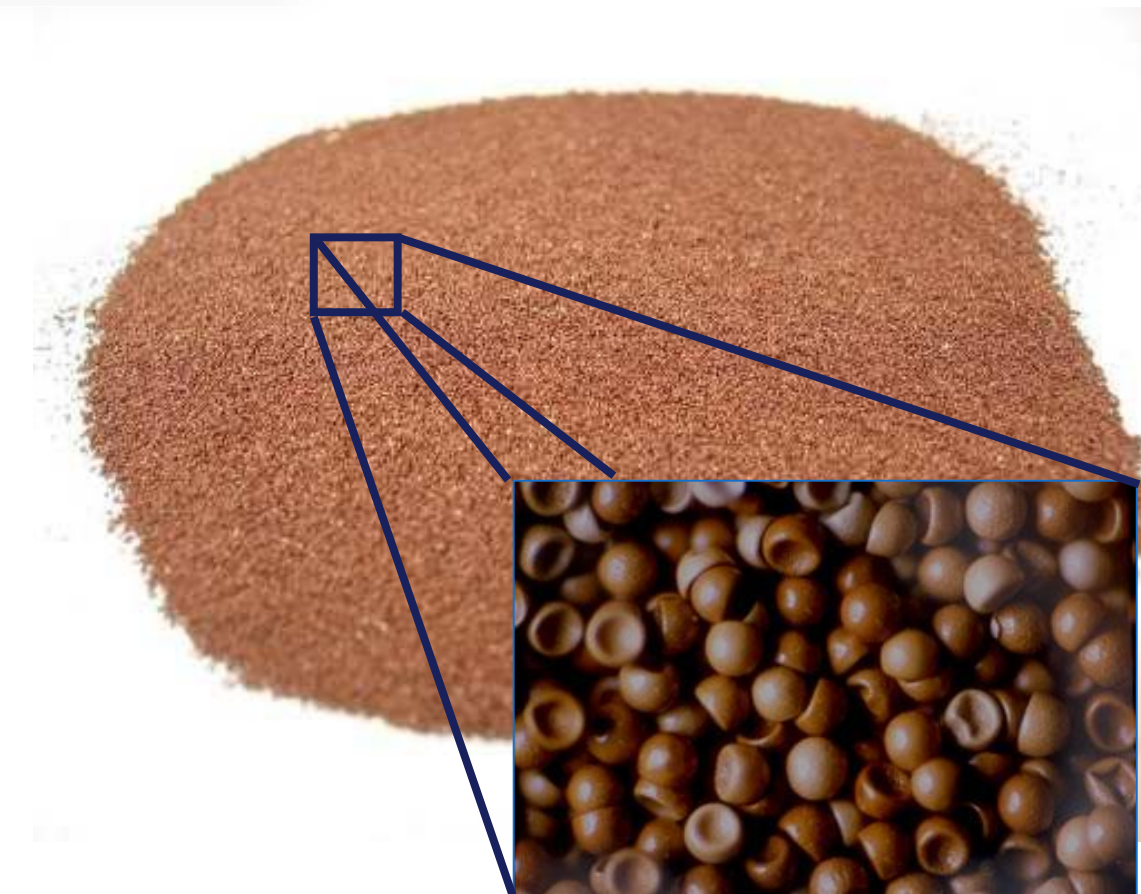
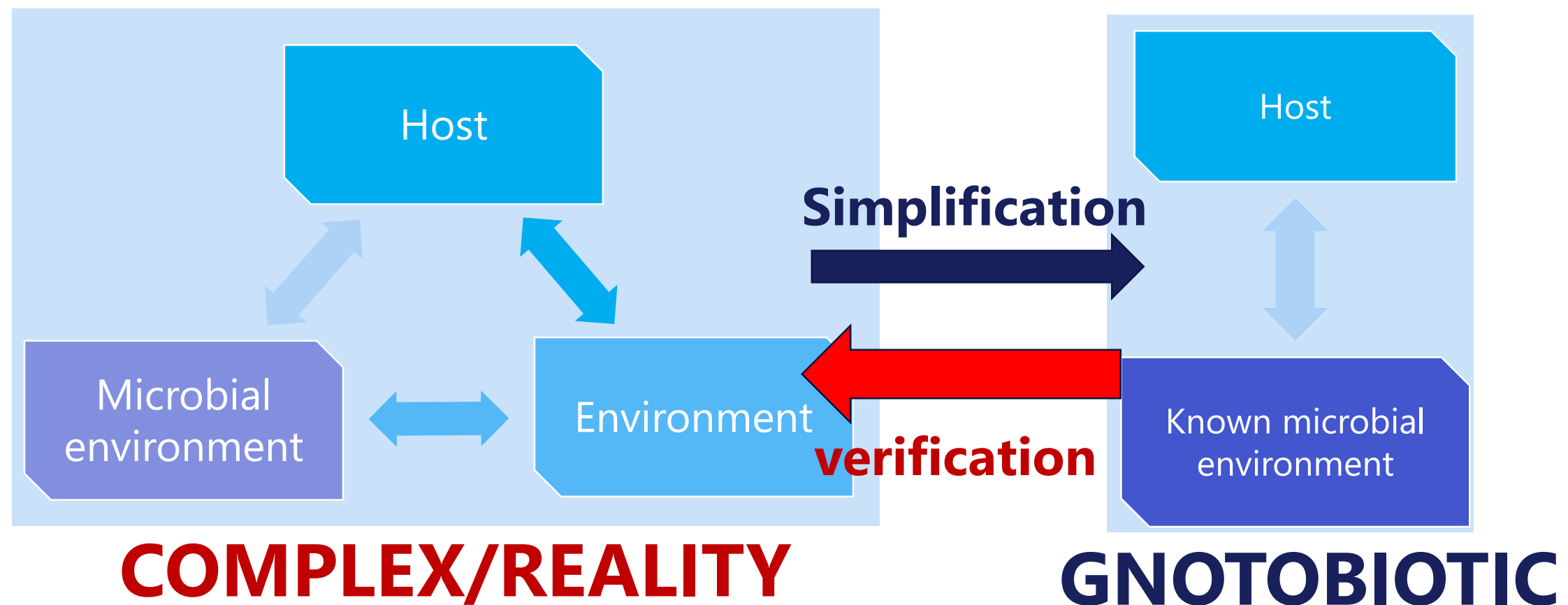


PHLOROGLUCINOL



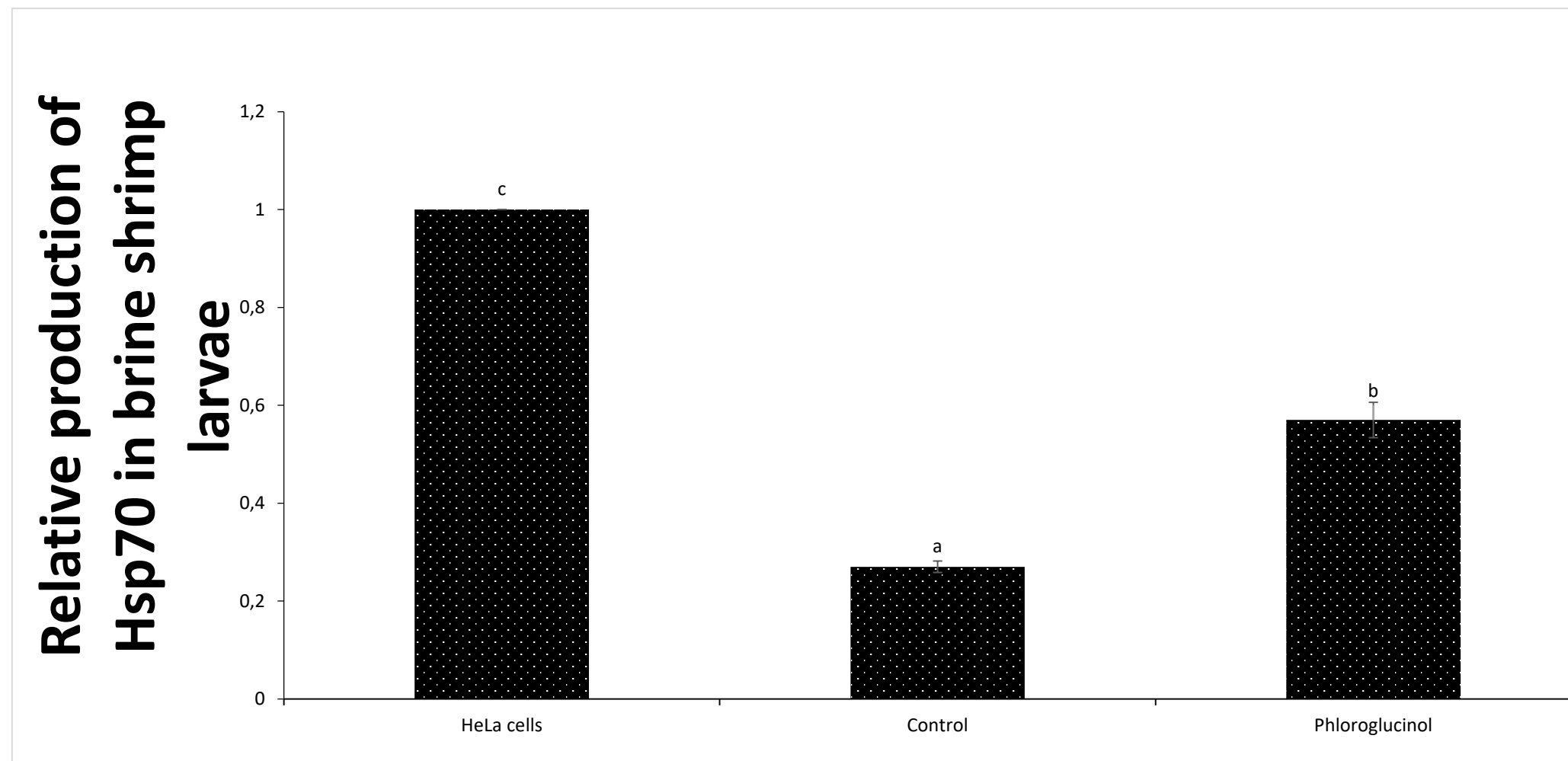
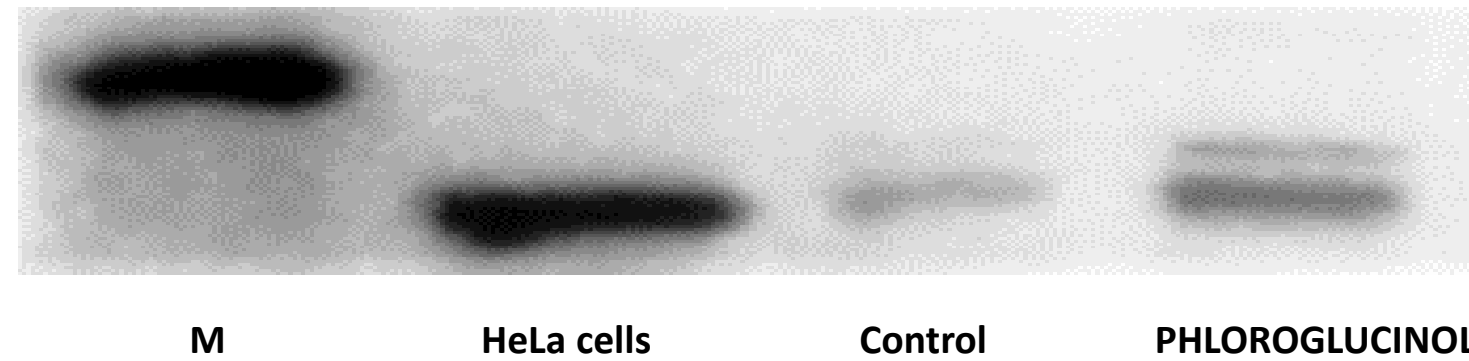
Gnotobiotic *Artemia* screening platform

- Small scale (ml)
- Continuous supply
- High throughput (48-72h)
- Highly controllable
- Realistic response



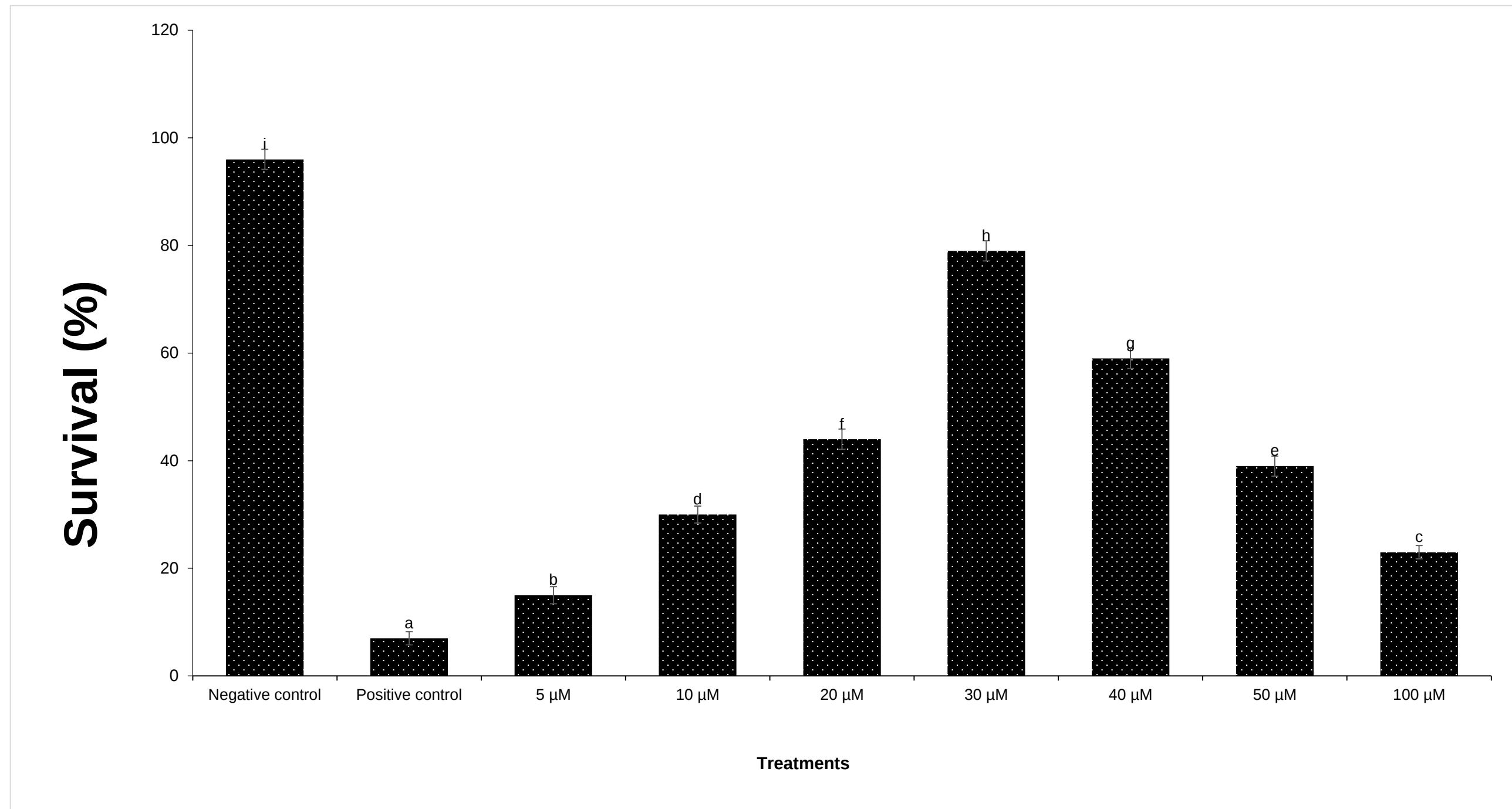
PHLOROGLUCINOL ACTIVITY

INDUCTION OF HSP70 PROTEIN IN BRINE SHRIMP LARVAE PRETREATED WITH PHLOROGLUCINOL (30 μ M).

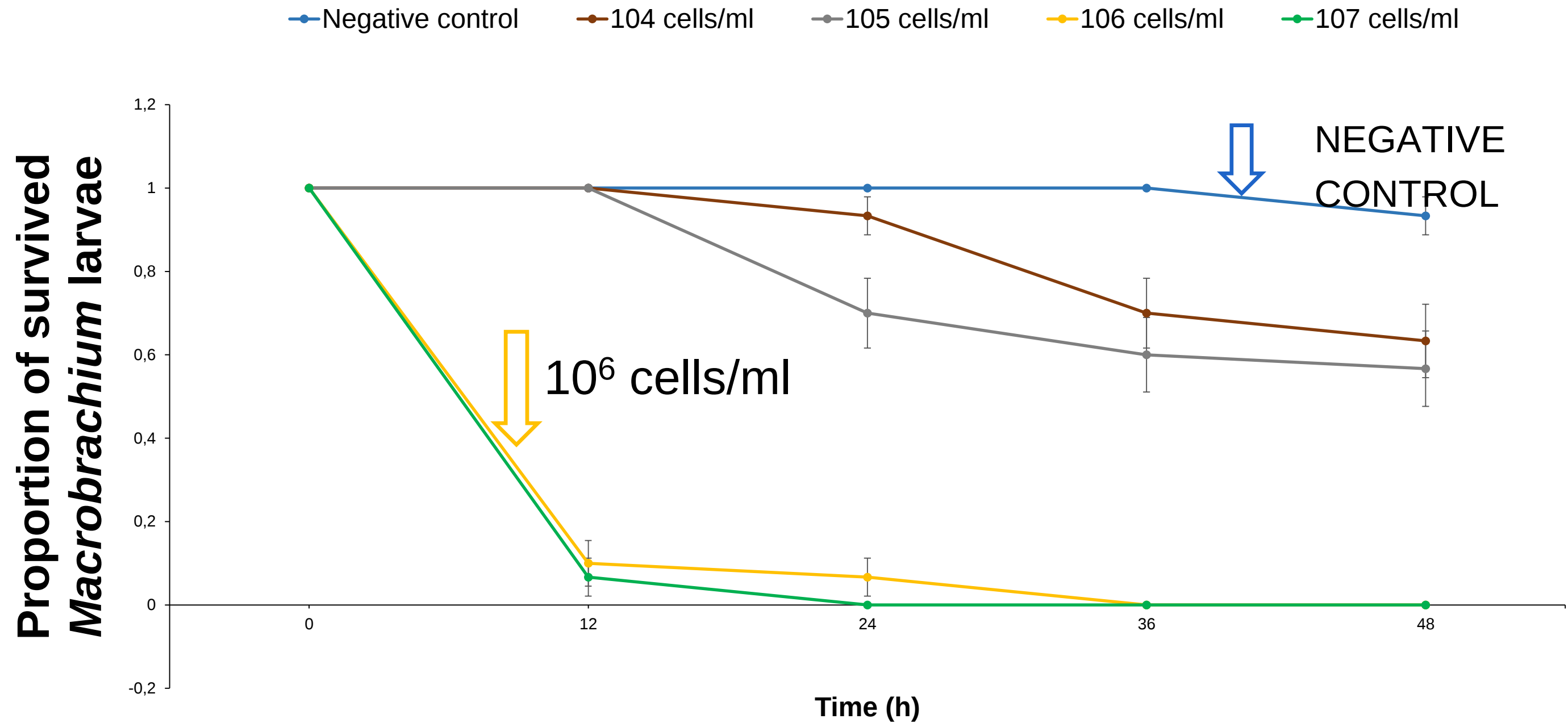


PHLOROGLUCINOL CONFERS PROTECTION TO ARTEMIA

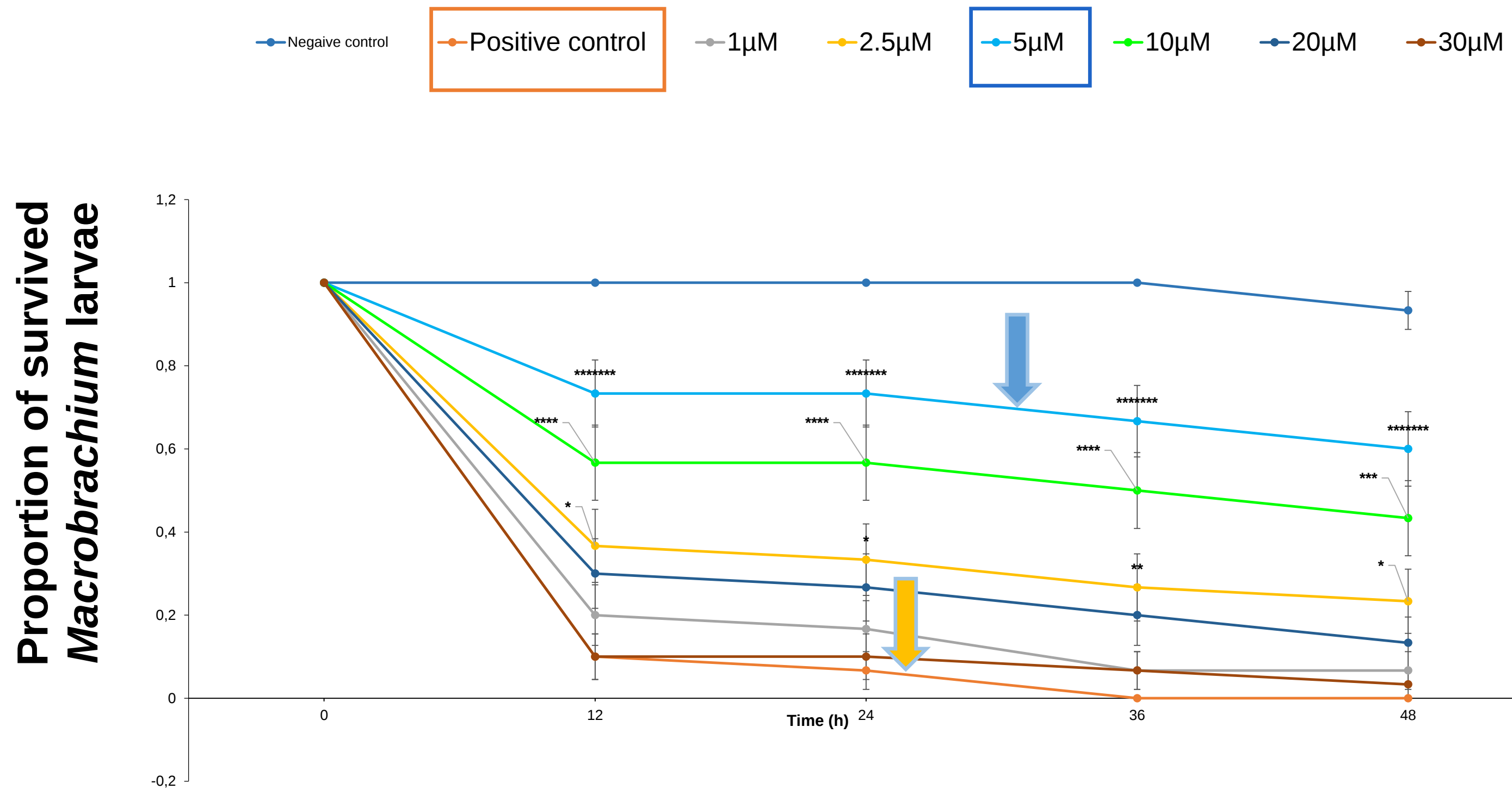
AGAINST PATHOGENIC VIBRIO PARAHAEMOLYTICUS



MACROBRACHIUM LARVAE (8-DAYS OLD) POST CHALLENGE WITH V. PARAHAEMOLYTICUS MO904 STRAIN



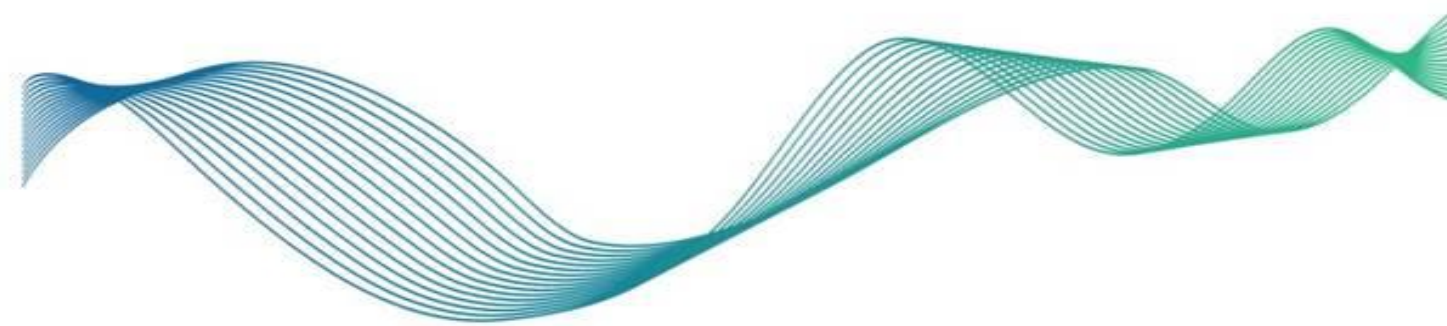
EFFECT OF PHLOROGLUCINOL PRETREATMENT ON THE SURVIVAL OF MACROBRACHIUM LARVAE (8-DAYS OLD)



CONCLUSION: PHOROGLUCINOL

- Non toxic at the tested concentration levels
- At 30 μM : induction of a stress response in Artemia
- Pretreatment with phloroglucinol confers protection against a biological stress (Vibrio)

MarineBiotech



NEPTUNA

Novel Extraction Processes for multiple high-value compounds
from selected Algal source materials

Coordinator: Dr Dagmar Stengel, NUI Galway, Ireland

Prof Bill Baker, NUI Galway and USF, US

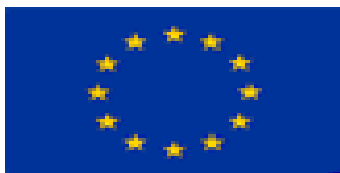
Prof Alan Dobson, UCC, Ireland

Prof Peter Bossier, University of Ghent, Belgium

Dr Sarah Hoskins, Unilever, UK

Prof Jeannette Hammer Andersen, Norway

ERA-MBT 1st Transnational Joint Call: Biorefinery processes



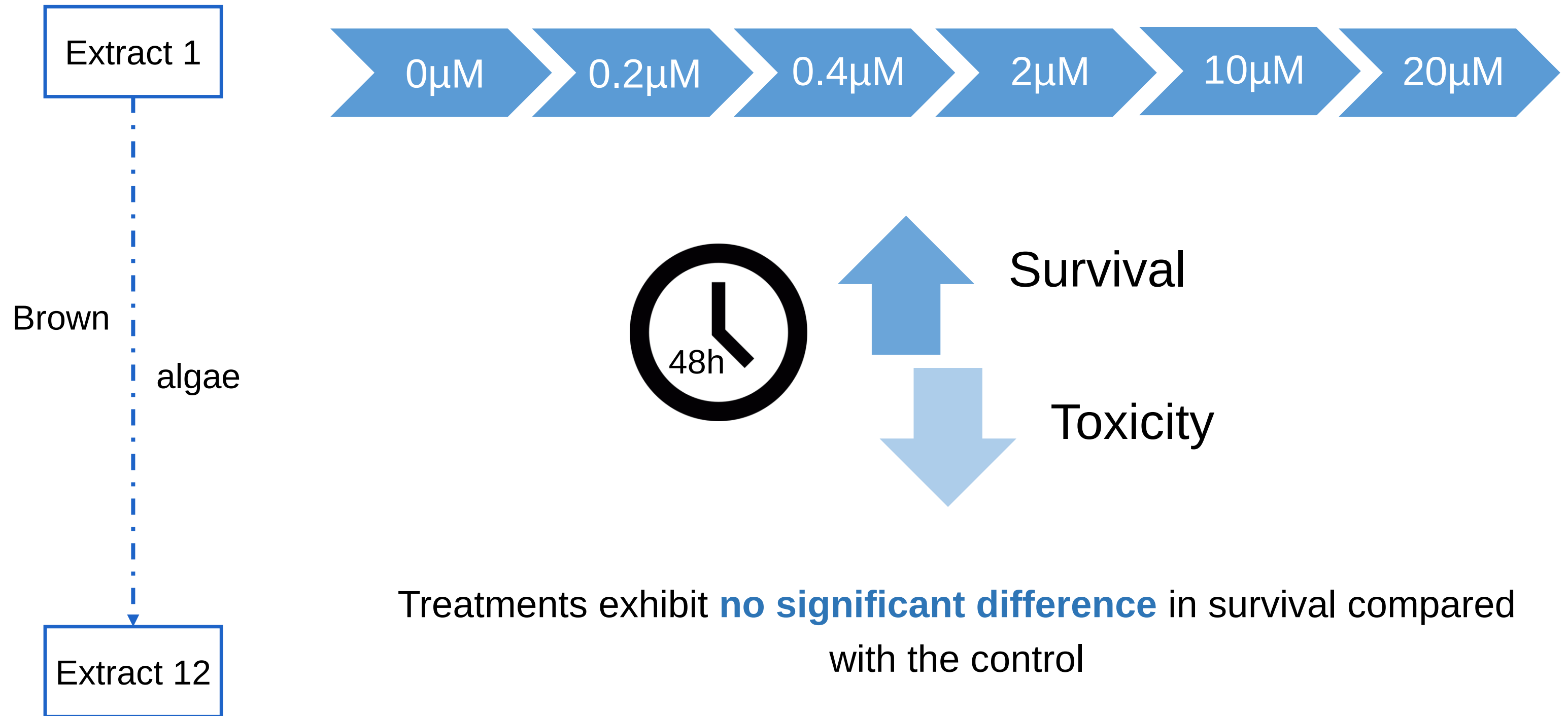
Marine Biotechnology ERA-NET (ERA-MBT) is funded under the European Commission's Seventh Framework Programme. Grant Agreement Number 604814
December 2013 - November 2017

MACROALGAE EXTRACTS: PERFORMED TESTS

- ✓ In vivo toxicity testing algal extracts
 - ✓ Survival
- ✓ In vivo evaluation – anti-bacterial activity
 - ✓ Pre-treatment survival
 - ✓ Continuous treatment survival
- ✓ *V. harveyi* virulence phenotypes – effects
 - ✓ Growth
 - ✓ Luminescence

The total phenolic content (%) of the NEPTUNA extracts, was expressed as *phloroglucinol equivalent*

IN VIVO TOXICITY – ALGAL EXTRACTS

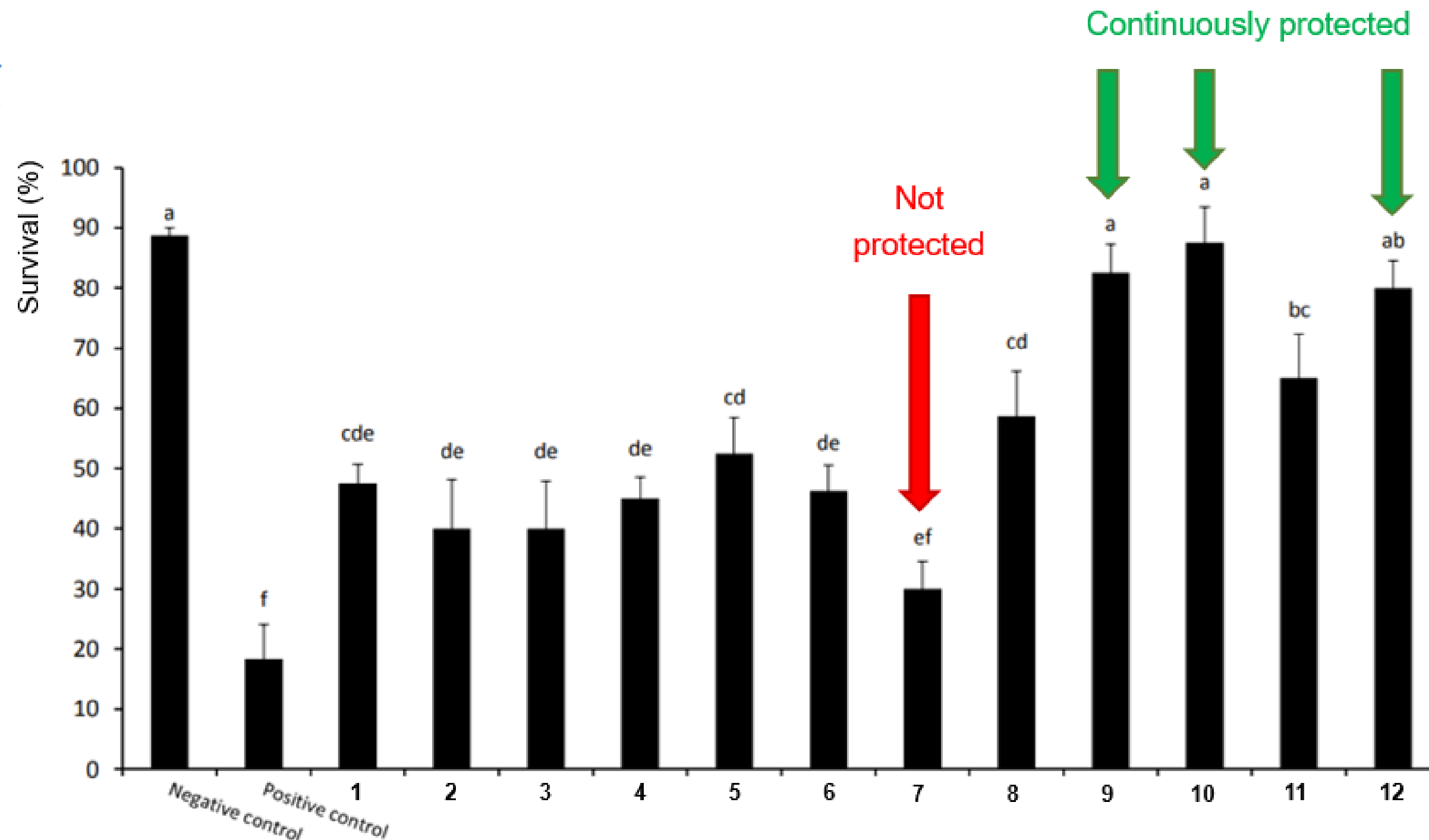
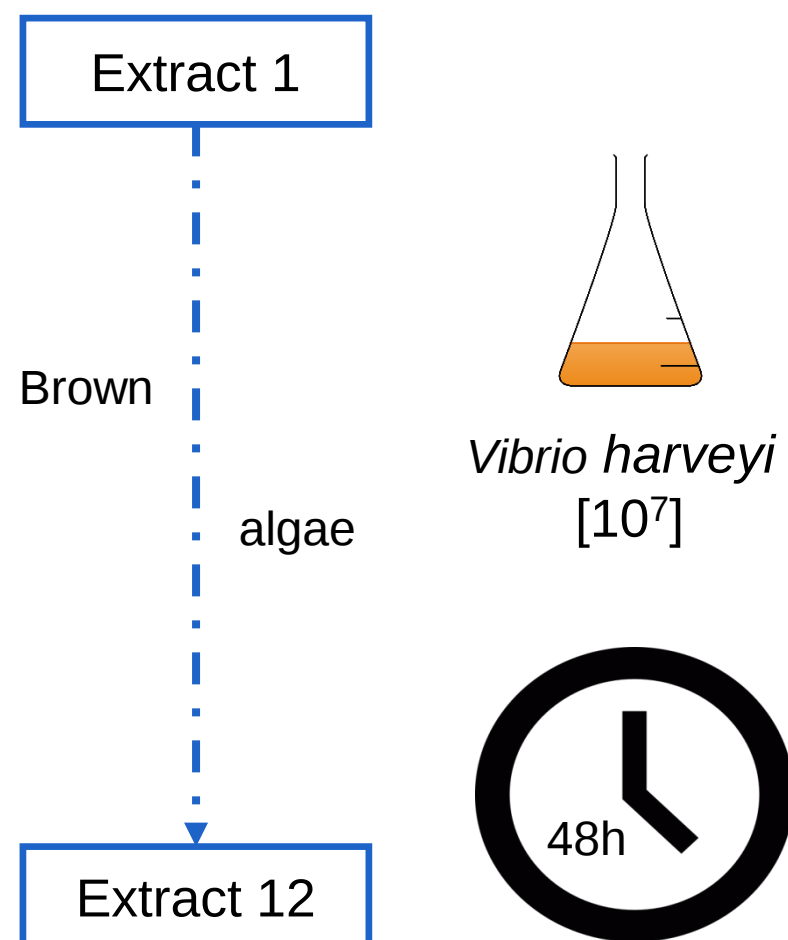


Treatments exhibit **no significant difference** in survival compared with the control

No toxic effect on Artemia under experimental conditions

IN VIVO EVALUATION: ANTI-VIBRIO ACTIVITY

0 μ M $\rightarrow$ 2 μ M

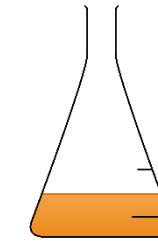


Effect of the algae extracts (AE) on the survival of Artemia larvae challenged with *V. harveyi*. Untreated Artemia challenged with *V. harveyi* (positive control) and those not challenged with *V. harveyi* (negative control) served as controls. All treatments were carried out with four replicates. Values (mean $\pm$ standard error) indicated with different letters are significantly different ($P < 0.05$).

V. HARVEYI VIRULENCE PHENOTYPES – LUMINESCENCE

0 μ M → 2 μ M

Extracts with better performance



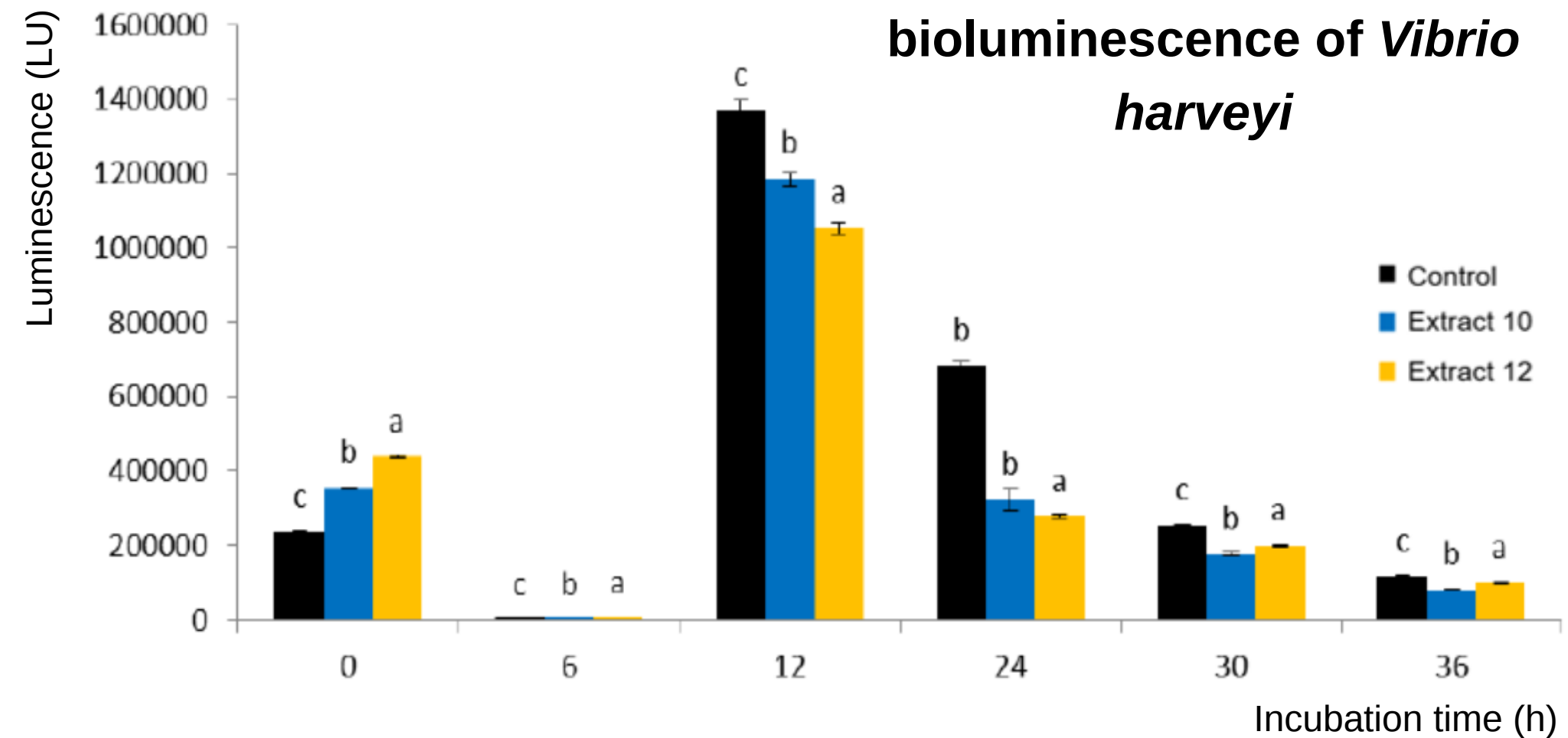
Vibrio harveyi
[10⁷]



Growth

No effect was seen on the growth of *V. harveyi*

Luminescence



Bioluminescence of *Vibrio harveyi* BB120 in MB medium with and without different AEs, Unexposed *V. harveyi* served as control. Values (mean $\pm$ standard error), at each time point, indicated with different letters are significantly different ($P < 0.05$).

CONCLUSIES

– In vivo

- Geen of beperkte toxiciteit voor Artemia
- Inductie van een “stress respons” in Artemia (phloroglucinol)
- Interferentie in Artemia - Vibrio model (sommige extracten): verhoogde overleving
- Reductie van Vibrio bioluminescentie (sommige extracten)

– Acknowledgement:

- ERANET Marine Biotechnology, FWO: Novel Extraction Processes for multiple high-value compounds from selected Algal source materials (NEPTUNA)

