

AQUAVAL

Valorisation of water use in aquaculture
using multi trophic systems



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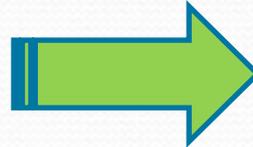
Luz Arregui

Water JPI
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MOTIVATION

Aquaculture:

the fastest growing food-producing sector



Environmental concerns

Need for optimization of **water** and **wastewater** management for **economic viability**

Driving interest for **novel technologies**:

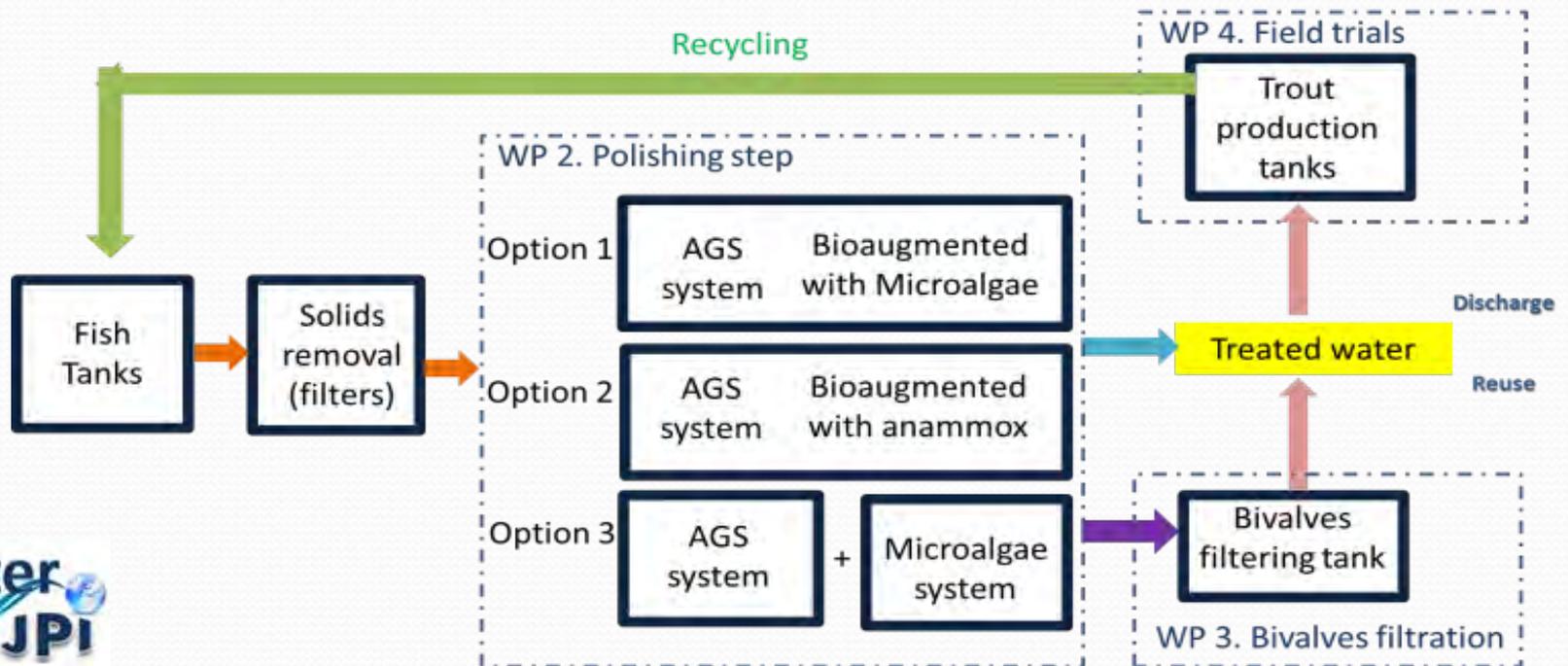
- more compact;
- cost efficient for intensive aquaculture to counteract water resources depletion.

PROJECT STRUCTURE

Technological solutions more compact and efficient, optimizing water use in aquaculture systems, promoting recycling of water and valorising its use prior to discharge



Multi-trophic systems (bacteria, algae and bivalves) to develop Model-Trout-Farms (MTF)



OBJECTIVES

- ❑ Stable operation of aerobic granular biomass systems to remove micropollutants.
- ❑ Stable operation of the anammox process operated at extremely low nitrogen concentration and low temperature.
- ❑ Treatment system for the recovery of water suitable for reuse in the aquaculture.
- ❑ Optimal operational conditions to culture bivalves.
- ❑ System feasibility at pilot scale in an aquaculture plant.

CONSORTIUM DESCRIPTION

- **UCP**



UNIVERSIDADE
CATOLICA
PORTUGUESA

Univ Católica Portuguesa

Expertise on granular sludge reactors and microalgae for wastewater treatment and reuse

- **USC**



Univ Santiago de Compostela

Expertise on the development of technologies based on anammox process

- **DSV**



University of Torino

Expertise in fish nutrition and freshwater rearing, with facilities for fish farming and bivalve rearing.

- **GTM**

TRES MARES



Grupo Tres Mares

Aquaculture facilities for the demonstrative pilot. On-site pathology, water and chemical analysis and hygiene assays.

- **UGhent**

Ghent University (Collaboration)

Experience on microbial biofloculation and microalgae



WP I - Project management

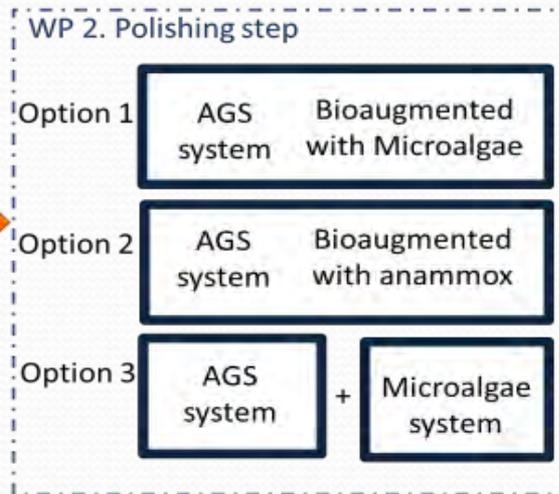
UCP, USC, DSV and GTM

- Manage the activities of the project
- Ensure achievement of outcomes and collaboration between teams
- Organize production of deliverables, meetings, workshops, short missions

WP 2 - AGS reactors operation with bacteria and microalgae

UCP, USC, UGhent (cooperation)

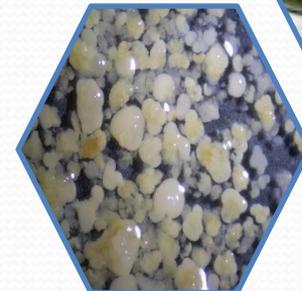
- Evaluate the three alternatives to treat wastewater from freshwater aquaculture systems.



→ UCP

→ USC

→ UCP



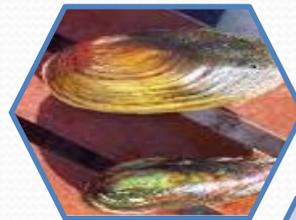
WP 3 - Bivalves filtration unit

DVS, GTM

- Evaluate bivalves for treatment of effluents from trout tanks
- Evaluate bivalves as trout feeding
- Investigate the application for rearing freshwater mussels



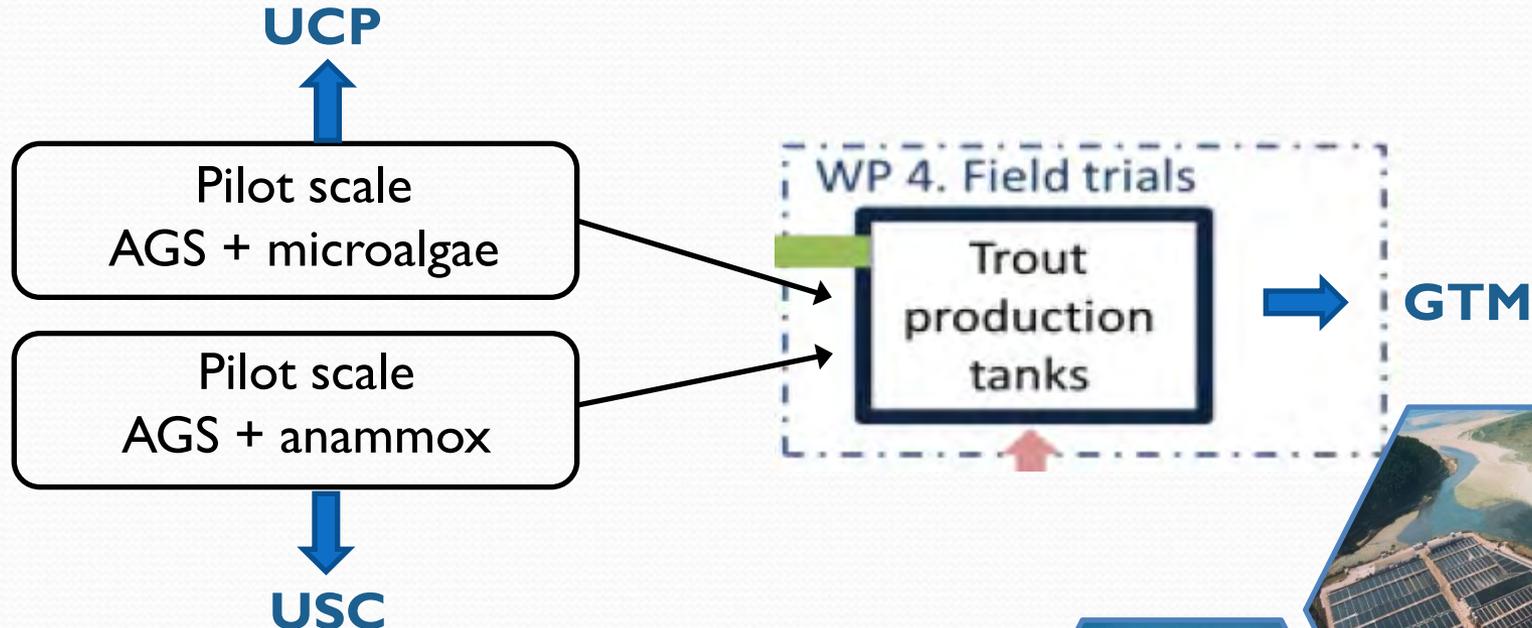
DSV + GTM support



WP 4 – Field Trials

USC, GTM, UCP,

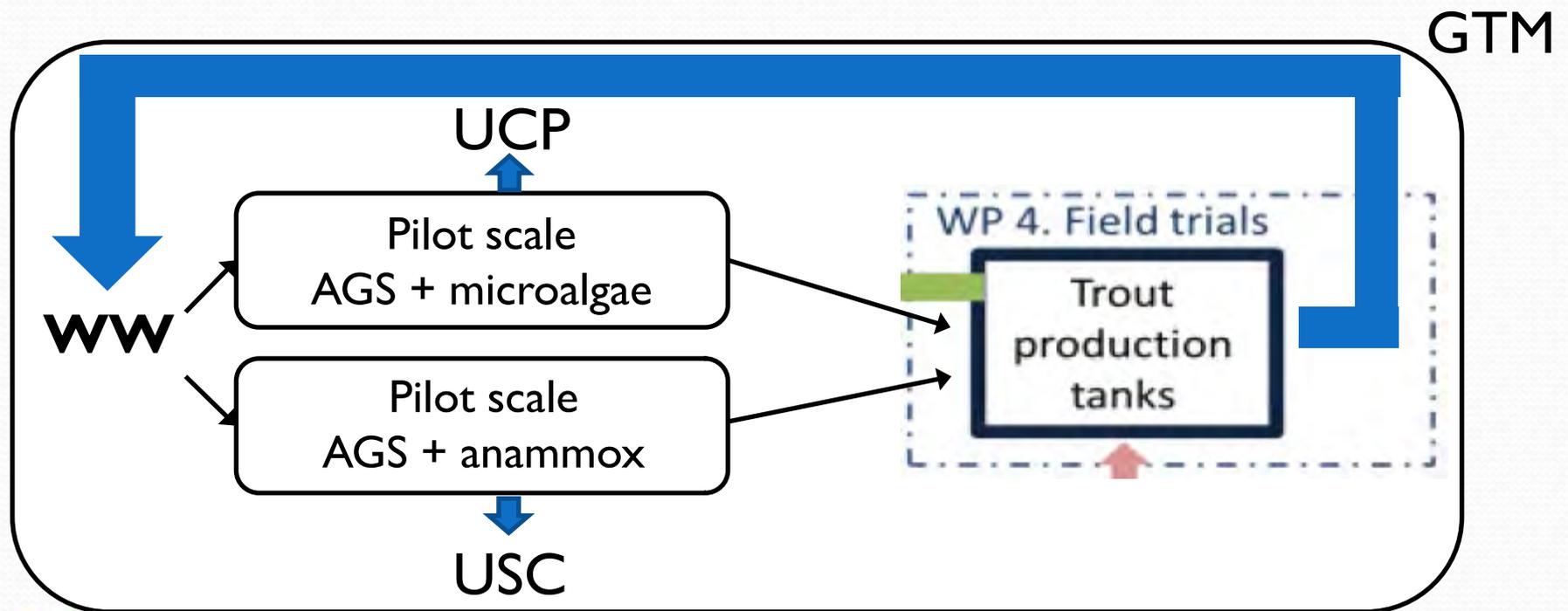
- Evaluate AGS reactors (bioaugmented with microalgae and anammox bacteria) in GTM facilities



WP 5 - Evaluation of the integrated system

GTM, UCP, USC

- Validate the integrated system implemented in situ
- Analysis of epidemiological and health risks impact



WP 6 - Dissemination and exploitation

UCP, GTM, USC, DVS

- Guarantee the correct dissemination of the results
- Exploitation of obtained results

Expected Impact of the Project

•Challenge-1) Increasing the efficiency and resilience of water uses

AGS reactors reduce N and pollutants with no temperature increase thanks to anammox

-Use of bivalves as depuration units using wastewater as resource

- 30% of trout production increase by recovery of 80-90% of the used water

- Granular sludge and anammox based processes as more energy efficient

•Challenge-2) Monitoring and reducing soil and water pollution

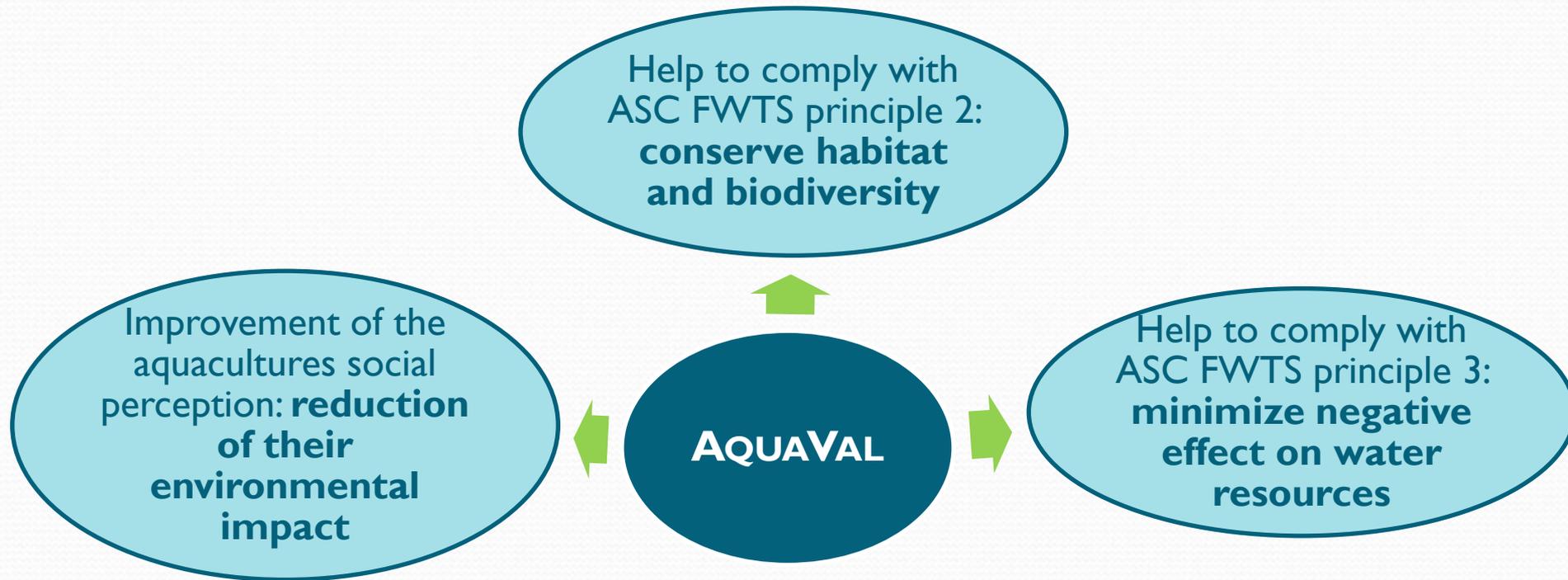
Technology aiming at reducing nutrient loads in the effluents

- Use of bivalves rearing units for depuration, indirectly increasing biodiversity

- Decrease the risk of therapeutics diffusion from aquaculture facilities

- Bivalves can drastically reduce bacteria carrying antibiotic resistance

Societal impact



Stakeholders:

- Industries: Findfresh (PT), FCC Aqualia (SP),
- Sectorial associations: Portuguese, Spanish and Italian Associations for Aquaculture producers

Promotion of a multi-disciplinary work

- **Multidisciplinary teams** allowing a **multi-skilled environment**
- Combination of **university and industrial partners** from different countries with complementary expertise
- **Connections among the partners** in terms of materials and knowledge

University partners	USC and UCP	Development of technologies for water treatment
	DVS	Bivalves culture
Industrial partner	GTM, a trout aquaculture farm	Final user of the development

Encouraging proposals with fundamental and/or applied approaches

- The integrated approach proposed will significantly decrease the impact of fish farm and will fit the commitment of European innovation programs (H2020, EIP Water, Water JPI)
- Feasibility to grow bivalves with potential economic outcomes
- The application of the developed system in situ will facilitate its diffusion to other companies

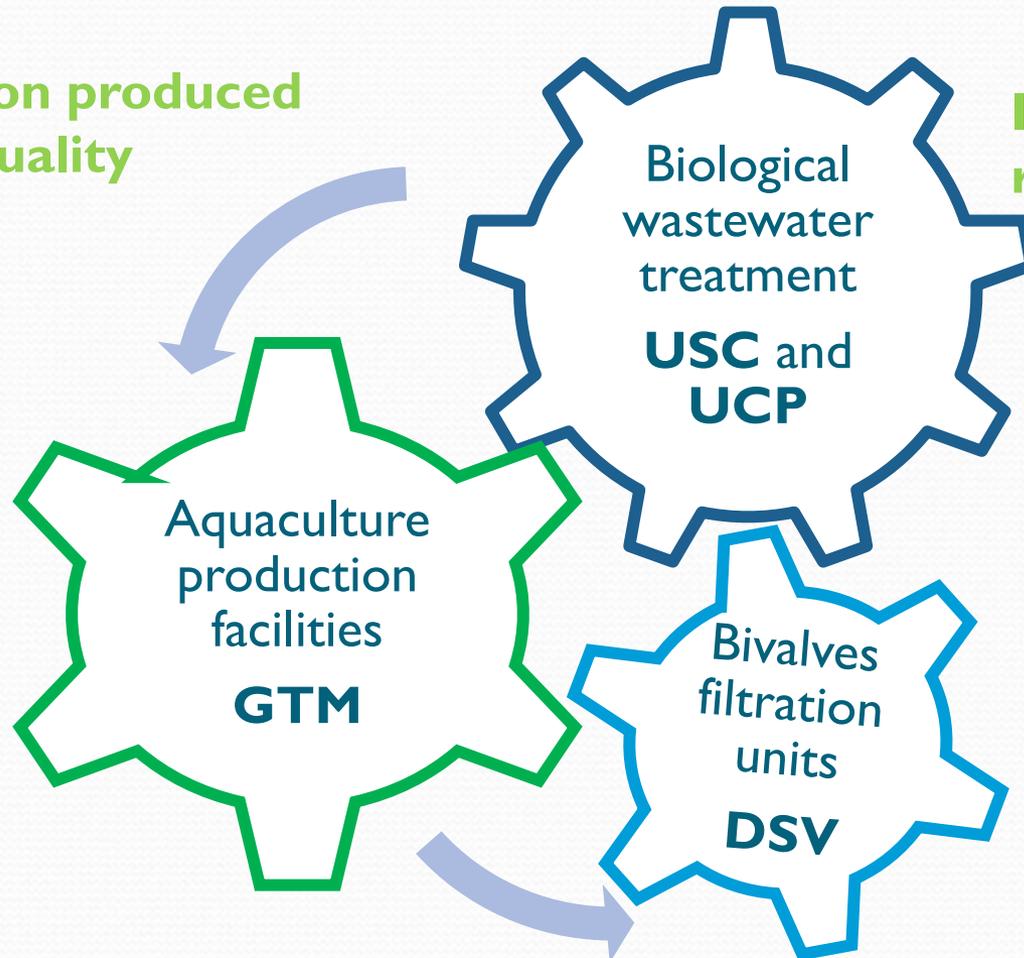
Mobility within the Consortium

From \ To	UCP	GTM	USC	DSV
UCP		Validation studies of the integrated system (WP4→5) (intersectorial)	Activity tests for granules enriched with microalgae (In WP2)	
GTM				Quality of fish fed with bivalve based feeds (WP5→4)(intersectorial)
USC	Bioaugmentation of AGS (In WP2)			Microbiological characterization of effluents (WP2→3)
DSV	Growth of bivalves on AGS+microalgae effluents (WP3→2)	Test the bivalve meal on rainbow trout (WP5→4) (intersectorial)		

Collaborative research and innovation

Feedback on produced effluents quality

Impact of reusing or recycling effluents



Effectiveness of mussel meal in rainbow trout nutrition

Acknowledgements

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