

# Automated apparatus and method for cultures of organisms in an aquatic environment



## Abstract

The present invention relates to an automatic apparatus for the cultivation of cultures of organisms in an aquatic environment. In particular, it relates to an automatic computerised apparatus system for the cultivation of aquatic invertebrates. Furthermore, the present invention relates to a corresponding process for the cultivation of cultures of organisms in an aquatic environment.

## State of the art

The use of aquatic organisms in scientific research is becoming increasingly important. In order to survive in captivity and, above all, to live and reproduce without stress, each aquatic organism (marine or freshwater) requires specific ecological conditions. Current technologies and systems that allow the breeding of organisms in an aquatic environment remain limited to a single culture per time and require complicated modifications from a construction and methodological point of view to adapt them to cultures of different organisms to be bred at the same time.

## Invention Description

In order to overcome the limitations of known systems, the invention relates to an apparatus adaptable to various types of culture and to a process adaptable to the needs of the user and more efficient and functional for many different species.

In particular, it refers to an automatic apparatus for the production of aquatic organisms in total autonomy, equipped with a control computer and a programming system. It comprises storage tanks, filters and special intelligent tanks for breeding animals and algae in a marine or freshwater environment, including model organisms for scientific research (Figure 1). Probes and effectors in the tanks allow complete automatic water treatment according to a program set up in the control logic, guaranteeing complete compliance with the protocols and constancy of the set ecological conditions (Figure 2). The organisms to be reared are contained in special cylinders equipped with two porous septa and special valves that allow management comparable to that carried out by a human operator, including the administration of dry or live foods, partial or total water replacement, elimination of any faeces and food residues. The water before introduction can be treated in various ways, including total sterilisation.

The system is fully thermoregulated and controlled to ensure constant experimental conditions. It allows automatic culture of different organisms, benthic or planktonic (including small copepods and soft-bodied organisms) thanks to special dosing rings used to perform water changes without producing pressure on the body. It can be used to produce and reproduce invertebrates and fish in temperate or tropical waters.



FIGURE 1 – Prototype used for research

## Industrial Property

European Patent no. EP 3282834 validated and granted in Germany, France, United Kingdom and Italy.

The Patent Application was filed with priority on 16.04.2015 as PCT/IB2016/052128

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## Advantages

The advantages of this patent are the following:

- cost savings for cultures of aquatic organisms, even only for fewer staff on the job;
- to increase yields of cultures of aquatic organisms as a result of lower mortality and better productivity, especially for the production of aquarium fish such as Amphyprion, discus, Caridina, tropical marine decapods, Lysmata;
- versatility, because the invention is adaptable to any experimental or production conditions, and also because it allows automated repetition of tasks that would require the presence of technical staff.

## Applications

This patent finds application in the following areas:

- aquarium use, because it is useful for aquarium manufacturers and/or producers of systems and components for tropical aquariums and greenhouses, and for breeders of animals and algae;
- in the aquaculture field, for small-scale live food production and for the reproduction of invertebrates to be carried out at different times in the rearing protocols (a single unit saves units of technical staff to produce live food or post-larvae from gametes after in vitro fertilisation);
- in scientific research, for the breeding of model animal and plant organisms under strictly controlled conditions.

## Development stage

### Current TRL: 5

A prototype is made by integrating components with reasonable and realistic supporting elements for use in the research environment..

### Perspective TRL: 6 (7)

The apparatus system may be used in a simulated operating environment.

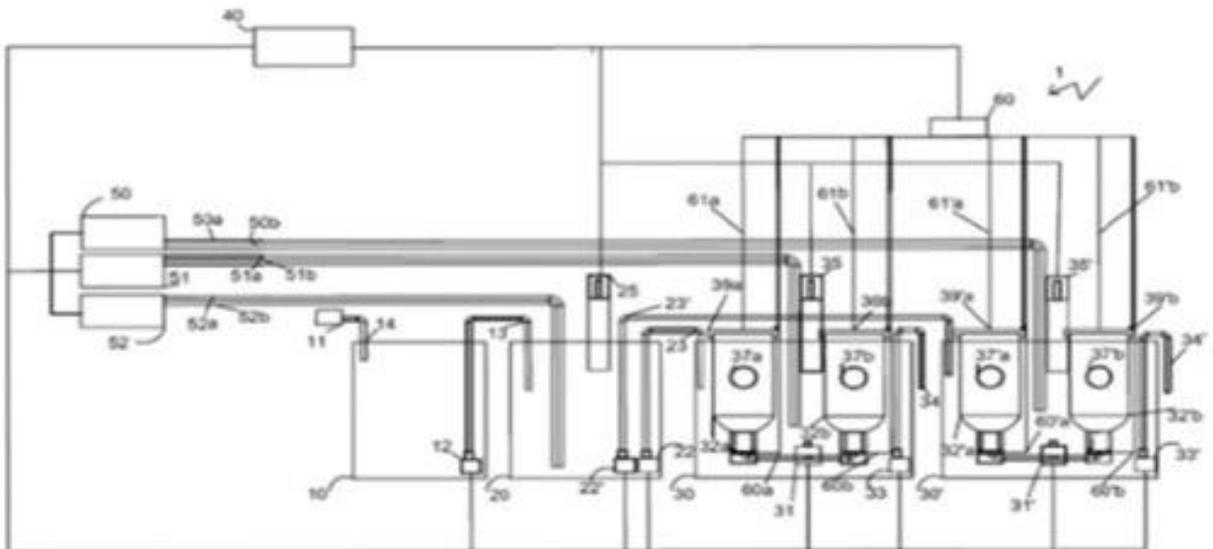


Figure 2 – A graphic scheme of an apparatus for growing of cultures of aquatic organisms comprising at least one storage tank for continuously collecting not treated water, at least one filtering tank connected to the storage tank, at least one rearing tank connected to the filtering tank and comprising at least one container for rearing the culture and at least one control and management system controlling the environmental conditions of growth of the culture and automatically varying the culture medium in response to variations in growth.