MASTS Small Grant Award Scheme

SG345 Funding Report: Investigation into the larval behaviour of *Ostrea edulis*

Ana Rodriguez-Perez ar62@hw.ac.uk

Heriot-Watt University, Edinburgh, and St Andrews University

Project overview

Europe´s native oyster (*Ostrea edulis*) beds once covered vast areas of Europe´s coastline and constituted a central ecological and economic resource. Yet today, after centuries of overfishing, these beds are functionally extinct and they are considered one of the most imperilled marine habitats in the world. There is an increasing interest in restoring the native oyster throughout Europe to recover the ecological functions which the European oyster, as a keystone species, provides in the marine environment. However, while the adult life stage of *O. edulis* has received a large amount of scientific attention, there is a lack of knowledge on its larval ecology and hence the dispersal characteristics of this habitat.

A MASTS small grant was awarded for the purchase of equipment to accurately observe and quantify the behaviour of *O. edulis* larvae in the water column, with the objective of subsequently informing the parameterisation of hydrodynamic models coupled with larval movement models. These results are expected to better predict dispersion patterns in this species, and will have the potential to inform planned restoration efforts in selecting restoration sites which can promote larval recruitment and connectivity between restored beds.

Summary of work funded by this grant

Initial larval work was carried out at FAI Ardtoe Marine Research Facility (Scotland) in August 2016, and a larger proportion of the experiments were conducted at the Danish Shellfish Centre (DSC) in the summer of 2017.

1. Methodology
   A novel method was developed to accurately observe, video record and quantify larval behaviour using a USB microscope connected to a computer, a retort stand to support the USB microscope, a tall aquarium with a narrow depth to insert the larvae and a plasticised grid in the background (Fig. 1). This inexpensive method allows to magnify and record the vertical movements of larvae in tall water columns (up to ~ 70 cm) in both light and darkness.

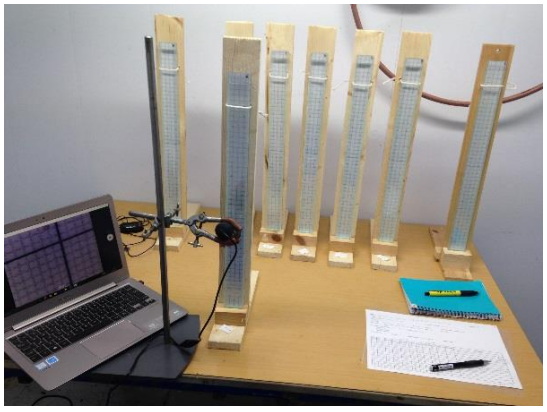

Figure 1: Larval visualisation method using a USB microscope

2. Larval distribution
   The larvae's vertical distribution was investigated by means of two different approaches. In the first approach, the distribution of 20-40 larvae was accurately quantified throughout the larval life history in light, darkness, as well as with and without food conditions. In the second approach, about 1000 larvae were observed throughout their life history in beakers and their distribution was estimated at regular time intervals. Preliminary analyses indicate that there is a strong preference for the bottom throughout the larval life history and regardless of treatment.

3. Swimming speed
   Swimming speeds were video recorded in 50 cm tall aquariums during all larval life stages, and at two temperatures, 13°C and 25°C. The results of these videos are currently being processed, but they seem to indicate that *O. edulis* larvae can reach greater speeds than previously reported in the literature, and hence have a larger control of the vertical position in the water column than previously thought.

4. Future work
   The collaborative work with DSC will continue in the summer of 2018, when at least one more experiment on the pelagic larval duration of *O. edulis* at different temperatures will be carried out.

Benefits to the MASTS community

The larval visualisation method constitutes a novel methodology for observing larvae and it is more affordable than methods used in previous studies, hence it could be used for future larval studies that have a lower budget available. The equipment for larval visualisation, purchased with this grant, will be made available to other projects upon completion of the larval behaviour work, and a detailed account on the advantages and disadvantages of the methodology will be presented at the 2017 MASTS Annual Science Meeting.

The partnership that has been fostered with FAI Ardtoe Marine Research Facility and the Danish Shellfish Centre may benefit other MASTS researchers that would be interested in conducting research at these centres, as they are willing and able to host further researchers.

Finally, the research supported by this grant will inform the planned restoration efforts of *O. edulis* in UK, and possibly in Germany and the Netherlands. This may both increase the resilience of the restored beds by increasing their connectivity, and enhance the sustainability of fishable stocks through potential larval supply from the restored beds. It is expected that the planned restoration efforts of *O. edulis* will result in a healthier and more biodiverse local marine environment, which is aligned with the core vision of MASTS.