



Aquainnova

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# PARAQUAM

**Parasite pathogens in new species of Mediterranean aquaculture: an experimental approach**

## The Challenge

Species diversification has become a major challenge to Mediterranean aquaculture. The greater amberjack *Seriola dumerili* is one of the “new species” of interest for diversification. However, the development of greater amberjack farming at industrial scale is jeopardized by several highly pathogenic parasites. Gill monogeneans (*Heteraxinidae*) and blood flukes (*Sanguinicolidae*) are known to cause mass mortalities in experimental amberjack cultures. The control of these infections is hampered by the lack of knowledge about the biology of these parasites.

## Project Objective

This project will attempt to elucidate the life cycle of Heteraxinid monogeneans and sanguinicolid blood flukes infecting cultured greater amberjacks, as well as to evaluate different strategies to control the infections caused by these parasites.

## Key Points

- A taxonomical study of the parasites
- A study of the development, transmission and life cycle (including the development of free living and parasitic stages and the habitat selection within the fish)
- An evaluation of several prophylactic and control methods (including several substances commonly used in fish cultures, such as disinfectants and anaesthetics).

### EATiP Thematic Area of Relevance

**TA1:** Product Quality, Consumer Safety and Health

**TA2:** Technology and Systems

**TA3:** Managing the Biological Lifecycle

**TA4:** Sustainable Feed Production

**TA5:** Integration with the Environment

**TA6:** Knowledge Management

**TA7:** Aquatic Animal Health and Welfare

**TA8:** Socio-Economics and Management

### Key Words

Disease, aquaculture diversification, Parasites

### Project Information

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## Output Highlights

### New Knowledge

New species of *Paradeontacylix* from the Mediterranean amberjack were sequenced and analysed together with further samples of other *Paradeontacylix* species from *S. dumerili* obtained from Japan. With the collaboration of the University of Adelaide, providing samples of *Paradeontacylix* from *Seriola* spp. from Australia and New Zealand, which will be used to complete the picture of the worldwide distribution, phylogeny and evolution of *Paradeontacylix* parasites and their *Seriola* spp. hosts.

### New Pathological Information

*Zeuxapta seriola* infection was associated with important mortalities of amberjacks reared in tanks in the experimental facilities of the Spanish Institute of Oceanography (Western Mediterranean) during the period 1998–2000. No apparent relationship was observed between the abundance of the parasite and the condition factor. However, the haematocrit values were significantly lower in the fish infested with monogeneans. The light and scanning electron microscope studies of affected gills revealed that the parasites attached to the host grasping one or two lamellae with each clamp of the haptor, which led to lamellar synechiae, lamellar clubbing and disruption of epithelial and vascular structures. A mild to moderate epitheliocystis infection was also detected in gills. Combined effects of gill damage and parasite blood feeding could be related to the anaemia and, finally, the death of the fish.

### Guidelines on Prophylaxis and animal welfare

The project undertook experimental infections with monogeneans occurring on gilthead seabream and sharp-snout seabream. Egg development, larval behaviour and survival rates, as well as infection strategies were investigated in *S. aurata*, whereas in *D. puntazzo* the studies were focussed on the distribution of the parasite in the host gills and the related pathology.

### New morphological knowledge

Study of the myxozoan parasites of fish candidate species for Mediterranean aquaculture, the striped seabream. Elongate plasmodia with myxosporean spores belonging to the genus *Unicapsula* were found in the skeletal muscle of the striped seabream. The only species of *Unicapsula* described from the Mediterranean is *Unicapsula pflugfelderi* from the picarel. Scanning electron microscopy of the spores revealed a different shell valve distribution than the one used for the diagnosis of the genus *Unicapsula*. This resulted in a review of the genus *Unicapsula* dividing it into two morphological groups of different spore valve arrangement.

See the final report at [http://www.uv.es/~zoomar/paraquam\\_archivos/paraquam\\_r.pdf](http://www.uv.es/~zoomar/paraquam_archivos/paraquam_r.pdf)

## Next Steps – Suggested Actions/Follow On



### RTD

- The planned immunological study of fish infected with monogeneans had to be postponed and so would require further investigation.
- As a result of problems associated with the availability of Mediterranean amberjack for experimental work, the focus of the study on sanguinicolid parasites of the genus *Paradeontacylix* in amberjack was moved to molecular aspects.

## Related Publications/Projects

### Publications:

REPULLÉS-ALBELDA et al. (2008). *Parasitology International*, 57 (3): 405-414; HOLZER et al. (2008). *Parasitology International*, 57 (4), 472-482; MONTERO et al. (2009). *Aquaculture*, 288 (1-2): 132-139. MONTERO et al (2004). *Aquaculture*, 232: 153-163. ALAMA-BERMEJO, G.; RAGA, J.A.; HOLZER, A.S. (2009). Morphological and molecular comparison and redescription of the myxozoan parasite *Unicapsula pflugfelderi* Schubert et al., 1975 from two teleost hosts in the Mediterranean and a review of the genus *Unicapsula* spp. *Journal of Fish Diseases*, 32(4): 335-350.