

Current and Past Collaborative Research

- PhD in *Carcharias taurus* (Sand Tiger Shark) Captive Breeding.
 - Jointly funded by The Deep and the University of Hull
 - Supervised by Dr. David Gibson, Director of Husbandry and Operations, The Deep and Dr. Andrew Lawrence, University of Hull.
 - Study aims to investigate the factors influencing captive breeding of the threatened species *C. taurus*.
- MPhil In Coral Propagation
 - Jointly funded by The Deep and University of Hull.
 - Supervised by Dr. Andrew Lawrence, University of Hull.
 - Study aims to investigate the factors influencing the growth of corals in aquarium conditions with the view to maximising coral growth and propagation.
- Novel use of Praziquantal for parasite treatment.
 - Funded and carried out by The Deep in conjunction with Zoovet International Ltd.
 - Study aimed to develop a new treatment regime for Monogenean flukes, a serious risk to animal welfare in aquarium systems.
- Sea Cucumber Population Dynamics Study, Red Sea.
 - Project run by University of Hull and funded by The Darwin Initiative.
 - Supported by The Deep with staff and resources.
 - Study to look at the economic and environmental impact of the removal of sea cucumbers from reefs in The Red Sea.
- Economic importance of Great White Sharks (*Carcharodon carcharias*) in South Africa
 - PhD project run by University of Pretoria, University of Cape Town, Marine and Coastal Management, Natal Sharks Board and the South African Museum.
 - Staff member from The Deep acted as an observer for a six week period gathering data for the project.

In-House Current and Past Research

- Development of husbandry practices Study of β -glucan immunostimulant. Uses of as adjuvant to vaccination, combination treatments with antibiotics and quarantine procedures
- Preliminary studies into the efficacy of β -glucan immunostimulant as an intramuscular injection.
- Continuation of praziquantel study with bioladen lifesupport systems
- Energetic studies of feeding regimes.
- Use of liquid vitamin supplementation of food and subjective study of health and colouration of exhibit animals
- Surgical procedures to remove an infected eye of a Flying Gurnard *Dactylopterus volitans* and use of constant flow anaesthesia
- Surgical excision, histological investigation into a tumor-like growth and recovery of Greater Spotted Dogfish *Scyliorhinus stellaris*.
- Development of techniques for 'in water' administration of intramuscular drugs
- Study of mineral and essential element depletion of artificial seawater in closed cycle filtration systems
- Comparison of bath treatment and system dosing efficacy on the treatment of a monogenean fluke infection in the Yellow Masked Angelfish *Euxiphipops xanthometapon*
- Tooth shedding rate in captive Grey Reef sharks, unique opportunity for investigation into recording increase in tooth size possible correlations with growth rates
- Biomass calculations of exhibits
- Histological examination of post mortem samples with development of photographic database for tissues references
- Videographic and photographic database of post mortems and treatments– Their use in baseline line reference data, unique to The Deep
- Development of interactive CD-ROM for training in post mortem and quarantine procedures

- Trials with a sintered glass filtration column for removal of nitrates on the coral quarantine system.
- Positive feedback habituation to visual targets in the Grey Reef shark *Carcharhinus amblyrhynchos*–A technique to segregate species for target feeding
- Use of feeding stations to target specific exhibit animals
- Environmental enrichment for the Day Octopus *Octopus cyanea*
- Trials and development of application of a new gel diet
- Enrichment regimes for live food culture
- Management database to amalgamate stock, transfers drug, treatment, PM, photographs, donations from public, COSSH, and veterinary records– Aim to design database transferable to other aquaria.
- Clown fish breeding study– Investigation of preference of spawning substrate, nutrition work, egg mass density, survivability at various stages in lifecycle
- Literature review of Cold water corals eg. *Lophelia sp.* as background research for future displays and development of husbandry manual for the European coral FAITAG (Fish and Invertebrate Taxonomic Advisory Group)
- Continuous monitoring of behaviours observed in exhibits
- Breeding success of the Brown Banded Bamboo shark *Chiloscyllium punctatum* in the lagoon

Publications and presentations

- “Stock Record Techniques at The Deep”, presentation by Graham Hill (Science Officer, The Deep) at The National Aquarium Workshop 2001.
- “Coral Display at The Deep”, poster presentation by Andrew McLeod (Senior Aquarist, The Deep) at The National Aquarium Workshop 2001.
- “Quarantine”, poster presentation by Richard Oades (Aquarist) at The National Aquarium Workshop 2001.

- “Aquarium Diving Operations in the UK”, presentation by Dr. David Gibson (Director of Husbandry and Operations, The Deep) at the National Aquarium Workshop 2002.
- “Applications of Praziquantel for the control and treatment of monogenean flukes in aquaria”, presentation by Katy Rigby (Assistant Curator, The Deep) and Mark Geach MRCVS (Zoovet International Ltd.)
- “Coral Propagation at The Deep”, poster presentation by Andrew McLeod (Senior Aquarist, The Deep) at the National Aquarium Workshop 2002.
- “Feeding and Supplementation”, poster presentation by Richard Oades (Aquarist, The Deep) at the National Aquarium Workshop 2002.
- Case Study: Grey Reef Shark Transport. The development of post transport acclimation using fluid therapy. Presentation by Graham Hill (Science Officer, The Deep). To be presented at 7th European Elasmobranch Association meeting in September 2003 in Italy.
- “The Deep, it’s first year and beyond”, presentation to be given by Dr. David Gibson (Director of Husbandry and Operations. The Deep) at the European Union of Aquarium Curators conference, Vienna October 2003.
- The clinical development and management of catherisation and parenteral nutrition in captive Grey Reef Sharks (*Carcharhinus amblyrynchos*). Intended for peer reviewed publication in Veterinary Record
- Pharmacokinetic studies of praziquantel in seawater and the effects of protein skimming, ozone and ultraviolet radiation on its stability and efficacy. Intended for a report for the Veterinary Medicals Directorate and for publication as a paper as yet undecided.
- The isolation and genetic identification of temperate bacterial pathogen *Vibrio ichthyenteri* found in Pollock (*Pollachius pollachius*). Intended as short communication.

Additional Outputs

Elasmo ASP

Dr. David Gibson, Director of Husbandry and Operations for The Deep is the Co-coordinator of the European Union of Aquarium Curators Elasmobranch ASP (Aquatic Sustainability Plan). In conjunction with Juan Romero, Dr. Gibson coordinates conservation and research initiatives in relation to Elasmobranchs within European Aquariums.

Anti Finning Campaign

In 2002 The Deep ran a pilot programme aimed at increasing the public awareness of the issue of Shark Finning for the Shark Fin Soup Trade. In a highly public campaign numerous restaurants were awarded with "Shark Friendly" certificates for agreeing to sign up to The Deep's standards on the non-consumption of shark or shark based products.

This campaign was run in conjunction with The Shark Trust.

The Deep also obtained 15,000 signatures in support of a worldwide ban on Shark Finning, which will be presented by The Shark Trust to the United Nations in 2003.