



EUAC Conference 2018 Abstract Book



THE DEEP

For conservation, not profit.



WELCOME

Welcome to The Deep! We are delighted that you are joining us in Hull for this year's EUAC Conference! Over 160 experts from the aquarium industry will be taking part in the conference over the course of this week. We will also be celebrating 20 years of FAITAG and International Sawfish Day – it's going to be a busy week!

The Deep opened to the public in 2002 and operates as an education and conservation charity. Our dramatic building overlooks the Humber estuary and the River Hull and was designed by world class architects, Sir Terry Farrell and Partners. The building was inspired by natural geological land formations. With its gleaming glass and aluminium thrusting into the dramatic landscape, it represented a brand new future for the city of Hull, in what was then one of the most deprived and unfashionable cities in England.

16 years on and we have built our reputation as a world player in conservation and proudly sit amongst our aquarium colleagues in BIAZA, WAZA and EUAC. We have also played a crucial role in the regeneration of a city which has been on a journey of transformation in recent years. In 2017, Hull celebrated as the UK City of Culture, a title which has been proudly embraced by all in the region.

The Deep is committed to its conservation work at home and abroad and proudly partners with a number of global conservation

organisations including the IUCN and Équipe Cousteau. With strong links to the University of Hull, The Deep supports a number of student projects each year and houses the Universities 'Total Environment Simulator'. The Deep and the University are currently developing the next exciting chapter of collaboration, a joint Institute for research to include an IUCN Red Listing Hub, state of the art lecture space along with marine culturing and breeding systems.

We very much hope you enjoy your stay in Hull. We are a friendly city with an exciting offering including free museums and art galleries, beautiful historical buildings, lively entertainment, bustling shops, bars and restaurants... all in Yorkshire's only waterfront city! Please do let us know if there is anything we can help you with during your stay.

Kind regards,
Katy Duke
CEO

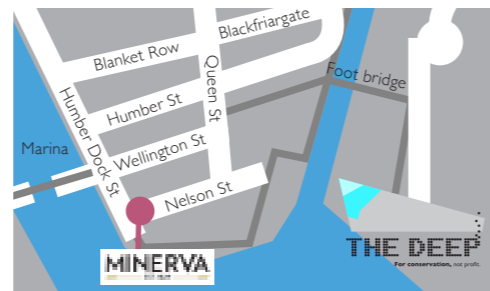
WHILE YOU'RE HERE...

Behind the scenes tours

Places are still left for the behind the scenes tours on Friday 19th October. Please see Clair Rush / Information Desk to book.

Pub tour

Take a tour with a local guide around the many famous drinking spots in Hull's historic Old Town. The tour starts at 7:00pm on Tuesday 16th and Wednesday 17th at The Minerva on Nelson Street. Please see Clair Rush / Information Desk to book on.



Food and drink

Please see the Hull City Centre map for details of some of Hull's best restaurants. Please note the Marco Pierre White restaurant within the Doubletree Hilton hotel is offering delegates a special set menu comprising of two courses for £25. Please book your table with the hotel to take advantage of this offer – 01482 755500.



Artwork

Don't forget to view the current artworks on display within The Deep:

- Inspiring underwater photography on the 3rd floor by Nuno Vasco Rodriguez
- *One Use, No Life* – plastic pollution installation in the foyer by local student, Nikita Spires
- Carbon Art – stunning sculptures made from Formula 1 car parts in various locations around The Deep, by Alastair Gibson

Happy to help

A member of staff will be stationed at The DoubleTree Hilton throughout the conference so if you need help with anything, just ask!

PROGRAMME – Monday 15 October

Start time	End time	Speaker	Subject	Page
15:00			Registration desk open, Trade Sponsor Stands Open	
12:30	15:30		Species 360 workshop in education rooms, refreshments at 13:45	
12:30	1700		EUAC committee meeting at the Business Centre	Closed session committee only
18:00	20:30		Ice Breaker	

Start time	End time	Speaker	Subject	Page
08:30	18:00	Registration desk open, Trade Sponsor Stands Open		
Session 1 – Katy Duke				
09:00	09:10	Katy Duke	Welcome	–
09:10	09:20	EUAC President João Falcato	Welcome	–
09:20	09:30	Lucie Parsons	Ocean Plastics: The Children's Voice	12
09:30	10:00	Heather Koldewey	Ocean optimism in a sea of plastic	12
10:00	10:20	Catherine Waller		13
10:20	10:30	Questions		
10:30	11:00	Coffee break		
Session 2 – Isabel Koch				
11:00	11:20	Stephan Inselman	New EUAC sponsors	–
11:20	11:40	Nadia Ounasis	Worlds Aquariums: #ReadytoChange #BeatPlasticPollution?	15
11:40	12:00	Mike Causer	75% of every breath we take comes from the oceans	15
12:00	12:20	Philippe Vallette, Stephane Hénard, Dominique Mallevooy	A new giant aquarium for a theme of the 21st century	16
12:20	12:30	Questions		
12:30	13:30	Lunch		

Start time	End time	Speaker	Subject	Page
Session 3 – Stephane Henard				
13:30	13:50	Max Janse	Building a new eco-display Burgers' Mangrove. A technical and ecological challenge	16
13:50	14:10	Isabel Koch	Native freshwater fishes: A superb exhibit with Danube salmon (Hucho hucho) and Brown trout (Salmo trutta)	17
14:10	14:30	Aldo van Tongeren, M.Sc, B.Eng	Energy Saving in our LSS. Yes we can!	17
14:30	14:50	Jeffrey de Pauw	Insights in morphology, handling techniques and husbandry of the bowmouth guitarfish (Rhina ancylostoma)	17
14:50	15:10	Thomas Schwend	Amalion, a lighting that cares for the plants	18
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15:20	15:50	Coffee break		
Session 4 – Nicole Kube				
15:50	16:10	Nadia Ounasis	An aquarium network committed to sustainable financing and mediation around marine protected areas	18
16:10	16:30	Rita da Silva	Can aquariums save corals?	20
16:30	16:50	Andrey Telegin	Russian northern fishes and invertebrates in public aquariums	20
16:50	17:10	Richard Oades and Clem Kouijzer	The Marine Animal Isolation Device (MAID): from concept to completion and its impact on animal welfare	21
17:10	17:40	Brian Zimmerman, Alex Cliffe, Charles Fusari	Big changes in aquatics at the Zoological Society of London	21
17:40	17:50	Questions		

Start time	End time	Speaker	Subject	Page
08:30	18:00	Registration desk open, Trade Sponsor Stands Open		
Session 1 – Brian Zimmerman				
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10:30	11:00	Coffee break		
Session 2 – Max Janse				
11:00	12:30		20 Years of FAITAG	–
12:30	13:30	Lunch		
Session 3 – Ben Jones				
13:30	13:50	Jamie Craggs & Michelle Davies	PROJECT CORAL – A synopsis of five years of ex-situ broadcast coral spawning research and in-situ goals for the future.	23
13:50	14:10	Michelle Davis & Jamie Craggs	Developing land-based coral facilities to stimulate multiple ex-situ broadcast spawning events per year for reef restoration.	23
14:10	14:30	Dr. Chrysa K. Doxa, Michail Orfanakis & Aspasia Steriotti	The effect of the anemone presence on growth performance of <i>Amphiprion ocellaris</i> .	24
14:30	14:50	Marga Ardao & Carlos Taurá.	Introducing the <i>Mobula hypostoma</i> at the Oceanographic of Valencia.	24
14:50	15:10	Dr. Nicole Kube	The Sea Turtle Working Group	25
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15:20	15:50	Coffee break		

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Session 4 – Attila Varga				
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16:10	16:30	Daniel Abed-Navandi	How to culture plankton ?	25
16:30	16:50	Nuno Vasco Rodrigues & Núria Baylina	Cleaning behaviour of adult Bluestreak cleaner wrasse, <i>Labroides dimidiatus</i> (Perciformes: Labridae), in Oceanário de Lisboa	25
16:50	17:10	Jeffrey de Pauw	The sad forgotten species that no one wants to keep, but occasionally come and visit the aquarium without invitation	26
17:10	17:30	Nuria Baylina	Conservation Work and Communication at Oceanário de Lisboa	26
17:30	17:40	Questions		
17:40	18:30	TAG Chairs and Steering Committee		–

International Sawfish Day

The Deep, in partnership with the Sawfish Conservation Society (SCS), the European Association of Zoos and Aquariums (EAZA) and Association of Zoos and Aquariums (AZA) was extremely proud to have launched the very first International Sawfish Day on 17 October 2017. Now in its second year, we hope to increase awareness of the most threatened family of sharks. Please show your support by taking a Sawfish selfie **and** using #IntlSawfishDay on social media. You can also buy one of our sawfish t-shirts for £20, or buy a raffle ticket for your chance to win a stunning signed sawfish artwork by Nick O' Neil.



Start time	End time	Speaker	Subject	Page
08:30	18:00	Registration desk open, Trade Sponsor Stands Open		
Session 1 – João Falcato				
08:30	10:30		General Assembly	–
10:30	11:00	Coffee break		
Session 2 – Graham Hill				
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		Dr Duncan Williams and Dr Deborah Cracknell	Measuring biophysiological responses in The Deep	
		Dr Lance Putnam and Dr Duncan Williams	Welcome to The Bloom, an overview of jellyfishin'	
12:30	13:30	Lunch		
Session 3 – Philippe Jouk				
13:30	13:50	Fátima Gil	Conservation of <i>Achondrostoma occidentale</i> , a freshwater fish endemic to the westernmost tip of Europe	29
13:50	14:10	Jean-Denis Hibbitt	Blacktip reef shark (<i>Carcharhinus melanopterus</i>) reproduction and neonate survivorship in public aquaria – what we have learnt so far	31
14:10	14:30	Ester Alonso	Shark training development	31
14:30	14:50	Meredith Knott	Pooling Our Resources: Using Global Data to Create Invaluable Animal Care Tools	32

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14:50	15:10	Kristina Skands Ydesen	Experiences with physiology and growth in captive ocean sunfish (<i>Mola mola</i>)	32
15:10	15:20	Questions		
15:20	15:50	Coffee break		
Session 4 – Daniel Abed-Navandi				
15:50	16:10	Michael Laterveer	Reintroduction of critically endangered sharks and rays through breeding: feasible or not? A pilot programme	33
16:10	16:30	Charles-Edouard Fusari	Fresh water fish conservation at the heart of ZSL Aquarium's mission	33
16:30	16:50	Nicolas Hirel	Planet Ocean Montpellier, a new Journey from the Ocean depths to the confines of the Universe	34
16:50	17:00	Questions		
17:00	17:00	João Falcato, Katy Duke	Closing of the conference	-
19:00	Late	Gala dinner		

ABSTRACTS – TUES 16 OCT

OCEAN PLASTICS: THE CHILDREN'S VOICE

Lucie Parsons – Hull

The recent past has seen an explosion of public interest in the significant impact of plastic pollution on the oceans and marine life. This interest is already driving response from policymakers, agencies and industry alike. However, many members of the public confess to not understanding the responses they should be making as individuals, highlighting the need for significant educational drive throughout wider society.

Educating through children can be an effective dissemination mechanism and a vector for societal change. This paper will detail a study on children's views and opinions on plastics in the oceans exploring the knowledge of the issues and concerns they presently have. The United Nations Convention on the Rights of the Child (UNCRC) states in articles 12 and 29 that children have a right to participate and be educated on environmental matters.

The children's voice can be a powerful force for change, this paper will highlight the ways in which this voice can be best harnessed to advance the issues of plastic pollution in the oceans.

OCEAN OPTIMISM IN A SEA OF PLASTIC

Dr Heather Koldewey – Zoological Society of London

Plastic pollution in the ocean is now recognised as one of the most pressing issues of our time. Over 8 billion metric tons of plastic have been produced since 1950, and production is projected to increase to 34 billion metric tons by 2050. As of 2015, only around 9% of plastic was estimated to have been recycled, with around 12% being incinerated and 79% ending up in landfill or in the environment, where it continues to break down into smaller particles.

Some 700 species of marine animals have been reported to have eaten or become entangled in plastic. It is predicted that plastic ingestion will affect 99% of all seabird species by 2050 and has already been shown to affect 100% of some species.

Strong links have been found between plastic and poverty, with poverty as a driver for plastic waste, status of the informal waste sector, and development of products that present environmental and economic challenges. Plastic has been found in every level of the food chain, in both the most remote and populated areas of the world, and even in drinking water. Plastic pollution has become an issue that is global, visible, and harmful - but also solvable.

This presentation will showcase a series of solutions to this issue that have direct relevance to the public aquarium sector, including Net-Works, #OneLess and Plastic Free Communities. A review of current actions by the public aquarium sector will be presented, with a focus on how the European aquarium community can be agents of change in addressing ocean plastic pollution.





WORLD AQUARIUMS #READYTOCHANGE TO #BEATPLASTICPOLLUTION?

Dr Nadia OUNAIS / Gilles DOIGNON – Institut océanographique / European Commission DG ENV – ENVIRONMENT

In 2017, the European Commission, with the support of the 'Oceanographic Museum of Monaco, the European Union of Aquarium Curators and the World Association of Zoos & Aquariums, built a coalition of 150 aquariums from 38 countries to raise awareness about marine litter and promote the Our Ocean 2017 conference hosted by the European Union (Malta, 5-6 October 2017).

The campaign was officially launched by the EU Commissioner for Environment, Maritime Affairs and Fisheries Karmenu Vella in Monaco on 27 July 2017, in the presence of H.S.H Prince Albert II, the head of the United Nations Environment Programme Enk Solheim, and the WAZA CEO Doug Cress.

The 'World Aquariums against marine litter' were engaged in various activities; many displayed a tank full of marine litter to shock their visitors, others organised beach cleans, broadcasted movies, created artistic pieces with litter, etc. All aquariums disseminated the main messages on all communication channels, notably on social media. All these activities, including the press releases prepared by most aquariums resulted in hundreds of articles, television and radio programmes.

Following this success, the European Commission and UNEP, together with five international partners, will announce a commitment to the Our Ocean 2018 conference, to transform the 2017 campaign into a permanent action with the focus on plastic pollution.

In addition to long lasting communication actions, the coalition will call on aquariums to change their procurement policies, for example in canteens and shops, to eliminate all single use plastic items. Aquariums will also be

encouraged to ally with all potential partners and multipliers to maximise impact by promoting best practices in behavioural change on a local, national and global scale.

Material will be available for all participating aquariums, based among others on the EU campaign #ReadyToChange and on the #CleanSeas campaign by UNEP.

75% OF EVERY BREATH WE TAKE COMES FROM THE OCEANS

Howard Dryden, Mike Causer – Dryden Aqua

Dryden Aqua is committed to making the world a better place and to the creation of a non-toxic environment. We have the technology to make a difference but cannot do it alone.

This presentation highlights the problem and the particular threat posed to climate change by a drop in primary ocean productivity. It further explores:

- the work that we have done that is already making a difference
- a new not for profit, social enterprise company that have been established to deliver solutions to water pollution in the third world.

and

- a new non-profit foundation that has been established to collect data for further research from both professional and recreational activities in the field.

The Goes foundation needs support and data from all sources, including both EUAC members and aquarium visitors.

A NEW GIANT AQUARIUM FOR A THEME OF THE 21ST CENTURY

Philippe Vallette, Stephane Hénard, Dominique Mallevooy – Nausicaá, Centre National De La Mer

In May 2018 the French National Sea Centre Nausicaa did open to the public its new exhibit.

The central piece is a single 10 Million litres tank designed to host together hammerhead sharks, manta rays and shoals of sardines and mackerels. Several windows including an 18 meters long tunnel and a 20 metres long by 5 metres high flat panel give very different views of the tank.

The need for such a big tank is connected to the theme of this new exhibit : sustainable management of the high seas in the 21st century. The landscaping and the hosts of the tank evocate the emblematic island of Malpelo off the coast of Colombia.

It is a major and topical issue for mankind. Discussion have just started at the United Nations, on methods of governance of the high seas, which cover half of the Planet's area.

BUILDING A NEW ECO-DISPLAY BURGERS' MANGROVE. A TECHNICAL AND ECOLOGICAL CHALLENGE

Max Janse and Willeke Huizinga – Royal Burgers' Zoo, Arnhem, The Netherlands

In July 2017 a new eco-display has been opened at Royal Burgers' Zoo, Arnhem, The Netherlands. The 'eco-display' concept refers to large-scale animal exhibit in which a naturalistic representation is given of a selected biotope with their typical combination of animal and plant life and where ecological processes are included within the management. Over the years Burgers' Zoo has developed different eco-displays: in 1988 Bush (Tropical rainforest), in 1994 Desert (Sonoran Desert) and in 2000 Ocean (Indo-Pacific coral reef). The latest eco-display shows different aspects of a Central American Mangrove. The choice was Central American due to a large conservation program Burgers' Zoo is having together with a Swiss Zoo Papiliorama, Kerzers, Switzerland: the International Tropical Conservation Fund (www.itcfund.org) in Belize.

The presentation will include an introduction to the system and the development over the first year. Especially the substrate, filtration and collection plan was a challenge beforehand. What choices were made and what was realised. Special emphasis are given on the fiddler crabs and the fish collection development of the 1000 m3 manatee display.

NATIVE FRESHWATER FISHES: A SUPERB EXHIBIT WITH DANUBE SALMON (HUCHO HUCHO) AND BROWN TROUT (SALMO TRUTTA).

ISABEL KOCH – Zoologisch-Botanischer Garten Wilhelma

Freshwater is becoming rare in European public aquaria and so are freshwater fishes. There must be reasons for this, but certainly not because the species lack attractivity or importance? The aquarium of the Wilhelma displays native freshwater since the opening in 1967.

One of the most beautiful exhibits is a landscape aquarium dedicated to the salmonid region of the Black Forest in the south of Germany. Showing various trouts in the beginning, we now dedicated the exhibit to endangered native salmonids. Today we display aqua-cultured Danube salmons (Hucho hucho) and wild caught Brown trouts (Salmo trutta) from the region - both highly charismatic fishes if you let them grow to full size! The presentation gives an overview on making and maintenance of the exhibit and the inhabitants.

ENERGY SAVING IN OUR LSS. YES WE CAN!

Aldo van Tongeren – ATO Energysaving

The potential for energy saving in the life support systems (LSS) is huge. In many designs safety factors have been added to secure a minimum of operational conditions. After having put the LSS in operations, most of the LSS is adjusted to have a best match, leading to new conditions of equipment. These new conditions however could have a negative impact on the efficiency of the system, leading to more noise, more maintenance and more energy use!

Driven by global warming and the responsibility we have to new generations, energy savings should have nowadays the highest priority. But what can we do and what are the effects of changes we make in our LSS? What can we learn from other projects?

This presentation gives important information on LSS optimizing by presenting results of energy saving projects in several European aquaria.

INSIGHTS IN MORPHOLOGY, HANDLING TECHNIQUES AND HUSBANDRY OF THE BOWMOUTH GUITARFISH (RHINA ANCYLOSTOMA).

Jeffrey de Pauw – De Jong Marinelife

Taking care of your animals always consists of exploring every aspect of the individual species you want to take care of. Not every shark or ray can be displayed in the same way and nor does it apply that you can have the same husbandry method for all. This especially applies for the Bowmouth Guitarfish. The experience we have had with all the Bowmouth Guitarfish in the past has been documented very closely. This was the only way to guarantee their health and stamina for ourselves during their acclimation and quarantine period. They are very specific animals that need extra attention in terms of commonly seen parasites, necessary diet, different handling techniques when being moved and caution in terms of water quality and conditions. All these topics will be addressed during this presentation.

AMALION, A LIGHTING THAT CARES FOR THE PLANTS

Thomas Schwend

Plants are an important element of most zoos, parks and aquariums installations. Finding a lighting, which keeps your plants healthy without compromising the atmosphere of your exhibition can be a challenge. Designated plant lightings are usually pink, disturbing to the human eye, and designed to stimulate extensive growth. White light, on the other hand, is pleasing for the visitors, but inefficient when it comes to photosynthesis. Therefore, we developed a new product line 'Amalion', which gives plants all the light they need and the visitor white light with all the colours they wish for. It emits a full spectrum with all colours in the visible range and, at the same time, provides sufficient photosynthetically active photon flux for plants to grow. In this way, your plants will thrive without interfering with the human experience of an indoor installation.

AN AQUARIUM NETWORK COMMITTED TO SUSTAINABLE FINANCING AND MEDIATION AROUND MARINE PROTECTED AREAS (MPA'S)

Dr Nadia OUNAIS, Vice-president, International Affairs –
Romain RENOUX, Coordinator / Oceanographic Institute –
Sustainable financing of Mediterranean MPAs (M2PA)

On April 13, 2018, the Oceanographic Institute, Albert I Foundation, Prince of Monaco signs a partnership agreement with the Association of Sustainable Financing of Mediterranean MPAs (M2PA) a fund dedicated to Marine Protected Areas in the Mediterranean.

So far, MPAs have benefited from international funding and European programs. In order to perpetuate the resources dedicated to these protected areas, the M2PA association was created in 2015. Its vocation: to unite actors to feed an environmental fund, which is in the long term. This association now includes 11 aquariums and zoos, some of which participate in its financing and all communicate and mobilize their public and partners to the cause of the Mediterranean MPAs. Thus, for each entry ticket to the Museum, 5 cents are now donated to the Mediterranean MPA support fund.

Beyond this financial participation, the institute is committed to leading and developing the network of aquariums and actors working together for the development of Marine Protected areas in the Mediterranean. #MyMedSea will be dedicated to actions implemented within the framework of this network.



CAN AQUARIUMS SAVE CORALS?

Rita da Silva – University of Southern Denmark; Species360

Marine ecosystems are facing unprecedented threats that lead to continuous biodiversity loss. Among the biggest pressures are coastal development, climate change and pollution. Several taxa have already been affected and corals are amongst them. This group is disappearing at a fast pace leaving behind empty environments for species that depend on them. In 2011, 75% of the world coral reefs were considered threatened by human activities and many of them might vanish by 2050.

By now protecting the remaining corals might not be sufficient and aquariums are seen as crucial for the conservation of the ecosystems. This project assessed the number of corals in the Species360 ZIMS database network to understand the potential of captive individuals for conservation of corals reefs. Aquariums can provide genetic information or the expertise on how to successfully handle, reproduce and propagate corals. The wealth of data can help them recover from years of damage.

RUSSIAN NORTHERN FISHES AND INVERTEBRATES IN PUBLIC AQUARIUMS

Andrey Telegin

There are few of large aquariums now in Russia, but their number is notably growing. They display mainly foreign tropical fauna yet. But our domestic hydrobionts are very diverse and interesting as well. A significant part of Russian waters has a low temperature. The Russian North is huge. We have mastered the life support technologies for cold-water systems. The main problem is the organization of capture and delivery of hydrobionts. Besides that, every year we organize expeditions to catch hydrobionts at the White and Japan Seas. We plan to expand the geography of these trips.

In Russia, it is rather difficult to achieve bureaucratic registration of relevant documents. In addition to our quarantine facilities in Moscow, we created and registered a quarantine complex by the White Sea. An important area of our work is the promotion of the Russian fauna among public aquariums. In this presentation, I will describe the way we grow and develop a system that enables displaying of Russian northern hydrobionts in aquariums.

THE MARINE ANIMAL ISOLATION DEVICE (MAID): FROM CONCEPT TO COMPLETION AND ITS IMPACT ON ANIMAL WELFARE

Richard Oades and Clem Kouijzer

Part 1. Design and Build. Richard Oades, The Deep

The Deep's husbandry area had originally been built with a modest 4 x 2m holding lock. With substantial growth of existing display animals, and requirement to introduce or isolate new or larger species, there was a need for a much greater holding capacity. Initially working with IAT and I-2-I Animal Handling Products, a larger capacity holding cage was designed and built and the Marine Animal Isolation Device (MAID) was created.

Part 2. Animal welfare and benefits. Clem Kouijzer, I-2-I Animal Handling Products

I-2-I Animal Handling Products are proud to share details of the positive impact similar custom built devices have made at Aquariums throughout the world. The device reduces cross contamination between species due to the quarantine element, as well as increased success rates with marine animal introductions. It has also significantly reduced the mortality rate of newborn shark pups (compared to the mothers giving birth in an exhibit surrounded by predators)

BIG CHANGES IN AQUATICS AT THE ZOOLOGICAL SOCIETY OF LONDON

Brian Zimmerman, Alex Cliffe, Charles Fusari

The London Zoo Aquarium opened in 1924 and was considered a world class building due to its unusual engineering and architectural design. The uniqueness that brought worldwide attention also meant it was challenging to maintain with significant repairs required in the 1950s. Despite the many accomplishments and world famous aquatic collection over its ninety plus years of operation, a decision was made in 2018 to close the building permanently in November 2019.

The closure of the London Zoo Aquarium will not end ZSL's work with aquatics however; two new projects are in development which will retain 75% of the species in the collection. At Whipsnade Zoo a new freshwater aquarium comprising eleven exhibits plus a large conservation breeding facility is being designed. At London Zoo the living coral collection fishes will occupy a large reef exhibit in the invertebrate house. Our presentation will recount ZSL's history and future with aquatics.



ABSTRACTS – WED 17 OCT

PROJECT CORAL

Jamie Craggs 1,2, Michelle Davis1, Keri O’Neil3, Scott Graves3, James Guest4, Michael Sweet2 – 1. Horniman Museum and Gardens, Forest Hill, London, SE23 3PQ, United Kingdom. 2. Aquatic Research Facility, Environmental Sustainability Research Centre, University of Derby, Derby, DE22 1GB, United Kingdom. 3. Center for Conservation, The Florida Aquarium, 701 Channelside Drive, Tampa, FL 33602. 4. School of Natural & Environmental Sciences, Newcastle University, Newcastle upon Tyne, NE17RU, United Kingdom.

A synopsis of five years of ex-situ broadcast coral spawning research and in-situ goals for the future. In 2012 the Horniman Museum and Gardens set up Project Coral, an innovative research programme developing techniques to predictably induce broadcast coral spawning events ex-situ, in collaboration with international partners.

Utilising specific mesocosm design eighteen species of *Acropora* have been spawned to date and in-vitro fertilisation capacity has been developed to produce genetically diverse coral in captivity. We are now using this platform for broader research purposes, focusing on understanding reproduction at a fundamental level, through documentation of embryogenesis with advanced microscopy techniques and investigating coral resilience using metabolomic analysis.

More applied outputs focusing on co-culture of corals with grazing species to increase spat survivorship are being studied, with a view these will be utilised by our partners, Florida aquarium and University of Newcastle, for in-situ reef restoration. A synopsis of techniques developed over the past five years will be highlighted, along with some of this cutting-edge research.

DEVELOPING LAND-BASED CORAL FACILITIES TO STIMULATE MULTIPLE EX-SITU BROADCAST SPAWNING EVENTS PER YEAR FOR REEF RESTORATION

Michelle Davis & Jamie Craggs

In February 2017 the Horniman Museum & Gardens (HMG), London and the Center for Conservation (CFC), Florida entered a partnership to develop land based coral research facilities. Via the ex-situ production of sexually reproduced coral spat these facilities aim to support coral restoration initiatives in the Florida Keys.

Using techniques developed at the HMG, where ex-situ gamete production has been induced in 18 species of *Acropora*, the CFC is constructing four climate controlled systems that, from 2019, will facilitate multiple broadcast coral spawning event per year. Initially focusing on the US Endangered Species Act and critically endangered species *Acropora cervicornis*, the team at CFC will gain increased access to gametes per year and building on their current field knowledge, will explore opportunities to up-scale coral production for restorative purposes.

This presentation will cover some of the ex-situ broadcast spawning methodology developed at the HMG and construction progress at CFC.

THE EFFECT OF THE ANEMONE PRESENCE ON GROWTH PERFORMANCE OF AMPHIPRION OCELLARIS.

Dr. Chrysa K. Doxa, Cretaquarium, Hellenic Centre for Marine Research (HCMR)

In nature, all anemonefishes of the Amphiprioninae subfamily form symbiotic mutualisms with sea anemones. The present study has examined the effect of anemone on the growth performance of Amphiprion ocellaris. The experiment was performed on four groups of 5 individuals, of approximately 140mg weight, for 7 weeks.

Each group was placed in a 6 L container under open water circuit during the absence and presence of two sea anemones *Entacmaea quadricolor* in two replicates. Clownfish grew up significantly faster in the presence rather than the absence of sea anemones, reaching 307mg and 190mg weight after 7 weeks respectively. Specific growth rate also differed significantly between the two conditions, with the value of fish that grew with the anemones (0.78) being almost two times higher than the value of fish that grew without anemones (0.40). The results of this study contribute to the improvement of clownfish breeding and maintenance in aquariums.

INTRODUCING THE MOBULA HYPOSTOMA AT THE OCEANOGRÁFIC OF VALENCIA.

Marga Ardao, Carlos Taurá – Zoologisch-Botanischer Garten Wilhelma

The Oceanographic of Valencia always had the intention to keep mantas, but two unsuccessful previous trials with *M. mobular* forced us to reconsider the idea. In this presentation we will explain our previous trials and the present work done since the reception of four *Mobula hypostoma* on November 10th of 2016.

Right from the beginning one animal appeared to be in poor condition with abnormal swimming. 23 days later the animal died. For the first time with this kind of animals, we carried out force feeding but it was unsuccessful.

During 18 months we have been solving the difficulties that have been arising, such as shark bite accidents and interference from other species while feeding. However, in April of 2018 another one died after a period of anorexia without definitive diagnosis.

After two years we are still working with the two remaining animals. We will show you all our work from reception to the latest modifications in feeding conditioning in order to guarantee good feeding.

UPDATE FROM THE SEATURTLE WORKING GROUP

Dr. Nicole Kube – German Oceanographic Museum

The Seaturtle Working Group which was founded in 2015 met for the second workshop from 15th to 17th of May 2018 in Cretaquarium, Greece. Participants from Netherlands, France, Italy, Croatia, Greece, Spain, Slovenia, UK and Germany were taking part.

The aim of that workshop was to create a template with all necessary information to be transformed into the Best Practice Guidelines for long-term captive seaturtles which is supposed to be finished in 2019.

The talk is about a quick update about what has been discussed in this workshop and what the future activities will be.

SHARKS. WHAT ARE YOU TALKING ABOUT?

Paul Cox – Shark Trust

Everyone here should be talking about sharks. They're the stars of the show and many of them are in troubled waters. But what should we be telling our visitors and what can we be asking them to do?

Whether talking to the media, to online supporters, to businesses, to aquarium visitors or just to ourselves, nobody talks sharks more than the Shark Trust.

We'll explore some of the contemporary challenges in shark conservation and look at some ways to engage our distracted public(s). Everyone can be part of the shark movement, we just have to find ways to motivate them beyond a mouse-click.

HOW TO CULTURE PLANKTON ?

Daniel Abed-Navandi – Haus des Meeres Vienna

Despite plankton being a basis of marine food chains only a few public aquaria are actually growing food plankton organisms. This is mainly due to constraints in time, staff, space or money. In a short presentation the principles of marine Phyto- and Zooplanktoncultivation are presented with an emphasis on "how to". Selection of technical equipment, the choice and handling of stock cultures, massgrowth and harvesting methods are covered.

CLEANING BEHAVIOUR OF ADULT BLUESTREAK CLEANER WRASSE, *LABROIDES DIMIDIATUS* (PERCIFORMES: LABRIDAE), IN OCEANÁRIO DE LISBOA

Nuno Vasco Rodrigues & Núria Baylina – Oceanário de Lisboa

The Bluestreak cleaner wrasse *Labroides dimidiatus* plays an important role in coral reefs of the Indo-Pacific, since it acts as cleaner of larger animals. The presence of this species in aquariums intends to keep a low parasite load, thus reducing potential stress in fish. The objective of this study was to understand its cleaning behaviour in Oceanário de Lisboa's central aquarium.

One hour visual observations were performed daily, for 22 non-consecutive days in the four different sections of the tank (Atlantic, Antarctic, Pacific and Indian). *L. dimidiatus* performed cleaning interactions with 57% of the species present in the tank, including species that do not occur in its geographic region, on a total of 3587 interactions. *Lutjanus griseus* was its favourite host (14%) and the "Indian" was the section of the tank where more interactions occurred (34 % of the total). These results provide important data about this species' biology.

THE SAD FORGOTTEN SPECIES THAT NO ONE WANTS TO KEEP, BUT OCCASIONALLY COME AND VISIT THE AQUARIUM WITHOUT INVITATION. ALSO KNOWN AS: “PARASITES”

Jeffrey de Pauw – De Jong Marinelife

The world of parasites is one that actually is truly fascinating, the speed that they reproduce with, the adaptation to different hosts and occurring on nearly every living organism. During this presentation the commonly seen parasitic infections on fish, sharks and rays will be shown. The possible causes that result in a parasitic outbreak and also the remedy or cure to some parasites. Besides that also the possibilities will be addressed what to do in bigger multi taxa tanks. This is often the most challenging part in finding a remedy to get rid of the parasites lurking around on your animals. Also what to watch out for if the parasites in your system are under control and stable. This is something that is often forgotten when there are new introductions to your system.

CONSERVATION WORK AND COMMUNICATION AT OCEANÁRIO DE LISBOA

Nuria Baylina – Oceanário de Lisboa

Oceanário de Lisboa is owned by Oceano Azul Foundation since the end of 2016. Ocean Conservation is one of the pillars of both institutions' activities. In the last years Oceanário has increased its conservation action and communication in order to be more efficient in its mission and recognized as an institution dedicated to ocean conservation. This presentation focus on the actions developed to achieve this goal from team reinforcement and restructuration, support to conservation projects and increase in communication of the conservation activities.



ABSTRACTS – THURS 18 OCT

AQUARIUMS AND WELLBEING

Dr Deborah Cracknell – Plymouth University

Dr Duncan Williams – York University

Dr Lance Putnam – Goldsmiths University of London

This session - comprised of three discrete but overlapping talks, below - presents practical work researching the links between perceptual and biophysiological responses, and explores how technology and gamification might be used to create new ways of interacting with exhibits for visitors.

Jellyfishin' VR will also be on display throughout the day with Dr Putnam and Dr Williams (venue TBC), and we would welcome interested visitors (regardless of age) to come and have a play!

1) OCEAN AND HUMAN HEALTH OPPORTUNITIES IN PUBLIC AQUARIUMS...AND BEYOND...

Deborah Cracknell

Public aquariums serve many purposes: they are venues for precious family time; are important sites for conservation learning and research; and help foster greater connectedness to our oceans. They offer an escape from daily routines, enabling relaxation and recovery from life's worries and stresses. Research suggests that people may experience significant benefits (e.g. improved mood, lower heart rate) after visiting aquarium exhibits. Certain factors influence these benefits, such as preferences for particular marine species. These benefits, however, have the potential to extend far beyond the aquarium walls. Innovative

research is set to explore how technological developments (e.g. VR), may enable public aquariums to also contribute to the health and well-being of the wider community. Importantly, an overall greater understanding of people's responses to marine life and aquarium settings, could also help inform conservation messaging and aquarium design in the future.

2) MEASURING BIOPHYSIOLOGICAL RESPONSES IN THE DEEP

Duncan Williams and Deborah Cracknell

As part of a late night event for the British Science festival 2018, we measured visitor responses to an aquarium scene at The Deep (The Endless Ocean exhibit). Jointly conducted with Graham Hill, head of animal care and research, we measured real-time brain activity and simultaneously screened to a live audience, whilst a 'scary' video sequence (and soundtrack) was played to the participant. The goal was for the participant to calm down their heart rate as much as possible in 60 seconds whilst watching the real aquarium scene.

This talk will explain how these devices work, what they do and don't measure, and how they might be used in conjunction with the perceptual measurement techniques illustrated in Dr Cracknell's previous talk, and how metrics for engagement might more broadly be used for curatorial experience design in museums and other public facing environments.

3) WELCOME TO THE BLOOM – AN OVERVIEW OF JELLYFISHIN'

Lance Putnam and Duncan Williams

Jellyfishin' is a virtual reality world based on the Mutator VR engine, designed to allow an audience of 5-11 year olds to interact with talking jellyfish in a huge, constantly changing virtual seascape. Built in collaboration with the Jellyfish curatorial team at The Deep, it has been exhibited at the annual York Festival of Ideas (which attracted 32k visitors this summer) and the inaugural York Mediale festival as part of Yorks UNESCO City of Media Arts award.

The origins of Mutator date back to William Latham and Stephen Todd's work in the late 80s in Winchester when they first developed Mutator and the grammar FormGrow, to evolve organic forms by a process of evolution by aesthetics. Jellyfishin' uses speech to imbue characters with anthropomorphic identities in order to explore how engaged visitors might be with the conservation and biological messaging 'hidden' in the experience.

CONSERVATION OF *ACHONDROSTOMA OCCIDENTALE*, A FRESHWATER FISH ENDEMIC TO THE WESTERNMOST TIP OF EUROPE

Fátima Gil 1, Carla Sousa-Santos 2 – 1 Aquário Vasco da Gama, Algés, Portugal; 2 MARE - Marine and Environmental Sciences Centre, ISPA, Lisboa, Portugal

Report of an in situ conservation project funded by EUAC. *Achondrostoma occidentale* is a small cyprinid endemic to three small river basins located at the westernmost tip of Europe. The increasing frequency of droughts, water pollution by faulty sewage treatment plants and habitat degradation are the identified causes for population reduction in this species. *A. occidentale* is reproduced in Aquário Vasco da Gama since 2007 as part of a conservation project targeting critically endangered freshwater fish species.

In 2017 AVG and MARE-ISPA chose river Safarujo, the smallest of the rivers inhabited by *A. occidentale*, as the target for conservation awareness activities conducted with local school children, including field trips to the river, educational games, and production of informative material. Contacts established with the municipality resulted in effective in-situ conservation measures, namely the preservation of summer refugia used by fish. We also aim to evaluate genetic diversity loss by captive breeding and adequate molecular markers are being selected for that purpose.



BLACKTIP REEF SHARK (*CARCHARHINUS MELANOPTERUS*) REPRODUCTION AND NEONATE SURVIVORSHIP IN PUBLIC AQUARIA – WHAT WE HAVE LEARNT SO FAR.

Jean-Denis Hibbitt, Chris Brown, Emma Rees – SEA LIFE Conservation and Engagement Department

Between 2007 and 2014, the breeding of blacktip reef sharks, *Carcharhinus melanopterus*, was confirmed at 17 aquaria, predominantly European, resulting in 36 litters and 105 pups. A high proportion of *C. melanopterus* pups were stillborn (43.8%) and an additional 19.1% died within a week of parturition, leaving a survivorship of 37.1%. Pup survival varied greatly depending on the birthing method employed with the greatest success from using holding pools connected to the main exhibit (87.5%) or a floating pen within the main exhibit (74.1%).

This presentation will examine these results and their causes, the birthing methods currently employed by public aquaria and provide an update of pup survivorship over 2014-2018.

It will also propose a new genetic study to establish the parentage of captive bred pups in European aquaria.

SHARK TRAINING DEVELOPMENT

Ester Alonso – Loro Parque

Loro Parque since 2014 are training all of our sharks. The goal is to have a total control in the behaviour, get biometrics to recalculate the diet or any clinic action without any stress process.

when we are working with all of our species, we realize we have to continue improve our method because a pelagic Shark is not the same than a benthonic shark or if they are baby of adult. also, we have preliminary conclusion in relation if the shark training is in a multi specific biological collection or if it is just one specie in one ecosystem.

we would like to do a presentation because several people have trained some species in Europe and US from several years, and we should use and understand these dates, sharing them and try to explain why and how we are continue doing in Loro Parque, and which kind of useful results we have had.

POOLING OUR RESOURCES: USING GLOBAL DATA TO CREATE INVALUABLE ANIMAL CARE TOOLS

Meredith Knott – Species 360

Partnering with the Institute of Museum and Library Sciences, Species360 focused on extracting, summarizing and organizing information contained within millions of medical records to produce resources that could support and improve veterinary care in aquariums and zoos. The project successfully produced 3 completely new medical resources (Anesthesia Summaries, Drug Usage Extracts, Morbidity and Mortality Analysis) and significantly enhanced an existing resource (Expected Test Results).

Each resource provides easy, searchable access to a unique compilation of medical experience and knowledge that is useful to animal care staff and conservation research partners. As aquariums increasingly pursue in-situ and ex-situ conservation goals, the community need for data sharing and pooled resources grows exponentially each year.

EXPERIENCES WITH PHYSIOLOGY AND GROWTH IN CAPTIVE OCEAN SUNFISH (MOLA MOLA)

Kristina Skands Ydesen – Nordsøen Oceanarium

The first Ocean sunfish (*Mola mola*) arrived by chance at the North Sea Oceanarium in 2001. It quickly became a guest favorite and an icon for the Aquarium. More sunfishes followed, which offered an opportunity to improve management skills of the impressive fish species and gather data from dissections. This has led to investigations of growth rate, various physiological parameters of captive fishes and signs of possible secondary gender characteristics.

We have also tried out various feed types in search of the most practical and best solution. Results so far indicate an average growth rate of 75kg/year (6 individuals) in our tank. Boiled blue mussels appears to be an excellent and easy feed when supplemented with vitamin pills. Also it seems that gender can be determined by the head and body shape. The aim is to be able to compare wild with captive fish to investigate a possible physical effect of diet differences, but more data is needed.

Thanks to:

Øresundsakvariet, DK for helping with new live fishes and data collection. Monterey Bay Aquarium, US for information and advice on feed and rearing. Ocean Sunfish project (Marianne Nyegaard) for advice and knowledge. Flying Sharks, for delivery of fishes and know how.

REINTRODUCTION OF CRITICALLY ENDANGERED SHARKS AND RAYS THROUGH BREEDING: FEASIBLE OR NOT? A PILOT PROGRAMME

1. Monique van de Water, 2. Niels Brevé, 3. Michaël Laterveer, 4. Georgina Wiersma – 1. Worldwide Fund for Nature Netherlands, Zeist, Nederland, 2. Sportvisserij Netherlands, Driebergen, 3. Blue Linked Netherlands, Zoetermeer, 4. Dutch Shark Society, Netherlands.

Worldwide, 25% of all sharks and rays are threatened with extinction (IUCN 2016, Red List of Threatened Species). In European waters, more than 30% of species are endangered. At the beginning of the 20th century, elasmobranchs were frequently found in the Dutch North Sea. Ten out of the twenty shark and ray species that still occur in the North Sea are on the IUCN Red List of threatened species and their habitats are not protected. The angel shark (*Squatina squatina*) and the shagreen skate (*Leucoraja fullonica*) are probably extinct in the Dutch North Sea.

Some populations have disappeared or decreased to such an extent that natural recovery does not seem feasible. Reintroducing sharks and rays which are (locally) extirpated in the North Sea such as the angel shark and the common skate (*Dipturus batis complex*) could possibly be the only way to reinstate these species in Dutch waters.

In 2015, WWF Netherlands and 4 other NGO's started an innovative unique project investigating possibilities for a reintroduction program of endangered eligible North Sea sharks and rays. Pilot species is the thornback ray (*Raja clavata*), still quite rare in Dutch waters.

So far, 300 thornback ray eggs have successfully been reared at the breeding center Blue Linked, which is equipped to breed sharks and rays just for conservation purposes, 300 more will follow until 2019. Both the breeding and the reintroduction programme are set up in

FRESH WATER FISH CONSERVATION AT THE HEART OF ZSL AQUARIUM'S MISSION

Charles-Edouard Fusari – Zoological Society of London

Lakes, rivers and wetlands account for 1% of the total world's water and host 5% of the earth's biodiversity. However, a loss of 81% of the freshwater vertebrates species has been recorded since 1970, higher than the decline observed in land (38%) and marine (36%) populations.

This presentation focuses on how the Aquarium team at ZSL, through the FishNet conservation programme, uses husbandry skills and expertise to rescue critically endangered freshwater fish species. In-situ, with field work in Greece, Turkey and Madagascar and ex-situ within the Aquarium building at London Zoo. This presentation aims to highlight the importance of the role public aquariums and zoos can play in freshwater fish conservation and contribute to the larger effort to preserve freshwater ecosystems.

**PLANET OCEAN MONTPELLIER, A NEW JOURNEY
FROM THE OCEAN DEPTHS TO THE CONFINES OF
THE UNIVERSE**

Nicolas HIREL – Odysseum, 34960, Montpellier-France

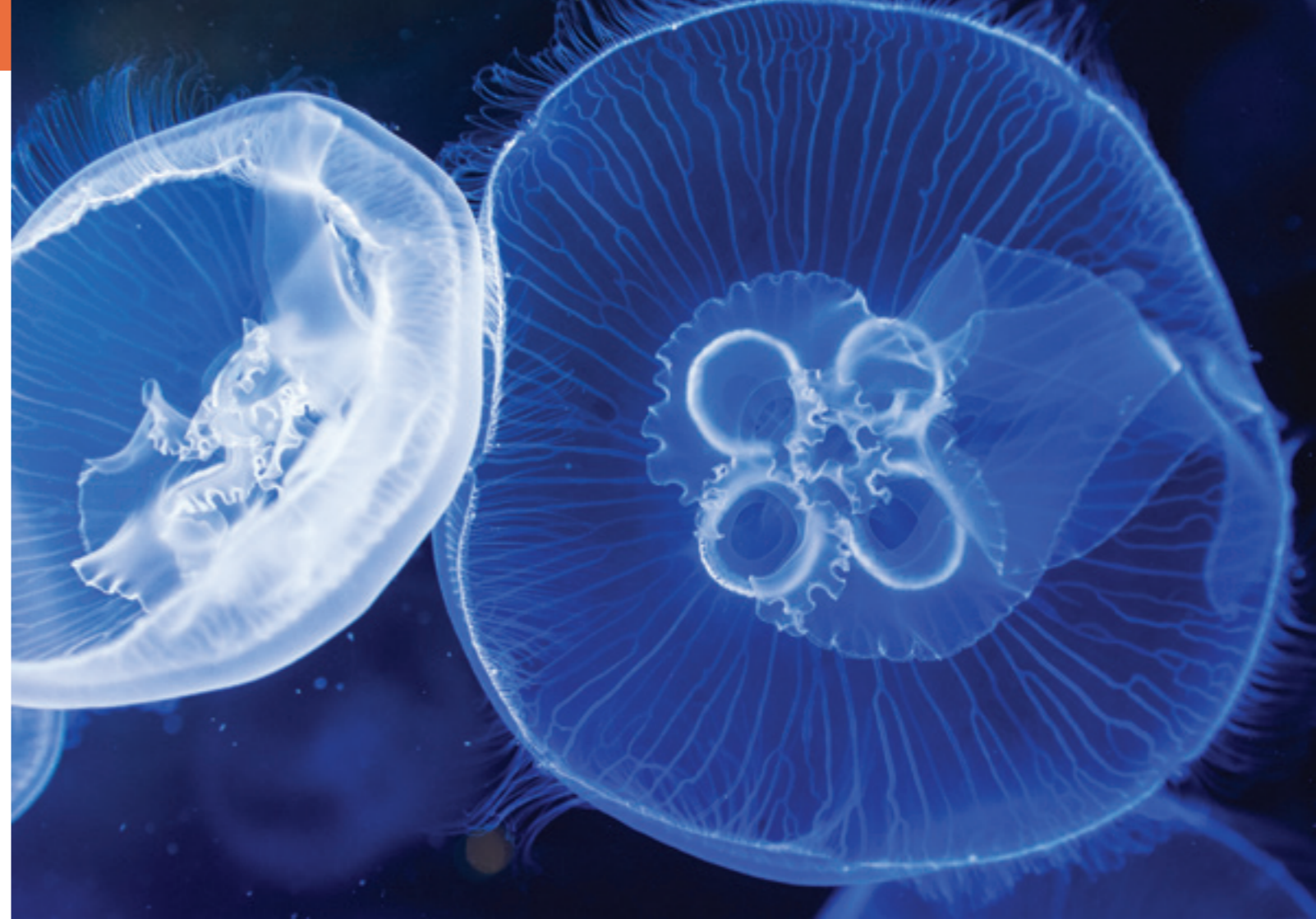
Respectively opened in 2002 and 2007, Planetarium Galilée and Aquarium Mare Nostrum were built «wall to wall» in the Odysseum area in Montpellier.

Since then, the 2 institutions have conducted at their own rythm, regular display improvements, such as new aquariums at Mare Nostrum and new films for the planetarium.

In 2016, Montpellier Méditerranée Métropole, owner of the 2 sites, launched a call for tenders for a single management of both institutions.

Aspro Group won the competition and an ambitious investment program was set up to «break the walls» and to merge the 2 separated sites into a single one, with a unique visit.

This presentation describes the 18 latest month period of structural works, display improvements and new exhibits, that gave birth to Planet Ocean Montpellier; and now take the visitors, in a unique site, for a Journey from the Ocean depths to the confines of the Universe.



POSTER ABSTRACTS

AZA SAFE ELASMOBRANCH PHLEBOTOMY AND BLOOD CHEMISTRY REGISTRY

Graham Hill – The Deep, Jill Arnold – National Aquarium, Baltimore and Alexa McDermott – Georgia Aquarium

The Association of Zoos and Aquariums (AZA) developed a suite of projects under the SAFE (Saving Animals From Extinction) umbrella.

AZA SAFE programme provides a new approach for collaborative conservation. Using a 'One Plan' approach, conservationists working to save species or taxa, work together to identify and prioritize the conservation needs of a species and then develops a 3-year Conservation Action Plan (CAP). Each AZA SAFE Conservation Action Plan includes specific projects, goals, and actions that will address the needs of each species. There are 4 areas of the Shark and Ray programme that were identified:

- Public Action projects
- Policy and Legislation
- Research – In situ and Ex situ
- Species Survival Plan (SSP)

As part of the Species Survival Plan, key areas where there were significant gaps in our knowledge of sharks were identified. One of which is the need for a comprehensive, unified and standardised

registry and database of elasmobranch blood chemistry and hematology values that can be used to develop reference intervals necessary for effective husbandry and veterinary care.

Using this collaborative approach, co-leaders from National Aquarium, Georgia Aquarium and The Deep are in the process of co-ordinating the necessary expertise and developing the database for the efficient collection, analysis and interpretation of this information.

This poster will outline the project, its progress over its first year and attempt to gauge the interest of European aquariums to contribute and collaborate with the project.

TOWARDS A SUSTAINABLE FUTURE: AN INTRODUCTION TO THE SUSTAINABLE AQUARIUMS PROJECT (SNAP)

Tom Galley, Nick Jones, Graham Hill, Jean-Denis Hibbitt, Brian Zimmerman and Jon King

Over 90% of the estimated 20-27 million coral reef fish entering the global aquarium trade are collected from the wild. Concerns over the sustainability of wild collection are driving the aquarium community to search for sustainable alternatives in order to reduce the ecological impact of the trade on the world's coral reefs.

To date, approximately 14% of the estimated 2,300 species entering the marine aquarium trade have been successfully bred and reared in captivity. However, only an estimated 1% are commonly available to the trade as aquacultured animals. The difficulty in rearing the majority of coral reef fish lies in the small size of their delicate larvae, a poor understanding of appropriate larval rearing environments plus a lack of suitably sized and nutritious diets.

These combined factors have hindered the development of culture techniques for the vast majority of species commonly found within the global aquarium trade. The Sustainable Aquariums Project (SNAP) is a collaboration between The Deep, SEA LIFE, the Zoological Society of London and Bangor University. The aim of SNAP is to increase the number and diversity of sustainably and ethically produced coral reef fish species available to the aquarium industry, and therefore enhance the global sustainability of the trade in coral reef fish.

Our objective is to achieve this through the advancement of hatchery production techniques, technology and biological knowledge. SNAP is part-funded by the European Regional Development fund through the Welsh Government's SMARTExpertise programme.

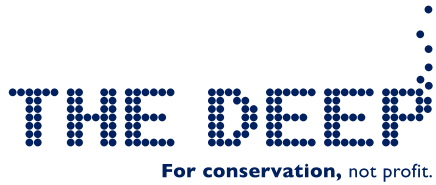


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