

The 42nd Annual
SYMPOSIUM
of the European Association
for Aquatic Mammals



14th-17th March 2014 · LORO PARQUE · Tenerife · Spain



European Association
for Aquatic Mammals



LORO PARQUE



European
Association
for Aquatic
Mammals

Lisbon March 1st 2014;

Dear Participant;

Dear Member, colleague and friend

Our 42nd annual Symposium is fast approaching.

It was an intense and interesting experience to receive all Abstracts and interact with many of you preparing this meeting.

The scientific committee had an important role evaluating and approving the Abstracts submitted. A special thank you for Manuel Garcia Hartmann and his incredible support in the scientific program organization. We consider this year has an outstanding scientific quality for the papers presented.

The short talk format had a very good adhesion and we believe it can be a new tool for communicating our community' work.

LoroParque is a worldwide reference for the Pscittacidae management with a major contribution for its conservation. Having Loro Parque more involved with Marine Mammals brings us the faith that we can be even stronger in conservation actions in the near future.

I can not finish without thanking all effort Dr Javier Almunia and Maria Fernández made along the last year exchanging ideas and working hard to make this conference a big success.

Thank you Mr. Wolfgang Kiessling for inviting us!

Arlete Sogorb



Puerto de la Cruz, March 1st 2014;

Dear Participants,

LoroParque welcomes you to the 42nd Symposium of the EAAM. We are honoured to host this event for the third time, proving our firm commitment to the science, welfare and protection of aquatic mammals.

Our concern about the marine fauna can be traced back to the early eighties when my good friend Petra Deimer raised my awareness about the sperm whale hunting operations that were taking place in Azores. The passionate work of Petra with the people and authorities of the Azores turned those traditional whaling operations into a Sanctuary for Marine Mammals. That success inspired me, and I joined her efforts to extend this protection to Macaronesia, the oceanic region that comprises the Azores, Canary Islands, Cape Verde, Madeira, and also some coastal waters of Morocco, Southern Portugal and Southern Spain.

The creation of an international sanctuary for the protection of sea creatures is a challenging enterprise, but we have not ceased in our endeavour. Back in 2007, Loro Parque teamed up with the Convention on Migratory Species (CMS) to promote an international agreement for the protection of the small cetaceans in the Western African coast. This event, coinciding with the Year of the Dolphin, was probably the first milestone of our Macaronesian Sanctuary. Now, simultaneously with the EAAM 42nd Symposium, Loro Parque Fundación is going to plant the second milestone by promoting a Macaronesian Network on Cetacean Health, SANICET. Hopefully this network will become the first layer of scientific collaboration and sharing of knowledge, which will allow us to know the conservation status of the cetaceans in the region and, ultimately, help us preserve their populations for future generations.

I am convinced that sharing knowledge, building capacity and establishing scientific collaborations is the best way in which we can help the aquatic mammals, and that is the reason why we are so proud to host this Symposium in Loro Parque.

I wish you a successful symposium and I hope you return home full of new, stimulating ideas and with many good memories from Tenerife.

Yours,

A handwritten signature in blue ink, which reads "Wolfgang Kiessling". The signature is written in a cursive, flowing style.

Wolfgang Kiessling, President



European
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Mammals



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SCIENTIFIC PROGRAM

INVITED SPEAKERS

Saturday, 15th of March 2014

[Gabriel Mato](#)

“Europe: a different view”

Sunday, 16th of March 2014

[Brad Andrews](#)

“A journey”

Monday, 17th of March 2014

[Kevin Willis](#)

“The strategic importance of the Alliance of Marine Mammals Parks and Aquariums”

FRIDAY, 14TH OF MARCH, 2014

15:00 - 18:00 Registration desk open
18:00 - 23:00 Icebreaker

SATURDAY, 15TH OF MARCH, 2014

08:30 - 13:00 Registration desk open
08:45 - 09:00 Welcome Address
09:00 - 10:00 Europe: a different view
Gabriel Mato, Member of the European Parliament and Chair of the Committee on Fisheries

10:00 - 10:20 40 years of Aquatic Mammals Publications
Kathleen Dudzinski

10:20 - 10:40 Loro Parque education about cetaceans through videoconferences
Maria Fernández Martin

10:40 - 11:00 Dolphins and whales are calling you!
David Nácher

11:00 - 11:30 Coffee Break
11:30 - 11:50 Scientific studies: from theory to reality
Caroline Lévy

11:50 - 12:10 Ethological analysis of the social development of two bottlenose dolphin calves (*Tursiops truncatus*).
Brigitta Mercera

12:10 - 12:30 Open Water Training of Bottlenose Dolphin Mother-Calf Pair
Zenzi Willems

12:30 - 12:50 Training for a new presentation at Baia dos Golfinhos - Lisbon Zoo
Manuela Oliveira

12:50 - 13:10 Open and closed eye ultrasound training in sea lions
Pablo Joury

13:10 - 14:20 Lunch Break
14:20 - 14:40 Ultrasonic anatomy of the sea lion eye and early detection of cataractous changes
Geraldine Lacave

14:40 - 15:00 First dolphin adenovirus outbreak in a population of bottlenose dolphins (*Tursiops truncatus*).
Daniel Garcia-Párraga

15:00 - 15:20 Novel adenovirus in captive bottlenose dolphins: diagnosis and phylogenetic analysis.
Consuelo Rubio-Guerri

15:20 - 15:40 Live strandings of cetaceans in Israel
Danny Morick

15:40 - 16:00 Where are all the old orcas gone?
Javier Almunia

16:00 - 16:20 Using a multi-disciplinary approach to define and assess the conservation unit of killer whales (*Orcinus orca*) in Southern Spain
Renaud de Stephanis

16:20 - 16:40 To split or not to split: Management units for bottlenose dolphins in southern Iberian Peninsula
Joan Giménez

16:40 - 18:00 Coffee Break
Poster Session
Marine Mammal TAG

18:00 - 19:30 Annual General Meeting (members only)
20:30 Dinner at "La Casa del vino" with carnival surprise.

SUNDAY, 16TH OF MARCH, 2014

09:00-10:00	A Journey Brad Andrews, Chief Zoological Officer SeaWorld
10:00 -11:00	Short Talks Corneal lesions in captive California Sea Lions (<i>Zalophus Californius</i>). The influence of water quality on the cornea Kim de Haan Skin and blood sampling on bottlenose dolphins for scientific purposes Marco Tulio Flores, Phocine distemper virus antibodies among harbor seals (<i>Phoca vitulina</i>) in the coastal waters of The Netherlands Sánchez Contreras Drawing seal blood from the tarsal sinus Sánchez Contreras Behavioral progress of Morgan, a hearing impaired killer whale (<i>Orcinus orca</i>) Claudia Vollhardt Smart IP net to acquire and detect bio-sounds Jose Carlos Sanluis The shifts in public opinion? Sietze Hess Does public presence affect belugas whales (<i>Delphinapterus leucas</i>) behaviour? Gabriela Postiglione New Cetacean Pavillion at the Acquario di Genova Claudia Gili Salivary cortisol in <i>Tursiops truncatus</i> : a complementary management tool Tania Monreal-Pawlowsky
11:00 -16:00	Visit to Loro Parque & Lunch
16:00 -16:20	Importance of adrenergic hormones in the management of marine mammals Luana Cortinovis
16:20 -16:40	Captive Killer Whale "Morgan" Vocal Dialect Miguel Neves dos Reis
16:40-17:00	Coffee Break
17:00 -17:20	Functional morphology of the hind-limb in the locomotion of the sea otter Kent Mori
17:20-17:40	Nutritional Analysis of Frozen Canadian Capelin (<i>Mallotus villosus</i>), Atlantic Herring (<i>Clupea harengus</i>), and Canadian Lake Smelt (<i>Osmerus mordax</i>) over a 9 Month Period of Frozen Storage Jo Mejia-Fava
17:40 -18:00	Zygomycosis on bottlenose dolphins (<i>Tursiops truncatus</i>) caused by <i>Rhizopus oryzae</i> Fernando Palmero
18:00 -18:20	Morbillivirus and herpesvirus in free-ranging bottlenose dolphins in the Canary Islands: a molecular retrospective study Eva Sierra
18:20-18:40	Two cases of morbillivirus infection in white beaked dolphins in the rehabilitation centre SOS-Dolfijn Niels van Elk
18:40-19:00	Herpesvirus in Beluga whale: relationship with appearance of lesions and routes of transmission Mar Melero
20:30	Gala Dinner

MONDAY, 17TH OF MARCH, 2014

- 09:00-10:00 The strategic importance of the Alliance of Marine Mammal Parks and Aquariums
Kevin Willis, Vice President of the Alliance of Marine Mammal Parks and Aquariums
- 10:00 -10:20 How Long Do Dolphins Live?
Kevin Willis
- 10:20 -10:40 Identification of a hearing deficit in a stranded killer whale
Dorian S. Houser
- 10:40 -11:00 Developmental trajectory of dialect formation in Orcas (*Orcinus orca*) - A case study
Dietmar Todt
- 11:00 -11:30 Coffee Break
- 11:30 -11:50 Fatal autoimmune disease in a 10 year old manatee (*Trichechus manatus manatus*)
Katrin Baumgartner
- 11:50 -12:10 Environmental monitoring program at the Marine Life Park, Singapore
Christopher S Torno
- 12:10 -12:30 Assessment of the levels of polycyclic aromatic hydrocarbons and organochlorine contaminants in bottlenose dolphins (*Tursiops truncatus*) from the Canary Islands, the Eastern Atlantic Ocean.
Natalia García-Alvarez
- 12:30 -12:50 Variability of fluoride levels in two populations of North Atlantic fin whales (*Balaenoptera physalus*)
Morgana Vighi
- 12:50 -13:50 Closing Ceremony
Announcement of the Student's Award
Presentation of the 2015's Host Facility
- 13:50 -15:00 Lunch Break / Transport
- 16:00 -18:00 Workshop / Wetlab
Connecting science and education, the whale watching trip include an "on site" demonstration on the cutting-edge technology on cetacean bioacoustics developed by the University of La Laguna and Loro Parque Fundación.



ABSTRACTS

SATURDAY, 15TH OF MARCH, 2014

Europe: a different view

Mato, G. Member of the European Parliament and Chair of the Committee on Fisheries

40 years of Aquatic Mammals Publications

Dudzinski, KM. *[1]

[1] Aquatic Mammals Journal, P.O. Box 711, Old Mystic, CT 06372-0711 USA, kdudzinski@dolphincommunicationproject.org

Aquatic Mammals Journal celebrates 40 years of publishing papers on topics centered on marine and aquatic mammals. These topics include scientific inquiry (e.g., immunology, behavior, anatomy, physiology, etc), husbandry and care, education, reproduction and more. A concise history of how the journal evolved from the beginning to the current year will be presented and will include details from each of the previous managing editors as well as highlights about various series and topics included in the journal

Loro Parque education about cetaceans through videoconferences

Fernández, M. *[1]

[1] Loro Parque. Educational Department. Puerto de la Cruz, Tenerife, auladelmar@loroparque-fundacion.org

In 2006 Loro Parque Fundación developed a web-based videoconference software, called Nautilus, using open-source media streaming software to avoid costs of the commercial media streaming services. Nautilus is accessed as a regular website and allows videoconferences to be performed using any web browser. The system has been designed as an interactive blackboard and allows slideshow presentations, video streaming in multiple directions, ask and answer questions by chat, play interactive educational games, etc. The videoconference programme is offered for free to every school. Every year around 400 schools and more than 15.000 pupils participate in the activities. Programs focused on cetaceans are by far the most in demand. Information on the biology and ecology of the species, their conservation status, and the threats they are facing in the wild are conveyed through a slide-show presentation with a simultaneous video streaming from an educator. The final part is a question and answer session with the animal trainers. The videoconference is one of the most successful educational program at Loro Parque, giving students in their classrooms across the country to closely observe cetaceans, increasing understanding about their biology, husbandry and threats in the wild.

Dolphins and whales are calling you!

Nácher, D. *[1]

[1] Parques Reunidos Valencia S. A. L'Oceanogràfic, Ciudad de las Artes y las Ciencias, Educaro Primo Yúfera S/N, 46013, Valencia, Spain, dnacher@oceanografic.org

Most people ignore whether whales are present in the Mediterranean or their main threats or even what they can do for their conservation. The Education and research Departments of the Oceanogràfic have developed different actions to mend this:

Workshops:

~"Listening to dolphins": A 1h15m activity where High school students can listen to live dolphin vocalizations in our dolphinarium with a real hydrophone and understand how researchers work to learn more about cetaceans and how these animals depend mainly on their hearing.

~"Cetacean Workshop-oceans": 1h 15m guided-tour for students from 4 to 16 years old. By using biofacts, and approaching to the dolphinarium acrylic we can explain basic knowledge about cetaceans and go into detail about their classification, identification and main threats

Campaigns:

~Stranded sperm whale action: Through a stranded sperm whale in the downtown we pretend to create awareness about threats on cetaceans and how to act if you find one, and introduce the Rehabilitation Center located in our facilities

~Our main goal is to make people know the existence of cetaceans in the Mediterranean and which daily actions can they do to conserve and protect them.

Scientific studies: from theory to reality

Lévy, C. * (1), Malassis, R. (2), Mercera, B. (1) and Delfour, F. (1)

(1) Parc Astérix, 60128 Plailly, France, delphinarium@parcaterix.com

(2) Université Paros 13, 93430 Villeteuse, France

Parc Asterix dolphinarium hosts several times a year students from different universities to study dolphins and sea lions behavior and cognition. We know today that several species are able to follow human pointing gestures (dogs, horses, goats, dolphins, elephants, etc.) but we don't know much about sea lions. Last year, we decided to answer this question. We have the dolphinarium, 4 sea lions (*Zalophus californianus*), 9 trainers and an interesting scientific study conducted by a Master student. So in theory, this should be easy and simple. However in reality, several non-expected parameters came up: inappropriate location, inadvertent cueing, noisy and busy surroundings, etc. In order to help the animals to understand the question the scientific wanted to ask them, it was necessary to follow the same method, to have one trainer in charge of the protocol, to be patient and attentive to all animals and staff involved. Trainers' knowledge and relation with the animals, plus a strong team work, are essential to conduct a scientific work to success.

Ethological analysis of the social development of two bottlenose dolphin calves (*Tursiops truncatus*).

Mercera, B. *(1), Delfour, F. (1), Levy, C. (1), Serrano, J. (1)

(1) Parc Asterix, BP 8, 60128 Plailly, France, birgitta.mercera@parcaterix.com

Like many behaviours of marine mammals in the wild, maternal and allo-maternal behaviours of the bottlenose dolphins (*Tursiops truncatus*) are little known. The relation between the newborn and its mother is crucial for the survival of the calf. Other factors, like the mother's personality and the interactions with other group members can also play an important role for the development of the calf.

This study investigates the social development of two bottlenose dolphin male calves from their birth to their 8 months old, in an environment under human care.

Partners and companions of the two calves, together with their mothers or not, were noted as well as the behavioural repertoire [e.g. affiliative behaviours, echelon swimming, infant position, swim alone, etc.].

As expected, the results show that the two calves spent a lot of time together, especially from the 4th month and further on.

Surprisingly, at one month old the calves already looked for interactions with conspecifics. The third calf, born the year before had a very important role in their social interactions.

This study shows how important the first year of life is for social learning and for building future social networks.

Open Water Training of Bottlenose Dolphin Mother-Calf Pair

Willems, Z. * (1), Kieffer, G.(2)

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(2) Curacao Dolphin Academy, Bapor Kibra Z/N Curacao

Since 2004, the Curacao Dolphin Academy has been operating an open water dolphin training program involving scuba diving and snorkeling sessions with paid participants; in addition to daily boat following excursions. The training staff believes this program provides an additional tool for further stimulation and enrichment to their overall human care experience.

This presentation will focus on our latest, and most well documented open water training case involving an experienced mother and her inexperienced one-year-old calf. Materials and methods will be discussed; as will the behavioral insights provided during each approximation along the way.

One of the most fascinating aspects of this work is the fact that during scuba dive sessions, food reinforcement is not provided, nor are the animals cued to perform specific tasks. Therefore, the dolphins' behavior is spontaneous, providing an excellent opportunity to document creative behavior involving feeding and foraging, communication and social/sexual behavior. Examples of these observations will also be included.

Training for a new presentation at Baia dos Golfinhos - Lisbon Zoo

Oliveira, M.* (1), Elias, V. (1), Castro, P. (1) and Sogorb, A. (1)

(1) Lisbon Zoo, Estrada de Benfica, 158, 1549-004, Lisboa, baiagolf@zoo.pt

Baia dos Golfinhos, at Lisbon Zoo has been characterized by presentations with a storyline that introduces educational and conservation messages. Every 2-3 years we create a new storyline offering the public a new presentation and new opportunity of learning about ocean and marine mammal's conservation.

Since 2013 our presentation is sponsored by ISN-Instituto de Socorros a Náufragos. ISN is part of the Portuguese Navy and is responsible for the lifeguards on the beaches. ISN worked with us on safety rules for swimming that we introduced in the storyline.

Baia dos Golfinhos presentations used to be the classical sea lion presentation followed by a dolphin presentation. As novelty we have a new format where dolphins and sea lions are presented simultaneously with special emphasis on water work.

We will focus on the training methods and desense techniques applied to sea lions and dolphins in order to allow animals' control when both species are together.

We believe this new presentation format offers an engaging and interactive way, inspiring people to learn, care and act.

Open and closed eye ultrasound training in sea lions

Joury, P. *(1), Candice, J., Alexandre, L.B., Christilla, B., Claudia, M., Maillot, A., Alerte, V. and Geraldine, L.

(1) Amneville zoo, France, team-otaries@zoo-amneville.com

At Amneville zoo in France, where the pinnipeds were already very well trained for ultrasound examination and upon further discussion about the scientific information gained from the procedure, it was decided to desensitize the animals to voluntary eye ultrasound. Several positions for the animals, the trainers and the veterinarian were tested such as to have the most comfortable access to scan the eyes. Both open and closed eye ultrasound were attempted. The animals were desensitized to eye flushing before the administration of the topical anesthesia drops. Teaching them to focus on a target to minimize eye globe movement during the examination proved to be a real challenge. Habituation to close-up photography and flash for the continuous record of the behaviors was important. In and out of water scanning were considered. The training allowed for the follow-up of cataract development in an animal and is seen as a helpful diagnostic tool pre and post-surgery. SCIL France, distributor of the GE ultrasound machines in France, sponsored the project by providing the equipment. The presentation will review all the training steps to achieve this goal.

Ultrasonic anatomy of the sea lion eye and early detection of cataractous changes

Lacave, G. *(1) & Huguet, E. (2)

(1) Marine Mammal Veterinary Services, Daverlostraat 186, 8310 Assebroek, Brugge, Belgium, geraldine.lacave@skynet.be

(2) Oftalmovet, Islas Canarias, 32, 46023 Valencia, Spain

A project was started at Amneville zoo in France to voluntarily ultrasound the eyes of sea lions. Indeed there have been several reviews and publications about pinniped eye disease lately (Colitz, 2011, 2013; Miller 2013) and references on the sea lion eye anatomy through ultrasound seemed appropriate. Several animals were trained to voluntarily accept the probe on closed eye lids but also, after utilization of topical anesthetic, directly on their cornea to record images and videos of the eye. Reference images of the internal eye structure were henceforth obtained. Ultrasound can help in the diagnose of retinal detachment, foreign bodies, swelling/inflammation, tumors and other disorders that are sometimes difficult to identify through lack of pupillary dilatation and/or direct ophthalmoscopy. Identification of cataract and anterior luxation are high on the list. Surgical removal of the lens has become more frequent in pinnipeds, generally through an intra or extracapsular approach upon full ripening of the lens. An earlier identification of cataractous changes though ultrasound may potentially allow to a surgery by phacoemulsification, less invasive and the most widely used cataract surgery nowadays, because performed at an earlier development of the disease.

First dolphin adenovirus outbreak in a population of bottlenose dolphins (*Tursiops truncatus*).

García-Párraga, D.*(1), Rubio-Guerri, C.(2), Melero, M. (2), Álvaro, T. (1), Valls, M. (1), Crespo-Picazo, J.L. (1), Milo Sierra, C. (1) and Sánchez-Vizcaíno, J.M. (2)

(1) Veterinary Services. Oceanográfico. Parques Reunidos Valencia. Eduardo Primo Yúfera, 10B. 46013 Valencia. Spain. dgarcia@oceanografic.org

(2) VISAVET Center and Animal Health Department, Veterinary School, Complutense University of Madrid, Av Puerta del Hierro s/n, 28040 Madrid, Spain consuelo@sanidadanimal.info

In September 2013, two 9 year old dolphins, from a total population of 14 individuals of different ages, presented with acute gastrointestinal disease including anorexia, profuse vomiting and diarrhea. Different samples from both animals were submitted to 3 different laboratories for a battery of multiple tests including bacterial isolation, viral detection through molecular and immunological techniques and serological testing. During the next two weeks, 5 more individuals became progressively symptomatic with different severities. All testing came out negative/not significant except serology against Adenovirus (CAV1) in all affected individuals. Specific PCR with posterior sequencing was then performed to confirm the diagnosis of a new "Dolphin" adenovirus strain and for monitoring elimination process. Juvenile individuals born at the aquarium suffered from a more severe illness, and all symptomatics seroconverted while the rest of adults remained seronegative. Diseased individuals recovered around 10 days after supportive treatment and antibiotic coverage, except two more severely affected dolphins that developed frank hematuria with subsequent significant anemia, in one case, also complicated with gastrointestinal hemorrhage. The origin of the virus remain uncertain, though low chlorine levels previous and during the first days of the outbreak could have at least contribute to the spreading of disease.

Novel adenovirus in captive bottlenose dolphins: diagnosis and phylogenetic analysis.

Rubio-Guerri, C.*(1), García-Párraga, D. (2), Melero, M. (1), Valls, M (2), Álvaro, T (2), Crespo, J.L. (2), Sánchez-Vizcaíno, J.M. (1)

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(2) Oceanographic Aquarium of the Ciudad de las Artes y las Ciencias, C/ Junta de murs i valls s/n, 46023 Valencia, Spain

Adenoviruses have been isolated from wild cetaceans, including a sei whale (*Balaenoptera borealis*), two bowhead whales (*Balaena mysticetus*) and a beluga white whale, (*Delphinapterus leucas*). These viruses were isolated from gastrointestinal samples, and the correlation between disease and these viruses in cetaceans remains unclear as they have not been characterized. Furthermore, only one polymerase sequence from a cetacean (*Phocoena phocoena*) is found in GenBank (JN377908). We report the identification of a novel adenovirus, the first well-characterized cetacean adenovirus, from an outbreak of adenovirus in animals from the Oceanográfico of Valencia. The animals were sampled (fecal and urine samples) and the consensus nested-PCR for polymerase gene described by Wellehan in 2004 and conventional PCR for the hexon gene published by Thomsom in 2002 were performed. We obtained the same sequence for all the animals, and it was different to any sequence from GenBank. Therefore, we present partial genomes and phylogenetic analyses of *tursiops* adenovirus 1, as well as the development of quantitative PCR assays to be used for the surveillance and epidemiologic studies of these viruses.

Live strandings of cetaceans in Israel

Morick, D.*(1,2), Yamin, G. (1,2), Scheinin, A. (2), Goffman, O. (2), Elsar, M. (2), Amiel, S. (2), Hadar, N.(2), Levy, A. (2), Kerem, D. (2),

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(2) IMMRAC, Israel Marine Mammal Research & Assistance Center, Michmoret, Israel

During the last 20 years, since IMMRAC (Israel Marine Mammal Research & Assistance Center) has begun operating, 18 cases of live cetacean strandings were recorded. During this period, about 280 dead strandings were noted. Most of the live strandings accrued during 2008-2011 when 6 striped dolphins (*Stenella coeruleoalba*) were stranded alive, of which 4 were taken under rehabilitation. In the same period, a mass stranding of striped dolphins was reported in Spain, where distemper virus was found to be the cause of stranding or death. On December 2013 an adult bottlenose dolphin (*Tursiops truncatus*) was stranded and was treated in rehabilitation for 6 days. This was the first and only rehabilitation attempt of a bottlenose dolphin in Israel. Unfortunately, until now none of the rehabilitated animals survived to be released. In this presentation, rehabilitation procedures and the pathology detected in selected cases will be described and the rehabilitation versus the euthanasia options will be discussed.

Where are all the old orcas gone?

Almunia, J. * (1)

(1) Loro Parque Fundación, Avda. Loro Parque, S/N. 38400 Puerto De La Cruz, Spain adjunto@loroparque-fundación.org

The first determination of the life expectancy for *Orcinus orca* was done 25 years ago, using age-based mortality rates calculated from observations of the Southern and Northern resident killer whales off Washington State. In that study the mean life expectancy of the species was determined to be 50 years for the females and 30 years for the males. These calculations and the associated maximum longevity estimations (80 years for the females and 60 for the males) have been widely used and accepted since then. In 2000, a new evaluation using almost 30 years of observations resulted in higher mortality rates, which would imply shorter life expectancies. Nevertheless the authors concluded that these higher mortality rates were of anthropogenic origin, and were attributed to the salmon depletion.

A current review of the ages of the killer whales living in the coast of Washington State reveals that older individuals (those over 60 years) are less abundant than predicted by the model published in 1990. A detailed analysis of the mortality rates during the last 40 years suggest an alternative explanation to the high mortality rates found in the last years, hence the accepted mean life expectancy and longevity estimations must be reevaluated.

Using a multi-disciplinary approach to define and assess the conservation unit of killer whales (*Orcinus orca*) in Southern Spain

Esteban, R. (1), Verborgh, P. (1), Gauffier, P. (1), Giménez, J. (2), Martín, V. (3), Pérez-Gil, M. (3), Tejedor, M. (3), Foote, A. (4), Stephanis, R. *(2)

(1) CIRCE (Conservation, Information and Research on Cetaceans), Cabeza de Manzaneda 3, Pelayo, 11390 Algeciras, CADIZ, Spain. joan.gimenez@csic.es

(2) Department of Conservation Biology, Estación Biológica de Doñana (CSIC), 41013 Sevilla, Spain

(3) SECAC, Society for the Study of Cetaceans in the Canary Archipelago, Edificio Antiguo Varadero, 1ª planta, Local 8B, Puerto Calero, 35571 Yaiza, Lanzarote, Spain

(4) Centre for GeoGenetics. The Natural History Museum of Denmark. Øster Voldgade 5 – 7 1350 Copenhagen K

Identifying demographically independent conservation units is a key goal for management. Previous genetic work assigned killer whales in the Strait of Gibraltar in a population with whales occasionally seen in the Canary Island. However, there was weak differentiation between them. This could result from historic gene flow and an absence of contemporary one. Here we present analyses of photo-identification and individual genotypes to assess the level of contemporary migration. A total of 26,430 dorsal fin images were analyzed, showing the presence of 47 different individuals in Gibraltar and 16 in Canary, no matches were found. The catalogue was analysed with Socprog, identifying 5 pods in the Gibraltar and 2 pods in Canary. The temporal relationships were fitted to models calculating their lagged association rates resulting in a social system based on Constant Companions and Casual Acquaintances. Mitochondrial DNA haplotype was shared by all individuals sampled within each group, but differed between the two Canaries groups and between groups within the Strait, suggesting that social structure was matrifocal and there was little or no migration. Kinship analysis detected no close kin, suggesting low or no contemporary gene flow. The results suggest that the individuals within Gibraltar are a distinct 'conservation unit'.

To split or not to split: Management units for bottlenose dolphins in southern Iberian Peninsula

Giménez, J. *(1), Barón, E. (2), Louis, M. (3), Verborgh, P. (4), Gauffier, P. (4), Esteban, R. (4), Forero, MG. (1), Eljarrat, E. (2), Barceló, D. (2), Stephanis, R. (1)

(1) Department of Conservation Biology, Estación Biológica de Doñana (EBD),

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(3) LIENSs (Littoral Environnement et Sociétés), UMR CNRS-Université de La Rochelle 2, rue Olympe de Gouges 17000 La Rochelle, France.

(4) CIRCE (Conservation, Information and Research on Cetaceans), Cabeza de Manzaneda 3, Pelayo, 11390 Algeciras, Spain.

Identifying discrete, demographically independent, conservation units is essential for the conservation of wildlife populations. Here we use a combination of photo-identification, as well as both ecological and genetic markers as a multi-disciplinary approach to define the conservation units of bottlenose dolphins in southern Spain (Gulf of Cádiz and Strait of Gibraltar).

Photo-identification showed long-term residency of bottlenose dolphins in the region, but no recaptures between the areas, suggesting a spatial segregation. While genetic analysis based on bayesian clustering and F_{st} values show no significant differentiation.

Stable isotope analysis revealed that the two areas have significant different signatures both for nitrogen ($F=8.98$, $p<0.01$) and carbon ($F=5.14$, $p<0.05$). Moreover, standard ellipses showed only a 9.11% of overlap between areas, indicating different diet or foraging on same preys but with different baselines. Regarding contaminants, significant statistical differences were found for some congeners. Classical multidimensional scaling and standard ellipses were applied to the different types showing very low overlap for PBDEs (9.33%) and dechloranes (0.51%) and a complete inclusion for MeO-BDEs.

These results suggest that bottlenose dolphins from both areas, although genetically indistinguishable, belong to distinct ecological management units and will need different conservation measures to manage the different threats that are facing.

SUNDAY, 16TH OF MARCH, 2014

A Jouney

Andrews, B, Chief Zoological Officer SeaWorld

SHORT TALKS

Corneal lesions in captive California Sea Lions (*Zalophus Californius*)

The influence of water quality on the cornea

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Corneal opacities and corneal ulcers are frequently observed in captive California sea lions. The objective of this research project was to investigate the influence of water quality on these eye problems. The diagnostic aid of fluorescein dye in corneal defects was also tested. For six weeks two sea lions and their corneal lesions were followed up and water quality (Chlorine, salinity and pH) was tested every day. It appeared that the concentrations of total, free and combined Chlorine had a significant influence on the size of the corneal lesions, whereas combined Chlorine had the most significant influence. It also appeared that not all the lesions were positive with fluorescein. However, fluorescein can be a useful diagnostic tool to determine the seriousness of the corneal lesions. Since organic material increases the concentration of combined Chlorine, and this study demonstrated that corneal lesions are most severely affected by combined chlorine, it is recommended to decrease the organic material in the water and to use an alternative for Chlorine, such as Ozone.

Skin and blood sampling on bottlenose dolphins for scientific purposes

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On the 2nd of October 2012, we initiated the data collection of the scientific research project Evaluation of the trophic ecology of the cetacean community in the gulf of Cadiz, in collaboration with CIRCE and CSIC (Spanish agency for Scientific Research). The group of dolphins in Loro Parque underwent a controlled diet experiment to determine the isotopic fractionation indexes. The dolphin training staff was responsible of the quarterly skin collection and facilitating the simultaneous blood sampling to the veterinarian staff, on six of our dolphins, one male and five females.

At the training level, our goal was to maintain the high criteria for the medical behaviours, and to work on gatings between all available pools on a constant level. That ensured an easier control over the animals, since control depended on the number of trainers working each day.

The diet experiment lasted 350 days, and more than 96 skin samples were obtained for the calculation of isotopic fractionation indices.

Phocine distemper virus antibodies among harbor seals (*Phoca vitulina*) in the coastal waters of The Netherlands

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Phocine distemper virus (PDV) affected the population of harbor seals (*Phoca vitulina*) in the north-western European coastal waters in two major outbreaks during 1988 and 2002. Serum samples collected from seals admitted to rehabilitation at the Seal Rehabilitation and Research Centre, in The Netherlands, from 2002 to 2012 were tested for the presence of PDV-neutralizing antibodies. Antibodies were detected in most seals in 2002 and 2003 while after 2003, only seals younger than two months old and adult seals that probably survived the 2002 PDV-epizootic presented antibodies. Using mathematical modeling, we estimated that 11% of the seals have currently antibodies against PDV, which suggests that the population of harbor seals is mostly not immune to PDV infection. Thus, a new outbreak in this area may cause a major epizootic with infection of →80% and mass-mortality of →50% of the population.

Drawing seal blood from the tarsal sinus

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The Seal Rehabilitation and Research Centre admits more than 500 harbor seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) every year for rehabilitation. Diagnosing the problems that affect these seals quite often requires blood sample results. Handling these wild animals is dangerous and stressful for the animals themselves, so a quick and easy method for drawing blood is necessary to minimize any complication. Even though sampling blood from a seal is generally done using the extradural vein, for us the tarsal sinus has revealed to be an easy and fast approach for blood collection in these kind of marine mammals.

Behavioral progress of Morgan, a hearing impaired killer whale (*Orcinus orca*)

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In 2010, Morgan, a young female killer whale (*Orcinus orca*) was rescued from the Wadden Sea and underwent rehabilitative care at Dolfinarium Harderwijk. After she was found to be a candidate unsuitable for release, she was relocated to Loro Parque where she currently lives with five other killer whales. Upon arrival in November 2011, previous observations were confirmed when systematic testing of her hearing indicated a deficit as compared to the rest of the animals in the group. Her training plan was adjusted to switch from auditory bridging to tactile and visual bridging (a separate hand signal). Currently we are in the process of teaching her an additional bridge in form of a light. The light bridge will help us to communicate with her under water and over long visual distances. Despite her challenges, Morgan's integration into the existing group of killer whales keeps going well and together with the other animals she will continue to participate in a research program intent on examining the scope and nature of her hearing disability.

Smart IP net to acquire and detect bio-sounds

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In the study and analysis of bio-sounds in cetacean populations, In the wildness or in captivity, it is of great utility to automatically classify their calls on the fly, and finally identify and count individuals for better management. Sound measurements or other physical parameters require easy access to data from the hydrophones and other sensors and the best possible conditions of measurement, namely the reduction of acquisition noise, get a suitable range of the signal, etc. In order to obtain data that could improve the management of wild populations, some hydrophones were installed at the facilities of Orca Ocean (Loro Parque). We have developed some smart IP modules for that facilities that, when attached to the fixed hydrophones, will build up a "network of smart hydrophones" with a master-slave structure. By this way it is possible to get control of the acquisition, send data from nodes to master or storage them into an internal memory. Each node is able to send data as raw streams or detected events that can include event meta-data. The smart behavior, modularity and low human supervision of the network makes it easy to use for field data collection and analysis.

The shifts in public opinion?

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There is a negative strength that is attacking us. Activists have nowadays a loud and big voice. Celebrities have an opinion about us and some ex-employees has shifted to the other side. They influence the public opinion through the media (TV/Radio/print and Social Media). Till now the only thing we do is react and sometimes we even choose to ignore these sounds. Will there be a shift in your way of working with your communication department?

Does public presence affect belugas whales (*Delphinapterus leucas*) behaviour?

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Recent studies focused on Beluga (*Delphinapterus leucas*) behavior under controlled environment, but none considered the "presence of the public" as a possible behavior's modifier. A dyad of beluga housed at the Oceanografic Park of Valencia (Spain), was observed from June to August 2012 before the public opening and in the presence of visitors. Focal-animal sampling observations lasting 1-hr each and a specific behavioural catalogue including 68 units were utilized. Subsequently, Observer software (Noldus) was applied to provide quantitative behavioural descriptions and social relationships among individuals. From 216 hours of registrations, 127 hours (63 for the male and 64 for the female) have been selected and divided in two groups with presence/absence of visitors as the main variable. A significant ($p < 0.05$) difference was found for social and postural displays. In particular, the male-female pair spent more time swimming together ($p < 0.01$) and interacted more often ($p < 0.05$), with behaviours such as belly-to-belly swimming when the park was closed. Despite the limitation of the case and considering that this is a preliminary study, these evidences remark how external conditions such as the presence of public seems to influence the quality as well as the quantitative expression of beluga's behavior.

New Cetacean Pavillion at the Acquario di Genova

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Acquario di Genova opened in 1992 with the mission to "educate and increase public awareness on conservation of aquatic species and their natural environment".

The aquarium is located on the Mediterranean sea inside a Marine protected area (Pelagos Sanctuary), where projects are constantly developed for the protection of the species inhabiting these "International waters".

The new Cetaceans Pavilion has been opened on July 27, 2013 and is dedicated to the education, conservation and research activities regarding the 8 species living in the Pelagos sanctuary. Here the public can also admire a group of dolphins (*Tursiops truncatus*) and engage with the staff to learn about the biology, ecology and threats of this species in natural waters.

The engineering part of project has been quite impressive: this concrete facility (surface of 7000 square meters and 16 meters tall) was in fact built in a shipyard and transported to Genova by sea, positioned next to the aquarium and immersed, attached to bottom. This innovative building is based on state of the art knowledge of the husbandry of this species regarding water quality management, space definition and distribution, animal welfare and aims to present the dolphins to the public in their natural way.

Salivary cortisol in *Tursiops truncatus*: a complementary management tool

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Cortisol is secreted in mammals as a response to a wide range of stimuli and situations, including short-term secretion to perceived noxious stimuli. Measurement of cortisol levels can therefore provide complementary information on an animal's subjective response to environmental changes such as those that may happen in captive settings. Measurement of salivary cortisol offers an apparent optimal balance between non-invasive (vs. serum) readily available samples (obtainable via medical training) and sensitivity to short term events. Daily baseline salivary cortisol levels were established in a group of 5 adult Bottlenose Dolphins (*Tursiops truncatus*) on saliva collected on cotton swabs by medical training at 2 hour intervals throughout the day.

This sampling was also performed on a day construction works, entailing noise and vibrations, were carried out in the building housing the dolphin pool. As compared to the baseline data, a marked increase in salivary cortisol was observed, especially in the adult male. According to results, there is an apparent short term visible cortisol response to a change in the normal environmental settings in Bottlenose Dolphins. These data provide invaluable information as to the subjective experience of environmental changes, on which decision to mitigate or counteract their impact can be based.

Importance of adrenergic hormones in the management of marine mammals

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In recent years an always increasing concern on the welfare of wildlife species kept in captivity had been observed. A lot of discussions based on common sense or scientific hypothesis have been done but, as far as our techniques can go, the most important tool that can be used with the aim to understand and quantificate what is commonly called "stress" in these animals are hormones, above all cortisol and corticosterone. With this presentation we want give a general idea of what these hormones are, how they work, why they should be important for everyone is working with marine mammals, how they can be detected and when and do a brief excursus on the main literature on this subject showing also our three-years-long researches on cetaceans, pinnipeds, polar bears, sea turtles and elasmobranch species using both invasive and non-invasive sampling methods.

Captive Killer Whale "Morgan" Vocal Dialect

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Killer whales are highly social animals that rely upon acoustic cues to communicate. They are good candidates to investigate vocal learning because they produce group-specific sounds that are presumably acquired through vocal learning. In this study we describe the repertoire of a killer whale estimated to be 1-2-year-old, Morgan, to assess how her calls and those of her tank-mates in Loro Parque might have changed after they were placed together. To fully describe and catalogue Morgan's call repertoire before she was moved to Loro Parque, we analysed over 360 hours of recordings made in Dolfinarium Harderwijk, where Morgan was taken after she was found stranded. Primary results suggest that her repertoire consists of 42 discrete call types which are composed of unique combinations of 15 call units. Morgan's call repertoire was different from that of the whales in Loro Parque, with only one call type matching between them. By identifying how the sounds of Morgan and other animals in Loro Parque have changed since Morgan was introduced there, we plan to test the hypothesis that killer whales can learn sounds that are not part of their natal repertoire, and the role of hearing ability in that learning process.

Functional morphology of the hind-limb in the locomotion of the sea otter

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(2) The University Museum of the University of Tokyo

Although the sea otter *Enhydra lutris* is a completely aquatic animal which spends whole life span on the ocean, it has been comparative-morphologically considered as a semi-aquatic animal. This study aims to reveal the morphological specialization and the functional adaptation to aquatic life of the hind-limb in the sea otter among Mustelidae. We compared weight of hind-limb muscles among five Mustelidae species as follows; Eurasian river otter *Lutra lutra*, American mink *Neovison vison*, Siberian weasel *Mustela sibirica*, Japanese weasel *M. itatsi*, and sea otter. It was shown that the sea otter possessed significantly larger gluteus muscles, a popliteus muscle, and fibularis muscles, and smaller adductor muscles and ischiopubic muscles than the other four species. The popliteus muscle and the fibularis muscles might act as a pronator of cruris and abductors and/or extensors of foot, respectively. The bundles of the gluteus superficialis muscle of the sea otter fused to those of the tensor fasciae latae muscle and the caudofemoralis muscle, and might play a role in the abduction of femur. The results suggest that the sea otter uses the abducted femur, pronated cruris, and extended web as a powerful generator of the propulsion.

Nutritional Analysis of Frozen Canadian Capelin (*Mallotus villosus*), Atlantic Herring (*Clupea harengus*), and Canadian Lake Smelt (*Osmerus mordax*) over a 9 Month Period of Frozen Storage

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Freezer storage of fish is needed to preserve nutrients, but at the same time can result in degradation. We investigated levels of vitamins A, B1, E, C, minerals (calcium [Ca], phosphorus [P], magnesium [Mg], sodium [Na], potassium [K], manganese [Mn], zinc [Zn], copper [Cu], chromium [Cr], molybdenum [Mo], nickel [Ni], selenium [Se], iodine [I]), and fatty acid composition in Canadian capelin (*Mallotus villosus*) and Canadian Lake Smelt (*Osmerus mordax*), over a period of 9 months in freezer storage. All tests, except minerals, were also run on Atlantic herring (*Clupea harengus*). One lot per fish species was analyzed, with blind samples collected over 3 sampling periods: one month after catch, and then subsequently 3 and 9 months after being stored at a constant temperature (-2°F, -18°C). Samples were submitted to NP Analytical Laboratories (St. Louis, MO) for analysis; a 24-hour thaw at 36-40°F (2.2-4.4°C) was performed prior to analysis to mimic usual practices before feeding marine mammals. Preliminary results showed that vitamins B1, C, and E and minerals (I, Cu, Cr, Mo, Ni, Se) were present in negligible amounts at all sampling points. Fatty acid results when comparing initial and final 9 month sample showed that eicosapentaenoic acid and docosahexaenoic acid levels stayed consistent.

Zygomycosis on bottlenose dolphins (*Tursiops truncatus*) caused by *Rhizopus oryzae*

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The bottlenose dolphin (*Tursiops truncatus*) is the most common cetacean species kept in marine mammal Centers for educational displays due to their adaptability. In 2009, during a routine check up of blowhole cytology, high quantities of hyphal fragments were collected from forced expiration and fungal colonization of the respiratory tract was found. Blowhole samples were collected in Petri dishes with sabouraud dextrose agar with chloramphenicol. After incubation at 25 °C, single conidium cultures were obtained from fungal colonies emerging. On the basis of morphological characters, isolates were provisionally referred to *Rhizopus oryzae*. Three isolates were selected for molecular identification. Molecular identification was performed by sequencing the region ITS1-5.8S-ITS2 of the rDNA. Subsequent database searches by the BLASTN software indicated that the resulting sequence of 577 bp had a 100% identity with the corresponding gene sequence of *Rh. oryzae*, a fungus associated with rhinocerebral zygomycosis for humans. The sequences were identical for the three isolates and were deposited on the EMBL Sequence Database (Provisional accession number Hx2000036920). The need and success of antifungal treatment against respiratory zygomycosis in dolphins is also discussed. To our knowledge, this is the first report of *Rh. oryzae* as a pathogen of bottlenose dolphins in captivity.

Morbillivirus and herpesvirus in free-ranging bottlenose dolphins in the Canary Islands: a molecular retrospective study

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A retrospective study in free-ranging bottlenose dolphins (*Tursiops truncatus*) was performed by a molecular biological method polymerase chain reaction (PCR). Samples from 35 specimens stranded in Canary Islands from 1997 to 2013 were examined. The PCR analyses were performed on selected tissue samples, upon availability, for the presence of morbillivirus and herpesvirus. In addition, immunohistochemical detection of morbilliviral antigen in tissues was performed on PCR-positive samples. A systemic morbillivirus infection was detected, for the first time in the Canary Islands, in a juvenile bottlenose dolphin stranded in 2005. Sequence analysis of a conserved fragment of the morbillivirus phosphoprotein gene indicates that the virus is closely related to dolphin morbillivirus reported in striped dolphins currently in the Mediterranean Sea. This particular point is extremely important to better understand the epidemiology and transmission of morbilliviruses between cetacean populations. Conventional PCR detected herpesviral DNA in samples from four animals. The PCR positivity was observed in the skin, lung, and brain. Unit of Histology and Veterinary Pathology, Institute for Animal Health, Veterinary School, University of Las Palmas de Gran Canaria, Trasmontaña s/n, Arucas (Las Palmas), Canary Islands 35413, Spain.

A retrospective study in free-ranging bottlenose dolphins (*Tursiops truncatus*) was performed by a molecular biological method polymerase chain reaction (PCR). Samples from 35 specimens stranded in Canary Islands from 1997 to 2013 were examined. The PCR analyses were performed on selected tissue samples, upon availability, for the presence of morbillivirus and herpesvirus. In addition, immunohistochemical detection of morbilliviral antigen in tissues was performed on PCR-positive samples. A systemic morbillivirus infection was detected, for the first time in the Canary Islands, in a juvenile bottlenose dolphin stranded in 2005. Sequence analysis of a conserved fragment of the morbillivirus phosphoprotein gene indicates that the virus is closely related to dolphin morbillivirus reported in striped dolphins currently in the Mediterranean Sea. This particular point is extremely important to better understand the epidemiology and transmission of morbilliviruses between cetacean populations. Conventional PCR detected herpesviral DNA in samples from four animals. The PCR positivity was observed in the skin, lung, and brain.

Two cases of morbillivirus infection in white beaked dolphins in the rehabilitation centre SOS-Dolfijn

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The virulence of morbillivirus differs according to host species. In odontocetes morbillivirus causes major epizootics with substantial mortalities in 4 species. In 8 species, including the white-beaked dolphin, morbillivirus has been observed as an incidental infection without it being clear what the virulence was. The admittance of two white-beaked dolphins, with an active morbillivirus infection, into the rehabilitation centre SOS-Dolfijn, provided a rare opportunity to investigate the virulence of morbillivirus in white-beaked dolphins. Both animals were investigated clinically and pathologically. Two forms of infection were diagnosed, an acute systemic infection in case number 1 and a chronic central nervous infection in case number 2. DNA analysis of the morbillivirus demonstrated it was Dolphin Morbillivirus (DMV) which was most closely related to DMV observed in a white-beaked dolphin which stranded in 2007 on the German coast. A moderate polioencephalitis was observed in the cerebrum of case number 2. However no nervous signs were observed. Case number 1 had a subacute systemic infection. No secondary infections were observed in this animal. Both animals died to causes unrelated to their morbillivirus infection. No DMV was detected in two contemporaneously stranded white-beaked dolphins. Stranding rate of white-beaked dolphins did not increase during the period of the stranding of the two DMV infected animals. These data suggest DMV is not highly virulent in white-beaked dolphins.

Herpesvirus in Beluga whale: relationship with appearance of lesions and routes of transmission

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Since Herpesvirus are one of the most studied virus in cetaceans, there are still many unresolved issues such as the relationship between the virus and the appearance of lesions and the routes of transmission between individuals. In order to study Beluga whale Herpesvirus (*Delphinapterus leucas*), we proceeded to take samples of normal skin, different skin lesions, blood, serum, breath, feces and swabs of oral mucosa, eye and blowhole in two adult male and female individuals, kept in the same enclosure at the Oceanographic of Valencia. Herpesvirus diagnosis was performed on these samples using a nested PCR for the gene encoding the DNA polymerase described by VanDevanter in 1996. The positives were sequenced and, based on the sequences obtained, a real time PCR was designed with the purpose of quantify the number of copies of virus present in the different samples, and to assess the relative importance of the different elimination routes. In addition, other genes were amplified and analyzed in order to study more thoroughly the Herpesvirus strains found in these samples, as well as relations between them in the two different individuals.

MONDAY, 17TH OF MARCH, 2014

The strategic importance of the Alliance of Marine Mammal Parks and Aquariums

Ken Willis, Vice President of the Alliance of Marine Mammal Parks and Aquariums

How Long Do Dolphins Live?

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The question "How long do dolphins live?" appears to be very simple and straight forward. But what do people, from guests at our facilities to reporters from the media, really want to know when they ask that question? How long can they live? How long do they live on average? How long does an adult live? This is difficult because there is not a single number that can adequately represent the complexity of survival data that spans both decades and continents. We need to decide what the question is that we will answer. We need to use a valid and defensible method of calculating the number. We need to be consistent. The Alliance of Marine Mammal Parks and Aquariums has decided that the question most people want answered (although they do not know it) is: What is the median life expectancy of a one year old dolphin?" This number allows comparisons both across time within our facilities as well as with studies of wild dolphin populations. The results of these comparisons are included in the presentation.

Identification of a hearing deficit in a stranded killer whale

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An immature killer whale stranded in the Wadden Sea in 2010 and was later transferred to Loro Parque, Tenerife (Spain) for rehabilitation. The whale, named Morgan, was suspected to have a hearing deficit. To test whether Morgan has a hearing deficit, auditory brainstem responses to short-duration, broadband click stimuli were recorded. The same procedure was conducted in five other killer whales at Loro Parque for comparative purposes. Stereotypical click-evoked responses were recorded in all whales except Morgan, even at the highest click level that could be projected. Reductions in the amplitude of the click-evoked response paralleled reductions in the stimulus amplitude of the clicks presented to all of the other whales. The lack of a click-evoked response in Morgan indicates that she suffers from a hearing deficit. Morgan's hearing ability is at least 20-30 dB worse than the hearing sensitivity of the other whales tested. However, the magnitude and frequency range over which the hearing deficit occurs cannot be specified with the techniques used here.

Developmental trajectory of dialect formation in Orcas (*Orcinus orca*) - A case study

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Resident populations of killer whales (*Orcinus orca*) perform vocal dialects that obviously promote in-group communication (Deecke et al. 2002). We studied whether and how such dialects develop also in captivity. Subjects were four whales that grew-up in different locations of SeaWorld and only later (2006) were allowed to live together in one large pool system, i.e. the Orca Ocean of Loro Parque (Tenerife/Spain). Methods: We recorded and investigated all sounds produced before and after the whales arrived to Tenerife. Data analysis was based on the so-called "group repertoire". Results: The vocal activity of whales varied over time, but was continuously high enough for an inquiry into the repertoire of call types. The size of this group repertoire showed a spectacular developmental trajectory which achieved its final target value already after 4 months. The same was true for the repertoire composition (e.g. the percentages of shared versus unshared call types) as well as for the repertoire performances. Our results suggested that the whales - less than 2 years after their unification - had developed their own dialect indicating that they had established also a community of their own. These suggestions were tested and confirmed, e.g. by playback experiments.

Fatal autoimmune disease in a 10 year old manatee (*Trichechus manatus manatus*)

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In summer 2012 Zoo Nuremberg received from Zoo Beauval the female manatee Luna. The transfer was recommended by the EEP in order to secure optimal breeding conditions for this female. She had a history of 2 dead calves (2008, 2011). In Nuremberg she twice showed skin lesions, which healed without treatment. In summer 2013 some vaginal discharge was observed. In autumn 2013 marked skin lesions, reduced behavior and feeding were noticed. The animal was moved to the medical pool for a complete examination including skin-, blow-, faeces- and blood samples, ultrasonography and x-rays. The blood tests revealed a slight anemia. There were no signs of pregnancy. The animal was treated with antibiotics. The symptoms progressed dramatically and she died 3 days later. The necropsy showed severe skin lesions with secondary bacterial and mycological infection. The anemia was confirmed and a hydrocephalus was detected. The lesions looked like an autoimmune disease. A close analysis of the Studbook data revealed that also her grandfather died from a suspected autoimmune dermatosis, so that a genetic predisposition for this disease should be taken into consideration.

Environmental monitoring program at the Marine Life Park, Singapore

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The Marine Life Park (MLP) is a new facility on Sentosa Island in Singapore and houses twenty-four (13:11) Indian Bottlenose Dolphins (*Tursiops aduncus*). The various aspects of its artificial environment are diligently monitored to ensure optimal living conditions for the animals. These include water quality, air quality, and pathogen monitoring (specifically *Burkholderia pseudomallei*). The most pressing environmental issue for 2013 was the Southeast Asian haze, wherein Singapore was one of the territories that was most severely affected. Respiratory samplings were done at a higher frequency than usual due to reports of chuffing and mucus expulsion in some of the animals. Results, however, were within normal limits. The haze is said to be a yearly phenomenon, and is allegedly due to seasonal burning of forests in Sumatra for palm oil production. Infrastructure modifications are being planned to provide refuge if haze reach unhealthy levels in the future. Also, the dolphins are currently being trained for "voluntary nebulization" behavior using a custom-made nebulizer. Despite having very low to negligible results for *B. pseudomallei* in the physical environment, the monitoring program is in full effect. No clinical case of melioidosis has been detected in the current dolphin population at MLP.

Assessment of the levels of polycyclic aromatic hydrocarbons and organochlorine contaminants in bottlenose dolphins (*Tursiops truncatus*) from the Canary Islands, the Eastern Atlantic Ocean.

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The concentrations of 57 Persistent Organic Pollutants (POPs) were determined in free-ranging and stranded bottlenose dolphins (*Tursiops truncatus*) from the Canary Islands. 64 blubber biopsies were collected from 2003 to 2011 and also blubber and liver of 27 dolphins stranded from 1997 to 2011. Median of total PCBs and DDTs were 30.8 ppm and 24.2 ppm lipid weight (lw), respectively, in biopsies, and 27.6 ppm and 23.2 ppm (lw), respectively, in blubber of stranded. Among PCBs, the highly chlorinated PCB 180, 153 and 138 were the predominant congeners, and the dioxin-like PCBs median levels were of 4.6 ppm (lw) in live specimens and 2.9 ppm (lw) in blubber of stranded dolphins. All the samples showed detectable values of any of the 16 PAHs studied. Phenanthrene was the major compound followed by pyrene and naphthalene. In free-ranging, the median value for total PAHs was 13.6 ppm (lw) while median PAH values in stranded was 0.8 ppm (lw). According to our results, concentrations of POPs are at toxicologically relevant levels in the bottlenose dolphins. The present information represents the first study of pollutants in free-ranging cetaceans from the Canary Islands and increases the data of stranded already reported from the studied area.

Variability of fluoride levels in two populations of North Atlantic fin whales (*Balaenoptera physalus*)

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As other mysticetes, the North Atlantic fin whale (*Balaenoptera physalus*) is believed to undergo seasonal migrations between temperate breeding grounds and colder feeding grounds. Nevertheless, migratory routes, location of breeding grounds, and structuring of the metapopulation are not precisely identified. Different tracers can be used to achieve this goal. Fluoride is a natural component but also a contaminant of the marine environment, potentially affecting bone integrity. It bio-accumulates in marine fauna, and levels of 1,300-3,300 ppm have been reported in the favourite fin whale prey, *Meganyctiphanes norvegica*. In this study we aimed to: i) determine fluoride concentration in fin whale bone samples, ii) verify its possible variation with age and sex, and iii) evaluate its potential as a population structure indicator. For this purpose, we analysed fluoride concentration in 78 fin whale bone samples from two North Atlantic areas: Iceland (n=24), and NW Spain (n=54), as well as in 2 krill samples from Iceland and in 5 from NW Spain. Our findings indicate that fin whales from the two areas cannot be distinguished by fluoride levels. We found a significant increase of fluoride concentration with age, and a strong influence of sex over this correlation.

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POSTER SESSION

Cerebral toxoplasmosis in Atlantic spotted dolphin stranded in Canary Islands.

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Toxoplasma gondii is a parasitic protozoan species belonging to the Family Sarcocystidae. The life cycle of *T.gondii* has two phases; a sexual phase, which takes place in a definitive host (members of the family Felidae); and an asexual phase, in the intermediate hosts (any warm-blooded animal, including several species of marine mammals). It has been considered a potential cause of mortality in many species of domestic and wild animals, including the cetaceans species. The present study is focused on 85 Atlantic spotted dolphins (*Stenella frontalis*) stranded along the coast of the Canary Islands, from 2000 to 2013. A complete necropsy was performed on 60 specimens with a very fresh to moderate autolysis conservation status. During necropsy, selected samples were collected and fixed in 10% neutral buffered formalin, routinely processed and stained with hematoxylin and eosin for histopathological studies. Histology revealed the presence of granulomatous inflammation and necrotizing encephalitis associated to tachyzoites and tissue cysts. *T. gondii* was detected immunohistochemically by using a polyclonal antiserum (anti-*T.gondii*). As a result, 8 out of 60 (13,3) cetaceans presented *T. gondii* protozoan. We are conducting further studies to investigate other possible concomitant pathologies in these animals.

Pulmonary carcinosarcoma in a California sea lion (*Zalophus californianus*) kept under human care

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A 15-year-old intact male Californian sea lion with a previously unremarkable medical history became progressively lethargic and anorexic and developed severe respiratory distress and difficulty swallowing. CBC and biochemistry profile were normal.

Symptomatic therapy with antibiotic and anti-inflammatory for 10 days was unsuccessful and the animal maintained its neck hyperextended to breathe.

On day 12 sedation was attempted for x-rays and bronchoscopy, but animal died under anesthesia.

At necropsy, 38 L of sero-fibrinous fluid was found in the thoracic cavity and both lungs were collapsed. Multiple single or coalescent nodules were observed on the pleura, pericardial sac, mediastinal tissues, diaphragm, myocardium, muscles of the neck and laryngeal wall. Tracheo-bronchial and mesenteric lymph nodes were slightly enlarged. Samples were collected, formalin-fixed, paraffin-embedded and processed for histologic examination. Prussian Blue histochemical staining and electron microscopy and immunohistochemical analysis were performed on pleura, lungs and lymph nodes.

These exams showed the presence of a pulmonary carcinosarcoma with widespread metastases.

The complexity of the characteristics of the animal, its environment and the disease itself can make the right diagnosis and correct targeted therapy difficult.

Sometimes the exact diagnosis, is only possible at necropsy but is always very useful for the clinician, in retrospect.

The importance of gastric cytology in bottlenose dolphins under human care

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Preventive medicine of the digestive system in dolphins is fundamental to ensure the welfare of these animals under human care. Inappropriate diet, social problems, infectious diseases and stress can play an important role in the development of digestive system pathology.

This study aimed to establish a reference baseline data for normal cytological findings (pH, epithelial cells, leucocytes) in gastric samples of healthy bottlenose dolphins (*Tursiops truncatus*), following the "Guidelines for the determination of reference intervals in veterinary species" issued by the Quality Assurance and Laboratory Standards Committee (Friedrichs et al., 2012).

From 2006 to 2012, 62 endoscopies were performed and gastric samples were collected from the forestomach of 21 dolphins kept under human care. The animals were considered healthy based on physical examination, laboratory evaluation (CBC, serum chemistry, proteinogram and fecal analysis) and histological assessment of the mucosa of the first chamber (biopsy performed by endoscopy). Animals during pregnancy weren't considered.

Results show that pH was moderately correlated with the epithelial cells mean values ($r_s=0.493$, $P=0.0272$), but no such correlation was found with WBC mean values ($r_s=0.049$, $P=0.8369$). The Mann-Whitney test didn't find a significant difference for weight ($P=0.1237$), pH ($P=0.8775$), epithelial cells mean ($P=0.1473$), WBC mean ($P=0.1269$) between sexes.

New insights to test behavioral profiles in captive bottlenose dolphins (*Tursiops truncatus*)

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In non-human animals, personality traits (or behavioral profiles) are defined as behavioral differences across individuals that are consistent over time and across contexts or situations. Behavioral profiles in animals can be studied by using behavioral encodings or subjective ratings. The former method is based on direct observations and records of animal behavior, while the latter depends on the observation by experts familiar with the study subjects. The purpose of this study was to validate the rating method designed for the personality study of bottlenose dolphins, by testing the relationship between different behavioral traits against empirical observations. We used 28 behaviorally based adjectives and 5 factors previously determined by other studies in humans and non-human animals, rated on a 10 point scale, for 7 bottlenose dolphins of the Barcelona Zoo. Knowledge of animal personality in captivity and their implications provides useful information for decision-making of proper management of animals in zoological institutions. This includes, for example, the formation of suitable social groups, ensuring their welfare in captivity. Expanding the study with other dolphin specimens would help standardize a questionnaire to easily identify dolphin personality types that are fundamental for group composition and other animal keeping aspects.

The central nucleus of the amygdala of toothed whales: a microscopical description of the brain nucleus mediating fear and anxiety.

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The amygdala is a noticeable bilateral structure in the medial temporal lobe and it's composed of at least 13 different nuclei and cortical areas, subdivided into the deep nuclei, the superficial nuclei, the anterior amygdaloid area, the amygdalohippocampal area, the intercalated nuclei, and the central nucleus (CeA).

CeA mediates the behavioral and physiological responses associated with fear and anxiety and pituitary-adrenal responses by modulating brain CRF activity (Kalin et al., 2004).

Nine animals of six different species of the suborder Odontoceti were used for this study. CeA extended mainly dorsal to the lateral nucleus of the amygdala and ventral to the most ventral part of the corpus striatum. It was medial to the internal capsule and lateral to the optic tract and the medial nucleus of the amygdala. CeA contained smalls neurons, morphologically similar to those in the corpus striatum: spherical, poligonal or spindle in shape. Neuropil and cell body of the CeA were heterogenically positive to Calbindin D-28k.

The subdivision, volumen and position of the CeA and, in general, the odontocetes amygdaloid complex resemble that of Primates. Ongoing studies of its involvement in acute stress response in live stranded Cetaceans are been carried out.

Possible allergic reaction in Bottlenose Dolphin (*Tursiops truncatus*): A case report

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An adult female Bottlenose Dolphin (*Tursiops truncatus*) and two of her offspring showed dermatological symptoms in their abdomen in spring 2013. An allergic reaction was suspected because of the unusual high pollen content in the air and the dolphin pool at that time. Symptoms included pruritus, marked reddish areas and little wheals which increased in size over a short period of time. Diagnostic tools included blood and biopsy samples, swabs cultures from the wheals, intradermal tests and response to treatment.

Cultures proved negative to pathological bacterial or fungal growth. Blood analyses were inconclusive, not showing any abnormal values. Biopsy sample showed hyperplasic dermatitis. Intradermal test proved difficult to evaluate and further research is warranted to set range values for specific *Tursiops truncatus* Ig G levels against different reagents. Methylprednisolone response proved effective at different doses in the three animals, being the highest dose 0, 2 mg/Kg SID 10 days, and the lowest 0,02 mg/Kg SID 3 days.

Herpesvirus infection associated with tubulo-interstitial nephritis in a Blainville's beaked whale (*Mesoplodon densirostris*)

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Here we described a novel alphaherpesvirus associated with tubulo-interstitial nephritis in an adult male beaked whale (*Mesoplodon densirostris*) stranded in the Canary Islands. The animal, which showed a poor body condition, was found alive near shore on Tenerife Island, and died soon after beaching. Necropsy started 8 hours postmortem (code 1-2) and routine sampling for histological, immunohistological, electron-microscopy (EM), bacteriological and virological studies were carried out. Membranous glomerulonephritis with multifocal lymphoplasmacytic interstitial nephritis, multifocal interstitial and tubuloepithelial necrosis with presence of intranuclear inclusion bodies in tubuloepithelial cells were the main pathological findings. In the immunohistological study, HV antigen was only detected in the kidney, in which immunopositivity was clearly found in the intranuclear inclusions bodies of tubuloepithelial cells. Ultrastructurally, intranuclear inclusion bodies labeled immunohistologically, corresponded to HV particles. The HV DNA detection was conducted by a pan nested HV polymerase chain reaction (PCR). Positivity was observed in lung and kidney tissues. The same 181 bp (60 aa) sequence was obtained from the kidney and lung samples, and a 692 bp (230 aa) sequence from the kidney (GenBank accession number JN863234). With the phylogenetic analysis it was shown that the sequence obtained in this study is a novel herpesvirus.

Traumatic intra-/interspecific interactions as a cause of mortality of stranded cetaceans in the Canary Islands

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From December 1999 to April 2013, a total of 574 cetaceans were stranded in the Canary Islands and a systematic and comprehensive pathological study was carried out in 405 specimens. Some cases showed severe traumatic injuries due to anthropogenic activities related to fisheries and vessel traffic but also to natural causes such as interactions between animals. A retrospective study revealed the presence of lesions related to intra- or interspecific in 31 (7.65%) out of 405 cases (including 13 different species). The most common observed lesions were hemorrhages (found in 29 out of 31; 93.55%), tooth marks in skin (18 out of 31; 58.06%) and fractures (14 out of 31; 45.16%), mainly located in the thorax but also on the head. Six out of 31 animals (19.35%) showed multiple fractures, sometimes bilateral, and other discrete lesions distributed along the body suggesting a repeated impact (on more than one direction) (Dunn et al., 2002). Final diagnosis was highly consistent with interaction between animals in 20 out of 31 (64.51%) cases. Other etiologies of trauma were not completely ruled out in 8 (25.81%) cases and the cause of death remained inconclusive in 3 cases (10%), due to advanced decomposition of the carcasses.

Is feeding gelatine to our animals really safe? A microbiological experiment.

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It's unique properties make gelatine a valuable and widely used addition to the food of our marine mammals. However, the unique properties of gelatine also make it an excellent substrate for microbiological growth. We therefore wondered if the gelatine we use is really safe for our animals, and conducted a one week study to assess it's microbiological contamination. Gelatine was prepared under usual conditions, and divided into three containers, which were stored with and without lid in two different places in the fish kitchen cooler. We took daily swabs from these gelatine blocks, and cultured bacteria using MacConkey Agar and Colombia Agar, and fungi using Can2 Agar. Some bacterial growth occurred when the gelatine stored without lid was only one day old, and the bacterial load increased with time. Almost no fungus grew from any sample. The gelatine in the lidded container grew less bacteria than the gelatine from the two containers without lid. We conclude that gelatine is a safe food for our animals, if properly stored and handled. It should only be stored for a short time, however, and preferably in a lidded container to avoid bacterial and fungal contamination.

Herpesvirus associated to genital lesions in a stranded striped dolphin (*Stenella coeruleoalba*) in Canary Islands.

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An adult male striped dolphin (*Stenella coeruleoalba*) stranded alive at Arico, Tenerife, Canary Islands, Spain, on 16 May 2011. The animal died shortly after stranding and a complete necropsy examination was performed. Both 10% neutral buffered formalin-fixed and fresh unfixed samples, for histopathological and microbiological studies, respectively, were taken from selected tissues. Tissue sections for microscopic studies were stained routinely with hematoxylin and eosin. The most remarkable gross finding was the presence of two fleshy masses of approximately 1 cm in diameter, raised, both tan and pigmented, respectively, near the tip of the penis. Histologically, these masses were composed of hyperplastic epithelial cells with pigmentary incontinence. Balloning degeneration and margination of chromatin were observed within superficial stratus of the epidermis. Lymphocytes and plasma cells were present at the epidermal-dermal junction in the affected regions. Based on the association of herpesviruses with skin lesions in other marine mammal species, a universal nested PCR that amplifies a conserved region within the polymerase gene of the Herpesviridae family was applied. The product of the PCR was electrophoresed in 2% agarose gel. An amplicon of about 215 and 315 bp was obtained (expected size) and sequenced.

Muscular senescence in cetaceans: adaptation towards a slow muscle fibre phenotype

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Sarcopenia is the slow and progressive loss of muscle mass with advancing age. Skeletal muscles (*longissimus dorsi*) from 155 cetaceans of 19 different species were examined. Transverse and longitudinal muscle samples were carved and routinely processed, embedded in paraffin, serially sectioned and stained with haematoxylin and eosin, periodic acid-Schiff, phosphotungstic acid haematoxylin, and Von Kossa method for special stainings. In addition, the skeletal muscle samples were immunostained to detect the fast and slow MHC isoforms, type II and type I, respectively, and myoglobin using the avidin-biotin-peroxidase method. Histological diagnosis of the age-related effects on muscle included generalised atrophy, increased fibre size variation, morphological myofibre alterations, the fibre type involved and alterations in the distribution of the fibre types and the presence of yuxtanuclear lipofuscin. Because of the heterogeneity of the species included in this study, only skeletal muscles samples of adult and senile animals of *Stenella frontalis* were used for the morphometric and statistical studies. The present study describes the age-related changes in cetacean muscles regarding the three factors that determine muscle mass: fibre size, fibre number, and fibre type. We show that the skeletal muscle fibres in cetaceans change with advancing age, evolving towards a slower muscle phenotype.

An automatic system for detection and classification of beluga whale vocalizations

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Passive acoustic monitoring (PAM) devices are important tools to detect and classify marine mammals, to monitor migratory patterns and even for density estimation. This discipline has gained popularity and nowadays it is easy to find specific software that can automatically identify the different species. The majority of these detection algorithms are focused on detecting in the underwater-recorded audio stream of a given specie from a large catalog of cetacean species. Additionally, only a few of these programs can do this task in real time. In this work we propose a PAM system for real time detection and classification of a specific specie: beluga whales (*Delphinapterus leucas*). The proposed system is capable of analyzing the different beluga whale sounds and classifying them in three different categories: tonal sounds, pulsed sounds and jawclap sounds. This system may be a valuable tool for biologist when studying how different sounds are related to animal interactions. It can also serve as a tool to evaluate welfare of captive beluga whales.

CT imaging analysis of the forelimb movement in Otariidae

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Forelimb of Otariidae has higher aquatic propulsion and maneuverability during swimming than that of other pinnipeds. Since the behavioral differences are observed among species in swimming distance and speeds. It is suggested that the movement of the forelimb during swimming may vary based on the strategy of the swimming locomotion. In this study, the forelimb locomotion was compared between the two Otariid species, the California sea lion (*Zalophus Californianus*) and the northern fur seal (*Callorhinus ursinus*). The movement of the forelimb skeleton was reproduced by CT imaging from carcasses. The shoulder joints of the California sea lion adducted largely during power paddle stroke, however their elbow movement was small. The large adduction of shoulder joints and less flexibility of elbow joints enable the species to generate powerful propulsion. In the northern fur seal the shoulder and elbow joints moved flexibly combined abduction and lateral rotation, and adduction and medial rotation. Their forelimbs have high maneuverability revealed by the flexible movement of shoulder and elbow joints.

Optimizing non-invasive sampling for genetic studies of marine mammals

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Genetic studies imply to collect biological samples in a way allowing the extraction of good quality DNA, but avoiding misidentification of the targeted animals. For marine mammal species, biopsy samplings are often performed in the field. But alternative non-invasive methods have also been used, that vary between species and between studies. Sloughed skin pieces, feces or blow collection, skin taking by gentle rubbing, hairs, and even environmental water can all contain sufficient amounts of DNA for genetic analysis. We tested 3 different sampling methods on captive bottlenose dolphins (*Tursiops truncatus*) at Parc Astérix (France). We collected feces from one dolphin, blows using simple collection tubes on 2 dolphins, and skin cells by rubbing 7 animals' skins with a piece of sterile gauze. We conserved these samples frozen for several months, and then we extracted DNA and amplified a part of the mitochondrial genome, using as most as possible standardized experimental procedures. The qualities of the DNA sequences obtained were compared between samples, as well as reproducibility between different samplings performed on a same animal. We confirm here that captive animals can serve to optimize experimental procedures and therefore help to develop non-invasive field sampling strategies for genetic analyses.

Causes of death of stranded short-finned pilot whales (*Globicephala macrorhynchus*) in the Canary Islands

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The Canary Islands are the only place in Europe where it is possible to maintain a continued observation of the short-finned pilot whale (*Globicephala macrorhynchus*). For this reason, the short-finned pilot whale has become the emblematic species of cetaceans in the Canaries. The aim of this study is to describe pathologies and determine the causes of death in this species, using Pathological Anatomy. Between 1996 and 2009, 43 stranded pilot whales were reported in the waters of the Canary Islands. Of these, 24/43 (55.8%) were subjected to a complete or partial standardized necropsy. With the tools of Pathological Anatomy, we have been able to classify 46, 5% of the cetaceans studied in one of the anthropogenic or non-anthropogenic pathological entities. The total of the diagnosed animals corresponding to non-anthropogenic pathological categories include: 16, 7% consumptive pathology, 33,3% non consumptive pathology, 12,5% neonatal-perinatal pathology and 20,8% intra-interspecific interactions.

Persistent Organic Pollutants (POPs) in the blubber and liver of 27 Bottlenose Dolphins (*Tursiops truncatus*) stranded along the coasts of Canary Islands from 1997 to 2011.

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The persistent organic pollutants (POPs) accumulate in lipid-rich tissue and build up along trophic levels, therefore affecting populations of marine mammals all over the world; additionally, little information is available on cetaceans from the Canary Islands. Polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), and polycyclic aromatic hydrocarbons (PAHs) were measured in the blubber and liver of 27 bottlenose dolphins (*Tursiops truncatus*) stranded along the Canary Islands coasts from 1997 to 2011. Dichlorodiphenyltrichloroethanes (DDTs) and PCBs levels were predominant in both tissues but presented higher concentrations in the blubber, median of 23155 and 27592 ng/g lipid weight (lw) respectively, than in the liver samples, median of 288 and 416 ng/g lw. Among the 18 PCBs analyzed, the highly chlorinated PCB180, 153 and 138 were the major congeners. We found a p,p'-DDE/∑DDTs ratio of 0.87 in blubber and 0.88 in liver, which is indicative of DDT ageing. All the samples showed detectable values of some of the 16 PAH studied. Phenanthrene was the most frequently detected and at the highest levels. The pollutants found were at toxicologically significant levels in many animals. Further studies are needed to investigate potential associations between contaminants and health status.

Treatment, physiotherapy and adoption in two residual cases of paralysis in California sea lions (*Zalophus californianus*)

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Zoo Nuremberg has been keeping and breeding California sea lions since the late 50ies.

At the moment there are two breeding groups at the Zoo (Aquapark and Lagoon).

In June 2012 three females of the Lagoon group gave birth to one pup each- whereby one was stillborn with various malformations. Some days later one of the mothers, Soda, showed severe signs of paralysis, which were treated with suspicion of trauma with antibiotics and glucocorticoids. At first treatment was successful, but after a few days Soda died- pathology couldn't rule out trauma.

Fortunately Blue, the mother of the stillborn pup, adopted Sodas young, thus its supply with mother's milk could be continued.

But in July and September Blue also showed neurological symptoms respectively respiratory sounds. The animal was treated with antibiotics and NSAIDs and recovered fully both times.

The poster shows the course of two residual cases, but also effective treatment. It demonstrates the possibility of adoption in sea lions, which could be of great value for captive breeding and ESB management. Furthermore it approaches the impact of physiotherapy on paralysed sea lions and gives advice for the optimisation of enclosures.

Social Play in Killer Whales (*Orcinus orca*) - A chance to improve housing conditions

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Social play is well-known in non-aquatic mammals, where its performance is a crucial prerequisite of an adequate socialisation of young. Often, the behaviour includes encounters such a "playful chasing" or "playful biting" which - in contrast to genuine agonistic encounters - do not affect the dominance hierarchy (Todt 1997). Because of such differences a distinction between play and non-play is essential, especially in captive animals. Recently, we began to study social play in a group of killer whales that are housed in the OrcaOcean (Tenerife). Methods: Data sampling took place by audio-visual recording above and/or under water. Data evaluation followed procedures of time series analysis. Here we concentrate on encounters observed before and after a wild-born female (name: Morgan) joined the group. Results: Three weeks after Morgan had started to swim with the other females she began to initiate a play category termed "rough-and tumble". About six months later the percentage of rough encounters had decreased; and another six months later, playful encounters contained even many rather tenderly looking contact patterns. We assume that these changes reflect cases of social learning and suggest that social play is an important element of group life also in captive killer whales.

Sexual behavior in Captive Yangtze Finless Porpoise (*Neophocaena asiaeorientalis asiaeorientalis*)

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Yangtze finless porpoise (*Neophocaena asiaeorientalis asiaeorientalis*) is the only freshwater subspecies of porpoise family inhabiting the Yangtze River and its adjacent waters. Due to the intensification of human disturbances, the population of this riverine dolphin has decreased dramatically, and IUCN upgraded it from "Endangered" to "Critically Endangered" in 2013. The current study examined the mating strategies on 7 Yangtze finless porpoises (3 adult males, 2 adult females and 2 sub-adult females). A total of 245 sessions were recorded from July 20th to September 13th 2013. Ethogram of sexual behaviors was defined that included precopulatory behaviors, mating, and associated swimming mainly by video and related data (times, initiator/recipient, acceptance/rejection) was recorded in papers simultaneously. 14.92% of time was spent on sexual behavior by YFP during which no mating was observed ($P < 0.05$). Male-male took highest percentage of time (60.91%), followed by Male-Female (27.78%), Female-Female (8.13%) and Female-Male (3.18%) ($P < 0.05$). 25.59% of total times was rejection when male as initiators comparing to none of rejection when female as initiators ($P < 0.05$). Further analysis should be operated to discuss quantitative relationship among sex/individual class and correspondent reasons.

Individual behaviour patterns and interactions among orcas (*Orcinus orca*) in a zoo

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Killer whales (orcas, *Orcinus orca*) are maintained in several zoos throughout the world. In Loro Parque zoo (Puerto de la Cruz, Tenerife), six individuals have been kept in large facility since 2006.

We report here the results of a study performed continuously along two months on the individuals' behavioural patterns and their interactions. Three females (Kohana, Skyla and Morgan), two males (Keto and Tekoa) and a juvenile male (Adan) were present along the study.

Orcas were video-filmed (cameras placed above and in the lateral of the main pool) in two time periods: during intervals among public shows (8:00 to 18:00 h) and during times without shows (7:00-8:00 and 18:00-20:00). From the videos recorded (a total of 66.5 hours), using the focal animal sampling rule, we analyzed in detail and quantified the behaviour patterns of each individual and interactions among them. Individuals' behaviour patterns were quantified both as frequencies (event type behaviours) and durations (state type behaviours). Interactions among individuals were classified in three general categories as "affiliative", "sexual" or "agonistic".

A new social behaviour pattern ("mouth-tongue touching") is described. Affiliate, sexual and agonistic behaviour patterns were performed by the orcas. Affiliate behaviours were more common among the three females, the youngest adult male (Tekoa) and the juvenile (Adan). Sexual behaviours were mainly observed between Tekoa and Morgan (with the interference of Skyla). A dominance interaction was detected between Keto and Tekoa (including some sexual behaviours). And some agonistic behaviour patterns were registered mainly between Skyla and Morgan.

When dolphins have a choice to leave their home range

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About twenty years ago a number of research projects were started in a place called Dolphin Reef (Eilat/Israel). A group of bottlenose dolphins (*Tursiops truncatus ponticus*) was and still is living there under semi-free conditions. When these animals had the choice to leave their confinement and swim out into the Red Sea, most of them did not make use of such chance. We have investigated possible causes of the dolphins' obvious choice problems and in addition trained some dolphins to settle their problems. Also, we investigated whether and how dolphins can be released without risking their life. Finally, a release was planned and successfully performed. The results of all projects were published in the Proceedings of the Annual Conferences of the European Cetacean Society, e.g. meeting in Stralsund (1997). As the results are rarely known in Europe, but nevertheless relevant for the current discussion about a well-being of marine mammals, we offer a short summary at the EAAM meeting 2014.

Marine Mammal "Virtonecropsies": The use of Computerized Tomography and Magnetic Resonance Imaging in forensic research

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In the last decade, the increase in the use of imaging techniques such as computerized tomography (CT) and magnetic resonance imaging (MRI) on marine mammals has led to a parallel increase in the number of pathological cases reported with these procedures. Using these techniques, 17 very fresh dolphin and seal carcasses found stranded in NW Spain and Portugal (including *Halichoerus grypus*, *Delphinus delphis*, *Stenella coeruleoalba* and *Tursiops truncatus*) were examined. Bone lesions, parasite infestations, pneumonias, abscesses, brain lesions and tumours were observed in the images and confirmed during the necropsy. Imaging techniques appeared to be superior to necropsies in revealing certain lesions, particularly in bony tissues, or observing difficult access structures such as the brain, the ears or the paraotic sinuses. Despite this, these virtual and non-invasive approaches didn't provide definitive diagnostics and also didn't allow sampling. Nevertheless, CT and MRI examinations previous to the opening of the carcasses can be considered as a very useful tool to search for some lesions, considerably improving post-mortem information and allow re-examination of the cases even many years later after the necropsy.

Evaluation of etorphine reversed by diprenorphine for the immobilisation of free-ranging Atlantic walrus (*Odobenus rosmarus rosmarus* L.)

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We evaluated 69 immobilisations with etorphine that were performed by remote darting on 41 individual free-ranging adult Atlantic walrus (633–1883 kg) over 12 years as a prerequisite for other studies. Ten individuals were immobilised repeatedly. Full immobilisation was achieved in 58 cases (84 %). Insufficient restraint happened in 6 cases (9 %) and 5 animals died (7 %) following the immobilisation. Satisfactory immobilisation was achieved after 5 min (n = 38, range 1.9–12.4 min, SD = 2.2) with a dose of etorphine of 6.1 µg/kg (range 2.4–12.6 µg/kg, SD = 2.4). Induction time was negatively correlated with the dosage of etorphine. Etorphine-induced apnoea lasted 13.7 min (n = 36, range 17.0–26.7 min, SD = 5.1) and was reversed by multiple doses of diprenorphine. The first dose of antagonist of 12.2 mg (n = 39, range 6.0–21.0 mg, SD = 3.5) was administered 8.4 min (n = 38, range 4.7–18.0 min, SD = 2.8) after injection of the agonist. The total dose of diprenorphine per animal ranged between 7.7 and 41.7 µg/kg (n = 31, mean = 17.2 µg/kg, SD = 7.5). For some animals blood pH values were measured following the apnoea and reached low levels (min pH 6.8).

For animals that were immobilised several times there were no indications of changed sensitivity to etorphine as reflected in unchanged induction times. Mortalities could neither be related to the doses of agonist and antagonist, or to the times of administration of the drugs. From this (n = 69) and other (n = 103) studies involving etorphine immobilisation of walrus (both Atlantic and Pacific) the overall success rate is 83 % (8 % casualty rate). We conclude that the combination etorphine-diprenorphine is suitable for both single and multiple immobilisation of walrus provided that (a) a casualty rate of 8% is acceptable (b) the antagonist diprenorphine is administered fast and well into a tissue with good blood irrigation, and (c) the animal is promptly intubated endotracheally to secure regain of breath.

Assesing the distribution of the Atlantic spotted dolphin in the Azores

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The Atlantic spotted dolphin (*Stenella frontalis*) is one of the seasonal species sighted every year in the Azores. We aim to analyze its distribution using data collected between 2009 and 2011 off the south coast of São Miguel during whale watching tours. The Atlantic spotted dolphin was the fourth most sighted species in this study, making up 12.43% of all cetacean sightings (3090 sightings of 18 different species). Each year they were encountered between June and December, with 75% of sightings occurring between July and September, coinciding with the period when common dolphin sightings decrease in the area. In 2009 there were also some records in January and February, corresponding with the unusual higher temperatures registered during those months. 69.8% of sightings occurred with a sea surface temperature between 21 and 23.5°C. 71.35% of sightings were recorded in areas fewer than 900m deep. During the three year study period, groups often comprised of several hundred individuals. In 2009 group size increased to more than 1000 individuals. Most of the groups (74.22%) were formed by a mixture of adults, juveniles and calves.

Mixed testicular neoplasia in a short-beaked common dolphin (*Delphinus delphis*)

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Among the cetacean scientific literature, testicular neoplasms have been rarely described. A diagnosis of mixed testicular neoplasia in a short beaked common dolphin (*Delphinus delphis*) is present. An adult male short beaked common dolphin was found stranded on the coast of Almeria (Andalucía, Spain). At necropsy, two masses were observed in the abdominal cavity. Samples from different organs were preserved in buffered formalin (10%), embedded in paraffin, sectioned at 5 µm, and stained with hematoxylin and eosin. One of the masses was adhered to the left testicle showing poor demarcation from the adjacent testicular parenchyma, and the other, was closely related to the right testicle and consistent with a retroperitoneal lymph node. Histologically, three distinguishable neoplastic cell populations comprising a Sertoli cell tumor, an interstitial (Leydig) cell tumor and a seminoma were observed in both testicles. Lymphatic spread to examined adjacent retroperitoneal lymph node was seen for neoplastic Sertoli cells. Demonstration of clinical signs and further health implications is extremely challenging when dealing with non accessible wildlife species, such as dolphins. However, metastatic potential for these neoplastic conditions should be considered. The occurrence of this mixed pattern of testicular neoplasia has not been previously reported in wildlife pathology.

Acute deadly Septicemia by *Erysipelothrix rhusiopathiae* in an Atlantic spotted dolphin (*Stenella frontalis*) stranded in the Canary Islands

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A subadult male Atlantic spotted dolphin (*Stenella frontalis*), fresh and in good body condition was subjected for necropsy after being found stranded dead in Tenerife (Canary Islands, Spain). Samples from skin, muscle, lung, trachea, lymph nodes, tonsil, heart, liver, pancreas, stomachs, intestine, kidney, urinary bladder, testicle, thyroid and adrenal glands, and central nervous system were collected, fixed in 10% buffered formalin, embedded in paraffin and stained with HE, GRAM, ZN, PAS, MAC387, and lysozyme. Bacterial culture and electron microscopy were additionally carried out. Main gross findings at necropsy included cutaneous tattoo-like lesions; multiorganic parasitosis; diffuse, bilateral pulmonary emphysema; pancreatic hemorrhages; and marked generalized lymphadenomegaly. Major histopathologic findings comprised suppurative cortical adrenalitis with vascular fibrinoid necrosis; lymphocytic and histiocytic interstitial bronchopneumonia, alveolar edema and histiocytosis; multicentric reactive lymphoid hyperplasia with marked sinus histiocytosis; multiorganic congestion, edema, and thrombosis; and disseminated bacteria-laden intrahistiocytic-macrophagic cells (IHMC). Gram variable, ZN (-), IHMC-bacilli were observed in every tissue assessed by optic microscopy. *Erysipelothrix rhusiopathiae* was isolated and identified from liver, lung and mesenteric lymph node samples. Electron microscopy revealed multiplying IHMC-bacilli, occasionally within variably sized cytoplasmic vacuoles. *Erysipelothrix rhusiopathiae* poses a major bacterial concern in dolphinaría worldwide, species conservation programs and public health, as it is a potential zoonotic agent.

Lateralized behaviors in a group of captive Yangtze finless porpoise (*Neophocaena asiaeorientalis asiaeorientalis*)

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Lateralized behavior refers to a preference or bias for one movement direction or one side of the body that is consistent across events. Despite the variety of studies carried out on this subject in a number of nonhuman species, its origin still remains under debate. This research examined lateralized behaviors of seven captive Yangtze finless porpoises (*Neophocaena asiaeorientalis asiaeorientalis*). 217 sessions were recorded for a total of 1085 minutes. Observations were performed through a 250 x 150 cm underwater glass window, and data regarding the presence of bias in spinning direction (corkscrew maneuver), pectoral fin use during contact with objects or conspecifics, and eye preference, were assessed for each subject. No bias at population level was observed for pectoral fin preference and visual laterality ($p > 0.05$). A counterclockwise bias in spinning direction at population level was found ($p < 0.05$), that may be consistent with a leftward movement of the body. Studies on functional laterality can lead to a better understanding of the evolution of the brain and to reveal the presence of asymmetries in other species that are similar to those in humans.

First case report of fatal asphyxiation in a long-finned pilot whale (*Globicephala melas*) due to primary bronchi obstruction caused by an European eel (*Anguilla anguilla*)

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On February 20th 2013, a subadult male (397cm total length) long-finned pilot whale (*Globicephala melas*) was found stranded in the Western Mediterranean Coast (Granada, Spain). A complete necropsy was carried out the day after, the animal was in good nutritional condition an estimated post-mortem time of 48-72h (early code 3). The cause of death was associated to a lower airway obstruction from an impacted European eel (*Anguilla anguilla*) (52cm length), which was located along the main pulmonary bronchi, causing fatal asphyxia. During inspection of the digestive tract, squid beaks and two fresh squids (*Ommastrephes bartramii*), one of them with 62cm body length, were found on the first stomach, as well as, some nematodes (*Anisakis* sp.). A number of single cases of fatal aspiration have been reported in the literature. Fatal asphyxiation was diagnosed as the cause of death when laryngeal displacement, compression or obstruction was identified. Normally the cases reported showed that large fish lodged in the esophagus or posterior pharynx. This is the first report of a fatal asphyxiation due to complete obstruction of the pulmonary bronchi caused by a common eel.



Thank you



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