Prof. Antonio Fernández

EDUCATION AND QUALIFIACTION:
Veterinary degree (1982) & **PhD** (1985) University of Córdoba (Spain).

HONORS AND AWARDS:
Córdoba University PhD annual Award (1985); **Fuerteventura Island Environmental Award** (2003); "**Canarians in the world**" Award ("El Mundo" Spanish newspaper) (2007); **Canary Islands Award** in Science and Innovation (2008); **Academic Excellence Award**, University of Las Palmas de Gran Canaria (2008); **Honorary member**, Professional Veterinary College, (2009).

TEACHING (GRADE AND POSTGRAD. STUDIES) AND RESEARCH QUALIFICATION:
Assistant Professor (1983 - 1985): University of Córdoba; **Associate Professor** of Veterinary Pathology (1985 -1986): University of Santiago de Compostela (Spain); **Postdoctoral Researcher Alexander von Humboldt** (1986-1987). Institute of Veterinary Pathology. Hannover (Germany); **Associate Professor** (1985-86 & 1988-92): University of Santiago and Córdoba (Spain); **Full professor** of Veterinary Histology and Pathology (since 1992): Veterinary School (certified by EEAVE in 2009, www.fv.ulpgc.es). University of Las Palmas (**ULPGC)** (Spain); **Visiting Professor** (1994): Veterinary Pathology Department, Cornell University (USA).

EUROPEAN VETERINARY SPECIALIZATIONS:
European Veterinary Pathology diplomat (**ECVP**) since 1995 and European Zoological Medicine (Wild Life Population) diplomat (**ECZM**) since 2012.

ACADEMIC LEADERSHIP (RESEACH AND TEACHING AREAS):

- **Director**, Institute of Animal Health and Food Safety (since 2007).www.iusa.eu**. ULPGC.**
- **Deputy Vice-Chancellor** of Research and Innovation, **ULPGC**, two terms (98-07).
- **Member** of the representative **council** of research Spanish vice-chancellors (00-07).
- **Dean** of Veterinary School. University of Las Palmas (1993-1998).
- **Director** of the **Master** Programme in Animal Health and Food Safety (National Certification). Since 2010.
- **Director** of the **PhD** Programme in Animal Health and Food Safety. (National Quality Certification 2007-2010, National Excellence Certified 2011- 2015).
- **Member** at the University Council (ULPGC) (since 1993)
- **EU projects reviewer**: EU Research Science and Technology Programs & **National and Regional projects reviewer (**Science and Technology Programs). (Several programs since 1998). **Horizon H2020 European Commission** (Member **/ N**ational advisor committee -Food security, Sustainable agriculture, Marine and maritime research-).

RESEARCH EXPERIENCE AND LEADERSHIP

- **Principal Investigator** and participation in 40 Regional, National and EU research and scientific infrastructure projects.
- **PhD thesis – director**: 17 (8 out of 17 received an annual PhD award).
- **5 Positive Evaluations** (1983-1988-1994-2000-2006-2012) by the National Agency for Evaluation of Research Activities.
- **Research assistantship**: Reports and contracts for public and private institutions.
- **JCR Publications**: 165 scientific articles (international peer reviewed journals).
- 60 ***scientific works*** (Technical reports and non-peer reviewed publications in Spanish).
- **Assistant Editor** (*Research in Veterinary Science*). **Reviewer** (25 JCR Journals: *Nature, Science, Vet. Pathology, DAO, JA Ac Am J. Env.Tox, MMS, JWLD, J Exp Biol, Marine Poll, BMC, Scientific. Reports, J Clin Microb, Marine Mammal Sci,, etc.).*
- **International** Whales and dolphins **scientific missions:** Iran, Taiwan, Peru, Cambodia, Turkey, Greece, UK.

CONFERENCE PAPERS, POSTERS, PRESENTATIONS, PUBLIC LECTURES

- **Scientific communications (oral and posters):** 321 communications presented at 30% national and 70% international congresses. 65% related to Marine Animal Pathology.
- **50 Invited talks and seminars at international level (summary):**
- Plenary lecture at the European Congress for Veterinary Pathology (2007): Stranding whales and sonar.
    - Marine Mammal Commission (USA), International Whaling Commission, Persian Gulf Cetacean Network Meeting.
    - 15 different countries (USA, Mexico, all south American countries, France, UK, Germany, Italy, Turkey, Iran, Taiwan, Cambodia, etc.), from 2003 to 2015

ACADEMIC AND RESEARCH ASSOCIATION AND AFFILIATIONS: Summary

- **Founding Member and Vice-president** of Spanish Veterinary Pathology Society (1989 & 1999-2003).
- **Member of International Organizations:** (most significant)
    - International Whaling Commission (**Expert scientist).**
    - **Expert member** of The International Union for Conservation of Nature.
    - **Diplomat and member** of the European College of Veterinary Pathologists.
    - **Diplomat and member** of the European College of Zoological Medicine.
    - **Member** of the Society for Marine Mammalogy & the European Cetacean Society.
    - **Scientific Commissioner** for La Palma, Fuerteventura and Gran Canaria, *UNESCO **Biosphere Reserves*****.**

RESEARCH AWARDS AND PhD students job placement

8 Research awards (scientific presentations and posters) received at National and International level. 8 PhD students are currently full professors at different universities. 3 are Assoc. Professors, 6 are involved in research and veterinary practice (Spain, UK, USA).

MORE INFORMATION:

Search key words: Fernandez, Antonio (A), Veterinary, Pathology

- https://www.researchgate.net/profile/Antonio_Fernandez6/

ABSTRACT - Cetacean Pathology: Decompression Sickness in Cetaceans?

Antonio Fernández, DVM, PhD, ECVP dipl., ECZM dipl.

(1) Veterinary Histology and Pathology. Department Morphology. Veterinary School. (2) Institute of Animal Health and Food Safety. Division of Animal Pathology. (3) Atlantic Cetacean Research Center. University of Las Palmas Gran Canaria. Canary Islands, Spain.

In the Canary Islands waters, more than 30 different cetacean species have been identified. Of these, at least 26 have been found stranded on the coasts of the Canary Islands. There are historical references to cetacean stranding in the Canary Islands, but a more systematic study and scientific analysis has begun to take place only in the last 2 decades. A specific unit of Veterinary Pathology based at Institute of Animal Health (University Las Palmas) has been carrying out studies and research on stranded cetaceans in the Canary Islands as well as in different parts of world. Necropsies and ancillary multidisciplinary laboratory analyses are carried out on each animal attempting to determine finally either natural and/or human related activities have been involved in stranding and/or cause of death. Even though, the information is obtaining individually, a high amount of data has been gained regarding species, pathologies and etiologies which has contributed to a better understanding of the health status of those studied species.

The veterinary and forensic pathological sciences applied to each stranded cetacean is only a piece of a multidisciplinary comparative bio-eco-health discipline which clearly contribute scientifically to the conservation of these marine mammals, one of the best worldwide environmental health bio-indicator of the oceans. Therefore, joining these premises, we are convinced that these cetaceans´ studies may represent good examples within the concept "One Health, One environment" which obviously should include human and animal welfare, as a parameter to be evaluated and confronted, as they (human versus animal) very often become into "welfare conflict of interests".

The Canary Islands, as many coastal areas in the world are densely populated and the anthropogenic impact on the marine environment includes effects of maritime traffic transporting cargo and people, the fishing industry and tourists observing cetaceans (whale watching). Marine life, including cetaceans, is affected by chemical pollution caused by dumping waste (urban, industrial and agricultural), and acoustic pollution

caused by maritime traffic, hydrocarbon prospecting and extraction, and civil and military use of sonar. In order to try to assess the impact of these potentially detrimental activities on cetaceans a systematic pathological studies have been carried out in the Canaries during the last 2 decades.

Briefly, between October 1999 and September 2005, these analyses allowed us to classify 128 out of 233 stranded cetaceans (54.9%) into one of the anthropogenic or non-anthropogenic pathological categories. The most important anthropogenic causes of death included interactions with fishing gear (including bycatch), foreign body pathology, atypical strandings of beaked whales associated with military manoeuvres and sonar, and collisions with vessels (particularly in sperm whales). On the other hand, natural (non-anthropogenic) causes of death included loss of nutritional status (starvation) and a range of infectious and noninfectious diseases. Conclusions indicated that anthropogenic causes were linked to 33% of the 128 stranded cetacean investigated (25).

A follow up study, between 2006 and 2012, after improving forensic field methodologies and laboratory technologies, it was able to classify 236/320 (73.75%) of the cetaceans studied into one of the anthropogenic or non-anthropogenic pathological categories (16). Direct human activity was responsible for approximately 18% of cetaceans' deaths in this study, while 'natural' pathologies would account for approximately 82%. The decreasing of anthropogenic causes was partially due to policy measures which were taken to ban military acoustic activities in the Canary Islands.

In the last recent years, we have been putting much attention on how human activities may affect cetaceans, improving methods and techniques to identify better lesions, mechanisms and causes, in order to associate "stressors" with "distress". At the same time, we, as veterinary pathologists, are actually interesting in showing ("convincing") to a wide non-scientific audience, how, dealing scientifically with "the death", which always means "bad news", good science, not necessarily big science, can help to preserve "the life" of the animal, either individually (welfare) and, there, collectively (conservation).

Pathologies related to effects of changes in pressure are well known among human divers. Decompression Sickness (DCS), is a syndrome related to the formation of gas bubbles in blood and/or tissues when the sum of the dissolved gas tensions exceeds the local absolute pressure. Gas bubbles may have biochemical effects and disrupt the tissues or occlude the vessels with clinical and pathological signs and, in certain cases, death (1).

Marine mammals have long been considered protected against DCS through anatomical, physiological, and behavioral adaptations (1). However, an acute systemic gas and fat embolic syndrome similar to DCS in human divers was described in beaked whales that stranded in temporal and spatial association with military exercises involving high-powered sonar (2, 3).

Several hypotheses have been proposed as a cause–effect relationship between MFA sonar use and these stranding events (4). One of them was the alteration of beaked whales' diving behavior in response to MFA sonar exposure in such a manner that behavioral or physiological mechanisms employed for protecting against the formation of nitrogen gas bubbles were overridden (3, 4). According to this proposal, bubble

evolution might occur as a result of severe alterations in dive behavior (e.g. extremely rapid surfacing or remaining at the surface and possibly vigorously swimming) (2, 3).

Excluding those beaked whales, two Risso´s dolphin out of 493 necropsied cetaceans stranded in the Canary Islands in a 15-year period (2000-2015), showed pathological findings and gas analysis consistent with a severe acute decompression pathology as a result of a diving fatality during a "dolphin-squid interaction". To the author's knowledge this is the first report of decompression like sickness in marine mammals not linked to anthropogenic activities, and the first report of decompression like sickness in a marine mammal species different than beaked whales. Dolphin individual predisposing risk conditions resembling those described in human divers are suspected and merit to be further investigated.

References:

1. C. A. Piantadosi and E. D. Thalmann: Pathology: whales, sonar and decompression sickness. Nature, 428(6984), 1 p following 716; discussion 2 p following 716 (2004)
2. P. D. Jepson, M. Arbelo, R. Deaville, I. A. P. Patterson, P. Castro, J. R. Baker, E. Degollada, H. M. Ross, P. Herraez, A. M. Pocknell, F. Rodriguez, F. E. Howie, A. Espinosa, R. J. Reid, J. R. Jaber, V. Martin, A. A. Cunningham and A. Fernandez: Gas-bubble lesions in stranded cetaceans - Was sonar responsible for a spate of whale deaths after an Atlantic military exercise? Nature, 425(6958), 575-576 (2003) doi:10.1038/425575a
3. A. Fernandez, J. F. Edwards, F. Rodriguez, A. E. de los Monteros, P. Herraez, P. Castro, J. R. Jaber, V. Martin and M. Arbelo: "Gas and fat embolic syndrome" involving a mass stranding of beaked whales (Family Ziphiidae) exposed to anthropogenic sonar signals. Veterinary Pathology, 42(4), 446-457 (2005)
4. T. M. Cox, T. J. Ragen, A. J. Read, E. Vos, R. W. Baird, K. Balcomb, J. Barlow, J. M. Caldwell, T. Cranford, L. A. Crum, A. D'Amico, G. D'Spain, A. Fernandez, J. J. Finneran, R. Gentry, W. A. Gerth, F. M. D. Gulland, J. Hildebrand, D. Houser, T. Hullar, P. D. Jepson, D. Ketten, C. D. MacLeod, P. Miller, S. Moore, D. C. Mountain, D. Palka, P. J. Ponganis, S. Rommel, T. Rowles, P. L. Tyack, D. Wartzok, R. Gisiner, J. Mead and L. Benner: Understanding the impacts of anthropogenic sound on beaked whales. Journal of Cetacean Research and Management, 7(3), 117-187 (2006)
5. P. D. Jepson, R. Deaville, I. A. P. Patterson, A. M. Pocknell, H. M. Ross, J. R. Baker, F. E. Howie, R. J. Reid, A. Colloff and A. A. Cunningham: Acute and chronic gas bubble lesions in cetaceans stranded in the United Kingdom. Veterinary Pathology, 42(3), 291-305 (2005)
6. M. J. Moore, A. L. Bogomolni, S. E. Dennison, G. Early, M. M. Garner, B. A. Hayward, B. J. Lentell and D. S. Rotstein: Gas Bubbles in Seals, Dolphins, and Porpoises Entangled and Drowned at Depth in Gillnets. Veterinary Pathology, 46(3), 536-547 (2009) doi:10.1354/vp.08-VP-0065-M-FL
7. Y. Bernaldo de Quirós, O. González-Diaz, M. Arbelo, E. Sierra, S. Sacchini and A. Fernández: Decompression vs. Decomposition: Distribution, Amount, and Gas

Composition of Bubbles in Stranded Marine Mammals. Frontiers in Physiology, 3 (2012) doi:10.3389/fphys.2012.00177
8. S. Dennison, M. J. Moore, A. Fahlman, K. Moore, S. Sharp, C. T. Harry, J. Hoppe, M. Niemeyer, B. Lentell and R. S. Wells: Bubbles in live-stranded dolphins. Proceedings of the Royal Society B: Biological Sciences, 279, 1396-1404 (2012) doi:10.1098/rspb.2011.1754
9. M. J. Moore and G. A. Early: Cumulative sperm whale bone damage and the bends. Science, 306(5705), 2215-2215 (2004) doi:10.1126/science.1105452
10. Y. Bernaldo de Quirós, J. S. Seewald, S. P. Sylva, B. Greer, M. Niemeyer, A. L. Bogomolni and M. J. Moore: Compositional Discrimination of Decompression and Decomposition Gas Bubbles in Bycaught Seals and Dolphins. PLoS ONE, 8(12), e83994 (2013) doi:10.1371/journal.pone.0083994
11. S. K. Hooker, R. W. Baird and A. Fahlman: Could beaked whales get the bends? Effect of diving behaviour and physiology on modelled gas exchange for three species: Ziphius cavirostris, Mesoplodon densirostris and Hyperoodon ampullatus. Respiratory Physiology & Neurobiology, 167(3), 235-246 (2009) doi:10.1016/j.resp.2009.04.023
12. W. M. X. Zimmer and P. L. Tyack: Repetitive shallow dives pose decompression risk in deep-diving beaked whales. Marine Mammal Science, 23, 888-925 (2007) doi:10.1111/j.1748-7692.2007.00152.x
13. D. S. Houser, R. Howard and S. Ridgway: Can diving-induced tissue nitrogen supersaturation increase the chance of acoustically driven bubble growth in marine mammals? Journal of Theoretical Biology, 213(2), 183-195 (2001)
14. D. García-Párraga, J. L. Crespo-Picazo, Y. Bernaldo de Quirós, V. Cervera, L. Martí-Bonmati, J. Díaz-Delgado, M. Arbelo, M. J. Moore, P. D. Jepson and A. Fernández: Decompression sickness (‘the bends’) in sea turtles. Diseases of Aquatic Organisms, 111(3), 191-205 (2014) doi:10.3354/dao02790
15. B. Knight: Forensic Pathology. London (1996)
16. J. Díaz-Delgado: Patología y causas de la muerte de los cetáceos varados en las islas Canarias (2006-2012). In: Institute of Animal Health. University of las Palmas de Gran Canaria, Las Palmas de Gran Canaria (2015)
17. J. Diaz-Delgado, O. Quesada-Canales, M. Arbelo, E. Sierra, J. F. Edwards, A. Suarez-Bonnet, C. Santana-Suarez, A. Espinosa de Los Monteros and A. Fernandez: Multicentric Benign Epithelial Inclusions in a Free-ranging Risso's Dolphin (Grampus griseus). J Comp Pathol, 155(2-3), 267-71 (2016) doi:10.1016/j.jcpa.2016.06.002
18. T. Barrett, I. K. Visser, L. Mamaev, L. Goatley, M. F. van Bressem and A. D. Osterhaust: Dolphin and porpoise morbilliviruses are genetically distinct from phocine distemper virus. Virology, 193(2), 1010-2 (1993)
19. D. R. VanDevanter, P. Warrener, L. Bennett, E. R. Schultz, S. Coulter, R. L. Garber and T. M. Rose: Detection and analysis of diverse herpesviral species by consensus primer PCR. J Clin Microbiol, 34(7), 1666-71 (1996)
20. T. J. R. Francis and J. M. Simon: Pathology of Decompression Sickness. In: Bennett and Elliott's Physiology and Medicing of Diving. Ed A. O. Brubakk&T. S. Neuman. Saunders, (2003)
21. V. Varlet, F. Smith, N. Giuliani, C. Egger, A. Rinaldi, A. Dominguez, C. Chevallier, C. Bruguier, M. Augsburger, P. Mangin and S. Grabherr: When gas analysis assists with postmortem imaging to diagnose causes of death. Forensic Science International, 251, 1-10 (2015) doi:10.1016/j.forsciint.2015.03.010

22. Y. Bernaldo de Quirós, O. González-Díaz, A. Møllerløkken, A. O. Brubakk, A. Hjelde, P. Saavedra and A. Fernández: Differentiation at autopsy between in vivo gas embolism and putrefaction using gas composition analysis. International Journal of Legal Medicine, 127(2), 437-445 (2013) doi:10.1007/s00414-012-0783-6
23. R. W. Baird: Risso's dolphin "Grampus griseus". In: Encyclopedia of Marine Mammals. Ed W. F. Perrin, B. Würsig&J. G. M. Thewissen. Academic Press, San Diego, CA (2009)
24. C. F. E. Roper, M. J. Sweeney and C. E. Nauen: Cephalopods of the world. An annotated and illustrated catalogue of species of interest to fisheries. FAO Fisheries Synopsis, 3(125), 277 (1984)
25. M. Arbelo, A. Espinosa de los Monteros, P. Herraez, M. Andrada, E. Sierra, F. Rodriguez, P. D. Jepson and A. Fernandez: Pathology and causes of death of stranded cetaceans in the Canary Islands (1999-2005). Diseases of Aquatic Organisms, 103(2), 87-99 (2013) doi:10.3354/dao02558
26. A. Fernández, E. Sierra, V. Martin, M. Méndez, S. Sacchini, Y. Bernaldo de Quirós, M. Andrada, M. Rivero, O. Quesada, M. Tejedor and M. Arbelo: Last "atypical" beaked whales mass staning in the Canary Islands (July, 2004). Journal of Marine Science Research and Develpment, 2(2) (2012) doi:10.4172/2155-9910.1000107
27. Y. Bernaldo de Quirós, P. Saavedra, A. Møllerløkken, A. O. Brubakk, A. Jørgensen, O. González-Díaz, J. L. Martín-Barrasa and A. Fernández: Differentiation at necropsy between in vivo gas embolism and putrefaction using a gas score. Research in Veterinary Science, 106, 48-55 (2016) doi:10.1016/j.rvsc.2016.03.007
28. R. D. Vann, F. K. Butler, S. J. Mitchell and R. E. Moon: Decompression illness. The Lancet, 377(9760), 153-164 (2011) doi:10.1016/s0140-6736(10)61085-9
29. C. Edmonds, M. Bennett, J. Lippmann and S. J. Mitchell: Diving and subaquatic medicine. CRC Press, Boca Raton, FL, USA (2015)
30. H. M. Vernon: The solubility of air in fats, and its relation to caisson disease. Proceedings of the Royal Society of London Series B-Containing Papers of a Biological Character, 79(533), 366-371 (1907)
31. G. Hulman: The pathogenis of fat-embolism Journal of Pathology, 176(1), 3-9 (1995) doi:10.1002/path.1711760103
32. T. Kuiken and M. García-Hartmann: Dissection techniques and tissues sampling. In: 1st European Cetacean Society workshop on Cetacean Pathology. Ed Newsletter. Leiden, Netherlands (1991)
33. Y. Bernaldo de Quirós, Ó. González-Díaz, M. Arbelo, M. Andrada and A. Fernandez: Protocol for gas sampling and analysis in stranded marine mammals. Protocol exchange (2012) doi:10.1038/protex.2012.002
34. Y. Bernaldo de Quirós, Ó. González-Díaz, P. Saavedra, M. Arbelo, E. Sierra, S. Sacchini, P. D. Jepson, S. Mazzariol, G. Di Guardo and A. Fernández: Methodology for in situ gas sampling, transport and laboratory analysis of gases from stranded cetaceans. Scientific Reports, 1, 193 (2011) doi:10.1038/srep00193
35. Y. Bernaldo de Quirós: Methodology and analysis of gas embolism: experimental models and stranded cetaceans. In: Institute of Animal Health. University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria (2011)