UNIVERSITÀ DI PISA

DIPARTIMENTO DI BIOLOGIA
Unità di Etologia

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Prof. Paolo Luschi
Curriculum vitae

Born 10 Oct. 1965 in Livorno, Italy.

Education
Ph.D. in Animal Biology (Ethology), 1997
Master degree in Biological Sciences with full marks and honours, University of Pisa, 1989.

Research training
Pre-doctoral: Department of Ethology, Ecology, Evolution; University of Pisa, 1995-1997 (advisor Prof. F. Papi).
Post-graduation: "Dott. G. Guelfi" fellowship by the Italian Academy of Science, 1990-1994 (research work at the Department of Ethology, Ecology, Evolution; University of Pisa; supervisor Prof. F. Papi)
Pre-graduation: Department of Ethology, Ecology, Evolution; University of Pisa, 1988-1989 (advisors Prof. S. Benvenuti and V. Fiaschi).

Academic employment
Presently: Full Professor in Zoology at the Department of Biology; University of Pisa.
2015-2019: Associate Professor in Zoology at the Department of Biology; University of Pisa.
2004-2014: lecturer in Zoology at the Department of Biology; University of Pisa.
1997-2004: research technician at the Department of Ethology, Ecology, Evolution; University of Pisa.

Awards
1998: “Dott. Giuseppe Borgia” Foundation award for Biological Sciences, awarded by the Italian Academy of Science

Main research interests
- Migration and general at-sea behaviour of marine turtles investigated by satellite telemetry and data loggers.
- Mechanisms of animal orientation and navigation, initially as regards pigeon homing and more recently as regards long-range navigation in the oceanic environment in turtles and seabirds.
- Migration and spatial behaviour of ducks.
- Additional interests include behavioural and physiological effects of exposure to altered artificial magnetic fields, diving and foraging behaviour of marine birds, short-range orientation in crabs, bird song variability.

Research activity

My scientific activity has been mainly carried out within the field of Ethology and investigated various aspects of animal behaviour, especially regarding animal orientation and navigation. My research findings have been the subject of over 70 scientific publications in international journals and books, including six review papers on major study topics, all being frequently quoted in recent scientific literature.

My first research works dealt with the orientation and navigation mechanisms of the homing pigeon. In particular, I initially investigated the nature of the effects produced by exposure to altered magnetic fields on the pigeon homing behaviour. My experiments have shown that the disturbances induced by these treatments are to be considered a side effect of non-specific actions exerted by magnetic treatments on the physiological mechanisms that control stress compensation (especially those mediated by the endogenous opioid system) in birds subjected to experimental releases. The results obtained have provided for the first time a plausible hypothesis of how altered magnetic fields may affect pigeon homing, and have also highlighted the need to accurately assess stress factors in the interpretation of pigeon experiment findings. Still in the homing pigeon, I have also investigated the orientation mechanisms used during homing from familiar areas, highlighting the relevance of solar compass reliance even in releases from familiar places close to the home loft, while under overcast sky conditions no indication of a supposed use of a magnetic compass was obtained.

The results on the magnetic field effects on pigeon orientation and stress compensation have given rise to research into the physiological actions of magnetic treatments, particularly on pain and perception systems. A series of experiments carried out in pigeons and mice, as well as in humans, revealed that substantial changes in psycho-physiological responses to pain are produced after short exposures (less than 2 hours) to various kind of altered magnetic fields, including shielding of the natural magnetic field. Such treatments are in fact able to inhibit the so-called stress-induced analgesia, an adaptive physiological response to stressful conditions, with a surprisingly similar effect in the various studied species including man.

I have also performed bioacoustic studies on the singing behaviour of two species of Passerine birds. Thanks to a detailed description of the acoustic structure of the complex songs of Sardinian warblers (*Sylvia melanocephala*), I have detected a surprisingly high intra-individual variability in these signals, that was obtained by continuously introducing new song elements. In the Cetti's Warbler (*Cettia cetti*), I performed song playback experiments to investigate the role of songs in territory marking and have revealed the presence of two distinct song-types, one of which was exclusively used in aggressive interactions with males intruding in the resident male’s territory.

From nearly 30 years, my research activity is mainly focused on the migrations and orientation of marine turtles. Thanks to the use of satellite telemetry techniques, I have reconstructed the postnesting migratory routes of three species of marine turtles from different rookeries in various parts of the world, and later extended these researches to juvenile turtles in the Atlantic Ocean and the Mediterranean Sea. In many cases, the reconstruction by satellite of the routes followed by tracked turtles

has been integrated with the recording of associated behavioural parameters (such as the turtle diving patterns or its orientation) and/or with data on the main environmental factors potentially affecting turtle movements (e.g., ocean currents and other oceanographic factors, prevailing winds) that have been detected through remote-sensing techniques. I have also studied the navigational abilities shown by adult turtles during their journeys, performing specific experiments to test previously formulated hypotheses on their navigational mechanisms. To this aim, special experimental paradigms have been developed that have been applied for the first time to sea turtles, such as the application to migrating individuals of magnets preventing their perception of the Earth's magnetic field, or the translocation of females away from their nesting sites. The latter experiments allowed to evaluate the turtle abilities to return to the original site after release in faraway, open-sea locations, and sometimes encompassed specific experimental treatments to displaced turtles like application of magnets. These researches have led to remarkable results in the field of animal orientation, allowing to demonstrate the role of geomagnetic stimuli in turtle oceanic navigation and to reveal a previously unsuspected role of wind-borne information in the process of localization of oceanic islands.

More recently, I have been involved in studies on the navigational abilities of seabirds through homing experiments with shearwaters that were displaced from their breeding islands to distant open-sea sites while being experimentally deprived of their olfaction or prevented from perceiving geomagnetic stimuli. The results have revealed the fundamental role of olfactory cues in the homing process of these birds navigating in the oceanic environment. Finally, I have collaborated to a pioneering study on the migration and spatial behaviour of small ducks, reconstructing by satellite telemetry the previously unknown migratory routes of Eurasian teals wintering in Italy and breeding in Northeastern Europe.

As a results of these studies, during the years I have set up fruitful and long-lasting international collaborations with a number of scientists, the main ones being:

- Prof. Graeme C. Hays, Centre for Integrative Ecology, Deakin University (Warrnambool, Australia)
- Prof. Susanne Åkesson, Department of Animal Ecology, University of Lund (Sweden),
- Drs. Simon Benhamou and Francesco Bonadonna, Centre d'Ecologie Fonctionelle et Evolutive del CNRS (Montepellier, France),
- Dr. George R. Hughes, KwaZulu-Natal Conservation Trust (Pietermaritzburg, South Africa),
- Prof. Johann R. Lutjeharms, Department of Oceanography, University of Cape Town (South Africa).
- Prof. Brendan J. Godley, Center for Ecology and Conservation, University of Exeter (UK)
- Prof. Elena Choleris, Department of Psychology, University of Guelph (Canada).

Publication records as of Dic. 2019

75 peer-reviewed papers in international journals
4 papers in multi-authored scientific books
17 papers in conferences proceedings
Total quotations: 2849; H-index: 34 (according to Scopus)