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Columns - Rubriche

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Special Review

Italian review of Doctoral theses in Ornithology (second edition)*

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Introductory note

For the second year, Avocetta collected the abstracts of some of the PhD-Dissertations focused on Ornithology and defended in Italian Universities between the academic years of 2011/2012 and 2014/2015. The aim of this collection is to offer a review of the research lines on which Italian ornithology is actually working and to offer visibility to young researchers that with their PhD contribute to the development of this scientific field.

In this second review, five theses were received belonging to four Universities. Overall, the thesis spread over seven major topics, not mutually exclusive: migration ecology (3 cases), phenology of life-history events (2), agricultural practices and conservation (1), population ecology (2), orientation (1) and habitat selection (3). Two thesis were structured as a series of investigations using a single model species (Barn swallow *Hirundo rustica*- thesis 2 and Lesser kestrel *Falco naumanni* – thesis 3) while the rest consider altogether a set of species sharing common behavioural traits or habitat preferences. All the thesis present results from data collected in the field during the PhD period, but in one case, final results comes from genetical analyses (clock-genes, thesis 1). One thesis was exclusively based on behavioural data collected through light level geolocators (thesis 2), while other one included experimental treatment of shorebirds in the field to study orientation (thesis 5).

The most of the chapters of the thesis are already available as published papers, which are listed in the reference section at the end of the review. When the full pdf file of the thesis is available, the relative link is indicated at the end of the abstract. Thesis are presented in alphabetical order following the name of University and of the PhD candidate surname. Contents of the abstract are not reviewed and are responsibility of the authors.

Nota Introduttiva

Per il secondo anno consecutivo, Avocetta ha raccolto gli abstract di alcune delle tesi dottorali di ambito ornitologico discusse nelle Università italiane tra gli anni accademici 2011/2012 e 2014/2015. L'obiettivo di questa raccolta è di offrire una panoramica delle linee di ricerca dell'ornitologia italiana contemporanea e di offrire visibilità a giovani ricercatori che con il loro lavoro di dottorato contribuiscono allo sviluppo di questo campo di studi.

In questa seconda revisione sono state ricevute cinque

* The first Review was published on Avocetta, 2015, 39 (1): 41-50.

tesi discusse in quattro diverse Università. Nel complesso, le tesi affrontano sette grandi argomenti, in maniera non esclusiva: ecologia della migrazione (3 casi), fenologia degli eventi di life-history (2), pratiche agricole e conservazione (1), ecologia di popolazione (2), orientamento (1) e selezione dell'habitat (3). Due tesi sono state strutturate come una serie di ricerche attorno ad una singola specie modello (la rondine Hirundo rustica – Tesi 2 e il grillaio Falco naumanni- Tesi 3) mentre le rimanenti tesi hanno avuto come specie modello un set di specie accomunate da tratti comportamentali o da preferenze ambientali. Tutte le tesi presentano risultati derivati da dati raccolti sul campo durante la realizzazione del dottorato, ma in un caso i risultati principali provengono da analisi genetiche condotte in laboratorio (geni-orologio, Tesi 1). Una tesi è esclusivamente basata su dati raccolti tramite geolocalizzatori miniaturizzati (Tesi 2), mentre un'altra include esperimenti sull'orientazione di limicoli realizzati direttamente sul campo (Tesi 5).

La maggior parte dei capitoli delle tesi qui presentate sono già pubblicati come lavori scientifici indipendenti, nel qual caso sono indicati nella lista bibliografica alla fine della raccolta. Le tesi sono presentate in ordine alfabetico seguendo il nome dell'Università e quindi il cognome del dottorando. Il contenuto degli abstracts non è stato oggetto di revisione ed è di piena responsabilità dei singoli autori.

LIST OF THE ABSTRACTS

Università degli Studi di Milano Statale

Thesis 1

Genes on the move: candidate genes and long-distance migration in birds

Geni in movimento: geni candidati e migrazione a lungo raggio negli uccelli

Author: **Gaia Bazzi**
Supervisors: Prof. Diego Rubolini
Academic Year: 2014/2015

Abstract

Bird migration is an adaptive strategy evolved to exploit the seasonal changes of resources by moving to different areas at different times of the year. Migratory birds reach the breeding grounds when the food supplies enable them to breed and leave towards more suitable areas before the ecological conditions deteriorate. To this end, migratory birds must anticipate the changes in ecological conditions by weeks or months to prepare for migration, hinting that migration is under a strong genetic influence and that the broad among-species, among-populations and among-individuals differences in migratory traits could be partly triggered by variation at genes controlling migratory behaviour. Identifying which genes underline the phenotypic variation observed in natural populations, and to which extent, is of broad evolutionary and conservation interest. In recent years, several studies have focused on the polymorphism of phenological candidate genes that may explain the variability of behavioural traits.

The *Clock* and *Adcyap1* genes are among the best-studied candidate genes involved in the photoperiodic response and in the circannual rhythmicity. Both genes show a polymorphism in short tandem repeat sequences that may affect the gene function or the post-transcriptional processes and that have been linked to variation in the timing of seasonal events and other behavioural traits in several species. However, no study has investigated the effect of *Clock* and *Adcyap1* genotype on migration phenology and on migration distance directly in wild birds. The aim of this thesis is to investigate whether polymorphism at candidate genes affects the timing of migration and the migration distance in avian species, with particular reference to *Clock* and *Adcyap1* genes. I found *Clock* allele size to predict the timing of migration in different trans-Saharan migratory bird species. The direction of the association was coherent with the findings of previous studies and across species, longer alleles being associated with a delayed phenology, with the only exception of willow warbler (*Phylloscopus trochilus*). In some of the species, the effect of *Clock* allele size on phenology varied according to the sex or the population considered. Moreover, *Adcyap1* allele size was associated with the migration distance in a Nearctic-Neotropical migratory bird, the Wilson's warbler (*Cardellina pusilla*).

In such species, the genotype-phenotype association was stronger among the northern, long-distance migratory populations than among the southern, short-distance migratory ones. Finally, using a comparative approach, I found that *Clock* allele size increased with breeding latitude across species and that *Clock* gene diversity was reduced among the species migrating over longer distances, that show delayed and more concentrated migration periods. To conclude, the findings from this thesis deepen our understanding of the role of polymorphism at candidate gene in shaping avian behaviour and corroborate the idea that the effect of the variability at such genes may vary according to the species or the population considered, or to the sex. These findings also suggest that the reduced phenotypic variance observed among long-distance migratory species (and perhaps their weak plastic phenotypic response to climate change), that has been previously attrib-

uted to a tighter endogenous control of migration, may also be determined by depleted genetic variation at phenological candidate genes.

Thesis 2

Migration and natal dispersal in the barn swallow *Hirundo rustica*

Migrazione e dispersione natale nella rondine *Hirundo rustica*

Author: **Chiara Scandolara**
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Academic Year: 2013/2014

Abstract

A detailed knowledge of all different phases of the annual cycle is fundamental to fully understand the ecology of a population. Birds, and particularly species that migrate over long-distances, spend their life on the wing, crossing and staging in many areas, often in different continents, at different times of the year.

The aim of the first part of this thesis was to investigate the migration ecology of three geographical breeding populations of barn swallow in southern Europe (one in Switzerland and two in northern Italy). For this purpose, I equipped adult swallows with geolocators in 2010 and 2011 and, after having recovered and downloaded data in the subsequent years - respectively 2011 and 2012- I followed the individuals along their year-round cycle, obtaining their geographic positions during the non-breeding period and their spring and autumn migration routes. I have examined the variance in migration phenology and the distribution residence areas in sub-Saharan Africa in relation to sex, diverse population and different year.

The data set consisting of 103 annual tracks is the largest dataset of this typology available for any migratory passerine. Thanks to this research, I identified in Central Africa, in a region of 1,000 km in radius centered in Cameroon, the main wintering area of the three geographical populations. Only 5 males reached southern Africa, covering more than 10,000 km between breeding and wintering sites. Most individuals occupied only a single site during their stay south of the Sahara. The dataset allowed, for the first time for a small bird, to compare migration behaviour of males and females based on a solid sample size, and to compare different geographical populations over two-years of investigation.

This research confirmed that miniaturized light-level geolocators are extremely useful tools, which are revolutionizing the study of small-size migratory birds, making it possible to follow the annual cycle of large samples of individuals and obtaining information that were unthinkable just a few years ago.

I have investigated the possible long-term impact of this innovative technology on the productivity, return rate and, more generally, on the life style of the adult swallows, so far one of the smallest species for which this methodology has been used. Finally, I contributed to the development of this methodology by comparing and optimizing the characteristics of two different model of geolocators' external size and shape (comparing fitness traits but also loss rate), and by developing an optimally-shaped harness for long-term external device attachment, with the purpose of giving a contribution to the evolution of this technique in the study of bird migration.

The second part of the thesis is focused on a series of different aspects related to natal dispersal, giving a fundamental contribution to the knowledge of this ecological process from different points of view, and identifying several factors that affect dispersal decisions and that act at different scale and stage of the individual life history. I analysed the natal dispersal propensity (i.e., dispersing or not) and dispersal distance in relation to different factors, with the aim of understanding which are the mechanisms underneath these decisions.

I found that sex strongly affected both dispersal propensity and distance, with females being the most dispersing sex, as expected for birds in general. Besides, natal dispersal of males was positively predicted by their position in the brood size hierarchy, while dispersal of both sexes was less likely to occur from large colonies located on farms with a large number of livestock, that is demonstrated to be an important factor for swallows in breeding site choice.

Both the results on migration and on natal dispersal may have also a great importance in order to plan appropriate conservation measures at the breeding sites and on the wintering grounds. Hence, my findings on the two topics can have in the future also a practical application for the conservation of the breeding populations of this declining, flagship bird species.

Università degli Studi di Palermo

Thesis 3

Distribution and survival of a Lesser Kestrel *Falco naumanni* population in a Mediterranean agro-ecosystem

Distribuzione e sopravvivenza di una popolazione di Grillaio *Falco naumanni* in un ecosistema agricolo Mediterraneo

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Academic Year: 2014/2015

Abstract

The spatial distribution of individuals in their environment has always attracted the interest of the researchers. In fact, mechanisms of habitat selection can influence basic ecological processes such as population regulation and demography, which in turn, could affect evolutionary processes such as natural selection, genetic variability and gene flow. Spatial distribution mechanisms assumed that habitat quality is heterogeneous and that organisms are looking for high-quality patches to optimize their fitness. This searching for high-quality habitat was the core of the first evolutionary models of breeding habitat selection, which postulated three alternatives: i) the Ideal Free Distribution; ii) the Ideal Despotic Distribution and iii) the Ideal Pre-emptive Distribution. Lesser kestrel (*Falco naumanni*) is a colonial raptor that lives in pseudo-steppic habitats characterized by patches of territories with different land-use. It is an appropriate model for the study of species-habitat relationships because of its role of biological indicator for monitoring population dynamics of pseudo-steppe avian species. In this thesis, I proposed a study in which I analyzed some biotic and abiotic factors determining distribution and survival probability in a lesser kestrel population breeding in a typical Mediterranean ecosystems in Sicily (Italy). Findings presented in this thesis are multifaced and encompass different topics, as lesser kestrel distribution, land use – related survival probability, diet and climate change. Among several factors I analysed, colony size seemed an important driver of population dynamics of this colonial bird with a positive role in enhancing fledglings and nestlings survival, through, for example, an interactive effect between nest distance and breeder abundance. Otherwise, a higher number of conspecific determined a decrease of relatedness between chicks and fecundity of the pairs. Moreover, long-term colonies monitoring and individual capture-recapture data showed first of all, an important influence of both habitat type and colony size on lesser kestrel demography and second, how group living interacts with agricultural intensification to drive species demography. Habitat type also determined a differential diet during chicks rearing that could, in turn, shape the population growth rate. The strong habitat effect revealed the unsuitability of intensive arable lands with respect to extensive grasslands for lesser kestrels. Noticeably, artichokes, a winter intensive crop, are high quality habitats due to prey availability and revealed to be a non-traditional crop suitable for lesser kestrels. In conclusion, conservation practices working on the basis of explicit factors affecting survival probability and distribution would be the most decisive for correct population management of the lesser kestrel across its Palaearctic range.

Pdf of the thesis is available at: https://iris.unipa.it/preview-item/207142?queryId=mysubmissions&

Università degli Studi di Pavia

Thesis 4

Survey techniques and evaluation of habitat suitability for conservation of alpine galliforms, with particular reference to rock ptarmigan (*Lagopus muta helvetica*) and black grouse (*Tetrao tetrix*).

Metodi di censimento e definizione dell'idoneità ambientale per la conservazione dei galliformi alpini, con particolare riferimento alla pernice bianca (*Lagopus muta helvetica*) e al fagiano di monte (*Tetrao tetrix*)

Author: **Luca Nelli**
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Academic Year: 2011/2012

Abstract

Rock ptarmigan and black grouse populations in the Alps are suffering an overall decline, and management actions are needed to ensure their conservation. Yet, wildlife management and conservation actions are often the consequences of political decisions taken by subjects that lack the scientific knowledge about the relationships between the environment and species ecology. In this thesis I dealt with some key factors for grouse conservation and management on the Alps. In particular I focused on two main topics: (1) evaluation of survey techniques for density estimation for both species and (2) definition of habitat suitability for rock ptarmigan.

I used distance sampling to assess the density and the detectability conditions of male black grouse and rock ptarmigan in two protected areas. Then I conducted a simulation study to compare the performance of two methods based on different assumptions: plot sampling assumes a perfect detection of animals within the surveyed plots whereas distance sampling assumes a fall of detectability as the distance of the observer to the animal increases. Simulation results showed that, when perfect detection did not occur within plots, plot sampling underestimated density with confidence intervals whose empirical coverage was lower than the nominal level of 95%. On the other hand, distance sampling estimators provided bias levels invariably smaller than those obtained using plot sampling and bootstrap confidence intervals with empirical coverage near to or greater than 95%. Based on the simulations, the distance sampling estimator was superior to plot sampling estimator in terms of precision and accuracy and the stratified allocation was superior to the random allocation.

I modelled the species-habitat relationships at different levels, by estimating how habitat affected both the potential distribution and potential density of male rock ptarmigan during the breeding season. My objectives were to identify habitat requirements of rock ptarmigan using resource selection methods and to evaluate the effect of digital map resolution on results quality. I modeled the probability of presence of the species as functions of habitat variables derived by three different digital maps with an increasing level of detail: the Corine land cover (CLC), the Forestry and other land-use categories map of the Piedmont Region (FMP), and a local phytosociological map (PSM). I also evaluated physical variables (altitude, slope and solar radiation) from a digital terrain model. My results showed how the variables of the CLC didn't have high predictive importance since the orographic variables alone were sufficient to describe the presence of birds, with the FMP I obtained good models containing both orographic and land-use variables, finally with the PSM the best models were those with only land-use variables. I concluded that a staged approach that uses maps of differing detail was successful for obtaining useful information on rock ptarmigan habitat selection, but the most interesting results were obtained only using a very detailed vegetation map.

Università degli studi di Pisa

Thesis 5

Stopover ecology and migratory orientation of shorebirds (*Aves, Charadriiformes*) in a coastal Tyrrhenian wetland

Orientamento ed ecologia della sosta di alcune specie di limicoli (*Aves, Charadriiformes*) in una zona umida della costa tirrenica

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Academic Year: 2013/2014

Abstract

The present work aims: (1) to investigate the spring migration ecology of Wood sandpipers (*Tringa glareola*) and Curlew sandpipers (*Calidris ferruginea*) at a Tyrrhenian stopover site; (2) to study the presence of migratory restlessness in shorebirds and its relation with body conditions and stopover length of spring migrating Wood sandpipers; (3) to develop a method useful to effectively study orientation in caged shorebirds and (4) to investigate the hierarchy of compass references used by shorebirds by means of cue-conflict experiments on Curlew sandpipers and Dunlins (*Calidris alpina*).

Curlew and Wood sandpipers are quite common as staging species during spring migration, but they seem to follow two different migration strategies. Our data show that Curlew sandpipers arrive in the area in fat conditions and ready to depart Northbound, whereas Wood sandpipers are likely to land in the study site in depleted condition, probably just after a no-stop flight over the Mediterranean Sea.

Our study is the first one to employ axial accelerometers to measure migratory restlessness in birds. Despite this method proved to be effective in recording Wood sandpipers activity, we failed to found any relationship among their stopover length, body conditions and nocturnal activity. The level of nocturnal activity was overall low, whereas a peak in activity was registered during sunset period. This twilight activity was oriented, and its level varied significantly according to the amount of food available in captivity, similarly to the migratory restlessness recorded in Passeriformes.

In order to study orientation, we developed a new method for recording directional preferences in captive shorebirds consisting in the use of infrared video recording cameras placed at the bottom of a transparent modified

Emlen funnel. This method proved to be successful in recording the preference and the activity of tested species, representing a significant improvement with respect to previous methodologies used for shorebirds. Cue-conflicts revealed that Curlew sandpipers and Dunlins are able to use the geomagnetic field to orientate under a simulated overcast sky. Tested birds seem not to recalibrate their magnetic compass on visual cues after the cue-conflict. However, our data indicate that they do not completely disregard the information derived from celestial cues.

Data collected in the present work represent the first attempt to investigate migratory restlessness in shorebirds. Furthermore this is one of the few experimental studies on migratory orientation of Charadriiformes and, in particular, on the hierarchical relationships between the different compasses used by these birds during their extensive migratory movements.

Pdf of the thesis is available at: https://etd.adm.unipi.it/theses/available/etd-05282015-103539/

Errata corrige issue 2015

PhD supervisor of Pierpaolo Storino at the Università degli Studi della Calabria was the Prof. Antonio Mingozzi, and not Prof. Maria Carmela Cerra as wrongly indicated in the previous issue.

PhD supervisor of Giovanni Forcina at the Università degli Studi di Pisa was the Prof. Filippo Barbanera and not the Prof. Roberto Lorenzi as wrongly indicated in the previous issue.

REFERENCES

(papers based on the above presented theses)

Bazzi G., Cecere J.G., Caprioli M., Gatti E., Gianfranceschi L., Podofillini S., Possenti C., Ambrosini R., Saino N., Spina F. & Rubolini D. 2016. *Clock* gene polymorphism, migratory behaviour and geographic distribution: a comparative study of trans-Saharan migratory birds. Molecular Ecology *in press.*

Bazzi G., Ambrosini R., Caprioli M., Costanzo A., Liechti F., Gatti E., Gianfranceschi L., Podofillini S., Romano A., Romano M., Scandolara C., Saino N. & Rubolini D., 2015. *Clock* gene polymorphism and scheduling of migration: a geolocator study of the barn swallow *Hirundo rustica*. Scientific Reports 5: 12443.

Bazzi G., Galimberti A., Hays Q.R., Bruni I., Cecere J.G., Gianfranceschi L., Hobson K.A., Morbey Y.E., Saino N., Guglielmo C.G. & Rubolini D., 2016 *Adcyap1* polymorphism covaries with breeding latitude in a Nearctic migratory songbird, the Wilson's warbler (*Cardellina pusilla*). Ecology and Evolution 6: 3226-3239.

Bazzi G., Podofillini S., Gatti E., Gianfranceschi L., Cecere J.G., Spina F., Saino N. & Rubolini D., 2016. Candidate genes have sex-specific effects on timing of spring migration and moult speed in a long-distance migratory bird. Current Zoology. *in press.* doi: 10.1093/cz/zow103

Di Maggio R., Campobello D., Tavecchia G. & Sarà M. 2016. Habitat- and density-dependent demography of a colonial raptor in Mediterranean agro-ecosystems. Biological Conservation 193:116-123.

Di Maggio R., Mengoni C., Mucci N., Campobello D., Randi E. & Sarà M. 2015. Do not disturb the family: roles of colony size and human disturbance in the genetic structure of lesser kestrel. Journal of Zoology 295:108-115.

Di Maggio R., Campobello D. & Sarà M. 2013. Nest aggregation and reproductive synchrony promote Lesser Kestrel *Falco naumanni* seasonal fitness. Journal of Ornithology 154: 901-910.

Franceschi S., Nelli L., Pisani C., Franzoi A., Fattorini L. & Meriggi A. 2014. A monte carlo appraisal of plot and distance sampling for surveys of black grouse and rock ptarmigan populations in alpine protected areas. Journal of Wildlife Management 78: 359-368.

Liechti F., Scandolara C., Rubolini D., Ambrosini R., Korner Nievergelt F., Hahn S., Lardelli R., Romano M., Caprioli M., Romano A., Sicurella B. & Saino N. 2015. Timing of migration and residence areas during the non breeding period of barn swallows *Hirundo rustica* in relation to sex and population. Journal of Avian Biology 46: 254-265.

Nelli L. 2015. Habitat suitability models and carrying capacity estimation for rock ptarmigan in a protected area on Italian Alps. Rivista Italiana di Ornitologia – Research in Ornithology 85:23-30.

Nelli L., Franzoi A. & Meriggi A. 2013. Habitat selection by breeding rock ptarmigan *Lagopus muta Helvetica* males in the Western Italian Alps. Wildlife Biology 19: 382-389.

Nelli L., Murru M. & Meriggi A. 2016. Effects of density on leksite selection by Black Grouse *Tetrao tetrix* in the Alps. Bird Study 63: 187-195.

Saino N., Bazzi G., Gatti E., Caprioli M., Cecere J.G., Possenti C.D., Galimberti A., Orioli V., Bani L., Rubolini D., Gianfranceschi L. & Spina F. 2015. Polymorphism at the *Clock* gene predicts phenology of long-distance migration in birds. Molecular Ecology 24: 1758-1773.

Saino N., Romano M., Romano A., Rubolini D., Ambrosini R., Caprioli M., Parolini M., Scandolara C., Bazzi G. & Costanzo, A. 2015. White tail spots in breeding Barn Swallows *Hirundo rustica* signal body condition during winter moult. Ibis 157: 722-730.

Saino N., Rubolini D., Ambrosini R., Romano M., Scandolara C., Fairhurst G. D., Caprioli M., Romano A., Sicurella B. & Liechti F. 2015. Light-level geolocators reveal covariation between winter plumage molt and phenology in a trans-Saharan migratory bird. Oecologia 178: 1105-1112.

Scandolara C., Rubolini D., Ambrosini R., Caprioli M., Hahn S., Liechti F., Romano A., Romano M., Sicurella B. & Saino N. 2014. Impact of miniaturized geolocators on barn swallow *Hirundo rustica* fitness traits. Journal of Avian Biology 45: 417-423.