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Egg size variation in Blue Tits *Cyanistes caeruleus* and Great Tits *Parus major* in relation to habitat differences in snail abundance

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Abstract. Wild passerines, especially tits, utilize snail shells as the main source of calcium necessary for laying females to construct egg shells. This research found that the two study areas, representing two habitat types — a mature deciduous forest and a human-disturbed parkland — are inhabited by different snail assemblages: both species richness and density are much higher in the parkland than in the forest. This means that less calcium is available to female tits in the forest than in the parkland, which could result in calcium limitation in the former habitat. Egg size traits, i.e. volume, length and breadth, in the Blue Tit show a consistent long-term pattern of variation that reflects the pattern of calcium availability: egg trait values are higher in the parkland than in the woodland. No habitat-related variation in egg size traits was found in the Great Tits. We suggest that the lack of a relation between Great Tit egg characteristics and snail availability results from the higher ecological plasticity of this species in comparison with the Blue Tit, including its ability to exploit alternative sources of calcium.

Key words: birds, tits, egg sizes, habitat contrast, calcium, shelled snails

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Variation in autumn migration strategy in the first-year Wood Sandpipers *Tringa glareola*

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Minias P., Kaczmarek K., Włodarczyk R., Janiszewski T. 2010. Variation in autumn migration strategy in the first-year Wood Sandpipers *Tringa glareola*. Acta Ornithol. 45: 131–138. DOI 10.3161/000164510X551273

Abstract. Wood Sandpipers are generally known to follow a time-minimization migration strategy on their autumn passage. We investigated whether the migration strategy adopted by first-year Wood Sandpipers is susceptible to temporal variations. Wood Sandpipers were trapped during the July–September period from 1997 to 2007 at the Jeziorsko reservoir, central Poland. Intra- and inter-seasonal variation in stopover length, refuelling rates, departure fat loads and flight range were investigated. There was a constant decline in the refuelling rates over the course of the migratory season, reaching 0.55 g/day at the end of August. Such low refuelling rates are considered typical of energy-minimizers. Despite showing high refuelling rates at the beginning of the season, first-year Wood Sandpipers left the stopover site with relatively low fuel reserves, resulting in a low potential flight range of about 1200 km, which suggested travelling in small hops — a trait characteristic of energy-minimizers. There was also considerable inter-seasonal variation in the adopted migration strategy. The results suggest that sandpipers caught at the beginning and at the end of the migratory season behaved as energy-minimizers, at least in some aspects of the migration strategy, unlike the intermediate migrants, which adopted a typical time-minimization schedule. These observations indicate that the migration strategies of waders may depend on the environmental conditions encountered en route and are thus likely to exhibit high intra- and inter-seasonal variation.

Key words: Wood Sandpiper, *Tringa glareola*, migration strategy, waders

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Nest construction costs affect nestling growth: a field experiment in a cavity-nesting passerine

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Moreno J., Lobato E., González-Braojos S., Ruiz-de Castañeda R. 2010. Nest construction costs affect nestling growth: a field experiment in a cavity-nesting passerine. Acta Ornithol. 45: 139–145. DOI 10.3161/000164510X551291

Abstract. Nest construction effort is seldom taken into account in avian life history studies, although activity duration and the amount of nest material collected may affect the condition of parent birds and their subsequent capacity to care for dependent offspring. In the present work, we reduced the effort needed to construct the nest in a cavity nester, the Pied Flycatcher *Ficedula hypoleuca*, where females are the main builders. To this end, we placed stored complete nests in certain nest-boxes as soon as nest building was initiated, whereas stored complete nests were placed in the control nests-boxes as soon as nest building had ceased. Thus, no nest-box contained the original nest. Pairs collected more nest material and for longer periods in the control nests, although the experimental pairs still added some nest material after the manipulation. Nest-boxes were filmed for 1 to 3 h during incubation and on days 4 and 11 of the nestlings' life. Female attendance during incubation was negatively affected by nest mass, this parameter explaining almost half the variation in attendance, which suggests an effect of nest mass on incubation efficiency. The female provisioning effort on day 4 was significantly higher in the experimental nests, whereas other parental care variables were affected by date, weather conditions and brood size or brood mass. Mean tarsus length at fledging was significantly longer in the experimental nests. The savings by females in nest construction effort were expressed in higher provisioning at early nestling stages and in improved nestling growth.

Key words: Pied Flycatcher, incubation, nest construction, nestling growth, nest mass, nest building effort, brooding

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Note types and coding in parid vocalizations: the *chick-a-dee* call of the Mexican Chickadee *Poecile sclateri*

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Moscicki M. K, Hoeschele M., Sturdy C. B. 2010. Note types and coding in parid vocalizations: the *chick-a-dee* call of the Mexican Chickadee *Poecile sclateri*. Acta Ornithol. 45: 147–160. DOI 10.3161/000164510X551282

Abstract. To understand the communicative functions of any vocalization it is important to describe and classify the elements of that vocalization. Mexican Chickadees produce a namesake *chick-a-dee* call. Here, the note types (A, C, D, and D_h) from a sample of Mexican Chickadee *chick-a-dee* calls are identified, described, and classified. Frequency and temporal features of each note type are measured and compared to determine which features may be useful for note-type discrimination. Frequency measures, particularly peak frequency, appear to be most useful for discriminating among note types. Call syntax is analyzed to determine rules for note-type production. Mexican Chickadees produce the notes within their *chick-a-dee* calls in a consistent order: $A \rightarrow C \rightarrow D_h \rightarrow D$ with the potential for any note type to be repeated or omitted within this sequence. Similar to species in the brown-headed chickadee clade, B notes were not found in the calls of Mexican chickadees, suggesting this species may belong to the brown-headed clade. This work describes the *chick-a-dee* call of Mexican Chickadees and provides a foundation for future work aimed at understanding the communicative significance of this call within this species, as well as for comparative work on the *chick-a-dee* call among chickadee species.

Key words: Mexican Chickadee, bioacoustics, *Poecile*, communication

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Measurement error revisited: its importance for the analysis of size and shape of birds

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Perktaş U., Gosler A. G. 2010. Measurement error revisited: its importance for the analysis of size and shape of birds. Acta Ornithol. 45: 161–172. DOI 10.3161/000164510X551309

Abstract. Measurement error in morphological characters is an important issue for many ornithological studies (e.g. ecomorphology, quantitative studies of heritability, studies of systematic and geographic variation). The variation in external morphological characters, such as wing and tarsus length, is usually evaluated using multivariate statistical methods such as principal component analysis (PCA). These are often considered better than univariate statistical methods for explaining size and shape variation in bird populations because they reduce the 'dimensionality' of the data — the size of individual measures (wing etc.) are assumed to contain a component reflecting a general character 'size'. However, the effect of measurement error on principal components has not been formally assessed with respect to such data. Here we report three examples in order to assess the importance of measurement error for analyses within and between bird populations. The effect of measurement error on PCA is also discussed in relation to the importance of levels of error in shape components.

Our results indicate that, in relation to size (PC1), principal component scores are affected less by measurement error if the covariance matrix is used rather than the correlation matrix. However, the effects of relative measurement error were substantially greater in subsequent axes, which represent shape variation rather than size, than they were in the size axis (PC1). Measurement error may, therefore, be a more important issue for shape axes than for the size axis and this problem may be exacerbated further if very few characters are used in the PCA. Our results also indicate that PCA is especially sensitive to issues relating to sample size. We recommend that if reducing the measurement error in size and shape measures is not possible, and the sample size is small (≤ 30), principal component scores should be derived using the covariance matrix, as these are more likely to give more robust results.

Key words: measurement error, size, shape, principal component analysis, Common Chaffinch, *Fringilla coelebs*, methods, museum studies

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Foraging range and habitat use by Aquatic Warblers *Acrocephalus paludicola* during a fall migration stopover

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Provost P., Kerbiriou C., Jiguet F. 2010. Foraging range and habitat use by Aquatic Warblers *Acrocephalus paludicola* during a fall migration stopover. Acta Ornithol. 45: 173–180. DOI 10.3161/000164510X551318

Abstract. Stopover sites of migratory songbirds are of great importance in the context of the maintenance of a species migration strategy. Here we studied the spatial needs and habitat selection of the endangered Aquatic Warbler at a major migration stopover site in France, the nature reserve of the Seine estuary. We radio-tracked 15 migrant birds in August 2008 to study habitat use and selection at that stopover site, and analysed faeces and blow trap samples to determine the local diet of the species and to compare food availability among the different available habitats in the reserve. Range size was estimated with fixed kernels and was on average 9 ha (90% isopleths), with daily core ranges (50% isopleths) of just over 1 ha. There was no variation in range size or habitat use during the survey period (August) or during an individual stopover stay. Studying habitat selection within the modelled ranges, we found that the species displayed a preference for wet grassland habitats. Larger daily ranges included more reedbed and fewer grassland areas. This matches the habitat preferences known from breeding and wintering grounds. The main identified prey belonged to a few invertebrate orders, with Odonata, Lepidoptera, Coleoptera and Araneida making the largest contributions to the biomass consumed. There was no significant difference in invertebrate availability between grassland and reedbed habitats in the study area. The availability of grassland habitats close to the reedbeds appears to be a key parameter to ensure the rapid and efficient refuelling of migrant Aquatic Warblers during their autumn migration.

Key words: *Acrocephalus paludicola*, fixed kernel, habitat selection, diet, tracking, wet grasslands

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Feeding effort of male Tawny Owls *Strix aluco* follows a fixed schedule: a field experiment in the early nestling period

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Sasvari L., Hegyi Z. 2010. Feeding effort of male Tawny Owls *Strix aluco* follows a fixed schedule: a field experiment in the early nestling period. Acta Ornithol. 45: 181–188. DOI 10.3161/000164510X551327

Abstract. The 'fixed schedule hypothesis' proposes that parental investment is independent of offspring needs in order to maximize adult survival or to prevent reduced future fecundity. We tested this hypothesis on Tawny Owls *Strix aluco* by experimental manipulation of brood size. We measured the call frequency of begging chicks, feeding frequency of males, overnight weight gain of nestlings and parental body condition in reduced or enlarged broods, and in control broods. In reduced or enlarged broods nestling begging calls reflected the respective decrease or increase in demand, but the frequency with which the males fed did not differ between the reduced and enlarged broods. Consequently, chicks gained body weight more rapidly in reduced broods, whereas those in enlarged broods grew more slowly. Male body weight did not change during the early nestling period when they delivered food to reduced or enlarged broods, but the condition of females worsened in the enlarged broods. As the males did not increase the feeding frequency in the enlarged broods, the females were under pressure to pass on more of the prey to nestlings begging in these broods. Male Tawny Owls regulated their feeding effort according to a fixed schedule, independently of the chicks' needs, to maintain their body condition. Nevertheless, the females whose condition deteriorated during the feeding of enlarged broods did not stop brooding earlier, nor did they suffer mortality in the breeding period.

Key words: brood manipulation, chick demands, parental condition, parental effort, *Strix aluco*, Tawny Owl

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Song variability in Pied Flycatchers *Ficedula hypoleuca*: impact of the sympatry with Collared Flycatchers *F. albicollis*

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Vabishchevich A. P., Formozov N. A. 2010. Song variability in Pied Flycatchers *Ficedula hypoleuca*: impact of the sympatry with Collared Flycatchers *F. albicollis*. Acta Ornithol. 45: 189–202. DOI 10.3161/ 000164510X551336

Abstract. In the sympatry zone many Pied Flycatcher males perform songs that resemble those of a sibling species (Collared Flycatcher): these are so-called mixed songs. The higher abundance of the Collared Flycatcher was once considered a possible cause of mixed singing. To examine this hypothesis we studied the influence of the Collared Flycatcher on the interpopulational song variability in the Pied Flycatcher in four areas with different abundances of Collared Flycatchers. We focused on: 1) the abundance of mixed singers and their distribution; 2) geographical variations of typical Pied Flycatcher songs. We show for the first time that mixed singing in the Pied Flycatcher is common also when its abundance is as high as and higher than that of the Collared Flycatcher. In the old area of sympatry about 40% of all Pied Flycatcher males had Collared-Flycatcher-like syllables in their repertoire. At the same time, the habitat distribution of mixed singers matches that of the Collared Flycatcher. In the context of our data we propose a hypothesis of mixed song-formation. We have also demonstrated interpopulational variability in pure Pied Flycatcher songs, with species-specific differences being more pronounced in sympatric populations than in allopatric ones. This pattern is in agreement with the theory of character displacement and acoustic divergence in a sympatry zone, but the differences discovered in pure vocalizations are evidently not the result of interactions with the sibling species.

Key words: Pied Flycatcher, Collared Flycatcher, interspecies interactions, character displacement, mixed singing, acoustic divergence, acoustic convergence, interpopulation song differences

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Ringing procedure can reduce the burden of feather lice in Barn Swallows *Hirundo rustica*

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Vas Z., Fuisz T. I. 2010. Ringing procedure can reduce the burden of feather lice in Barn Swallows *Hirundo rustica*. Acta Ornithol. 45: 203–207. DOI 10.3161/000164510X551345

Abstract. Chewing lice (Insecta: Phthiraptera) are the most widespread obligate ectoparasites living in the plumage of birds. Lice have to cope with unusual mechanical effects during ringing, and they could fall off their hosts. We assumed that trapping birds in nets, taking measurements and estimating condition could reduce their louse burdens. Lousiness affects life expectancy and reproductive success, so if ringing causes remarkable louse loss, the fitness of ringed birds could be altered. Lice are usually collected at ringing sites, and ringing precedes parasite sampling. This may therefore lead to an underestimation of louse prevalence and intensity. Here we tested whether ringing reduces the louse burden. We allocated Barn Swallows *Hirundo rustica* in the breeding season to two experimental groups — the birds were subject to either a standard ringing procedure (recording biometry, fat and other condition scores, feather hole counts), or a reduced one (only feather hole counts). We used feather holes (traces of louse chewing) as a measure of louse loads. Holes were recounted after a month. Significantly more new holes appeared in the reduced ringing procedure group, indicating that the usual ringing procedures effectively reduce louse loads. We believe this is the first evidence that bird ringing affects ectoparasite infestations.

Key words: Barn Swallow, lice, bird ringing, handling of birds, louse collection, louse sampling, fitness alteration, ectoparasites, feather holes, Amblycera, Ischnocera

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Breeding bird dynamics in a primeval temperate forest over thirty-five years: variation and stability in the changing world

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Wesołowski T., Mitrus C., Czeszczewik D., Rowiński P. 2010. Breeding bird dynamics in a primeval temperate forest over thirty-five years: variation and stability in the changing world Acta Ornithol. 45: 209–232. DOI 10.3161/000164510X551354

Abstract. The composition and structure of the breeding bird assemblage in the Białowieża National Park (BNP) were documented in 2005–2009 and compared with the data from the previous 30 years. Mapping censuses were carried out in seven plots located in three forest types: ash-alder riverine, oak-hornbeam, and mixed coniferous forest. We checked whether the bird community composition had remained stable over the 35 years and the extent to which the numerical trends in BNP followed the regional trends. The composition of breeding avifauna and species richness was basically unchanged, except for the strongly increasing *Sylvia atricapilla*, which became a regular dominant in all habitats. The density gradient across habitats — highest in the riverine, lowest in the coniferous stands – was retained. After a maximum in 2001, the numbers of birds declined slightly, but densities were still among the highest in 35 years. Numbers of 18 of the 26 commonest species were higher in 2005–2009 than in 1975–2009; only *Anthus trivialis*, *Phylloscopus sibilatrix*, *Ficedula parva* showed negative trends, and *Ficedula hypoleuca* almost went extinct recently. Some numerical changes were attributable to local habitat changes (increases in *Phylloscopus collybita* and *Sylvia atricapilla*, declines in spruce-dependent species). Numbers of only four of 22 species (*Dendrocopos major*, *Erithacus rubecula*, *S. atricapilla*, *Parus major*) changed concurrently in BNP and the rest of Poland. The apparent lack of a relationship between changes in bird numbers and the local and regional situation suggests that factors acting on a far larger scale could have been involved. Despite these numerical changes, the breeding bird assemblage of primeval temperate forest stands out as an example of remarkable stability.

Key words: bird community structure, long-term study, species richness, density changes, Białowieża National Park, population trends

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To Ludwik Tomiałojć, the initiator of the ornithological studies program in the Białowieża Primeval Forest, on his 70th birthday

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SHORT NOTES

A columbid-like avian foot from the Oligocene of Poland

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Bocheński Z. M., Tomek T., Świdnicka E. 2010. A columbid-like avian foot from the Oligocene of Poland. Acta Ornithol. 45: 233–236. DOI 10.3161/000164510X551363

Abstract. The paper describes one of the very few avian remains from the Oligocene of Poland. It consists of a slab and counterslab with imprints of a partly damaged right tarsometatarsus and several phalanges of which those of the hallux are well-preserved. The fossil has been compared to all extinct and most extant taxa. Although the foot resembles that of extant columbids, its systematic affiliations remain unresolved due to its incompleteness.

Key words: Fossil birds, Menilite shales, Carpathian flysch, Oligocene, Tertiary

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