

SYMP04: 4th International shrike symposium

Convener: Anton Krištín

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Shrikes are an interesting bird group combining the features of the passerines and birds of prey. A considerable number of questions connected with their evolution, ecology and behaviour have still remained open. Many species shrink their range, dramatically decreasing their abundance. This fact was also a reason to create the International Shrike Working Group and to ensure a regular contact among shrikeologists having their own web page and e-mail group as well as regular meetings. The first International Shrike symposium was held in January 1993 in Lake Placid, Florida, and it was organized under chairmanship of REUVEN YOSEF from Israel. This symposium was attended by 71 participants from 23 countries. Then followed the meetings organized in Eilat, Israel (1996) and Gdansk, Poland (1999). In this year, the year of the 10th anniversary of this event, the fourth continuation of this symposium will be held in Chemnitz. We plan together 21 lectures and 9 posters by authors from 17 countries over the whole world.

The contributions deal with exciting problems of evolution of feeding strategies, with open questions in breeding biology, distribution of food supply and suitable habitats. Some of the presented contributions represent the shrikes as indicators of environmental changes, other explain their mating strategies, sexual dimorphism and „monomorphism“, overlapping of the ecological demands between relative species, population status inside and on the limit of their natural areas.

We believe that the symposium will be an important meeting of people, new ideas and hypotheses representing not even a contribution to knowledge of life strategies of this endangered animal group, but also to their effective protection.

SYMP04-1 Thoughts on the evolutionary pathway of impaling in true shrikes (Laniidae)

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Evolution, as described by Darwin, is a process of trial-and-error with a lot of luck thrown into the formula. The continued survival of a species or a trait is not only able to survive ecological pressures, evolutionary adaptations and processes that have become innate, but also a measure of luck to survive stochastic events. This has resulted in many a unique characteristic, or adaptation, being limited to a single, or limited, group of organisms. One such behavioral characteristic is impaling of prey. This trait has developed independently in three avian groups – the butcherbirds (Cractacidae) in Australia, the bush shrikes (Malaconotidae) in Africa, and in the true shrikes (Laniidae) that are more widely distributed and are found in Europe, Asia, Africa and Northern America. Impaling in the Australian butcherbirds and African bush shrikes has not been studied and only random observations published to date. In contrast, impaling in the true shrikes has been studied extensively and there are many a publication dedicated to the subject. Hence, I limit my thoughts to why and how impaling developed as a behavioral trait in the evolutionary progress of the true shrikes. It has been suggested that shrikes originated in Africa as a forest species. However, through evolutionary time, they have become birds of edge habitats and open areas. True shrikes appear to be the only family wherein the combination of impaling, caching, and subsequent use has been documented. The evolutionary pathway of impaling appears to have been one of trial-and-error like most other processes. A simplistic depiction of impaling was probably learned by the ancestral shrike dragging a heavy prey item that wedged into a fork or other projection allowing the indi-

vidual to learn the use of a tool for dismemberment. Territorial behavior and use of regular impaling sites allowed individuals to store food and communicate with conspecifics, in some resulting in the caches becoming parameters for sexual selection. Impaling inedible objects to improve the visual impact may have evolved into the discovery of their ability to exploit previously inaccessible prey that were toxically defended and opened a new feeding niche. The overall impression is of a behavioral adaptation that evolves quickly in response to local ecological pressures and that allows the true shrikes to adapt to a wide range of habitats ranging from the freezing snowfields of Alaska to the burning sands of the Sahara desert.

SYMP04-2 Food ecology of red-backed shrikes in an affected and an intact coastal dune system

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During the last five decades the red-backed shrike has disappeared from the Dutch coastal dunes. In 1998 the last pair was found in dunes of the Wadden Sea island Ameland. We found several indications that the main cause is the decrease in diversity of large insects and smaller vertebrates, the main food of the red-backed shrike. This affected prey availability is probably related to encroachment due to eutrofication, acidification, lower ground water tables and changes in land use.

To test whether the decline of the red-backed shrike was caused by affected food availability we compared breeding success and food ecology of the last pairs of red-backed shrikes on Ameland with a vital population in intact dunes near Skagen, Denmark. We found remarkable differences. Compared to Ameland, results in Denmark showed that: 1) breeding success was high, 2) mean prey weight was substantially higher, 3) the diet consists of more prey species, 4) the diet included several species that used to be important prey in the red-backed shrike's diet in Dutch dunes, but are no longer found there.

Our results strongly support the hypothesis that deteriorated invertebrate diversity caused the disappearance of the red-backed shrike from the Dutch dunes. This is an important step in trying to find key factors that are responsible for the decline of insect diversity. Without these key factors successful restoration of Dutch coastal dune ecosystems is likely to fail.

SYMP04-3 Diet composition and spatial patterns of food caching in the wintering great grey shrikes (*Lanius excubitor*) in Bulgaria

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The great grey shrike (*Lanius excubitor*) diet composition was studied from stored prey analysis, pellets and food remains collected beneath perches, during November to March for 5 years (1998–2002). The ratio of vertebrates and invertebrates (by numbers) was found to be 10.5 : 89.5%. Insects were the main part of the diet – 89.5%, orthopterans (chiefly *Gryllus campestris*) being most nu-

merous among them (64.4%). Mammals (mainly rodents, but also shrews) and reptiles (1 ind. of *Lacerta agilis*) comprised 10 and 0.5% respectively. The following pellet dimensions were established: $25.4 \pm 5.45 \times 10.8 \pm 1.13$ mm ($17.0 - 34.0 \times 9.0 - 12.5$; $N = 12$). A total of 104 caches were found (95 of which *G. campestris*), most of them fixed on plants (91.3%) and the rest on a barbed wire. Stored prey items were usually placed at a height of 1.05 ± 0.29 m (range 0.57–1.9) above the ground, and most commonly in the middle part of the plants. It was found that storage height was significantly correlated with plant height. Several patterns of cache fixation were also described – about half of the *Gryllus campestris* (52.7%) were impaled through the fore-part of the abdomen. A latitudinal cline for Europe in proportion of vertebrates in *L. excubitor* diet during winter-time was proved statistically. In general, various spatial patterns in great grey shrike food caching were discussed in comparison to the existing published data.

SYMP04-4 Feeding-site geometry and habitat use of red-backed shrikes (*Lanius collurio*) breeding around forest plantations and in natural areas in Hungary

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From 1999 forest plantation activities were carried out in a prime shrike habitat in Northern Hungary near the village of Nagykovácsi, where breeding success of red-backed shrikes was monitored from 1993. The effects of forest plantation were studied by comparing territory shape of shrikes breeding around the edges of plantations (three pairs) to those pairs that bred in the remaining natural areas of the study site (four pairs). Each observation session ($N = 17$) lasted for 45–50 minutes. The landing of shrikes was recorded from an observation point by a laser range finder and a compass reading. The landing points were mapped, and then the ratio of the shortest and longest axes of each polygon were calculated for each observation session. The ratio was significantly higher for the natural areas suggesting that these territories were more rounded, while the feeding area of pairs breeding along the border of the plantations were more elongated (Mann-Whitney U-test, $N_1 = 11$, $N_2 = 6$, $Z = 2.01$, $p < 0.044$).

Data from 12 observation sessions on feeding site choice of four pairs nesting on the edges of the plantations were categorised as inside the plantation and in the natural areas or hedges around the plantations. Significantly higher numbers of hunts were recorded in the natural areas than in the plantations (Wilcoxon matched-pairs test, $N = 12$, $Z = 2.14$, $p < 0.0323$).

SYMP04-5 Temporal- spatial patterns in impaling behaviour of the great grey shrike in Poland

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The impaling behaviour of the great grey shrike was studied over four years on two areas in Poland. About 587 of impaled prey items were recorded. Differences in temporal use of prey types, utilization of the impaling substrates and their characteristics, and spatial distribution of butchering sites

were related to phenology of the sedentary population. Generally in winter the most common impaled prey were mammals, especially *Microtus* sp. (61.5%), less insects (19.5%) and birds (11.5%). Reptilians and amphibians were found only occasionally. During pair formation proportion of reptilians reached almost half (47.2 %) of cached prey items. Second the most numerous groups were mammals – 33.3%, insects – 11.1%, whereas birds and amphibians were rare (5.5% and 2.7% respectively). In breeding period there was clear dominance of birds (46.9 %). Reptilians – were the second most numerous stored preys (22.2%), both mammals and insects reach 13.9% of all cached prey. Proportion of amphibians 3.7% found in breeding period was the highest in relation to all three studied periods but still was marginal

Utilization of impaling substrates was similar in wintering and breeding period when willow type bushes were preferred. In contrary, during pair formation period „open bushes“ were used more frequently when majority of preys was stored in visible places. However, overall shrikes preferred large dense bushes for impaling mammals and birds and open well visible sites for lizards and insects. During pair formation period, caches were located on boundaries of former breeding territories, whereas in breeding period were placed in close surroundings of nests. The potential role of impaled prey types in shrike „communication“ and possible benefits and cost of hoarding behaviour are discussed.

SYMP04-6 Modelling environmental and spatial effects in the edge of the distribution: the case of the red-backed shrike *Lanius collurio* in Northern Portugal

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Range margins are shaped by a complex interplay of biotic (e.g. demography) and abiotic (e.g. climate) effects, which are usually difficult to disentangle. We use a variation partitioning approach to address these issues for the red-backed shrike at the SW limits of its range, in Portugal. The study was based on occurrences of the shrike in 10 x 10 km UTM squares, which were related to three sets of explanatory variables, including environmental descriptors (climate and habitat), large-scale spatial trends and local neighbourhood effects. Spatial trends were modelled using the Cartesian geographic coordinates in a full third-order polynomial, with non-significant terms dropped in backward elimination; neighbourhoods were modelled with the number of occurrences in the eight squares adjacent to each square. The environmental model explained 73.1% of variation in shrike occurrences, the probability of occupation increasing with annual thermal amplitude and in habitat mosaics with agricultural land and forest/scrubland, and showing an unimodal response to rainfall. When the effects of spatial structure were partialled out, the environmental effects remained largely the same, but the variation explained by the ‘pure’ environmental model was reduced to 24.9%. This was probably because environmental variables tend to be spatially structured, justifying that a large proportion of variation was accounted for the shared effects of the three explanatory sets (43.2%). The unique contributions of spatial structures to the overall model were reduced, both in the case of large-scale spatial trends (5%) and neighbourhood effects (0.2%). These results suggest that climate and local habitats conditions are the most influential in determining the south-western range margin of the red-backed shrike, with no evidence for large-scale or neighbourhood demographic processes. From an applied standpoint, results of this study underline the importance of mosaic landscapes of agricultural and forest/scrubland habitats are required for the persistence of the red-backed shrike in northern Portugal. In summary, our study suggests that the variance partitioning approach to logistic regression may be of value to suggest plausible mechanisms shaping the distribution of a species, though it has limited power to test their actual significance.

SYMP04-7 Predictions of changes in population size of the red-backed shrike in Poland: population viability analysis

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Red-backed shrike *Lanius collurio* is one of the most valuable species in the Polish farmland. Unlike in many western European countries, this species in Poland still has a stable population. A long term research (30 year observation) of the study area in Western Poland made it possible to obtain detailed data on the red-backed shrike population. Based on these data a Population Viability Analysis was carried out for this species using the simulation program VORTEX. Environmental variability is involved into the model via unfavourable atmospheric conditions during the nesting season. Such events were with a 22 % probability during the last 100 years.

Apart from checking the viability of the today's population, the effect of some population characteristics on the population viability was tested (population size and changes in overall productivity). Since on the study population a long term database is available the output of the model simulation can be compared with the real population changes.

SYMP04-8 The breeding population of the great grey shrike (*Lanius excubitor*) in Austria

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Since the 1980s, the whole breeding area of the great grey shrike in Austria, was restricted to northern Lower Austria. Since 1995, the breeding population has been fully recorded there. Every breeding locality was checked six to eight times/season. In 1995 at least 38 occupied territories were found and 32 breeding pairs were confirmed. In 1997, after two hard winters, the number of occupied territories decreased to 18 and only 9 breeding pairs were confirmed. But since 1998, the breeding population has increased clearly again. In 2002, 50 occupied territories with 47 confirmed breeding pairs were found as a peak for the present.

The breeding territories in the lower situated Weinviertel are mainly connected to wet mowing meadows and fallow land. Of the 79 breeding territories, 51,9 % are located in mainly traditional field-balk-landscapes in the northern Waldviertel, often with a small portion of mown meadows. Further 21,5 % of the breeding territories are attached to areas in military use with succession of grove and fire incidents in the central Waldviertel.

The nests were built in deciduous trees in lower warmer localities and in coniferous trees in the higher situated localities. Most of the nest trees are located in small wood lots or in forest edges or, rarely, in tree-lines. Solitary trees are used most frequently in the March-Thaya-Valley. From 1998–2002, the portion of successful breeding pairs ranged from 65 % in 1998 (n = 20) to 80 % in 2001 (n = 40). On an average 3.5 (SD = 1.1, n = 103) fledglings per successful brood were observed. In total the number of observed fledged young birds did not differ between broods in Weinviertel and Waldviertel from 1998–2002 (Mann-Whitney U-test, p = 0.5). So far, broods with very high breeding success of 6 (five cases) or 7 (one case) fledged juveniles were only observed in the Waldviertel when there was a high supply of voles for food.

SYMP04-9 Habitat preferences in the two sympatric species, bull-headed and brown shrikes

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To elucidate habitat preferences in the bull-headed *Lanius bucephalus* and brown shrikes *L. cristatus*, establishment of territorialities and habitat selection were examined in a sympatric area of the two shrike species in northern Japan in 1992–93. Bull-headed and brown shrikes arrived at the breeding area in mid-April and mid-May, respectively. When brown shrike males arrived at the study site, although bull-headed shrikes had already established intraspecific territories in an area, brown shrike males established their territories among the bull-headed shrike territories. The bull-headed shrikes reduced the size of their territories. It appears that the two shrike species compete for breeding habitats. The manner of formation of interspecific territories suggests that brown shrikes do not have much latitude in selecting breeding habitats. The percentages of all habitat types within 100 m between shrike nests and randomly selected points were compared in each other. Bull-headed shrikes nested in various habitats, and their nests were found in a variety of plant species. Brown shrikes mainly established their territories in natural grasslands with shrubs, and nested in shrubs. These results mean that brown shrikes have narrower habitat requirements in the study area than bull-headed shrikes. It is inferred that bull-headed shrikes are „habitat generalists“, while brown shrikes are „habitat specialists“.

SYMP04-10 Impact of land-reallotment on a red-backed shrike population in southern Belgium

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A red-backed shrike population in southern Belgium (Gaume) was monitored systematically since 1979. The population saw a consistent growth till 1996 going from 9 known breeding pairs to 161 pairs. After this peak, the population went down at a slow pace in the areas outside the core-habitat. It was only after 1999 when the re-allotment scheme became implemented in the core-habitat that this region between Couvreur and Villers-la-Loue featured a decrease which was more important than the general decrease of the population outside this re-allotted area. Before the re-allotment the population stayed constant in the core-habitat and probably functioned as a source habitat for the rest of the region. The evolution of the population and the negative trend after the re-allotment will be discussed. We discuss the devastating impact of this initiative and the loss of most of the ecological infrastructure for the shrikes.

SYMP04-11 Metapopulation dynamics of the migrant subspecies of loggerhead shrike

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(Abstract not available in time)

SYMP04-12 Tempero-spatial evolution of a red-backed shrike *Lanius collurio* population in Poland

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Since 1964 BARBARA DIEHL has monitored the evolution of a population of red-backed shrikes *Lanius collurio*, barred warbler *Sylvia nisora* and yellowhammer *Emberiza citrinella* in Kampinos Forest (Strzeleckie Meadow) near Warsaw, Poland. We did some spatial analysis of the three species and their possible intra-specific and inter-specific interactions. The spatial distribution of the three species was tested for complete spatial randomness using the GMSD method and the CLARK & EVANS method from 1964 till 2002. We tested to what extent that these three species respectively cluster together, are distributed at regular distances or completely random. Correlations between the spatial distribution patterns for the three species were tested using a gradient of grid cell sizes. We used the Phi test of the three species' ranging for presence/absence data of the smallest grid cells and the Pearson correlation coefficient for number of breeding pairs in larger grid cells.

The data were also considered as time series i.e. the fluctuations were characterised species per species and tested for inter-specific correlations. Intra-specific correlation was tested through a test for temporal autocorrelation. The time-series analysis revealed a two-year periodicity for the yellowhammer that varied in function of population density, and was interpreted in terms of individual (intra-specific) interactions.

SYMP04-13 A 15 year population study of *Lanius excubitor* in north-eastern France: first results

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A population of great grey shrikes *Lanius excubitor* was studied for 15 years in an area covering about 1500 ha of suitable habitat (300–350 m a.s.l., NE France, near the town of Saint-Dié des Vosges). Shrike habitat mainly included meadows and pastures dotted with hedges, bushes, isolated trees and relatively small, 30–50 year-old spruce *Picea abies* plantations. Utility wires were frequently used as perches. Since 1998, the population has fluctuated widely with a peak of 14 pairs in 1994 (practically 1 pair /km²), but only 4 or 5 pairs in 1998, 2001 and 2002.

The species is strictly single-brooded, but builds replacement nests. In all, 118 pairs built 151 nests and 65 of these pairs (55 %) produced at least one fledgling (1 to 6). After a nest failure, only 46.5 % of the pairs concerned, built a new one. The second nest was on average located at c. 300 m (2–1700) from the first one, with often, at least a partial, territory shift.

The nests were located in 9 species of trees (98.7 %) or bushes (1.3 %) The „typical“ nest site (76 % for n = 150) was at a height of c 12 m towards the top of a spruce tree at the edge of a plantation, and often in a dominant situation. Egg laying rarely began at the (very) end of March (only 3 cases out of 107 suitable data). It culminated in the second and third decade of April; and ended (replacement clutches) in the first decade of June (only 2 cases). Between 1988 and 1993, 36, 7 % of the clutches (n = 49) were started before the second decade of April ; between 1994 and 2002 that percentage fell to 1.7 % (n = 58).

The first results and analyses suggest that meteorological conditions and fluctuations of small rodent populations influence the initiation of laying and play a major role in the breeding success. The destruction of nests which appears to be mainly due to the Carrion Crow *Corvus corone* is heavy, but less so when the parents are not obliged to forage far from their nest. (up to 800 m have been recorded).

SYMP04-14 Living in groups versus living solitary: does it matter?

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Breeding density is an ecological factor that has been shown to influence very different aspects of the reproduction of birds, like predation risk and breeding success, intensity of sperm competition and related topics such as extra-pair paternity rate and intensity of paternity guards. In comparison to other shrike species, the socially monogamous lesser grey shrike (*Lanius minor*) is less territorial and shows a more pronounced tendency to breed in clusters. Here we study the effect of breeding density on the breeding ecology of this shrike species in a stable and dense population located in Central Slovakia. We found that: (1) breeding density is highly variable with an internest distance range of 25–1125 m, (2) fledgling success was significantly higher in nesting aggregations than in solitary breeding pairs, (3) intruder rate was not related to breeding density, (5) accordingly, neither copulation rate nor mate guarding intensity were affected by breeding density, (5) we found no extra-pair paternity after sampling nests in an ample range of breeding density. We conclude that breeding density is advantageous in terms of basic reproductive parameters but not in terms of mating strategies and intensity of sperm competition.

SYMP04-15 Breeding density and clutch size of red-backed shrikes (*Lanius collurio*) breeding around forest plantations and natural areas in Hungary

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From 1999 forest plantation activities were carried out in a prime shrike habitat in Northern Hungary near the village of Nagykovácsi, where breeding success of red-backed shrikes was monitored from 1993. We studied the effects of forest plantation by comparing density and nesting success of pairs breeding in natural bushy pastures and in hedges around forest plantations. In 1995, prior forest plantation, the density and clutch size of shrikes nesting in the bushy areas and in hedges along the roads that border now the plantations were not different statistically. In 2001, pairs nesting around the plantations were more dispersed and had lower clutch sizes than those nesting in the bushy parts of the study area. In 2001 47.8 % of the pairs nesting in the natural areas fledged young,

while only 14.3 % of pairs fledged young nesting around the plantations. In 1995 the success of hedge nesting pairs were lower (55 %) than that of pairs nesting in the bushy pastures (78 %), but this difference was not significant.

SYMP04-16 Red-backed shrikes: how to become a sink population despite high fitness values?

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Like in most Western European countries, the red-backed shrike population in the Netherlands suffered heavily from habitat destruction and habitat deterioration during the 20th century. This caused a sharp decline in numbers and only a few local populations (1–10 pairs) could persist. In contrast, two decades ago a relatively large population developed in a regenerating bog (Bargerveen; maximum 110 pairs in 1996), due to improved prey availability. We hypothesized that this population could act as a source for the sparsely distributed relic populations and potential breeding habitats. To test our hypothesis, a colour-ringing program was started in 1992. In spite of a relatively high reproductive success and high return rates in Bargerveen almost no dispersal was found, neither from the Bargerveen population, nor between the relic populations. We suggest that dispersal is inhibited by the extremely high rate of habitat fragmentation in the Netherlands. Moreover, yearly calculations on recruitment showed that the Bargerveen population is partly supplemented by populations abroad. From these results we conclude that all Dutch red-backed shrike populations act as sinks.

SYMP04-17 A comparison of ringing data with genetic studies in Dutch red-backed shrike populations

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In the Netherlands the red-backed shrike population was subject to a dramatic decline. Nowadays the Netherlands inhabits one relatively large population in the Bargerveen area (about 80 pairs), and a few small populations (1–10 pairs). From colour-ringing data no exchange was found between the populations. In Bargerveen, the calculated population size is remarkably lower than the observed size and despite its high fitness values it seems that this population is not able to maintain itself. Moreover, unringed birds are found in all (sub)populations. These data indicate that migration must have taken place. We presume that our populations are complemented by birds from larger populations outside the Netherlands. This presumption was verified with genetic techniques. With microsatellites, markers for various European RBS populations will be determined. From these data migration rates and the origin of the birds can be unveiled. We also investigated genetic variation in the Dutch populations compared to a stable reference population, which was determined with AFLP markers. The first results will be presented at this Shrike Symposium.

SYMP04-18 Black spots in the tail: possible indicators for sex identification and quality in lesser grey shrike *Lanius minor*?

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Sexes are usually very similar in shrikes (Laniidae) and sexual colour dimorphism is rare also during the breeding period. About 43% of 23 species of the genus *Lanius* are so called grey species and further species can have grey races. In some of them the proportion of white colour in tail and wings is one identification trait for races (*L. e. homeyeri*, *L. collaris humeralis*), and as we expect, in other, may be one of sex identification traits (*Lanius minor*). During the breeding seasons of 1996–2000 we captured 169 lesser grey shrikes (97 males and 72 females) in Central Slovakia and we studied the role of the pattern and size of colour marks as characters for sexing in this species. We aim to answer the following questions: (1) whether the presence and size of black subterminal spots in first and second outermost tail feather (T6 and T5) is a suitable trait for sex identification (2) whether size of black spots is related with other morphological features of the birds (forehead height, wing, tail, tarsus and bill length) so that they could also be used for sexing, (3) whether the occurrence and size of black tail marks is related to breeding parameters (clutch size and number of fledglings), (4) if the occurrence of black marks in T5 is an age-related trait. Our results show that:

(1) Males have more white colour in the tail. The first outermost tail feathers (T6) colour was always completely white without black spots in males (100 %, n = 97), but not in females (94.5 %, n = 72). We found significant differences between males and females in the presence of black spots in T5. Females usually have black spots on both T5 (67 out of 72 females, 93.1%), but males usually have not spots (66 out of 97 males, 68.1%). Furthermore, the size of the black spots in right T5 was significantly greater in females than in males. (2) The extension of the black forehead is bigger in males, but females have bigger spots in T5 and slightly longer bills. (3) there were no differences in breeding success (clutch size and fledgling success) between females with and without black spots in both T5 and males with and without black spots in both T5. Furthermore, there was no relation between size of black spots in males and females and clutch size, fledgling success and laying date. (4) The amount of white colour in the tail is not related to age, what reflects a not significant increasing of so-called males traits.

SYMP04-19 Migration strategies and body mass variation of the red-backed shrike (*Lanius collurio*) along the eastern migration routes

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The results of a comparison of body mass and wing length variation of red-backed shrike (*Lanius collurio*) controlled at successive sites during migration along the eastern flyway are presented. During autumn migration, the species had a progressive gain in body mass across Europe before the

trans-Saharan flight. There were substantial losses in body mass during autumn migration across the desert. Once having had crossed the ecological barriers, red-backed shrike showed increase in body mass in eastern Africa before migrating to more southerly located wintering grounds. During spring migration, marked body mass increases were observed before crossing the desert; south of the desert edge mainly further east in the northeastern Africa regions. The species had a significant body mass loss during their northward migration across the desert. It is shown that red-backed shrike has well-developed seasonal migration strategies as well as strategies of crossing ecological barriers.

SYM04-20 Modeling winter habitat of great grey shrike using Generalized Additive Models

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Habitat use of great grey shrike *Lanius excubitor* was studied in Poland during the winters of 1988/89 and 1989/90. Altogether, 404 plots, randomly distributed across the country, were censused (192 and 212 in each year, respectively) covering in total more than 6.6 thousands of km². Simple habitat characteristics were recorded for each plot: geographic coordinates, area of meadows, fields and woodlands, number of villages and woodlands, the length of forest border, temperature and snow cover. Influence of these factors on the presence of great grey shrike were assessed using Generalized Additive Models (GAM). This method is semiparametric: the link function and the shape of error distribution has to be defined parametrically, but the shape of response for each predictor is nonparametric and data rather, than model driven. This method allows not only simple linear relationships to be modeled, but also can reveal more complicated shapes of response functions (i.e. non-monotonic, omni- or multi-modal, etc.).

Shrikes were recorded on 45% (95% CI: 40–50) of plots. The mean density was 0.055 (0.048–0.061) individuals/km² and mean density on occupied plots 0.122 (0.110–0.139) individuals/km². None of these abundance measures differed between years. On the basis of these figures and the area of open land in the country, population of the great grey shrike wintering in Poland can be roughly estimated at about 10–12 thousands of birds.

Significant spatial trend was revealed by fitting two-dimensional nonparametric loess regression to abundance data. Shrikes were common on lowlands, except NE, the coldest part of the country. When analyzing habitat data, the most parsimonious model was selected using AKAIKE information criterion, including spatial trend as model offset and possibility of excluding each predictor, linearizing it, including as polynomial spline or polynomial spline with separate fits for each year. None of the variables were included as nested term, suggesting insignificant differences in response curves between years. Three habitat predictors were selected: amount of meadows (linear, increasing), density of villages and length of forest edges (smoothing splines). Temperature seems to not influence birds below 5°C and lead to increase in abundance above this level. The greater the snow cover, the less probability of recording birds on a plot. Probably, meteorological factors influence birds' activity and detectability. Habitat used by great grey shrike during winter consists of a mosaic of meadows and small villages, with some optimum level of forest edges.

SYMP04-21 Migrant and resident shrikes of Malaysia: A review

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Three species of *Lanius* (Laniidae) occur in Malaysia, and most of Southeast Asia: *L. cristatus* (brown shrike; Tirjup Padang), *L. tigrinus* (tiger or thick-billed shrike; Tirjup Harimau) and *L. schach* (long-tailed shrike; Tirjup Ekor Panjang). Two species (*L. cristatus* and *L. tigrinus*) occur as passage migrants and non-breeding winter visitors in Malaysia. *L. schach* is a permanent resident.

Individuals of *L. cristatus* arrive in Malaysia in early August through early November (Peak: September 9–12), and depart from late April through late May (Peak: early May). The majority of the migrants are first year birds with the ssp. *superciliosus* and ssp. *confusus* the most common of the four. Earlier arriving individuals are the ones most likely to remain during the winter. This species prefers to occupy a variety of lowland non-forest areas. Winter territories include suburban gardens, open country scrub habitat, farmland, tea plantations and the forest edge. Territories average less than one hectare. When foraging individuals tend to utilize perches lower than 2–4 meters high. Most prey items are insects, and these are primarily captured during the first and last two hours of daylight. Although this species is much more common now than in the 19th. century, in the last 2–3 decades observers report a decline, probably due to an increased use of pesticides in suburban garden habitats.

L. tigrinus (all age-classes) arrives in Malaysia as early as late August through mid-October (Peak: late September/Early October) and departs from mid-March through early May (Peak: late April/early May). This species prefers to forage in the ecotone between dense secondary growth and recently cleared areas including gaps in the forest and along logging roads, overgrown plantations, waterways through forest/mangroves and occasionally even the secluded edge of wooded gardens in towns. Perching areas are on average lower than *L. cristatus* and located very close to cover. For the first few weeks after arrival in winter territory, individuals vocalize frequently. Successful winterers have demonstrated between season philopatry for two to three years. This species is less common than *L. cristatus*, but individuals will overwinter at higher elevations (up to 900 meters).

L. schach in Malaysia is uncommon to more or less common, but local in occurrence, primarily in the lowlands. It seems to have invaded the peninsula from Indonesia (via Singapore) in the late 19th Century. This species prefers open grassland where disturbance by humans is low such as military land, cordoned off airport fields, golf courses, abandoned landfills and mining fields. When foraging, individuals utilize bush-tops, fence-wires and posts, rarely as high as 7 meters. Nest sites (1–4 meters high) include tall herbaceous plants, small palms, and the horizontal forks of small thorny trees surrounded by coarse herbage and scrub. Eggs are laid in all months except April and October with peaks occurring in January and again in July, August and September. A full clutch is usually three, a minority four, and occasionally one or two eggs. Incubation and fledging periods are unrecorded. In Malaysia, the population of this species is stable.

SYMP04-P1 Red-backed shrike: indicator of degradation
and restoration of complex foodwebs

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In most western European countries the number of red-backed shrikes, like other bird species pre-dating mainly on large insects, has decreased (15,000 to 100 pairs in the Netherlands) during the

last century. We hypothesize that affected insect diversity leads to deteriorated prey availability. Since availability of different prey species strongly changes with time, due to phenology (seasonal effects), insect activity (weather and diurnal patterns) and peak abundance (between year variation), only a broad spectrum of potential prey species can maintain a continuous sufficient food supply. All comparative studies on diet composition and food availability in relation to reproduction success in ecosystems with different population trends, we conducted the last 8 years, strongly support this hypothesis. Moreover, results of these studies help trace the affected links within food webs in degraded habitats and can supply keys for ecosystem restoration.

SYMP04-P2 Decline of the spanish population of lesser grey shrike: is it a consequence of living off limits?

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The lesser grey shrike is highly endangered throughout Europe, having declined markedly in abundance and range in the last decades. A relict population of the species in the western limit of its breeding range (NE Spain) is known to exist at least since the 60's. During the last 15 years a sub-population located in a protected area has been monitored and the breeding biology of the population has been studied during the period 2000–2002. Here we report about the population trend observed in the last decade and about some basic breeding parameters and discuss the main problems and conservation issues affecting the Spanish population of lesser grey shrike. Our results show that: (1) the population in an area that held in 1989 around 50% of the estimated Spanish breeding population, has decreased dramatically in the last decades and has become extinct in 2002, (2) the interannual population fluctuations in this site closely fit the ones observed in the french population, (3) breeding success is low, averaging 2.5 ± 2.0 (SD) fledglings/breeding attempt ($n = 38$ nests), (4) complete breeding failure is 33% ($n = 54$ nests) but marked fluctuations are evident, (5) the main causes of breeding failure are adverse weather (39%) and predation (39%) ($n = 18$ failed nests). Habitat modification can partly explain the decrease of the species though the lesser grey shrike has also declined in protected areas where habitat is well-preserved. We also found a relationship between local climatic variables and decline of this shrike in the last 15 years. We conclude that factors acting both at a local level and at a larger scale are responsible of the decline of the Spanish population of lesser grey shrike at the border of its range.

SYMP04-P3 Lesser grey shrike (*Lanius minor*) in the North-East of Ukraine

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In the sixth and seventh decade of the 20th century lesser grey shrike was a usual bird for the Sumy region countryside and was frequently met in rural areas (its nests were found in a distance of 0.5 – 1 km apart of each other). Bee-keepers used to shoot shrikes at the apiaries and to destroy their nests. Now this species is rare for the whole territory of the region and has completely disappeared in

its northern districts. A total amount of breeding pairs is considered to be in between of 150 and 200 for the territory of 23,800 km². The reasons of decreasing are the same with that of the small falcons: plowing of virgin-soil nooks in river-valleys and gullies and long years of using pesticides in agriculture forced decreasing of food resources and environment pollution. Also lesser grey shrike tolerance to artificially created landscape influences negatively the species amount: birds arrange their nests on the trees near the streets, cemeteries and old orchards; near to the stock-breeding farms, in small forest plantations and woodland belts. In some places they settle in small groups up to 4 breeding pairs together.

The spring migration of lesser grey shrike is late. An average date for 13 years of observation is the 11th of May (7th of May, 1970 – 21st of May, 1993.) The birds mostly come separately and in pairs and only sometimes in small flocks from 3 to 5 individuals each. Lesser grey shrike nests ($n = 17$) were found on wild pear-trees (in 7 cases), on wild apple-tree (once), on poplars (in 6 cases), on ash-leaf maples (twice), and on elm-tree (once) as high as 2.4 – 12.0 m (in average height of 5.95 m.) The earliest beginning of laying eggs was observed on the 23rd of May 1978. It was found 2 eggs (once), 3 eggs (once), 4 eggs (thrice), 5 eggs (twice), 6 eggs (twice) and 7 eggs (once) in the full hatches. In average (totally in 10 hatches) it was 4.60 ± 0.48 eggs per hatch. Fledglings begin to leave their nests after the third week of June (22nd of June, 1971) Mass leaving starts in July. After leaving nests families move to their „brood territory“ to dry gullies, valley slopes, edges of reaped fields and sometimes to dry meadows. There they stay until they depart.

Departure takes place imperceptibly. The last observations of broods or individuals occur in August (2nd of August, 1987 – 21st of August, 1977.) An average date for 7 years of observation is the 14th of August.

SYMP04-P4 Habitat quality of selected bird species in agricultural landscapes: The occurrence of red-backed shrike (*Lanius collurio*) dependent on geomorphological and natural character and mode and intensity of land use

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The main cause of the decrease of species diversity in agricultural landscapes is the disturbance of their habitats within and near production sites. Therefore it is important that habitats should be preserved. In order to compare situations and to derive conservation recommendations there is a need for evaluating the current situation and potential land use effects on habitats as well. The habitat suitabilities of birds are good indicators for the overall landscape quality. Different birds represent to a certain degree different structural properties of the landscape. The appropriate scale for the evaluation of bird habitats is the landscape scale. The quantitative occurrence, the spatial distribution and the different quality of habitat patches of a species within the landscape are important factors to be considered. Habitat models may be good tools to summarize the various habitat demands and to support the study of spatial dependencies and connections.

In the paper we exemplarily investigate the occurrence of the red-backed shrike (*Lanius collurio*) within a special investigation region of the ZALF in North-East Germany. The observation results are related to the geomorphological and natural character of the landscape and the mode and intensity of land use. The outline and simulation results of a habitat model are shown.

SYMP04-P5 Breeding shrike populations in Turkey: the relationship between habitat preference and body mass

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Sizes of the populations of shrikes in Turkey are still unknown with respect to European Threat Status. All breeding species of shrikes in Turkey (red-backed shrike – *Lanius collurio*, lesser grey shrike – *Lanius minor*, woodchat shrike – *Lanius senator*, and masked shrike – *Lanius nubicus*) are subject to habitat loss in their European distribution. Habitat loss has not been evaluated in detail for the shrikes in Turkey. The pilot studies have shown that all shrike populations except masked shrike distribute throughout Turkey. It is also known that body mass is an indicator character for habitat preference determination in some animal species, especially in birds. The aims of this paper are to determine the distribution of some shrikes species in some habitats of Turkey, to complete the scarce systematic knowledge on shrike subspecies in these habitats and evaluate the habitat preference of these species by using the body mass variable in an ecological viewpoint.

SYMP04-P6 Notes to duet calls of yellow-brested boubou (*Laniarius atroflavus*)

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The yellow-brested boubou is an endemic species of the Cameroon Highlands and its call belongs to the loudest and most frequently heard in the area. The pair of Boubous usually vocalizes while searching for food in the lower and mid-strata of canopy. We recorded 7 pairs in ca 20 ha of the mosaic of plantations, secondary and primary growth and Eucalyptus wood. These habitats surrounded a small lake at 2000 m (N 5°51', E 10°11'). The aim was to describe general types of voices of *Laniarius atroflavus* and their use during the day. The observations were made during three consecutive days in the late December 2002, continuously between sunrise and sunset. In one case we found a nest that was destroyed by a snake. According to our observations, the duet-calls could be important means of communication at both intra-pair and intraspecific level. The female's answer, which indicates intra-pair communication, does not vary much (rusty „check“ ending the duet). The voice of male clearly varies (jointed or separated two „tvi“ notes), which depends on whether the male is solitary in the moment or not. The communication between two or more males is based on a single „tvi“ note that could be recorded from more than 200 metres (usually one male invokes other males in the area). The intra-pair duets are usually quieter. From the total number of 808 calls, the call of solitary male (44.2%) and the single note of male (36.5 %) were most common. The duet calls (when female answered) were recorded in 19.3% of all cases only. The use of duet calls during the day was highest one hour after the sunrise (7:00 – 9:00 AM) and one hour before the sunset (14:00 – 17:00 PM), with a clear midday break. The non-duet calls were used during the whole day, without a break.

SYMP04-P7 Temporal variation in territoriality of the fiscal shrike *Lanius collaris*

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Studies were carried out during the years 1999–2002 in an area of 82 ha on the NUL campus at Roma, Lesotho. Over four consecutive breeding seasons (September–February) densities of occupied territories varied from 26 to 36. Unexpectedly, it was shown that the larger amount of rainfall, the lower density of territories. Most territories were held throughout the year, but shifting of their boundaries during the first (September–November) and second (December–February) breeding were noticeable. Such high densities of occupied territories can be linked with the presence of large open spaces, isolated trees and thorns, multitudes of poles, fences and other similar man-made structures used as hunting perches, and with the absence of competitors such as the Bokmakierie and other shrike and bush-shrike species.

SYMP04-P8 Post-breeding habitat selection of the grey-backed shrike *Lanius tephronotus* in Sichuan, China

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The grey-backed shrike *Lanius tephronotus* is a partial migrant and a polytypic species with two races (*tephronotus* from Nepal to China and *lahulensis* northern India and several areas surrounding). Is mainly an eastern Palearctic taxon and an high elevation shrike. Study was conducted in southwestern and central part of Sichuan Province, People's Republic of China, on August 2002. We made casual observations in semi-open habitats in urban habitats around Kangding and Chengdu (elevation 510–4200 m) and Wolong Natural reserve in areas between the altitudes of ca. 2000–4000 m.

Our records in Sichuan shows that the species inhabits young open coniferous forests with forest clearings dominated by scrubs or pastures near the altitude edge of trees and in lower altitudes in extensive agricultural valleys near human habitations mainly with corn and fresh legumes surrounding by both tree and scrub hedges. In most of the cases these areas have a good availability of different kinds of poles that serves as perche sites, including telegraph ones.

We did not see any other species close to this one in Wolong, nonetheless Long-tailed Shrike was a very common bird in the outskirts of Chengdu and small cities in the way to Wolong. This species frequents a great variety of biotopes like agro-forestry systems of very different kinds including extensive areas of rice fields, urban gardens and a great variety of hedges.

SYMP04-P9 Male shrikes buy sex with food ...

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In several animal species, males offer material gifts to females during a courtship or precopulatory display. Yet recently, this behaviour was considered not occurring in extra-pair copulations. However, we found out that males of the great grey shrike not only offer nuptial gift also to extra-pair female, but such gift is significantly more valuable (regarding to the energetic value) as that offered to it's mate. Our findings also indicates that the size of the prey given to female may have a symbolic value in enabling female to judge a male's quality. Moreover, larger gift offered results in a higher chance of copulation for males in both within- and extra-pair events.

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