

# Trends in systematics

---

## Speciation in shades of grey: the great grey shrike complex

Sometimes clear-cut species limits are hard to come by. A number of widespread Palearctic species and species complexes display an intricate pattern of geographical (plumage) variation. Information on patterns of genetic variation can be a tremendous help in clarifying relationships between populations but the results are not always unambiguous. The great grey shrike complex is one such difficult case. Many may have been surprised to note the treatment of great grey shrikes in the second English edition of the Collins bird guide (Svensson et al 2009) in which two species are recognized: Great Grey Shrike *Lanius excubitor* and Iberian Grey Shrike *L. meridionalis*. The latter now only includes the birds from Iberia and south-eastern France. This treatment contrasts with more familiar former treatments in which these populations were considered conspecific with North African and southern Asian taxa, together forming 'Southern Grey Shrike'.

It should be noted that the Dutch Committee for Avian Systematics (CSNA) separated Steppe Grey Shrike *L. pallidirostris* as a third species (Sangster et al 1997, 1999) based on qualitative differences between *pallidirostris* and *L. excubitor* and *L. meridionalis*. More recently, Redactie Dutch Birding (2009) followed Gonzalez et al (2008) in regarding Iberian Grey Shrike as monotypic and the North African taxa were provisionally separated as Desert

Grey Shrike *L. elegans*, while other great grey shrike taxa were left undetermined for the time being.

The purpose of this short paper is to present an update on geographic variation in the great grey shrike complex based on recent genetic studies (Gonzalez et al 2008, Klassert et al 2008, Olsson et al 2010) and to show current implications for species limits within this complex. Olsson et al (2010) sampled by far the most extensively and agree with Gonzalez et al (2008) and Klassert et al (2008) on the basic structure of the phylogeny. Therefore, Olsson et al (2010) is referred to below, unless noted otherwise.

### Results

The recovered mitochondrial DNA (mtDNA) tree (figure 1) shows a deep split between two large clades, representing up to several million years of differentiation. In this tree, the 18 taxa of the great grey shrike complex are non-monophyletic, with some subspecies being more closely related to three universally recognized species: Somali Fiscal *L. somalicus*, Loggerhead Shrike *L. ludovicianus* and Chinese Grey Shrike *L. sphenocercus* (Lesser Grey Shrike *L. minor* was not included, but is thought to be only distantly related to the great grey shrike complex (Harris & Franklin 2000)). The latter clade furthermore includes not only one Nearctic (*borealis*) and four north-eastern Palearctic subspecies (*mollis*, *sibiricus*, *funereus* and *bianchii*) but, remarkably, also *meridionalis*. The second large clade contains, among others, nomi-



**347** Iberian Grey Shrike / Iberische Klapekster *Lanius meridionalis*, Castillo Branco, Portugal, 29 June 2010  
(René Pop/The Sound Approach)

**348** Desert Grey Shrike / Woestijnklapekster *Lanius elegans elegans*, Zaafrane, Tunisia, 6 May 2005  
(René Pop)

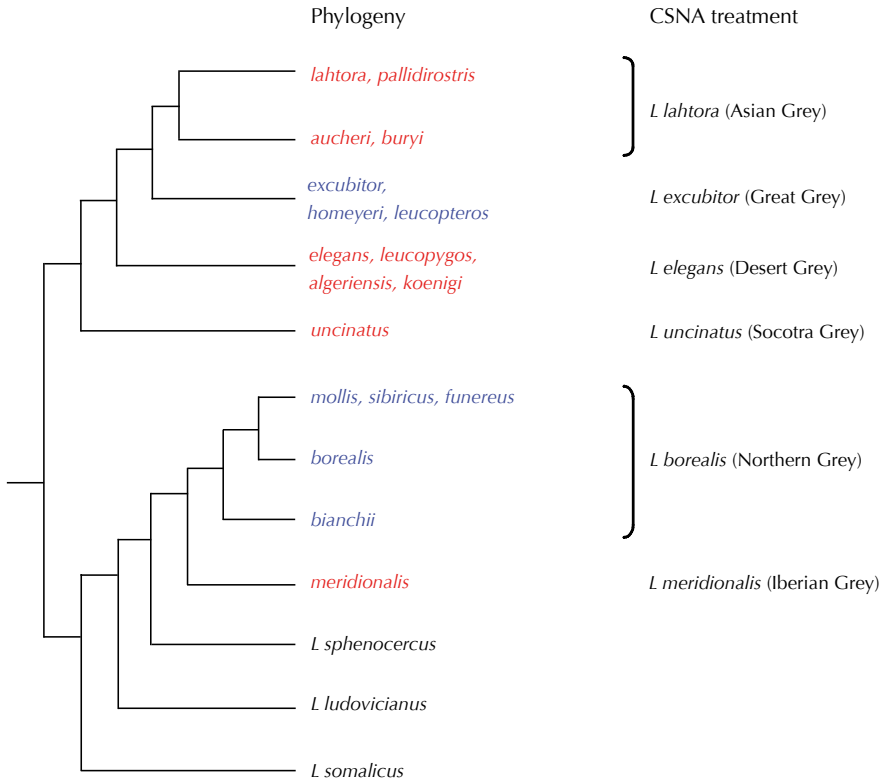


nate Great Grey Shrike *excubitor*, North African taxa (eg, *algeriensis*, *elegans* and *koenigi*), and south-western Asian taxa (eg, *pallidirostris*).

Perhaps the most striking outcome is the placement of *excubitor* and *meridionalis* (see figure 1), which is in conflict with usual taxonomy and surprising when considering both geography and plumage variation: *excubitor* is morphologically similar to its neighbour *sibiricus* while *meridionalis* is similar to nearby North African taxa, yet these pairs of populations are apparently not closely related. It also implies that a south-western European endemic has its closest relative in north-eastern Asia. However, such a situation is reminiscent of that in Iberian Magpie *Cyanopica cooki* and Azure-winged Magpie *C cyanus*, which were considered conspecific until recently as well (Fok et al 2002), and that in Corsican Nuthatch *Sitta whiteheadi* and Chinese Nuthatch *S villosa* (Pasquet

1998). A final similar case is that of Spanish Imperial Eagle *Aquila adalberti* and Eastern Imperial Eagle *A heliaca* (Martinez-Cruz & Godoy 2007, González 2008), although these two species are separated by a much smaller geographical area. In all these cases, the inference is that the now geographically restricted western European populations were once connected to their eastern counterparts, and that connecting populations have disappeared. One can speculate that a similar scenario may partly account for the distribution pattern in the great grey shrike complex, with additional colonizations by populations from, eg, south-western Asia 'filling up the gaps'. This does, however, not readily explain the morphological variation in the complex, which is also at odds with the inferred relationships. But then again, plumage characteristics are not always useful phylogenetic markers as they may be influenced by

FIGURE 1 Summary of phylogenetic relationships in great grey shrikes *Lanius* found by Olsson et al (2010). All reciprocally monophyletic groups are collapsed into single branches. Colours highlight conflict between tree and previous taxonomic treatments in, eg, Svensson et al (1999), by showing fairly long-standing division between great (blue) and southern (red) grey shrikes. Most progressive treatment would involve recognizing each branch as species, whereas current CSNA treatment (not yet published in Dutch Birding) is indicated on right hand side.





349 Steppe Grey Shrike / Steppeklapekster *Lanius lahtora pallidirostris*, Kyzylkol, Kazakhstan, 11 September 2007  
(René Pop)

350 Levant Grey Shrike / Levantklapekster *Lanius lahtora aucheri*, Golan, Israel, 21 March 1990  
(René Pop)



natural and sexual selection and can therefore change 'too' rapidly. For instance, in neighbouring clades, similar habitats may have selected for similar plumage. Conversely, a long independent evolutionary history does not necessarily imply that two taxa develop pronounced phenotypic differences: evolutionary more recently split taxa may thus be morphologically more different to each other, than to an older relative.

It is also worth mentioning that a phylogeny based on a single independent genetic unit such as mtDNA (ie, a single locus) does not necessarily represent the true evolutionary history. For example, gene flow between Pine Bunting *Emberiza leucocephalos* and Yellowhammer *E. citrinella* has led to the disappearance of the mtDNA of one of the species, and they have now identical mtDNA, while most of their nuclear DNA remains species-specific (Alström et al 2008, Irwin et al 2009). Past gene flow between some of the great grey shrike clades could similarly have affected the inferred relationships between them, although this would require more complex scenarios. The sparse nuclear genetic data on great grey shrikes obtained by Gonzalez et al (2008) and Olsson et al (2010) unfortunately do not allow for a robust verification of the mtDNA results.

#### Taxonomic implications

What are the potential taxonomic implications of these results? If we assume that the mtDNA tree correctly represents evolutionary history, none of the previous taxonomic treatments recognizes a monophyletic great grey shrike. Recognizing the two groups/clades as species resolves the main conflict between the mtDNA tree and taxonomic treatments. This was essentially also proposed by Klassert et al (2008), even though they did not include north-eastern Palearctic samples. The Socotran *uncinatus*, although in plumage very similar to Levant *aucheri*, pops up in a position sister to, eg, *excubitor*, North African taxa and *pallidirostris*, and is thus perhaps best granted species status as well. Although genetically less distinctive, similar arguments could be made for another island taxon, *bianchii*, from Sakhalin, Russia, and the southern Kuril Islands north of Japan. The Middle Eastern *aucheri-buryi* clade could also be separated (*aucheri* has previously been included in Desert Grey Shrike but appears more related to *pallidirostris*).

Olsson et al (2010) considered several taxonomical options as valid, including treating the great grey shrike complex as six species (Northern *L borealis*, Desert *L elegans*, Great *L excubitor*, Asian *L lahtora*, Iberian *L meridionalis* and Socotran

351 Great Grey Shrike / Klappekster *Lanius excubitor*, Oud-Alblas, Zuid-Holland, 25 January 2005 (Arie Ouwerkerk)





352 Dark Desert Grey Shrike / Donkere Woestijnklapekster *Lanius elegans algeriensis*, Agadir, Morocco, 4 November 2005 (Arnaud B van den Berg)

353 Canary Islands Desert Grey Shrike / Canarische Woestijnklapekster *Lanius elegans koenigi*, Fuerteventura, Canary Islands, 23 January 2010 (René Pop/The Sound Approach)



Grey Shrike *L. uncinatus*), and, alternatively, simply retaining only Great and Southern (ie, Iberian) Grey Shrike as full species for the time being. The uncertainty is mainly caused by the disagreement between genetic data on the one hand and morphological and geographical data on the other. CSNA (Sangster et al in prep) and Dutch Birding have chosen the former option (see 'WP bird names' under 'Vagrancy & taxonomy' at [www.dutchbirding.nl](http://www.dutchbirding.nl); not yet published in Dutch Birding) which means, for instance, that *L. lahtora* will contain Levant Grey Shrike *L. l. aucheri* and Steppe Grey Shrike *L. l. pallidirostris* as subspecies (since *lahtora* was described earlier than either *aucheri*, *buryi* or *pallidirostris*).

The recognition of Northern Grey Shrike as a species is also relevant to European birders, since at least *L. b. sibiricus* is a vagrant to Europe. In fact, one of the Norwegian samples from this study, a museum specimen collected in November 1881, was a *sibiricus*. Its identity was already suspected on basis of its plumage and could be confirmed genetically. *Sibiricus* looks similar to nominate Great Grey Shrike but useful field marks include fairly strongly barred underparts, limited white on the primaries and rectrices, and a pale mask throughout its first-winter plumage. Currently, there is at least one other European record, in Finland in March 2000.

#### Further research

So what can we expect for the future? First, an examination of independent genetic loci can hopefully determine whether the mtDNA pattern is telling the evolutionary truth. It is also still unclear how several taxa interact where they come into contact (eg, nominate Great Grey Shrike and *sibiricus* Northern Grey Shrike). Interestingly, two morphologically *borealis* individuals actually fell within the Loggerhead Shrike clade in the mtDNA tree, indicating ongoing occasional hybridization. Some gene flow between many of the forms may be likely but a more solid and stable taxonomy will among others depend on quantifying its extent. This interesting species complex will probably continue to stimulate research and taxonomic debate, and meanwhile birders are probably best advised to take careful notes (and photographs...) of all variants encountered.

#### References

Alström, P, Olsson, U, Lei, F, Wang, H-t, Gao, W &

- Sundberg, P 2008. Phylogeny and classification of the Old World Emberizini (Aves, Passeriformes). *Mol Phylogen Evol* 47: 960-973.
- Fok, K W, Wade, C M & Parkin, D T 2002. Inferring the phylogeny of disjunct populations of the Azure-winged Magpie *Cyanopica cyanus* from mitochondrial control region sequences. *Proc R Soc London B* 269: 1671-1679.
- González, L M 2008. Origin and formation of the Spanish Imperial Eagle (*Aquila adalberti*). *J Ornithol* 149: 151-159.
- Gonzalez, J, Wink, M, Garcia-del-Rey, E & Delgado Castro, G 2008. Evidence from DNA nucleotide sequences and ISSR profiles indicates paraphyly in subspecies of the Southern Grey Shrike (*Lanius meridionalis*). *J Ornithol* 149: 495-506.
- Harris, T & Franklin, K 2000. Shrikes & bush-shrikes. Including wood-shrikes, helmet-shrikes, flycatcher-shrikes, philentomas, batises and wattle-eyes. London.
- Irwin, D E, Rubtsov, A S & Panov, E N 2009. Mitochondrial introgression and replacement between yellowhammers (*Emberiza citrinella*) and pine buntings (*Emberiza leucocephalos*) (Aves: Passeriformes). *Biol J Linn Soc* 98: 422-438.
- Klassert, T E, Hernández, M Á, Campos, F, Infante, O, Almeida, T, Suárez, N M, Pestano, J, & Hernández, M 2008. Mitochondrial DNA points to *Lanius meridionalis* as a polyphyletic species. *Mol Phylogen Evol* 47: 1227-1231.
- Martinez-Cruz, B & Godoy, J A 2007. Genetic evidence for a recent divergence and subsequent gene flow between Spanish and Eastern imperial eagles. *BMC Evol Biol* 7: 170.
- Olsson, U, Alström, P, Svensson, L, Aliabadian, M & Sundberg, P 2010. The *Lanius excubitor* (Aves, Passeriformes) conundrum – taxonomic dilemma when molecular and non-molecular data tell different stories. *Mol Phylogen Evol* 55: 347-357.
- Pasquet, E 1998. Phylogeny of the nuthatches of the *Sitta canadensis* group and its evolutionary and biogeographic implications. *Ibis* 140: 150-156.
- Redactie Dutch Birding 2009. Naamgeving van taxa in Dutch Birding. *Dutch Birding* 31: 35-37.
- Sangster, G, Hazevoet, C J, van den Berg, A B & Roselaar, C S 1997. Dutch avifaunal list: taxonomic changes in 1977-97.
- Sangster, G, Hazevoet, C J, van den Berg, A B, Roselaar, C S & Sluys, R 1999. Dutch avifaunal list: species concepts, taxonomic instability, and taxonomic changes in 1977-1998. *Ardea* 87: 139-166.
- Sangster, G, van den Berg, A B, van Loon, A J & Roselaar, C S in prep. Dutch avifaunal list: taxonomic changes in 2009-2010.
- Svensson, L, Grant, P J, Mullarney, K & Zetterström, D 1999, 2009. Collins bird guide. First and second edition. London.

Jelmer Poelstra, Department of Evolutionary Biology, Uppsala University, Uppsala, Sweden  
([jelmerpoelstra@gmail.com](mailto:jelmerpoelstra@gmail.com))