The identification of Northern Shrike in Europe

Aleksi Lehikoinen

Abstract The Northern Shrike *Lanius borealis* is a potential vagrant to northern and western Europe, both from North America (nominate *borealis*) and from Siberia (*L. b. sibiricus*). Currently, there are a handful of accepted European records, including three supported by DNA. There have been several other European claims of Northern Shrikes, especially from Finland, in recent years. A detailed study by the Finnish Rarities Committee, based on examination of museum specimens, led to the development of a multi-character scoring system. This highlights clear differences between many Northern and Great Grey Shrikes *L. excubitor*. Because some vagrants have shown intermediate characters, and mitochondrial DNA contradicted a seemingly obvious morphological Northern Shrike in Sweden, the Finnish Rarities Committee has opted not to accept records of Northern Shrike without DNA evidence. Nonetheless, the scoring system described here is a step forward in our understanding of the identification of Northern Shrike in a vagrant context[1].

Introduction

There have been several claims of Northern Shrike *Lanius borealis* from northern Europe in recent years. Most of these come from Finland, with others in Sweden, the Netherlands and Lithuania, but also one from the Azores. In addition, there are two historical specimen records from Norway, one from the Netherlands and at least seven from Ukraine. Following the unexpected result that mitochondrial DNA (mtDNA) from an apparent Northern Shrike on Öland, Sweden, in October 2017, came from a Great Grey Shrike *L. excubitor*, the Finnish Rarities Committee has recently reviewed all Finnish records of Northern Shrike. That review concluded that claims from Finland could no longer be accepted without DNA evidence. Consequently, just one Finnish record (with DNA support) is currently accepted; all other claims were found 'not proven', including one previously accepted record.

More than a decade ago, molecular studies by Olsson *et al.* (2010) found that the (then) accepted morphology of the 'Great Grey Shrike' complex is contradicted by genetic findings. While Olsson *et al.* suggested that the complex could be treated as six or more species, they recommended that further studies were required to resolve uncertainties surrounding the extent to which the mitochondrial gene tree reflected the phylogeny. Currently, most taxonomic authorities and authors, including Shirihai & Svensson (2018), BirdLife International (2019), Clements (Paruk *et al.* 2020) and IOC (Gill & Donsker 2020), treat the group as comprising three species: Northern, Great Grey and Iberian Shrike *L. meridionalis*. In 2019, IOC adopted the following arrangement regarding subspecies, which is followed in this paper.

[1] A shorter version of this paper has been published in Finnish (in *Linnut* 3/2018) and in Swedish (in *Roadrunner* 4/2018), but more data and greater detail are presented here.

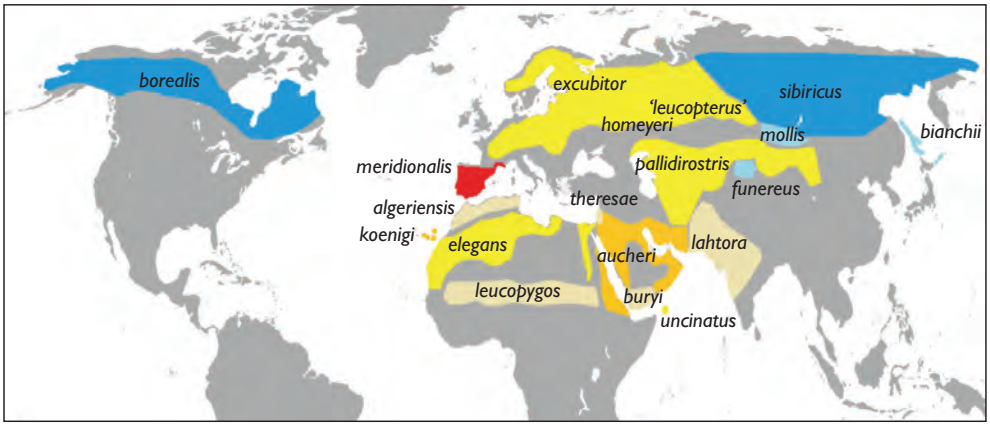

Fig. 1. Breeding distribution of the 'Great Grey Shrike' complex. Redrawn from Olsson *et al.* (2010) and Lefranc & Worfolk (1997).

Northern Shrike
Lanius borealis: including subspecies *sibiricus, bianchii, mollis, funereus* and *borealis*

Great Grey Shrike
L. excubitor: including subspecies *excubitor, homeyeri, koenigi, algeriensis, elegans, leucopygos, aucheri, theresae, buryi, uncinatus, lahtora* and *pallidirostris*

Iberian Grey Shrike
L. meridionalis (monotypic)

Among the subspecies of Northern Shrike, nominate *borealis* (hereafter '*borealis*') is restricted to North America while the other four subspecies breed in northern Asia (fig. 1). The species breeds mainly in the boreal forest zone in both continents and undertakes a relatively short-distance migration to wintering areas to the south (Lefranc & Worfolk 1997). In Asia, *L. b. sibiricus* (hereafter *sibiricus*) has the most extensive range and breeds closer to Europe than the other forms, eastwards from the Yenisey River (Olsson *et al.* 2010). The westernmost breeding areas of *sibiricus* are less than 2,500 km from eastern Finland and, owing to its migratory behaviour, it has the potential to occur as a vagrant in western Europe.

Records in Europe

There are currently three accepted records of first-winter *sibiricus* from Fennoscandia. Two were shot in Hedmark county, Norway, on 5th November 1881 and 17th October 1891. The first is held at the Zoological Museum of Oslo, Norway (plates 90–91), while the location of the second specimen is currently unknown. The third was in Helsinki, Finland, from 6th December 2009 to 13th January 2010 (plates 92–93). The identification of the first Norwegian specimen and the Finnish bird are supported by mtDNA (Olsson *et al.* 2010; Väisänen *et al.* 2020). Elsewhere, a bird in Lithuania on 3rd December 2019 was confirmed as *sibiricus* by DNA analysis (Eigirdas & Jonike 2020; plates 118–120), while a first-winter *borealis* on Corvo, Azores, on 18th–30th October 2014 (Hansen 2018; plate 124) was recently accepted by the Portuguese Rarities Committee, although DNA evidence was not available (Pedro Ramalho pers. comm.).

There are several other claims from northern Europe including six from Finland. Tajkova & Red'kin (2014) analysed the plumage and biometrics of seven museum specimens collected in Ukraine (from the Kyiv, Cherkasy, Sumy, Poltava, Kharkiv and Kherson regions, and from southern Crimea), and considered that these were 'undoubtedly belonging to *L. borealis sibiricus*', although as yet there has been no DNA analysis of these specimens. There is also a Dutch *sibiricus* specimen in Leiden Museum, dated 25th November 1909 (but currently no DNA analysis of this bird). More recently, two candidate *sibiricus* were reported in the Netherlands during autumn 2020, while another was photographed in Belarus in January 2021. These recent birds are not discussed further here.

Although several characters have been suggested to help separate Northern Shrike and nominate Great Grey Shrike (hereafter '*excubitor*'), the field identification of some birds is considered challenging or even impossible (Lefranc & Worfolk 1997; Perttula & Tenovuo 2002; van Duivendijk 2010; Shirihai & Svensson 2018). Currently, there are no clear guidelines for separating Northern Shrike from *excubitor* in a vagrant

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90 & 91. First-winter Northern Shrike *Lanius borealis sibiricus*, collected at Hedmark, Norway, 5th November 1881. The specimen shows many characters typical of *sibiricus* such as a brownish back, white rump, subterminal barring on the longest uppertail- and undertail-coverts, limited white in the outermost tail feather, broad white tips to the tertials and strongly barred underparts.

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92 & 93. The first-winter Northern Shrike *Lanius borealis sibiricus* present in Helsinki, Finland, from 6th December 2009 to 13th January 2010. The identification as *sibiricus* was supported by mtDNA analysis. The bird shows several characters typical of *sibiricus*, including a pale bill, faint mask, strongly barred underparts, barring in uppertail- and undertail-coverts (not clearly visible in these images) and pale brownish upperparts. The restricted white markings visible at the base of the secondaries in flight do not fit subspecies *borealis*.

context. This study aims to clarify the separation of Northern Shrike and Great Grey Shrike in a north European context, based on the combination of several characters.

Plumage characteristics

Museum specimens of *borealis, sibiricus* and *excubitor* were examined in the Natural History Museum of Helsinki (Finland), Natural History Museum, Tring (UK) and the Zoological Museums of St Petersburg and Moscow (Russia). The study focused on first-winter birds collected between September and March, since young birds typically have the highest vagrancy potential; in addition, some plumage characters of young birds may differ more between taxa than those of adults (Lefranc & Worfolk 1997; van Duivendijk 2010; Shirihai & Svensson 2018). This study involved a detailed comparison of 45 specimens of *borealis*, 64 of *sibiricus* and 100 of *excubitor* (all first-winter birds, mainly from Finland and Russia). Note that the specimens of *L. excubitor* in this study did not include typical individuals of the subspecies *homeyeri* (including '*leucopterus*'). Birds can be aged based on the partial post-juvenile moult, during which all or most of the greater coverts are left unmoulted. These retained feathers are brownish-black, often with pale tips, which contrast

Table 1. Key plumage characters and measurements of first-winter Northern Shrike *Lanius borealis* (*L. b. borealis* and *L. b. sibiricus*) and Great Grey Shrike *L. e. excubitor*, taken from museum specimens at the Natural History Museum of Helsinki, Finland; Natural History Museum, Tring, UK; Zoological Museum of St Petersburg and Zoological Museum of Moscow, Russia. For each character sampled, the sample size (n) is given along with the percentage of each taxon exhibiting the feature. Measurements include mean (range in parentheses) in mm.

Character	*L. b. borealis*	n	*L. b. sibiricus*	n	*L. e. excubitor*	n
mask: black lores / pale lores / brown ear-coverts	7/38/56	45	9/23/67	64	39/50/11	100
bill: mainly dark / pale base / largely pale	56/40/4	45	13/48/39	64	26/66/8	100
back: grey / light brown / clearly brown	13/29/59	45	3/27/70	64	80/16/4	100
rump: grey / pale / white	16/44/40	45	2/27/72	64	44/42/14	100
uppertail-coverts: unmarked / faint / obvious barring	16/51/33	45	23/44/33	64	69/30/1	100
undertail-coverts: unmarked / faint / obvious barring	33/27/40	45	38/36/27	64	89/11/0	100
underpart barring: none or very weak / weak / strong	0/2/98	45	0/9/91	64	8/60/32	100
Measurements						
White in outermost tail feather (T6)	30.9 (18–40)	45	35.1 (28–57)	63	43.8 (24–78)	100
White in second outermost tail feather (T5)	23.7 (13–35)	45	29.0 (21–37)	63	36.2 (21–81)	100
White in longest tertial	2.1 (0.5–5)	45	3.2 (1–6)	64	2.4 (0.5–7)	100
White in middle tertial	2.1 (0.5–5)	45	3.0 (1.5–6)	63	2.1 (0–6)	100
White in shortest tertial	1.7 (0.5–5.5)	45	2.0 (1–4.5)	64	1.0 (0–2.5)	100
White, tertials combined	6.0 (2–14)	45	8.2 (4–16.5)	63	5.5 (1–14)	100
White in secondaries	0.1 (0–5)	45	3.9 (0–25)	55	16.3 (0–38)	98
White in a number of secondaries	0.0 (0–2)	45	1.4 (0–5)	63	3.4 (0–6)	86
Pale tips to greater coverts	1.7 (0–6)	45	2.4 (0.5–5.5)	64	1.2 (0–3)	100

Table 2. Multivariate assessment of 12 characters in first-winter Northern Shrike *Lanius borealis* (*L. b. borealis* and *L. b. sibiricus*) and nominate form of Great Grey Shrike *L. e. excubitor*. Characters are scored using a ranking of 0–2. If a character cannot be evaluated in the field or established from the photographs, it should be assigned a score of zero. If the character is intermediate between scores, an intermediate decimal ranking may be assigned.

Character	Score 0	Score 1	Score 2
underparts	weakly barred or no bars	medium barring	strongly barred
pattern of uppertail-coverts	unbarred	weak barring	obvious barring
pattern of undertail-coverts	unbarred	weak barring	obvious barring
lores and mask	black mask and lores (faint pale areas in lores acceptable)	lores mainly pale, but ear-coverts black	lores pale, ear-coverts dark or pale brown
bill colour	pale restricted to base of lower mandible and edges	pale base extending to upper mandible	largely pale, extending to culmen
back and crown	grey	faintly brownish	clearly brown or brownish
rump	grey or brown, only weakly paler than back	pale grey or brown, clearly paler than back, but not white	clearly white
secondaries	white bases visible in closed wing or broad white wing-bar in flight	no white visible in closed wing, but weak wing-bar in the base of feather in flight	no white visible even in flight
tertial tips	little white, 0–5 mm combined	white tips, 5.5–10 mm combined	broadly white, >10 mm combined
pale tips to greater coverts	0–1 mm	1.5–2.5 mm	broad pale tips, 3 mm or broader
distance between white in the inner web of T6 and longest undertail-coverts	white areas overlapping	white areas meet or with gap (black) up to 1 mm	gap between white areas >1 mm
depth of white in the inner web of T5	>30 mm	c. 21–30 mm	≤20 mm

with uniformly glossy black moulted feathers (Svensson 1992). Altogether, 12 characters that showed clear differences between taxa were examined; these are discussed below and in tables 1 & 2.

Head pattern

Typical first-winter *sibiricus* and *borealis* have a weaker mask compared with *excubitor*. More than half of *sibiricus* and *borealis* have pale lores and/or brownish or pale brown ear-coverts, which is uncommon in *excubitor*. Less than 10% of *sibiricus* and *borealis* had black lores and ear-coverts, which is common in *excubitor* (table 1, plates 94–99).

94–99 opposite. Variation in the head patterns of first-winter Northern Shrikes *Lanius borealis* (nominate *borealis* in 94, 95 & 98; *L. b. sibiricus* in 96, 97 & 99). A strong black mask (94 & 95) is uncommon in Northern Shrikes. More often, first-winter birds show pale lores and/or black or rather brownish ear-coverts (96–99). In some cases (especially *L. b. sibiricus*) the mask can be particularly weak (99). Nominate *borealis* has a darker bill, typically wholly dark or with pale areas limited to the base of the lower mandible (94 & 95). The base of the bill is often strikingly pale in *L. b. sibiricus* (99) while nominate *excubitor* (Great Grey Shrike) has a bill pattern intermediate between the subspecies of Northern Shrike.


94.

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95.

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96.

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97.

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98.

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99.

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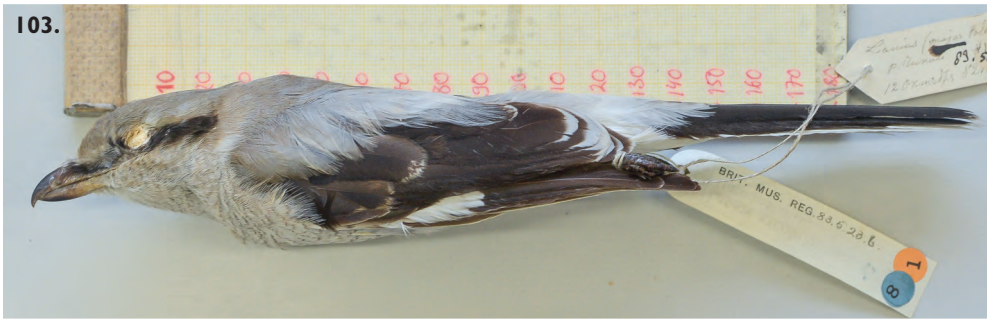

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100–104 opposite. Variation in the pattern of upperparts and tertials of first-winter Northern Shrike *Lanius borealis* (nominate *borealis* in 100 & 101; *L. b. sibiricus* in 102–104). Northern Shrikes typically show brownish hues in the mantle and scapulars, which are rare in nominate Great Grey Shrike. The rump in *L. b. sibiricus* is pale or white (102–104), paler than the mantle and scapulars, whereas in nominate *borealis* and nominate *excubitor* (Great Grey Shrike) the rump is generally darker and often concolorous with the rest of the upperparts, although this feature is quite variable (100 & 101). About one-third of Northern Shrikes have obvious markings in the uppertail-coverts (100 & 104). There is typically less white in the tertial fringes of both *borealis* and *excubitor* than *sibiricus* (the sum of the depth of white at the tip of each of the three tertials was measured at approximately 3.0 mm (plate 100), 4.5 mm (plate 101), 7.5 mm (plate 102), 10.5 mm (plate 103) and 16.5 mm (plate 104).

Aleksi Lehikoinen/ZM St Petersburg

105. Three relatively brownish Great Grey Shrikes *Lanius excubitor*, collected in eastern Europe (left), and three Northern Shrikes *Lanius borealis sibiricus*. Note the broader white markings in the tertials and the broad (and obviously brownish) pale tips to the greater coverts in *sibiricus*.

Bill colour

Among the three taxa, *sibiricus* has the palest bill, with c. 40% of birds examined showing a largely pale bill-base that reaches as far as the culmen. This pattern is rare in *excubitor* and especially so in *borealis*, where only 4% (2 of 45) of the birds showed an extensively pale bill-base that reached the culmen (table 1, plates 94–99).

Upperparts

The upperparts of *sibiricus* and *borealis* are typically browner than those of *excubitor*, which only rarely shows a brown tinge to the mantle and crown. Furthermore, *sibiricus* often appears paler than *borealis*, but all three taxa can have similar upperpart coloration (table 1, plates 100–105).

106.

Aleksi Lehikoinen/ZM St Petersburg

107.

Aleksi Lehikoinen/NHM Tring

108.

Aleksi Lehikoinen/NHM Tring

109.

Aleksi Lehikoinen/NHM Tring

Rump

The rump of *sibiricus* is typically white, contrasting clearly with the brownish-grey upperparts. Up to 25% of the *sibiricus* examined showed some grey in the rump, but no *sibiricus* showed a rump colour that matched the back colour. In contrast, a concolorous rump and mantle is typical in *excubitor*. The typical rump colour of *borealis* lay between that of *sibiricus* and *excubitor*, most frequently being pale grey or brown, although birds with white and grey/brown rumps were not uncommon (table 1, plates 100–104).

Uppertail-coverts

One of the most consistent plumage differences between *excubitor* and Northern Shrike was in the longest uppertail-coverts. About one-third of *sibiricus* and *borealis* showed obvious dark barring in the uppertail-coverts (plate 104), while in *excubitor* these feathers were almost always unmarked or so weakly marked that the barring would be almost impossible to see in the field (plate 100). Only one of 100 *excubitor* specimens examined showed obvious markings in the uppertail-coverts. However, faint markings, visible only in the hand, are not uncommon in *excubitor* (table 1, plates 100–104). Around one-fifth of *sibiricus* and *borealis* examined had unmarked uppertail-coverts. It is unclear whether barred uppertail-coverts may in some cases be retained juvenile feathers. However, based on all examined museum specimens, all three taxa have moulted their juvenile belly and breast feathers into first-winter plumage by September.

106–109 opposite. Both first-winter Northern Shrikes *Lanius borealis* (106–108) and first-winter Great Grey Shrikes *L. e. excubitor* (109) can be strongly barred from breast to belly. However, clearly marked longest undertail-coverts were observed only in specimens of *sibiricus* (106) and *borealis* (107 & 108). In *sibiricus* and especially *borealis* there is on average less white in the outermost tail feathers than in *excubitor*, which is why a 'dark gap' between the longest undertail-coverts and the white tip of the outermost tail feather is more common in Northern Shrikes (106 & 107) than Great Grey Shrikes.

Undertail-coverts

About one-third of *sibiricus* and *borealis* showed obvious dark subterminal markings in the longest undertail-coverts that would be visible in the field. None of the *excubitor* specimens examined had similarly prominent undertail-covert markings, but weak markings were found in some.

Breast and belly

The breast and belly barring appears, on average, stronger and more pronounced in *sibiricus* and especially in *borealis*, compared with *excubitor*. Northern Shrikes (at least of the subspecies *sibiricus* and *borealis*) never show unbarred underparts and even weak barring is uncommon, whereas this is typical for *excubitor*. Yet some *excubitor* can show strongly barred underparts, approaching *sibiricus* in their prominence (table 1, plates 105–109).

Tail

The pattern of white in the outermost tail feathers differs between taxa. This study found that the extent of white was smallest in *borealis* and most extensive in *excubitor*, but also found a high degree of variation. The amount of white in the tail pattern of *sibiricus* fell between that of *borealis* and *excubitor* (table 1, plates 110–113).

Seven of 100 *excubitor* specimens showed an entirely white outermost tail feather, whereas this occurred in only one first-winter *sibiricus* (out of 85 individuals of all ages examined). The amount of white in the spread tail can be estimated from good photographs in the field (plates 110–113). Alternatively, in a perched bird the amount of black in the (inner web of the) outermost tail feather (T6) can be estimated by the extension beyond the undertail-coverts. This study found that in 58% of first-winter *borealis* (n=45), the minimum extent of black in T6 lay close to or beyond (by up to 14 mm) the tip of the longest undertail-coverts (plates 90 & 107). The same was observed in 23% of first-winter *sibiricus* (n=63), but only in 7% of *excubitor* (n=100) (table 1, plates 106–109).


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110.


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111.


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112.


Aleksi Lehikoinen/FMNH Helsinki

113.

110–113. Variation in the amount of white in the outermost tail feathers of Northern Shrike *Lanius borealis* (110–112) and Great Grey Shrike *L. e. excubitor* (113). On average, nominate *borealis* (110 & 111) has the least amount of white compared with *L. b. sibiricus* and *excubitor*. An almost fully white outermost tail feather is very rare in *sibiricus* (112), but not uncommon in *excubitor* (113). The amount of white in the second outermost tail feather (T5, measured from the tip along the rachis to the point where the dark area expands from the rachis) is 14 mm, 21 mm, 31 mm and 37 mm, respectively.

Wing pattern

On average, *excubitor* has the broadest white primary patch, with 87% (n=86) of the examined birds also showing white in the base of the secondaries. White markings in the secondaries occurred in 48% of *sibiricus* (n=63), but the extent of white was typically very restricted and visible only in the hand or in good-quality flight photographs. White secondary markings were lacking in *borealis*; only one of 45 specimens showed 2 mm of white at the base of one secondary, which would not be visible in the field. In addition, the white bases to the primaries were typically more restricted in *borealis* than in other taxa (table 1, plates 100–105).

Tertials and greater coverts

Although *excubitor* shows the greatest amount of white in the flight feathers, it also shows the most restricted pale tips to the tertials and unmoulted greater coverts. This study found that, on average, *sibiricus* showed more white in the tertials and greater coverts than *excubitor* and *borealis* (table 1, plates 100–105). The extent of the pale tips to the tertials and

greater coverts was positively correlated in *sibiricus*, but this relationship was not found in either *borealis* or *excubitor*. These pale tips are most prominent in autumn, when the plumage is fresh. Note also that pale tips to the juvenile greater coverts in Northern Shrike (and also sometimes in *excubitor*) are often brownish and barred (plates 103–104).

Combination of plumage characters

All characters examined showed variation within and between the three taxa and no single character was diagnostic. When used in combination, however, these features were helpful in determining the taxon involved. A scoring system was developed where each of the 12 characters above was ranked on a scale of 0–2, increasing in increments of 0.5, where *excubitor*-type characteristics received the lowest score and *borealis*/*sibiricus*-type characters the highest score (table 2). The sum of scores thus ranges between 0 and 24, which enabled an objective comparison of the characters between taxa to be made.

The mean score for *excubitor* was 6.3 ± 2.8 SD, and this compared with *borealis* (mean 14.4 ± 3.1) and *sibiricus* (15.1 ± 3.0); the scores did not differ significantly between the two subspecies of Northern Shrike examined (fig. 2). Scores in the range 7–12 were overlapping and this study found that at least 25% of Northern Shrike specimens could not be separated from *excubitor* based on plumage characters and bill colour alone. Furthermore, variation could be greater than that recorded here and the range of overlap larger, especially where the breeding ranges of *excubitor* and *sibiricus* meet and where hybridisation reportedly occurs (see Panov 2011).

The scored *excubitor* specimens were divided into three groups, based on the geographical region where they were collected: (i) **western Europe** – UK (n=6), Germany (12), Italy (1); (ii) **northern Europe** – Sweden (n=2), Norway (1), Finland (27); and (iii) **eastern Europe and western Asia** – Kazakhstan (n=1), Ukraine (2), Russia (40), Turkey (3), Turkmenistan (3). Scores increased from west to east: in western Europe the mean score was 3.8 (± 2.3 SD, range 1–10, n=19), northern Europe 5.7 (± 1.3 SD, range 4–8, n=30) and eastern Europe and western Asia 7.7 (± 2.7 SD, range 2–12, n=49); Kruskal-Wallis test between all three groups $P<0.001$; fig. 2.

The collection localities of many of the *sibiricus* specimens were often vague and few came from the western part of the range. It was found that the mean score was slightly, but not significantly smaller for *sibiricus* collected from the western part of the range (eastern Kazakhstan, Kyrgyzstan and western Siberia east to Krasnoyarsk), where the mean score was 14.1 (± 3.6 SD, n=13); this compared with birds from farther east with a mean score of 15.3 (± 2.8 SD, n=50); Kruskal-Wallis test, P=0.43). We can be confident that these

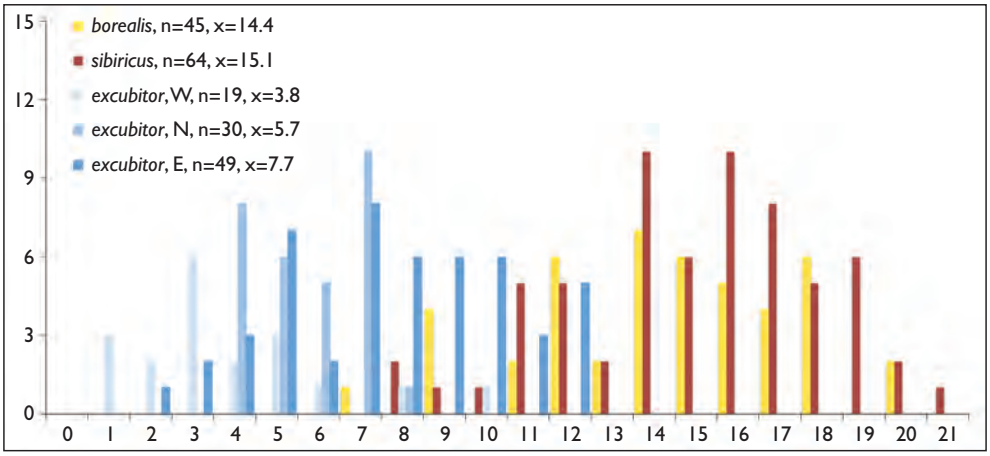

Fig. 2. Distribution of the sum of scores from multivariate analysis of museum specimens of Northern Shrike *Lanius borealis* (subspecies *L. b. borealis* and *L. b. sibiricus*) and nominate Great Grey Shrike *L. e. excubitor*. Scores for *excubitor* are divided into three geographical regions (W=western Europe; N=northern Europe; E=eastern Europe and western Asia). x=mean sum of scores, n=sample size.

specimens are *L. b. sibiricus* rather than subspecies *mollis* or *funereus*, however, since the last two taxa are quite different in overall colour from *sibiricus*, being much browner.

Scoring the European records of Northern Shrike

This scoring system can be applied to well-documented records in northern Europe that potentially relate to Northern Shrike. If characters fall between the guidelines, intermediate values of scores can be applied (i.e. by adding or subtracting 0.5). If a particular character is not sufficiently well documented, a score of zero should be applied. Hence, better documentation can increase the score of an individual bird. It is important to reiterate that this is a system for scoring a bird as 'Northern Shrike or not' – a poorly seen putative Northern, with a series of zero scores, should be regarded as not proven rather than as a Great Grey Shrike.

The accepted records of *sibiricus* from Norway and Finland, which have been supported by mtDNA, both scored 17 (plates 90–93), and thus higher than the range of *excubitor* specimens in this study. The Finnish bird showed narrow white bases to the secondaries, which is not uncommon for *sibiricus*, but is not documented in *borealis* (plate 93).

Six other claims from Finland were scored 10, 12, 12, 15, 16 and 16 (table 3). The birds scoring 10 and 12 fell within the overlap zone with *excubitor* but also had the poorest documentation. However, at least two of these birds showed some characters that were at odds with *sibiricus*, including an entirely white outermost tail feather or rather broad white markings in the secondaries – characters which occur more commonly in *excubitor* (plates 114 & 115). The Finnish bird from Mäntyharju in 2011, with a score of 16, displayed several characters, including pale lores and mask, brown back, strongly barred underparts, white rump and obvious barring on the uppertail- and undertail-coverts, which are rare or very rare in *excubitor* (plate 116). Likewise, the bird from Eurajoki in 2014 showed several characters typical of *sibiricus* and was scored 15 (table 1, plate 117).

A bird trapped at Ventes Ragas Ornithological Station, Lithuania, on 3rd December 2019 was scored 18, well within the range of Northern Shrike. This identification was supported by DNA analysis of a partial sequence of mitochondrial cytochrome b. This showed that it was a 99.76–100% match with *sibiricus* from South Korea, Russia and China (Eigirdas & Jonike 2020; plates 118–120).

Although the scoring system appeared to work well, an important stumbling block was an anomalous result from a bird in Öland, Sweden, on 30th–31st October 2017. This showed many characters supporting the identification as Northern Shrike and was scored 18 (plate 121), well within the range of *sibiricus*. However, mtDNA derived from a pellet and from faeces was collected and separate analyses of the samples established that the maternal line of the bird was derived from *excubitor*.

Jorma Tenovuo

Juha Laaksonen

114 & 115. Unidentified first-winter shrike, either Great Grey *Lanius excubitor* or Northern *L. borealis sibiricus*, Parainen, Finland, 30th October 2009. This bird has many characters pointing to Northern Shrike, including barred underparts, brownish upperparts, a rather faint mask and broad white tips to the tertials. However, broad white bases to the secondaries (visible in the open wing) and a completely white outermost tail feather are not good signs for *sibiricus*.

In general, putative Northern Shrikes in northern Europe have occurred in late autumn (from late October onwards) or winter (table 3). Even though *excubitor* overwinters in the Nordic countries, the claims of Northern Shrike from migration sites were later than the main migration period of *excubitor* in southern Finland; for example, the median passage period for *excubitor* at Hanko Bird Observatory is at the beginning of October (Hanko Bird Observatory 2019). These late-autumn dates match the occurrence of many vagrants from eastern Asia, which could potentially also include *sibiricus*.

The bird on Corvo in October 2014 (see above; plate 124) scored 13; although this is only just beyond the overlap zone with *excubitor*, several characters – including the pale base to the dark bill, small white patch at the base of the primaries, restricted white in the outermost tail feather and tertials – support the identification as *borealis* (as well as the location and the supporting cast of other American vagrants). Furthermore, *excubitor* from western Europe (the most likely alternative origin) score lower than those farther east; such a high-scoring bird on the Azores is highly unlikely to have originated from western Europe.

Table 3. Multivariate scoring of accepted and claimed Northern Shrike *Lanius borealis* observations in northern Europe and the Azores, using criteria set out in table 2. Note that the seven museum specimens collected in Ukraine that resembled *sibiricus* based on multivariate analyses of measured plumage characters (Tajkova & Red'kin 2014) have not been examined or scored, and are excluded from this review.

Location	Date	Score	Additional information
Identification accepted			
Norway Hamar, Hedmark	5th November 1881	17	Museum specimen in Oslo. mtDNA analysis confirmed *L. b. sibiricus*
Norway Hamar, Hedmark	17th October 1891	?	Location of specimen unknown
Finland Seurasaari, Helsinki	6th December 2009 to 13th January 2010	17	mtDNA analysis confirmed *L. b. sibiricus*
Portugal Corvo, Azores	18th–30th October 2014	13	No DNA analysis. Accepted *L. b. borealis* by Portuguese Rarities Committee
Lithuania Ventes Ragas	3rd December 2019	18	mtDNA analysis confirmed *L. b. sibiricus*
Claims			
The Netherlands	25th November 1909	13	Specimen in National Museum of Natural History, Leiden. No DNA analysis, scoring based on pictures at http://www.martinbrandsma.nl/
Finland Kärsämäki–Oriketo–Koroinen, Turku	1st February to 22nd March 2000	12	No DNA analysis. Formerly accepted, found not proven after review
Finland Utö, Parainen	30th October to 8th November 2009	12	No DNA analysis, thus not proven
Finland Kinni–Varpanen, Mäntyharju	30th January to 13th March 2011	16	No DNA analysis, thus not proven
Finland Böle, Kirkkonummi	27th January to 23rd February 2013	10	No DNA analysis, thus not proven
Finland Säppi, Eurajoki	17th November 2014	15	No DNA analysis, thus not proven
Sweden Öland, Stenbo udde	30th–31st October 2017	18	*L. e. excubitor* by mtDNA analysis
Finland Hanko, Täktom	22nd–25th January 2020	16	No DNA analysis, thus not proven

Jouni Sidorow

116. Unidentified first-winter shrike (Great Grey *Lanius excubitor* or Northern *L. borealis*), Mäntyharju, Finland, 31st January 2011. This bird resembles Northern Shrike: note brownish upperparts, faint mask and also barred uppertail- and undertail-coverts.

Tapani Lilja

117. Unidentified first-winter shrike (Great Grey *Lanius excubitor* or Northern *L. borealis*), Eurajoki, Finland, 17th November 2014. Characters suggestive of Northern Shrike include the faint mask, dark secondaries, pale rump, broad white tips to the tertials and rather restricted white in the outermost tail feathers.

Vytautas Eigirdas

118–120. First-winter Northern Shrike *Lanius borealis sibiricus*, Ventes Ragas Ornithological Station, Lithuania, 3rd December 2019. The identification of this bird as *sibiricus* was supported by mtDNA analysis.

Vytautas Eigirdas

Vytautas Eigirdas

121. Unidentified first-winter shrike (Great Grey *Lanius excubitor* or Northern *L. borealis*), Öland, Sweden, 30th–31st October 2017. This bird had mtDNA of Great Grey Shrike, but plumage that strongly resembled Northern Shrike, including a faint mask, brownish upperparts, weak primary patch, strongly marked underparts, uppertail- and undertail-coverts.

Ulf Gustafsson

Stephen Menzie/Falsterbo Fågelstation

Stephen Menzie/Falsterbo Fågelstation

122 & 123. First-winter Great Grey Shrike *Lanius excubitor*, Falsterbo, Sweden, 8th November 2020. This bird, one of the latest ever to be ringed at Falsterbo, showed a number of characters suggestive of Northern Shrike such as the brownish hue to the upperparts, moderate barring below, relatively weak mask in front of the eye, extensive pale base to the bill and a tail pattern more in line with *sibiricus* than *excubitor*. A number of retained juvenile uppertail-coverts showed moderate barring. The grey rump, visible white at the base of the secondaries, limited white in the tertials and greater coverts, and relatively large primary patch were, however, more suggestive of Great Grey Shrike. It scored 10.5 using the scoring system in table 2, within the overlap between *sibiricus* and *excubitor*. Genetic analysis showed it had mtDNA of Great Grey Shrike.

David Monticelli

124. First-winter Northern Shrike *Lanius b. borealis*, Corvo, Azores, 18th–30th October 2014. Characters that support the identification as nominate *borealis* are the limited white in the tertial tips and at the base of the primaries, the clear 'dark gap' between the white undertail-coverts and white in the outermost tail feather and a rather dark bill.

Nicole Richardson

125. Northern Shrike *Lanius b. borealis*, Ontario, Canada, 18th February 2019. This bird emphasises that not all first-winter nominate *borealis* are as distinctive as the Corvo bird in plate 124. Post-juvenile moult occurs on the wintering grounds (Pyle 1997) but the extent is variable and it is not uncommon to find first-winter birds which appear more adult-like. This bird has replaced all its greater coverts and much of the body contour feathering in the post-juvenile moult (but not its tertials and remiges). Using the scoring system outlined in the text it would score seven and would most likely pass for a Great Grey Shrike *L. excubitor* in the field in Europe, where a DNA sample might be the only answer to a correct ID.

Conclusions

The scoring system outlined in this paper confirms the clear average differences between *borealis* and *sibiricus* Northern Shrikes, and nominate Great Grey Shrike. The scoring system and characters presented here should help to identify potential Northern Shrike candidates outside their normal range. However, owing to the anomalous Swedish record described, the Finnish Rarities Committee has opted for a cautious approach, and will accept only those records which are supported by DNA evidence. This Swedish record, along with two Finnish records with intermediate characters, raises the possibility that these birds originate from a region in northern Siberia where *sibiricus* and *excubitor* may occur sympatrically (Lefranc & Worfolk 1997). The next step to a better understanding of the identification and variation in plumage characteristics of *sibiricus* and *excubitor* would require both nuclear and mitochondrial DNA data of birds from eastern Europe to Siberia, which would help to determine the frequency and extent of hybridisation. Since these shrikes occur at low density and are difficult to trap, use of museum specimens could be the easiest way to achieve this.

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References

BirdLife International. 2019. *Handbook of the Birds of the World and BirdLife International Digital Checklist of the Birds of the World* Version 4. [Retrieved from http://datazone.birdlife.org/species/taxonomy on 14th October 2020]

van Duivendijk, N. 2010. *Advanced Bird ID Handbook*. New Holland, London.

Eigirdas, V., & Jonike, V. 2020. The first record of the Siberian Northern Shrike (*Lanius borealis sibiricus*) in Lithuania with molecular confirmation. *Biologija* 66(1): 21–26.

Gill, F., & Donsker, D. (eds.) 2020. *IOC World Bird List (v 10.2)*. http://www.worldbirdnames.org

Hanko Bird Observatory. 2019. *Occurrence of Species at the Observatory*. Version 1.1. [Retrieved from https://haahka.halias.fi on 29th December 2019]

Hansen, J. S. 2018. Northern Shrike on Corvo: new to the Azores and the Western Palearctic. *The Azores Rare and Scarce Bird Report 2014*: 65–66.

Lefranc, N., & Worfolk, T. 1997. *Shrikes: a guide to the shrikes of the world*. Pica Press, Sussex.

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. *Molecular Phylogenetics and Evolution* 55: 347–357. https://doi.org/10.1016/j.ympev.2009.11.010

Panov, E. N. 2011. *The True Shrikes (Laniidae) of the World: ecology, behavior and evolution*. Pensoft Publishers, Sofia and Moscow.

Paruk, J. D., Cade, T. J., Atkinson, E. C., Pyle, P., & Patten, M. A. 2020. Northern Shrike (*Lanius borealis*), version 1.0. In: Billerman, S. M. (ed.), *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.norshr4.01

Perttula, P., & Tenovuo, J. 2002. Great Grey Shrike subspecies *excubitor, sibiricus* and *borealis*. *Alula* 8(2): 54–60.

Pyle, P. 1997. *Identification Guide to North American Birds*. Part 1. Slate Creek Press, California.

Tajkova, S. U., & Red'kin, A. A. 2014. The Northern Shrike *Lanius borealis sibiricus* Bogdanov, 1881 (Aves: Laniidae) in Ukraine: a taxonomic assessment. *J. Nat. Mus. (Prague), Natural History Series* 183(8): 89–107.

Shirihai, H., & Svensson, L. 2018. *Handbook of Western Palearctic Birds*. Vol. 2. Helm, London.

Svensson, L. 1992. *Identification Guide to European Passerines*. 4th edn. Privately published, Stockholm.

Väisänen, R., *et al.* 2020. Rare birds in Finland in 2019. *Linnut-vuosikirja* 2019: 106–121 (In Finnish with English summary.)

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