

SHORT COMMUNICATION

Received 7 April 2022 | Revised 16 June 2022 and 13 July 2022 | Accepted 15 September 2022
 Editor: Murielle Ålund

Two Eurasian Blue Tits *Cyanistes caeruleus* roosting together in a nest-box on multiple winter nights

Gemensam övernattning i en fågelholk under flera vinternätter noterad för blåmes Cyanistes caeruleus

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BIRDS THAT SPEND the winter in a harsh and cold climate face a suite of challenges that require optimization of energy expenditure and energy intake. Some birds roost communally, which can increase energy savings during cold winter nights. However, this behaviour is almost completely absent in chickadees, tits, and titmice (Paridae) as there are very few accounts in the literature of parids roosting together. Here I review these accounts and describe an observation where two Eurasian Blue Tits *Cyanistes caeruleus* were found roosting together in a nest-box on multiple winter nights in January 2021.

Keywords: communal roosting | cavity | sleep | night roost | parid

Introduction

Birds that overwinter at high latitudes face several challenges that they need to deal with to survive. Temperatures can be low, which increases the energetic cost of keeping body temperature constant. Days

are short, with limited time available for foraging and snow may cover the ground, making foraging even more difficult. In addition, the need to forage intensively during the few hours of daylight also increases the

Citation: Andreasson F. 2024. Two Eurasian Blue Tits *Cyanistes caeruleus* roosting together in a nest-box on multiple winter nights. *Ornis Svecica* 34: 56–63. <https://doi.org/10.34080/os.v34.24041>. **Copyright:** © 2024 the author(s). This is an open access article distributed under the **CC BY 4.0 license**, which allows unrestricted use and redistribution, provided that the original author(s) and source are credited.

risk of being depredated. This situation is especially difficult for small birds, disadvantaged by a high surface area to volume ratio, losing relatively more heat compared to larger birds. This model system, focusing on the trade-off between death from predation and starvation in such birds, is sometimes called “the little bird in winter” and is well studied both empirically and by theoretical modelling (Brodin 2007 for a review of such models).

Thus, a small bird in a harsh and cold climate needs to eat enough to ensure overnight survival while minimizing energy loss and predation risk. Some species enter shallow hypothermia during the night (examples from Eurasian Blue Tits *Cyanistes caeruleus*: Nord *et al.* 2009, 2011, Andreasson *et al.* 2019, 2020), which reduces the temperature gradient between the body and surrounding air, thereby saving energy. Small birds can also reduce heat loss by optimizing their sleeping posture and keeping poorly insulated parts of the body covered (Steen 1958, Hill *et al.* 1980). Fluffing up body feathers (ptilorection) also increases the insulatory capacity of the feather coat (Steen 1958, Hill *et al.* 1980, Hohtola *et al.* 1980), thereby reducing heat loss.

However, there are also behavioural adaptations that can help optimize the daily energy budget. Birds may use sheltered roosting sites to take refuge from wind and precipitation. Many parids roost in natural and artificial cavities, or in dense foliage or other sheltered spots (Perrins 1979). Some Northern species, such as Willow Tits *Poecile montanus* (Zonov 1967, Haftorn 1972), Common Redpolls *Acanthis flammea* (Sulkava 1968) and Siberian Tits *Poecile cinctus* (Korhonen 1981) make use of snow cavities but also Great Tits *Parus major* can do so occasionally (Zonov 1967, Helle 1980, Jarska & Wysocki 2012). Roosting in a natural cavity or a nest-box offers protection from wind and precipitation but also reduces the radiative cooling on clear nights. Thus, these roosting sites can provide a more beneficial thermal microclimate compared to open sites (Cooper 1999) and reduce heat loss considerably (Mayer *et al.* 1982). Cavity roosting can, for example, lead to energy savings overnight of 25 and 38 % as shown respectively for Juniper Titmice *Baeolophus ridgwayi* and Mountain Chickadees *Poecile gambeli* (Cooper 1999).

Some species make use of communal roosting, i.e. individuals aggregate together during roosting. In

functional terms, communal roosting is a wide concept that could include everything from the thousands of Rooks *Corvus frugilegus* and Jackdaws *Corvus monedula* that may roost together in groups (Coombs 1961) to a small number of Long-tailed Tits *Aegithalos caudatus* huddled together on a branch during the night (Hatchwell *et al.* 2009). This latter type of huddling behaviour increases the total volume of the huddled individuals and, together with the fact that each individual exposes less of its body surface to the colder surroundings, decreases heat loss. Such communal huddling behaviour can reduce energy expenditure overnight by up to 30% (example from Green Woodhoopoes *Phoeniculus porphyreus*: Du Plessis & Williams 1994). Communal roosting does not only convey energetic benefits, but it can also reduce individual predation risk (Weatherhead 1983, Eiserer 1984) and has been suggested to facilitate efficiency of upcoming foraging trips for birds that feed in flocks (discussion in Richner & Heeb 1995). Communal roosting is therefore more common in flocking species but also present in non-flocking species (Beauchamp 1999), where it presumably is maintained by the thermoregulatory benefits it provides. Examples of European passerine species (Passeriformes) that roost communally include the previously mentioned Long-tailed Tit but also Eurasian Wrens *Troglodytes troglodytes* (Haynes 1980, Bosch 2014), House Sparrows *Passer domesticus* (Janousek *et al.* 2014), Tree Sparrows *Passer montanus* (Pinowski *et al.* 2008) and Short-toed Treecreepers *Certhia brachydactyla* (Löhr 1955). Parids are, however, considered to roost solitarily (Perrins 1979, Beauchamp 1999) although Tufted Titmice *Baeolophus bicolor* have been reported to roost in pairs (Janousek *et al.* 2014) and Coal Tits *Periparus ater melanolophus* in the Himalayas have been seen roosting in groups in trees (Gaston 1979).

Communal roosting and cavity roosting can both entail significant energy savings but are not mutually exclusive. Some species make use of both energy saving strategies simultaneously, the most known examples being Green Woodhoopoes (Du Plessis & Williams 1994), Pygmy Nuthatches *Sitta pygmaea* (Knorr 1957, Sydeman & Güntert 1983) and Acorn Woodpeckers *Melanerpes formicivorus* (Du Plessis *et al.* 1994) but also Eastern Bluebirds *Sialia sialis* have been reported to do so in inclement weather (Frazier & Nolan 1959, Zeleny 1977).

In this paper I report a rare case of Eurasian Blue Tits observed roosting together, and I start by reviewing the literature of previous such cases described in parids.

Accounts in literature of parids roosting together

Considering the number of ornithologists and researchers that routinely check nest-boxes for roosting parids during winter and the lack of reports on communal roosting, it is probably safe to say that communal roosting is exceptionally uncommon in these species. For example, a German study that monitored winter roosting in nest-boxes from 1969 to 1975 found that out of 13,095 Great Tits and 1,379 Eurasian Blue Tits that slept in nest-boxes, none roosted together with another bird (Winkel & Hudde 1988). This aligns well with my own experience, having never encountered neither Great Tits nor Eurasian Blue Tits roosting together with another bird during winter in the south of Sweden. Neither have any of my colleagues during thousands of nest-box checks during multiple winters.

However, despite its rarity, there are some accounts in the literature of parids roosting together:

- One of the most detailed reports of parids roosting together comes from Einert (1973) in Rabenau, Germany. In February/March 1970 and 1971 two Eurasian Blue Tits were observed roosting together on eight and 25 occasions, respectively. The report does not specify if the records from different years were made on the same individual birds. During five of the days in 1971, the nest-box was equipped with a device that registered entrances into the nest-box and the time between the two birds arriving to roost was between one and 12 minutes. The roostings were associated with heavy snowfall or large drops in ambient temperature.
- Zonov (1967) reported two Great Tits roosting together in a natural tree cavity in an area around Lake Baikal, Russia.
- Blume (1951) reported two Great Tits roosting together in a natural cavity in an apple tree in Gladenbach, Germany.
- Tyller (2009) reported that, during regular winter checks in November 2007, on a single night, a

Great Tit was found roosting together with a Eurasian Nuthatch *Sitta europaea* in a nest-box near Grygov, Czech Republic.

- Isenmann (1987) found on a single night in February, a male and a female Eurasian Blue Tit roosting together in a nest-box in Montpellier, France. The two tits were ringed and had bred successfully together in the same nest-box in the preceding breeding season. In the coming breeding season, they once again bred together, but in another adjacent nest-box.
- Martin (1938) observed a single nest-box in St Leonards, UK, in December 1937 and January 1938 and noticed that in addition to the Eurasian Blue Tit that used the nest-box for roosting, another Eurasian Blue Tit also entered (and stayed in) the nest-box on two occasions. These observations were, as far as I can understand, made from inside a building and at a distance, which possibly reduces reliability somewhat.
- Loery & Nichols (1985) report that Black-capped Chickadees *Poecile atricapillus* have been observed in communal roosts, but this is based on a second-hand information, again perhaps decreasing reliability to some extent.

Observation of two Eurasian Blue Tits roosting together

In December 2020, I put up 50 wooden nest-boxes in Furulund, Kävlinge municipality, Sweden (55°46'N, 13°4'E). The boxes were spread out around a small pond in a recreational area with coniferous and mixed forest patches surrounded by farmland and residential areas (Figure 1).

Quite a few boxes were quickly taken as roosting sites by both Great and Eurasian Blue Tits and, in the spring of 2021, there were 17 Great Tit pairs and 12 Eurasian Blue Tit pairs breeding in the nest-boxes. During a night-check on 26 January 2021, I found two Eurasian Blue Tits roosting together in one of the nest-boxes. I checked the nest-box also on 28 and 30 January and the tits were still roosting together on both occasions (Figure 2).

I ringed the birds on 31 January, at which time I also took biometric measurements of both birds. Neither bird was ringed from before and both were males in their

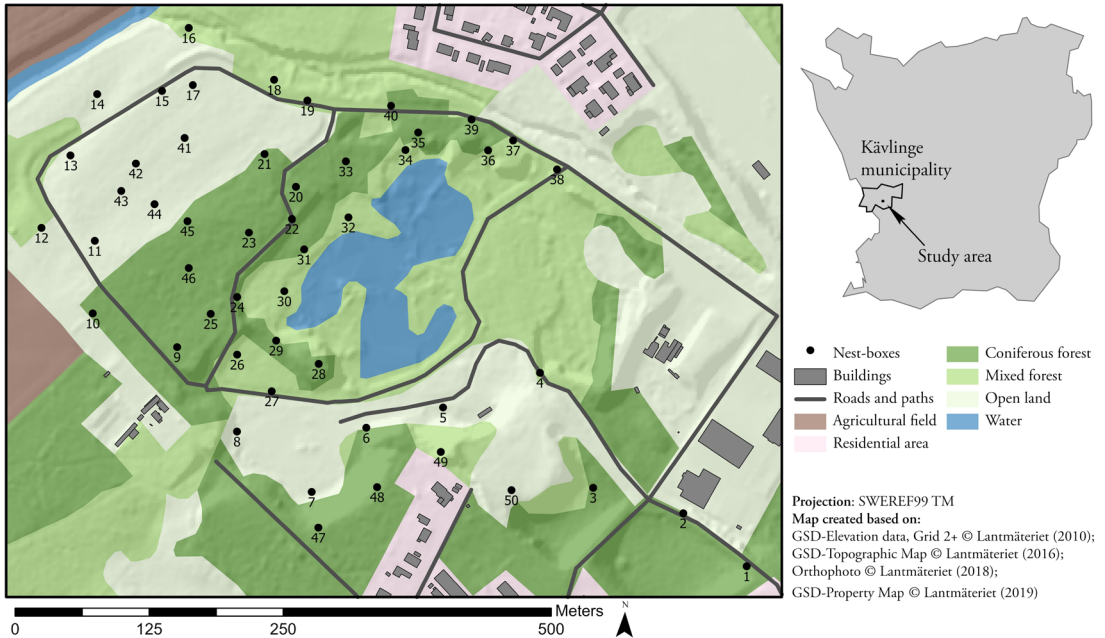


FIGURE 1. Map of the nest-box population. Box number 37 is where the Eurasian Blue Tits *Cyanistes caeruleus* were found roosting together. – Översiktskarta över holkpopulationen. De två blåmesarna *Cyanistes caeruleus* påträffades i holk 37.

second winter or older (i.e. 3CY+). They had a body mass of 11.5 and 12.5 g, respectively (mean body mass of ringed Eurasian Blue Tits in the population during the winter of 2021: $n=15$; mean body mass=12.1 g; standard deviation=0.6 g).

After ringing I returned on 7 and 11 February and found, on both occasions, only one of the Eurasian Blue Tits roosting in the nest-box. The other Eurasian Blue Tit was not found in adjacent nest-boxes. The bird that departed after ringing had a small featherless patch under the eye (visible as a small dark patch under the eye in [Figure 2](#)) but was otherwise in good condition. Eurasian Blue Tits and Great Tits have both been reported to engage in fights to the death over favourable roosting spots ([Typiak & Typiak 2018](#)). It is difficult to establish with certainty, but I do not think that the patch was a result of a clash in the box between the two, as there were no other signs of injury and nothing else to suggest that the two birds had been involved in a physical confrontation (i.e. feathers or blood in the nest-box).

The pictures in [Figure 2](#) were taken after the nest-box was opened so the birds had had time to change position, but both birds had body feathers erected (ptilorection) on all observations, indicating that

they had been resting or sleeping and were well settled before my arrival. Neither of the Eurasian Blue Tits were recovered during the breeding seasons of 2021 and 2022, when the nest-box was instead occupied by a pair of breeding Great Tits (2021) and Eurasian Nuthatches (2022).

Discussion

From the literature and by the accumulated experience of ornithologists, ringers and researchers it is clear that parids roost, almost exclusively, solitarily. On the rare occasions when parids have been found roosting together in a nest-box it has never been more than two birds. Interestingly, one series of observations is tightly linked to inclement weather ([Einert 1973](#)) and another to a pair-bond where the roost was shared by a pair that bred together both the year before and after the observation ([Isenmann 1987](#)). The two Eurasian Blue Tits described here were both males, excluding any possibility of a heterosexual pair-bond. The weather during the nights when I observed this behaviour was nothing out of the ordinary: the mean minimum daily temperature from 26 to 31 January was -4.1°C (recorded by a

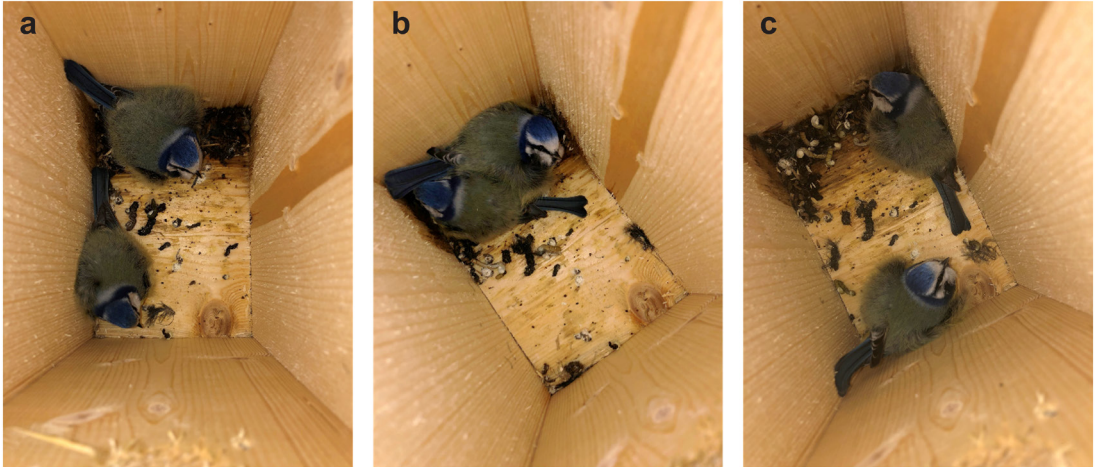


FIGURE 2. Two Eurasian Blue Tits *Cyanistes caeruleus* roosting together on (a) 26 January, (b) 28 January and (c) 30 January 2021. The bird with the dark patch is closest to the top of the photo in A and B and closest to the bottom in C.
 — Två blåmesar *Cyanistes caeruleus* övernattande i samma holk (a) 26 januari, (b) 28 januari och (c) 30 januari 2021. Blåmesen med den kala fläcken på kinden är fågeln högst upp i bild i A och B, men längst ner i C.

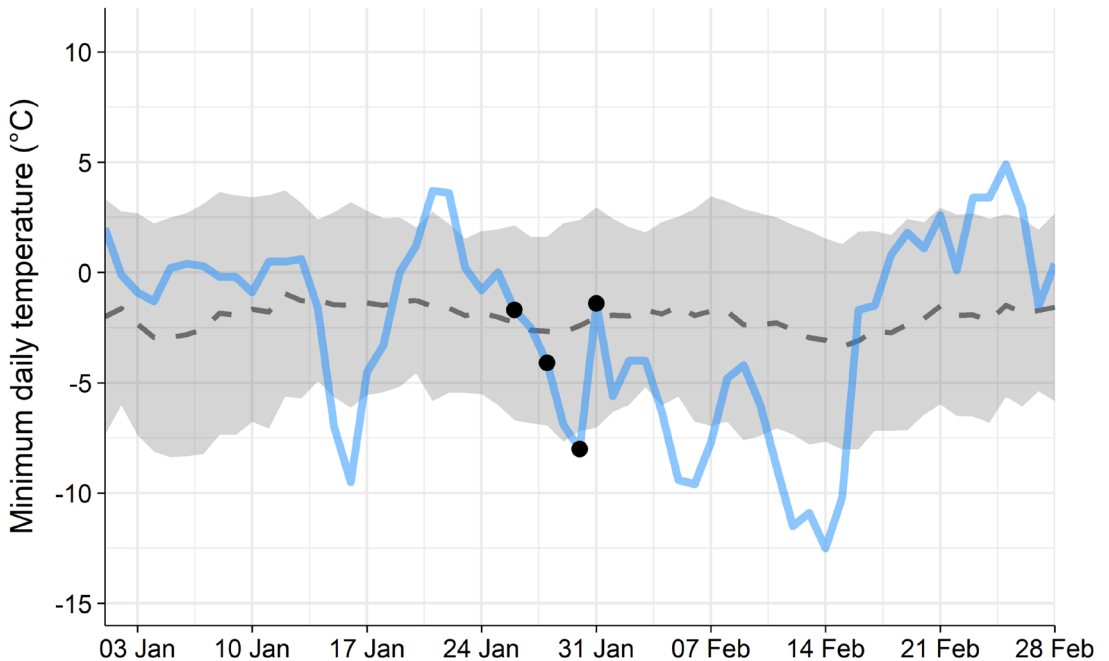


FIGURE 3. Minimum daily temperature in January and February of 2021 (blue solid line) and mean minimum daily temperature during the same period for all years from 1950 and onwards (grey dashed line with grey shading representing ± 1 SD), recorded by a weather station in Lund, approximately 13 km from the study site. Points indicate nights when the two Eurasian Blue Tits *Cyanistes caeruleus* were observed roosting together.
 — Lägsta dygnstemperatur under tiden januari-februari 2021 (blå heldragen linje) och medelvärde för lägsta dygnstemperatur under samma tidsperiod för alla år från 1950 och framåt (grå streckad linje, grå skuggning indikerar ± 1 standardavvikelse), mätt av en väderstation i Lund cirka 13 km från holkpopulationen. Punkterna visar nätterna då de två blåmesarna *Cyanistes caeruleus* observerades i samma holk.

weather station in Lund, Swedish Meteorological and Hydrological Institute, SMHI 2022; Figure 3). There was a slightly colder spell in mid-January (Figure 3) which, in theory, could have initiated this behaviour.

Given that some species from phylogenetically related families, like Long-tailed Tits and American Bushtits *Psaltriparus minimus*, roost huddled together (Smith 1972, Perrins 1979, Chaplin 1982, Hatchwell et al. 2009), it is intriguing to consider why this behaviour is practically absent in parids. Any explanation will, of course, be speculative but it is probably not too far-fetched to think that it could be related to the territoriality of these birds. Tits normally roost within their territory and therefore it seems logical that a bird roosting within its territory will not accept another bird roosting in the same spot (Perrins 1979), a spot that also will serve as a nest-site for the upcoming breeding season. European passerines that roost communally, e.g. Long-tailed Tits (Gaston 1973), House Sparrows (Summers-Smith 1988), Tree Sparrows (Summers-Smith 1988) and Short-toed Treecreepers (Osiejuk & Kuczyński 2000), are generally not territorial but the Eurasian Wren is a clear counterexample where males defend their territories year round (Armstrong 1956) but where individuals still may congregate within a territory in order to roost together during cold nights in winter.

It could also be that the costs associated with communal roosting in small cavities outweigh the benefits. Quality of sleep could decrease when there is a lot of disturbance in the roost (Bosch 2014) and transmission of pathogens and parasites can be facilitated (cf. Diuk-Wasser et al. 2010). In extreme cases, individuals can also die due to overcrowding if the cavity is too small for the number of roosting birds (Knorr 1957, Zeleny 1977) and individuals can get stuck while exiting the cavity (Stanback 1998).

My observation together with the previously reported instances of parids roosting together are exceptions to this rule and even though they may in some cases relate to weather (Einert 1973) or pair-bonds (Isenmann 1987) there is not currently sufficient data to draw any general conclusions from these anecdotal observations.

ACKNOWLEDGEMENTS

I would like to thank Kristaps Sokolovskis and Arne Hegemann for help with translation of original articles and Thomas Alerstam and Andreas Nord for their

comments on an initial draft of this communication. I would also like to thank two anonymous reviewers for their helpful and constructive comments.

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Svensk sammanfattning

Fåglar som övervintrar på nordliga breddgrader i ett kallt och ibland ogästvänligt klimat behöver hantera diverse utmaningar: dagarna är korta och marken är ibland täckt med snö, vilket försvårar födosökandet. Dessutom kan det vara kallt, vilket gör att mer energi går åt till att hålla kroppstemperaturen uppe – åtminstone nattetid då flygande och annan rörelse inte bidrar med någon värmeproduktion. Små fåglar är speciellt känsliga eftersom de har en stor yta i relation till sin volym vilket medför en större passiv värmeförlust. Kraven på ett ordentligt födointag för att säkerställa att energireserverna inte tar slut under natten kräver också att dessa fåglar födosöker stora delar av dagen, med en ökad preda-tionsrisk som följd.

Fåglar har flera olika anpassningar, såväl fysiologiska som beteendemässiga, för att hantera dessa energetiska och ekologiska avvägningar. En del mesar (Paridae) uppvisar hypotermi (sänkt kroppstemperatur) under natten, vilket minskar temperaturgradienten mellan fågeln och den omgivande luften. Därmed minskar värmeförlusten och fågeln sparar energi. Dessutom fluffar de ofta upp sina kroppsfjädrar, vilket skapar ett isolerande mellanlager som också minskar värmeförlusten.

Mesar övernattar ofta i holkar eller naturliga håligheter. Detta skyddar dem mot väder och vind och kan också medföra stora energibesparingar. I fågelvärlden finns det också många arter som övernattar tätt tillsammans, i större grupper, för att spara energi. Detta beteende återfinns extremt sällan hos mesar, trots att det kan ses hos relativt närbesläktade arter som stjärtmes *Aegithalos caudatus* och den nordamerikanska buskmesen *Psaltriparus minimus*.

I denna korta notis gör jag en litteraturgenomgång över de rapporter som finns rörande mesar som övernattat tillsammans med en annan fågel och beskriver ett tillfälle då två blåmesar *Cyanistes caeruleus* övernattat tillsammans, under flera nätter, i en holk i Furulund, Skåne.

Mesar som övernattar tillsammans vintertid, i samma hålighet, är en sällsynt förekomst. Med

reservation för att någon artikel undgått mig, så har mina försök att hitta observationer av detta i litteraturen renderat följande resultat: två observationer av två talgoxar *Parus major* som övernattade tillsammans i en naturlig hålighet i ett träd (Blume 1951, Zonov 1967), en talgoxe och en nötväcka *Sitta europaea* som övernattade tillsammans i en fågelholk (Tyller 2009), två blåmesar som övernattade tillsammans i en fågelholk (Isenmann 1987) samt två blåmesar som övernattade tillsammans i en fågelholk under upprepade nätter och förmodligen även under två vintrar (Einert 1973). Utöver detta finns det ytterligare en rapport rörande två blåmesar i en holk (Martin 1938) samt en rapport om amerikanska tallitor *Poecile atricapillus* (Loery and Nichols 1985), men där bedömer jag tillförlitligheten som lägre.

I december 2020 satte jag upp 50 fågelholkar i Furulund, Kävlinge kommun, runt en damm i ett ströv- och skogsområde med både rena barrskogsområden och blandad skog (figur 1). Den 26 januari 2021 upptäckte jag under en av mina nattliga kontroller av holkarna att två blåmesar övernattade tillsammans i samma holk. Jag återkom den 28 och 30 januari och fann återigen de två blåmesarna i samma holk. Den 31 januari ringmärkte jag båda fåglarna och när jag sedan återkom och kontrollerade holken 7 och 11 februari var endast en blåmes kvar. Blåmesen som valt en annan övernattningsplats (eller blivit byte för ett rovdjur) hade en liten, kal fläck utan fjädrar på kinden (synlig i figur 2) men var i övrigt i god kondition.

I ett utav de bäst dokumenterade fallen av två mesar som övernattat tillsammans (Einert 1973) noterade författaren också att dessa övernattningstillfällen sammanföll med kraftigt snöfall och kalla yttre temperaturer, men temperaturen under de dagar då jag observerade de två övernattande blåmesarna avvek inte nämnvärt ifrån temperaturen för den tiden på året (figur 3).

Av allt att döma verkar tidigare observationer, tillsammans med observationen som jag beskriver här, vara extremt sällsynta undantag till regeln att mesar aldrig övernattar tillsammans med andra fåglar.



Ornis Svecica (ISSN 2003-2633) is an open access, peer-reviewed scientific journal published in English and Swedish by BirdLife Sweden. It covers all aspects of ornithology, and welcomes contributions from scientists as well as non-professional ornithologists. Accepted articles are published at no charge to the authors. Read papers or make a submission at os.birdlife.se.

Ornis Svecica (ISSN 2003-2633) är en fritt tillgänglig granskad vetenskaplig tidskrift som ges ut på svenska och engelska av BirdLife Sverige. Den täcker ornitologins alla områden och välkomnar bidrag från såväl forskare som icke-professionella ornitologer. Accepterade uppsatser publiceras utan kostnad för författarna. Läs uppsatser eller skicka in ditt bidrag på os.birdlife.se.