Leucistic Blackbird (*Turdus merula*) observations from Slovakia: differences in occurrence frequencies between sexes, urban vs. non-urban habitats and across seasons

Pozorovania leucistov drozdov čiernych (Turdus merula) *na Slovensku: rozdiely vo frekvencii výskytu u pohlaví, v urbánnych vs. neurbánnych biotopoch a v ročných sezónach*

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Abstract. *Leucism or partial albinism is defined as insufficient production of pigment melanin indicated by normally pigmented eyes, but feather is white to pale brown and pale feather coloration may vary in extent, while some body parts e.g. beak, legs, skin may be normally pigmented. Using citizen science data from Slovak birding site (birding.sk, n = 16 leucists/233 total Blackbird records) and our own observations (n=19), we tested frequency of occurrence of leucism in Slovak Blackbird populations among sexes, habitats, seasons as well as the percentage extent of pale feather coloration. We separately analyzed citizen science and our own data set and found similar patterns. Four categories (0–25, 25–50, 50–75, 75–100%) of the extent of pale feather coloration were used in our analyses. Leucism was more frequent in males than females (73.3 vs 26.7%), all leucistic individual observations were from urban environments, and the observations during nonbreeding season were more frequent (88.6 vs 11.4%) than during breeding season. The most frequent extent of pale feather coloration was in the first category (0–25%), both in the internet records (75%) and in the whole sample (65.7%). Four leucistic males were observed for longer than one year in the same site, while two of them for more than three years. Our results are in line with published study and meta-analysis on a global scale. This is the first study and review on a leucism in a bird species from Slovakia.*

Key words: *bird aberrant coloration, habitats, seasons, urban habitats, Central Europe*

Introduction

Leucism or past term partial albinism is defined as insufficient production of pigment melanin so that affected individuals have normally pigmented eyes, but feather coloration is from white to pale brown and pale coloration may have various extent and other body parts may, but does not have to be normally colored, for instance, bill, tarsus, skin (Jasso 2006, Guay et al. 2012, Izquierdo et al. 2018). Albinism is caused by total loss of pigment melanin when these individuals has also red eyes (e.g. in our country found in bats, Kaňuch & Krištín 2003). Absence or insufficient

(deficiency) pigmentation (hypopigmentation) in animals is commonly caused by a mutation of gene that determines synthesis of enzyme tyrosinase that participate on synthesis of melanin (Lincoln et al. 1998). Mutations in minimum 18 different genes were identified in different types of albinism in humans (Fertl & Rosel 2018). According to van Grouw´s (2013) classification of aberrant white coloration of birds, we can define several types of white coloration that is related to mutation type or aging (e.g. progressive greying, sex mediated partial paling called ino). Because during common random observations in nature these differences in phenotype are not possible to distinguish by eye, we classify all pale color aberrations as a leucism, complete or partial, for objectives of our study (van Grouw 2018).

Albinism is relatively rare in birds in natural conditions and in Slovakia we have only several published records on occurrence of such individuals. Sládek (1962) described a specimen of a partial albino (in our terminology leucistic) Blackbird from the surrounding of the town Banská Štiavnica on 21. 1. 1960. Dravecký (1988) net-trapped a leucistic female of Savi´s Warbler (*Locustella luscinioides*) on Chymské fishponds near the city Košice in 1987. He also found its nests with five feathered nestlings, but anomalies in their coloration were not detected. Karlík & Veľký (2007) described observation of undetermined leucistic Great-spotted/Syrian Woodpecker (*Dendrocopos major/syriacus*) in garden in the Ružiná village. Turčoková & Chytil (2012) presented observation of albino Mallard (*Anas platyrhynchos*) in Levice ponds in Slovakia in the years 2009 – 2010, while they observed its breeding during the second year. Čanády (2010) described three specimens of albinotic birds of three species (Skylark *Alauda arvensis*, House Martin *Delichon urbicum* a Jackdaw *Coloeus monedula*) from the collections of the Faculty of Sciences of Pavol Jozef Šafárik University in Košice. Mikula et al. (2017) found 14 color aberrant individuals (progressive greying: 6, dilution: 4, ino: 2, albino: 1 (Barn Swallow *Hirundo rustica*), leucist: 1 (Redstart *Phoenicurus phoenicurus*)) out of 5047 bird specimens (251 species of 61 families) from Šariš Museum collections in Bardejov. AK observed leucistic House Sparrow (*Passer domesticus*) in the settlement Podborová in the Town of Zvolen from 31. 3. until 12. 5. 2023 and leucistic Hooded Crow *Corvus cornix* on 11. 2. 2024 in centre of Zvolen. A number of observations of leucistic birds of approximately eleven species is published in the Slovak website birding.sk.

Jasso (2006) summarized records of albinism in the Bohemia (Czechia) in the period 1834–2005 and presented 680 cases of 84 species out of which 371 were albinos and 309 partial albinos (leucists). Chytil (2019) analyzed data on 204 color aberrant Blackbirds that were obtained from a public survey, database of the Czech Ornithological Society and own observations from the Czech Republic. Out of this sample size, he used 131 records on analyses of an extent of aberrant coloration, occurrence frequency of sexes, habitat differences, and occurrence distributions among regions. Gross (1965) compiled 1847 records of albinism in 54 North American bird families and cited Sage´s work (1962 in Gross 1965) that compiled 3134 albinism records of British birds from 41 families. In fact, family Turdidae was the most frequently affected by this deviation in coloration. Van Grouw (2018) evaluated results of public survey „Abnormal Plumage Survey" organized by the British Trust for Ornithology (BTO) lasting five years (December 2011 till November 2016) in Great Britain. During this survey, 4350 records of more than 70 bird species were collected. The highest number of records were obtained on Blackbirds (more than 1588 ind. = 36.5%), House Sparrow, Jackdaw, and Hooded Crow. At least 1371 (90%) of 1516 selected records of aberrant Blackbirds were caused by progressive graying. Sex ratio in this sample was impossible to determine due to problems of sex identification of completely white individuals. Lepschi (1990) summarized published literature from Australia on this topic in the years 1986–1990 and presented 298 published cases of albinism from 87 (51.7%) Australian families and 95 (12.8%) species from the estimate of 740 species of Australian avifauna in that time. It is interesting to mention for our study that this aberration was very frequently

published in Blackbirds from Australia that contributed to a 5% of records together with other two bird species.

The objective of this study is to summarize observations of leucistic Blackbirds in Slovakia and test on the basis of published records from the internet site birding.sk and our own observations whether there is difference: (a) in occurrence frequency of leucistic Blackbirds between urban and non-urban environments, (b) in frequency of aberrant coloration between sexes, and (c) in occurrence frequency between breeding and nonbreeding seasons.

Material and methods

Our observations of leucistic Blackbirds are from towns Zvolen, Piešťany and Nitra. Observations were not systematically collected during years and do not have character of random sampling, yet are affected by our place of temporary residence and work. Each observation that is supported by photos and additional information is described by characteristics as follows: date, site, habitat, sex, extent of pale color aberration in coloration in four categories estimated by eye (1: 1–25, 2: 25–5, 3: 50–75, 4: 75–100%) and authorship/s (Table 1). Nesting season was characterized by the period from April until July, whereas the remaining months were taken into analyses as nonbreeding season. Working questions were tested from the observations and records from the internet site birding.sk on the basis of searching keywords „drozd čierny" (Blackbird) and „*Turdus merula*". In total, 16 records of leucistic Blackbird individuals were supported by a photograph, one by a video footage, and one by relatively detailed description. Statistical tests of observation frequencies in samples were conducted in the package NCSS 11 (NCSS 11 Statistical Software 2016).

Results and discussion

In the past, approximately since 1999, Jozef Sládek, PL, AK, and others noticed occurrence of several different individuals of leucistic Blackbird males (without detailed descriptions) in the campus of the Technical University in Zvolen (hereafter TUZVO) and its surroundings. MK observed an individual or individuals of leucistic Blackbird male with pied coloration several times as searching for food in the campus of TUZVO. This individual/s was seen during about one year, but nesting was not documented. PL photographically documented another leucist in the same site on 13. 2. 2023 (Fig. 1a) and MK observed different leucist (probably male) predominantly in white coloration while foraging (Fig. 1b) on 3. 11. 2023. Since this date, this individual was not seen again, even though almost daily observations during working days were conducted. AK in total observed seven leucistic individuals of blackbirds in several sites in Zvolen and five leucists in Nitra in co-operation with Milan Bolvanský in 2013–2021 (Table 1). Observations of two identical male leucists in the same sites in Nitra, the first male for almost three years and the second male for more the three years and seven months, are the longest from Slovakia. JK observed and documented five Blackbird leucists in an urban environment of Piešťany on several sites since 2010 (Fig. 1c, d). Of them, one male was seen for 30 days. It is necessary to state that all these observers regularly visit as field ornithologists urban and non-urban habitats and did not record any leucistic individuals outside of urban habitats. In no case, we proved nesting of such individuals except one case when a complete leucist female was observed to copulate with normally colored male several times in the City of Žilina (JK in prep.).

On the basis on an Internet search from website birding.sk on 19. 3. 2024, in total 16 observations of Blackbird leucists (including several mentioned JK records) were recorded out of 233 Blackbird observations in the period 4. 3. 2008–14. 3. 2024 (Table 1) in Slovakia. JK observations from the website were not included into our own observations due to excluding error of their repeated use in analyses. Observations were from Bratislava, Kysucký Lieskovec, Moravský Lieskovec, Pezinok, Piešťany, Rusinka, Štúrovo, Trávnica, Záhorská

Table 1. List of leucistic Blackbird observations from a website birding.sk and our own observations from Slovakia. Each observation is characterized by the date, site, sex, and percentage scale of the pale feather coloration (1: 0–25, 2: 25–50, 3: 50–75, 4: 75–100%) and an authorship.

Tab. 1. *Zoznam pozorovaní leucistov drozdov čiernych z internetovej stránky birding.sk a našich vlastných záznamov zo Slovenska. Každé pozorovanie charakterizujeme dátumom, lokalitou, pohlavím a kategóriou pokrytia bledým perím (1: 0–25, 2: 25–50, 3: 50–75, 4: 75–100 %) a autorstvom.*

No.	Date *Dátum*	Site *Lokalita*	Sex *Pohlavie*	Extent of pale coloration (%) *Rozsah svetlého sfarbenia (%)*	Repeatability of observation *Opakovanosť výskytu*	Author of observation *Autor pozorovania*
		www.birding.sk				
1	2009-01-18	Rudinka (Kysucké Nové Mesto)	M	2	No data *žiadne údaje*	Ivana Rouseková a Jaroslav Kizek
2	2010-02-14	Záhorská Bystrica (Bratislava IV)	F	1	No data *žiadne údaje*	Radovan Václav
3	2010-04-05	Piešťany, Kúpeľný park	F	1	No data *žiadne údaje*	Ján Kočí
4	2010-11-17	Moravské Lieskové (Nové Mesto nad Váhom)	?	4	No data *žiadne údaje*	Michal Jurica
5	2012-03-06	Bratislava I	M	1	No data *žiadne údaje*	Tomáš Novák
6	2012-11-15	Piešťany	M	1	No data *žiadne údaje*	Michal Dechet
7	2012-11-17	Piešťany, sídlisko A. Trajana	M	3	30 d in site *30 dní na lokalite*	Ján Kočí a Juraj Schuchmann
8	2016-03-24	Zvolen	M	1	No data *žiadne údaje*	Radim Holý
9	2016-03-28	Kysucký Lieskovec (Kysucké Nové Mesto)	M	1	No data *žiadne údaje*	Jozef Kulla, Jaroslav Kizek a Emília Kizeková
10	2016-06-08	Trávnica (Nové Zámky)	F	1	No data *žiadne údaje*	Martin Šabík
11	2017-03-17	Pezinok	M	1	in previous year also *aj predchádzajúci rok*	Vladislav Marušic
12	2019-03-19	Zvolen	M	1	year in the site *rok v danej lokalite*	Radim Holý
13	2019-10-08	Piešťany, sídlisko A. Trajana	M	1	No data *žiadne údaje*	Ján Kočí
14	2020-03-31	Štúrovo (Nové Zámky)	M	1	No data *žiadne údaje*	Ladislav Csifféry
15	2021-01-20	Piešťany, Mestský park	M	1	No data *žiadne údaje*	Ján Kočí
16	2024-02-16	Žilina, kampus ŽU	F	4	No data *žiadne údaje*	Ivan Bartko
		Other observations *Ostatné pozorovania*				
1	2012-13	Zvolen, kampus TUZVO	M	1	? year in the site *? rok v danej lokalite*	Martin Korňan
2	2012-12-03	Nitra, Starý park	M	2	No data *žiadne údaje*	Anton Krištín
3	2013-10-03	Nitra, Dunajská ul.	M	2	almost 3 years (till 1.10.2016) *takmer 3 roky (do 1.10.2016)*	Milan Bolvanský & Anton Krištín
4	2013-10-03	Nitra, Dunajská ul.	M	1	> 3 years & 7 months (till 7.5.2017) *> 3 roky a 7 mesiacov (do 7.5.2017)*	Milan Bolvanský & Anton Krištín
5	2013-12-02	Zvolen, Štúrova ul	M	2	No dat *žiadne údaje*	Anton Krištín
6	2014-11-04	Nitra, sídlisko Chrenová	M	2	No data *žiadne údaje*	Anton Krištín

Table 1. Continued.
Tab. 1. *Pokračovanie.*

No.	Date *Dátum*	Site *Lokalita*	Sex *Pohlavie*	Cover of pale colour (%) *Pokryv svetlej farby (%)*	Repeatability of observation *Opakovanosť výskytu*	Author of observation *Autor pozorovania*
		Other observations *Ostatné pozorovania*				
7	2014-12-11	Nitra, Nový park	F	1	No data *žiadne údaje*	Anton Krištín
8.	2015-09-11	Zvolen, Lanice	M	2	No data *žiadne údaje*	Anton Krištín
9.	2015-10-22	Zvolen, sídlisko Západ	F	2	No data *žiadne údaje*	Anton Krištín
10.	2018-10-03	Zvolen, sídlisko Západ	M	3	No data *žiadne údaje*	Anton Krištín
11.	2021-01-09	Nitra, sídlisko Klokočina	M	1	No data *žiadne údaje*	Milan Bolvanský
12.	2021-08-06	Zvolen, sídlisko Za múrami	M	1	No data *žiadne údaje*	Anton Krištín
13.	2022-03-27	Zvolen, Bystrický rad	M	1	No data *žiadne údaje*	Peter Kaňuch
14.	2023-02-13	Zvolen, kampus TUZVO	M	1	No data *žiadne údaje*	Peter Lešo
15.	2023-10-19	Zvolen, križovatka ulíc Ľ. Štúra a K. Kráľa	M	1	No data *žiadne údaje*	Anton Krištín
16.	2023-10-26	Zvolen, 3. Základná škola	M	1	No data *žiadne údaje*	Anton Krištín
17.	2023-11-03	Zvolen, kampus TUZVO	?	4	No data *žiadne údaje*	Martin Korňan
18.	2024-03-17	Piešťany, Adeli centrum	M	1	No data *žiadne údaje*	Ján Kočí
19.	2024-04-19	Zvolen, Park prof. A. Priesola	M	1	No data *žiadne údaje*	Martin Korňan

Bystrica, Zvolen, and Žilina. None of the records were in non-urban habitats. The extent of pale in the feather coloration varied from completely white through half-pale to black with only few pale patches. Frequencies of the extents of pale feather coloration were different, while the category 0–25% (1: 12, 2: 2, 3: 0, 4: 2) prevailed. From the sex aspect, observations of males (11) were more frequent than females (4) (Fisher´s exact test, P = 0.0268), yet one individual was not sexed (completely white). Frequency of observations during non-breeding season was significantly higher than during breeding season (Fisher´s exact test, $P < 10^{-4}$). Ratio of leucists (16/233 vs. 29/186, 6.9 vs. 15.6%) from the total number of Blackbird observations between records from birding.sk and the Google search engine from the study of Izquierdo et al. (2018) was significantly different (Fisher´s exact test, P = 0.0064).

Since 2012, we found other 19 unpublished observations of Blackbird leucists from Zvolen, Nitra, and Piešťany. Similarly as in the website birding.sk, males (16) also dominated over females (2) in this sample and one individual was not sexed, yet we assume that it was a male (Table 1). Out of four categories of the percentage extent of white feather coloration, the first category showed the highest frequency of observations (1: 11, 2: 6, 3: 1, 4: 1), similarly to the Internet data analysis. In analysis of year seasonality, we excluded three cases of repeated observation during more than one year. Observations from the nonbreeding season (15)

Fig. 1. Leucistic Blackbirds from several different sites in Slovakia (a – 13. 2. 2023, Zvolen; b – 3. 11. 2023, Zvolen; c – 17. 12. 2012, Piešťany; d – 20. 1. 2021, Piešťany; e – 13. 12. 2013, Nitra; f – 27. 3. 2022, Zvolen) that were observed in urban environment in 2012–2023. Photo by: a – P. Lešo; b – M. Korňan; c, d – J. Kočí; e – M. Bolvanský; f – P. Kaňuch.
Obr. 1. *Leucistické jedince drozda čierneho z rôznych lokalít Slovenska (a – 13. 2. 2023, Zvolen; b – 3. 11. 2023, Zvolen; c – 17. 12. 2012, Piešťany; d – 20. 1. 2021, Piešťany; e – 13. 12. 2013, Nitra; f – 27. 3. 2022, Zvolen), ktoré boli pozorované v urbánnom prostredí v rokoch 2012 – 2023. Foto: a – P. Lešo; b – M. Korňan; c, d – J. Kočí; e – M. Bolvanský; f – P. Kaňuch.*

strongly prevailed compared to the breeding season (1) from the remaining sample.

Hypotheses explaining occurrence of albinism or leucism in wild vertebrate populations are heterogeneous and prove their causality is very difficult task. Izquierdo et al. (2018) reported higher occurrence frequency of Blackbird leucists in urban habitats in comparison to non-urban that may be a result of habitat quality (mutagenicity of environment), food (tyrosine insufficiency), and predation pressure (low numbers of predators). Occurrence of Blackbird leucist only in urban environment prove all our observations from Slovakia; nonetheless, we have observations of this species from all major habitats in its distribution range in Slovakia. Izquierdo et al. (2018) also detected higher occurrence of leucism in males than in females that can be connected to different predation pressure on sexes or differences in physiology of aberration (eumelanin in males and phaeomelanin in females) and higher occurrence of this aberration in older individuals that supports hypothesis of progressive greying with age similarly to humans (van Grouw 2018). This phenomenon was also proved in Red-necked Nightjar (*Caprimulgus ruficollis*) (Camacho et al. 2022). Chytil (2019) also detected much higher occurrence frequency of leucism (128:3) in Blackbird males in the Czech Republic. We described similar prevalence of this aberration for males in Slovakia also. Statistical analysis of male and female ratios from the total number of observed leucists from the Slovak internet site also proved male prevalence. Chytil (2019) detected the highest frequency of the percentage of pale feather coloration in the category $5\% \leq x < 25\%$, 69 individuals of Blackbirds. In comparison between Czechia and Slovakia by using the data from birding.sk and recalculating the percentage of pale feather coloration on one category 0–25%, the occurrence frequency in this category is almost the same 75.0% (12:16 ind.) vs. 76.3% (100:131 ind.). In comparison to our total sample size (16 Internet and 19 our own data), this ratio in Slovakia is only 65.7% (23:35 ind.). The higher frequency of leucist observations during the non-breeding season in our data sets can be related to the higher probability of Blackbird observation in the period of leafless broadleaved vegetation. Chytil (2019) presented strong prevalence of leucist observations in towns compared to villages (113:16) too, and there were none observations in non-urban res. rural habitats that supports our conclusions. Van Grouw´s (2018) analysis of aberrant Blackbird individuals from the collections of several museums showed the most frequent occurrence of progressive greying (66%, 147 from 221 specimen). Sex mediated partial paling – ino (6.8%), albinism (2.7%), and leucism (2.3%) were relatively rare in this analysis. Higher occurrence of leucism in urban environments can also be connected to lower selection rate of aberrant phenotypes by predation (Rutz 2012). Bottleneck effect related to geographic isolation of small population during colonization of new areas can also cause albinism resp. leucism by inbreeding of sibling individuals. Bensh et al. (2000) detected higher occurrence of the partial albinism (leucism in our terminology) in Great reed Warbler (*Acrocephalus arundinaceus*) in Sweden after first years following establishment of semi-isolated population, yet heterozygosity of aberrant and normal individuals was not different, and, also, there were not significant differences between life longevity and fledgling productivity, but aberrant birds produced more fledglings and lived longer. Radio contamination of environment caused higher frequency of albinism and cancer diseases in birds in the surroundings of the nuclear power plant Chernobyl in Ukraine (Møller et al. 2013). In summary, our and foreign studies of leucism in Blackbirds detected much higher frequency of this aberration in males and higher concentration of these individuals in urban environments. Coming from the historic data analyses from museums (van Grouw 2018), the occurrence of leucism is not a new phenomenon, but was commonly observed during 19th century.

The presented results are necessary to understand as exploratory analyses non-systematically collected data and its results can be taken

only as indicative. The detected patterns can result from real patterns of Blackbird leucism in nature and effects of data collection or only from data collection effects alone. In the very end, we can state that occurrence of leucistic individuals of Blackbirds is relatively well-documented in Slovakia and abroad. Higher records in this species in urban environments might also be related to the higher probability of registration of aberrantly colored individuals by public and higher number of potential observers in urban settlements especially due to their synantropisation, and thus loss of natural shyness.

Acknowledgements

We are very grateful to M. Bolvanský and P. Kaňuch for providing data and photo documentations and to all observers that published their observations on the Internet site birding.sk and offered valuable documentation of leucistic Blackbird individuals from Slovakia. Their name list with authorship of observations is given in Table 1. In addition, we thank two referees, two editorial board members and the technical editor for constructive comments.

Súhrn

Leucizmus (čiastočný albinizmus) je definovaný ako nedostatočná produkcia pigmentu melanínu, pričom takí jedinci majú normálne sfarbené pigmentované oči, ale perie je biele až svetlo hnedé a biele sfarbenie môže mať rôzny rozsah a iné časti tela môžu, ale nemusia byť normálne sfarbené napr. zobák, behák, koža. Albinizmus je spôsobený úplnou stratou pigmentu melanínu, kedy majú takíto jedinci aj červené oči. Cieľom tejto práce je sumarizovať pozorovania leucistických drozdov čiernych na Slovensku a testovať na základe publikovanej databázy pozorovaní z internetovej stránky birding.sk a našich záznamov, či je rozdiel: i) vo frekvencii výskytu leucistických drozdov medzi urbánnym a neurbánnym prostredím, ii) vo frekvencii farebnej anomálie medzi pohlaviami a iii) vo frekvencii pozorovaní medzi hniezdnym a nehniezdnym obdobím.

Naše pozorovania leucistických drozdov čiernych sú z miest Zvolen, Piešťany a Nitra. Každé pozorovanie, pri ktorom boli záznamy a fotodokumentácia, je opísané nasledovnými údajmi: dátum, lokalita, biotop, pohlavie, podiel bledej farby na celkovom zafarbení v štyroch kategóriách (1: 1 – 25; 2: 25 – 50; 3: 50 – 75; 4: 75 – 100 %) a autor/i (tab. 1). Za hniezdne obdobie sme považovali obdobie apríla až júla, ostatné mesiace boli brané do analýz ako mimohniezdne obdobie. Pracovné otázky boli testované z pozorovaní a údajov z internetovej stránky birding.sk na základe kľúčového slova „drozd čierny a *Turdus merula*". Z celkovo 16 záznamov leucistických jedincov drozda čierneho bolo 14 doložených fotografiou, jedno videom a jedno pomerne presným popisom. Ani jedno pozorovanie nebolo mimo urbánneho prostredia. Pozorovania boli z Bratislavy, Kysuckého Lieskovca, Moravského Lieskového, Pezinka, Piešťan, Rusinky, Štúrova, Trávnice, Záhorskej Bystrice, Zvolena a Žiliny. Rozsah bieleho sfarbenia varíroval od úplne bielych jedincov cez polobiele až po čierne s niekoľkými bielymi škvrnami. Frekvencia kategórií pokryvnosti bledej farby v zafarbení bola rozdielna, pričom výrazne prevyšovala kategória 0 – 25 % (1: 12; 2: 2, 3: 0, 4: 2). Z hľadiska pohlaví výrazne prevažovali pozorovania samcov (11) v porovnaní so samicami (4) a u jedného jedinca sa nepodarilo určiť pohlavie (celý biely). Frekvencia pozorovaní počas mimohniezdnej sezóny bola signifikantne vyššia ako počas hniezdnej. Od roku 2012 sme získali ďalších nepublikovaných 19 pozorovaní leucistov drozdov čiernych zo Zvolena, Nitry a Piešťan. Aj v tejto vzorke výrazne dominovali samce (16) nad samicami (2) a jedného jedinca sa nám nepodarilo určiť, ale predpokladáme, že išlo o samca (tab. 1). Zo štyroch kategórií percentuálnej pokryvnosti bledej farby peria výrazne prevládala frekvencia prvej kategórie (1: 11, 2: 6, 3: 1, 4: 1), podobne ako u analýzy z internetových údajov. Pri analýzach ročnej sezónnosti pozorovaní sme vylúčili tri záznamy opakovaných pozorovaní počas viac ako jedného roka. Zo zvyšných pozorovaní významne prevládali pozorovania počas mimohniezdneho (15) oproti hniezdnemu obdobiu (1).

Na základe analýzy historických údajov z múzeí, výskyt leucizmu u vtákov nie je nový fenomén, ale bol bežne pozorovaný už počas 19. storočia. Vyššia frekvencia výskytu leucizmu u samcov drozdov čiernych a v urbánnom prostredí bola zistená aj v zahraničných prácach. Prezentované výsledky treba chápať ako exploračnú analýzu nesystematicky zbieraných údajov a jej výsledky treba brať len ako indikatívne. Získané výsledky môžu byť dôsledkom reálnych vzorcov výskytu leucizmu v prírode u drozdov čiernych a vplyvu zberu údajov alebo len samotného dôsledku zberu údajov. Zvýšený počet registrácií práve u tohto druhu v urbánnom prostredí môže tiež súvisieť s väčšou pravdepodobnosťou registrácie takto sfarbených jedincov laickou verejnosťou a vyšším počtom potenciálnych pozorovateľov v urbánnych celkoch, a to najmä kvôli ich synantropizácii a s tým súvisiacej strate plachosti.

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Došlo: 26. 4. 2024
Prijaté: 21. 6. 2024
Online: 4. 10. 2024