

# The Common Rock Thrush (*Monticola saxatilis*) in the Carpathian Basin

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**Abstract** The Common Rock Thrush (*Monticola saxatilis*) is a species with an extremely large distribution range. Its European population is the strongest in the Mediterranean, but it also breeds in Central Europe. It still nests in small numbers in the Carpathian Basin, but has become extinct as a breeder in Hungary, where it was never a common species. In the present study, we summarised the occurrences of the species in the Carpathian Basin published in the literature. In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, a large amount of observational data on the spring migration of the species was collected, which allowed us to describe the migration phenology of that time. The Common Rock Thrush bred in small numbers in mountainous areas of Hungary, in natural habitats and in mines, vineyards and orchards. The collapse of the population occurred in the 1970s, but thereafter a few pairs bred in Hungary until the 2010s. Very few published records were found in Slovakia and Romania, which does not give a true picture of its former distribution there. However, its population has also declined drastically in Romania and it has become extinct as nesting species in Slovakia. The exact cause of the decline cannot be determined and several explanations have been proposed in recent decades. It is likely that the Carpathian Basin population, which is considered to be an edge-population, has been more exposed to negative changes, such as climate change, chemical inputs or changes in wintering grounds. A century earlier, the median date of the first spring returns was mid-April, but sometimes it was observed as early as late March. Nowadays, vagrant individuals have been observed again several times in Hungary, which gives us some hope for the future.

Keywords: agricultural landuse, climate change, habitat degradation, Rufous-tailed Rock-thrush, Blue Rock Thrush

**Összefoglalás** A kövirigó (*Monticola saxatilis*) hatalmas elterjedési területtel rendelkező faj. Európai állománya a Mediterráneumban a legerősebb, de Közép-Európában is költ. A Kárpát-medencében kis számban ma is fészkel, Magyarországról azonban – ahol sohasem számított gyakori fajnak – kipusztult, mint fészkelő. Jelen tanulmányban összegeztük a faj szakirodalomban publikált Kárpát-medencei előfordulásait. A 19. század végén és a 20. század elején sok megfigyelési adat gyűlt össze a kövirigó tavaszi vonulására vonatkozóan, amelyek segítségével lehetőségünk volt leírni az akkori vonulási fenológiát. A korabeli adatok alapján a faj kis számban költött Magyarország hegyvidéki területein, természetes élőhelyeken és bányákban, szőlőültetvényeken, gyümölcsösökben. Az állomány összeomlása az 1970-es években következett be, de ezt követően egészen a 2010-es évekig költött néhány pár az országban. Szlovákiában és Romániában nagyon kevés publikált adatát találtuk, ami nem ad valós képet egykori elterjedéséről. Állománya azonban Romániában is drasztikusan lecsökkent, Szlovákiából pedig kipusztult a fészkelők közül. Az állománycsökkenés okára az elmúlt évtizedekben több magyarázat is született. Valószínű, hogy a perempopulációknak számító Kárpát-medencei állomány sokkal jobban ki volt téve a negatív változásoknak, mint például a klímaváltozás, a vegyszerezés vagy a teletérületeken bekövetkezett változások hatásainak. Egy évszázaddal korábban az első tavaszi visszaérkezések mediánja április közepére esett, de olykor már március végén is megfigyelték. Napjainkban Magyarországon ismét többször megfigyelték kóborló egyedeit, ami némi bizakodásra adhat okot a jövőre nézve.

Kulcsszavak: kövirigó, kék kövirigó, mezőgazdasági területhasználat, élőhelyek degradációja, klímaváltozás

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## Introduction

The Common Rock Thrush is an insectivorous bird species whose breeding range extends from NW Africa, through the Mediterranean and the mountains of Central Europe to China (Collar & Bonan 2020). In Europe, its population is concentrated in the mountainous areas of the southern part of the continent. Turkey accounts for 65% of the total European population. Its distribution in the Carpathians is fragmented (Volet & Keller 2020). Population density decreases northwards (Grangé *et al.* 2015). It is strongly associated with mountain areas during migration, where it colonises both lower and higher altitudes (Volet & Keller 2020). Its global population is stable and is currently classified as Least Concern (BirdLife International 2023). In general, its nesting population trend is declining in Europe (Volet & Keller 2020). However, it has been reintroduced to southern Germany in the early 2000s (Bauer *et al.* 2003). In recent decades, there has been a significant population decline in the Appennines, the Carpathians and Moldova, where it has become extinct as a breeder, as in Hungary and Slovakia. In addition to the effects of climate change, habitat degradation and the disappearance of grazing may be behind the decline (Volet & Keller 2020).

Long-distance migrant. All populations wintering in tropical parts of Africa, mainly in E Africa (Collar & Bonan 2020). The spring migration of the European population lasts from March to May, with a peak in late March and early April, while in autumn it starts its migration with a dispersal movement in August and continues until the end of September. In spring, males can sometimes arrive at breeding sites as early as the end of February (Shirihai & Svensson 2018). Individuals from Asian populations migrate across the Red Sea to their wintering grounds in Africa. These populations also leave the breeding grounds in August, and in Kazakhstan and Tajikistan, the last individuals disappear by the end of September. Migrants can be seen in Arabia and along the Red Sea between late August and late November. In spring, they reach the mountainous regions of Kazakhstan and Central Asia in early May (Collar & Bonan 2020). Recent observations suggest that they also appear in southern and western India during autumn migration, suggesting that they also fly across the Indian Ocean (Balar *et al.* 2016, Abhinav & Dogra 2020).

In the Carpathian Basin, it nested mainly in operating and abandoned andesite or basalt mines, dolomite and limestone rocks, but also in vineyards and orchards (Schmidt 2000, Haraszthy 2019). Chernel (1899) recorded breeding in house wall cavities in the 1880s, while after the Second World War, it may have bred in ruined buildings in Budapest (Schmidt 2000). The former population of the Carpathian Basin typically bred only once a year, with replacement breeding in case of destruction, but occasionally two breeding attempts occurred. The clutches were mostly complete in the first two-three weeks of May, and the number of eggs was usually 4–6. The birds hatched after 13–14 days and were not independent even at three weeks of age (Haraszthy 2019).

According to Szombath (1944), it was most common in Transylvania, also nested in the Mátra, Bükk, Bakony, Pilis, Buda Hills and Mecsek. In the 1950s it was found in all suitable habitats in Hungary. It nested sporadically in karst, rocky areas, quarries, and vineyards (Keve 1984). Its population has gradually declined since then and by the late 1970s it was

considered a rarity. The Hungarian population was estimated to be 15–25 pairs in the 1990s with regular breeding populations in Bükk, Zemplén Hills and Tokaj Hill (Magyar *et al.* 1998, Schmidt 2000), and 1–5 pairs in the 2000s (Hadarics & Zalai 2008). In the latter period, it bred regularly only in the Bükk (Hadarics & Zalai 2008), while by the end of the 2010s, it was considered extinct as breeder (Gál 2021). Its last confirmed nesting was in the Zemplén Hills in 2003, but it may have bred on Bél-kő in 2007 (Gál 2021). According to some authors, the disappearance was attributed to the changes in the wintering grounds in Africa (Schmidt 1995).

The aim of the present study was to collect the past and present occurrences of the Common Rock Thrush in the Carpathian Basin, especially in Hungary, that have ever been published. The large amount of data from the late 19<sup>th</sup> and early 20<sup>th</sup> century also allowed us an assessment of the species' migration based on contemporary data.

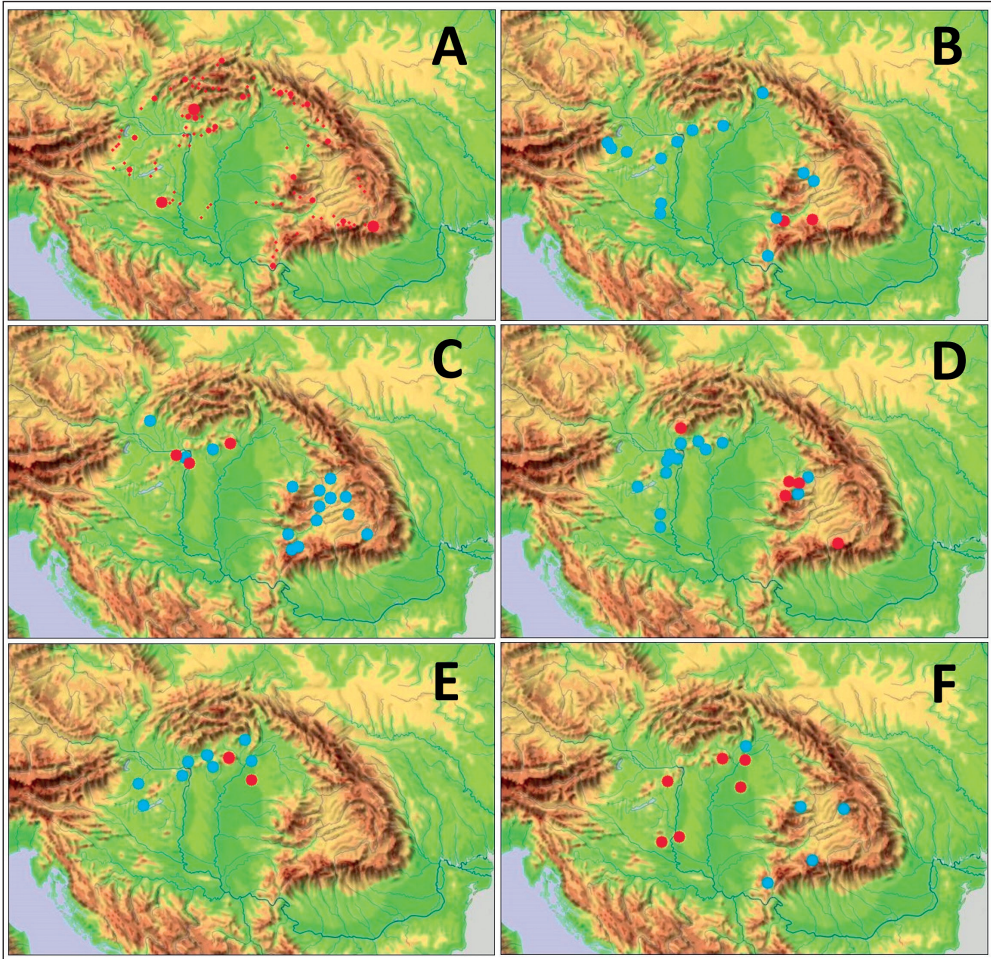
## Material and Methods

We reviewed the most important Hungarian ornithological journals (A Puszta, Aquila, BÍbic, Calandrella, Cinege, Kócsag, Madártani Tájékoztató, Madártásvlat, Ornis Hungarica, Túzok), the most important summary books as well as the website of the Hungarian field ornithologists ([www.birding.hu](http://www.birding.hu)). We have also used all the literature on the species cited in the Hungarian Ornithological Bibliography (Réthy 1980). Until the mid-1920s, a number of migration data were published (*Supplemental material 1*), while afterwards mainly nesting records were mentioned. During the period between 1894 and 1926, the Royal Hungarian Ornithological Centre coordinated a data collection covering the entire Carpathian Basin under the leadership of Otto Herman and Jakab Schenk. During data collection, birdwatchers recorded the date of the first spring return of migratory bird species. Based on the published migration data, we calculated the median date of spring migration of the species, and gave the earliest and latest return dates. Based on the published breeding data, it was possible to process the former distribution of the species by geographical regions. As most of the data from the Carpathian Basin since the mid-20<sup>th</sup> century are from Hungary, we mainly present data from this country, but also data from the Slovakian, Ukrainian, Romanian, Serbian and Austrian parts of the Carpathian Basin are used. We have also collected data on Common Rock Thrush in the Hungarian oological collections using Haraszthy (2015).

## Results

### Spring migration data 1898–1923

Of the spring migration data between 1898–1923 (142 observations in total), 38.0% (n=54) were from the Slovakian, 28.2% (n=40) from the Romanian, 24.6% (n=35) from the Hungarian, and the remaining observations (9.9%, n=14) were from the Austrian, Serbian and Ukrainian part of the Carpathian Basin (*Figure 1, Supplemental material 1*).



*Figure 1.* Spring observations from 1898 to 1923 (small: one observation at the given location, middle: 2–4 observations at the given location, large: 5–9 observations at the given location) (A), and field observations (red dots) and nestings (blue dots) from 1840–1925 (B), 1926–1950 (C), 1951–1975 (D), 1976–2000 (E) and 2000–2023 (F) in the Carpathian Basin

*1. ábra* Az 1898 és 1923 közötti tavaszi megfigyelések (kis kör: egy megfigyelés, közepes pont: 2–4 megfigyelés, nagy pont: 5–9 megfigyelés) (A), valamint az 1840–1925 (B), 1926–1950 (C), az 1951–1975 (D), az 1976–2000 (E) és a 2000–2023 (F) közötti terepi megfigyelési (piros pontok) és fészkelési (kék pontok) adatok a Kárpát-medence területéről

The median date of the first return of this species was 17 April (SD = 13.21 days), while the peak return period was between 11–30 April (*Figure 2*). In terms of first sightings, the earliest record was on 20 March 1902, 1911 and 1912, and the latest on 15 May 1908.

### *Data on oological collections*

In total, eight broods can be found in the Hungarian oological collections (*Table 1*).

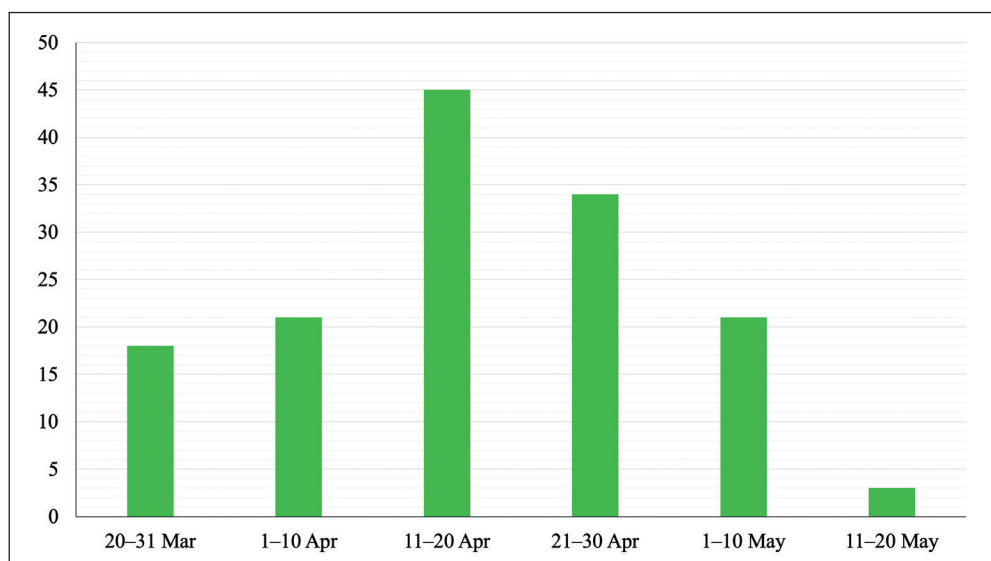


Figure 2. The spring migration data of the Common Rock Thrush between 1898 and 1923

2. ábra A kövirigó tavaszi dekádankénti visszaérkezési ideje 1898 és 1923 között a Kárpát-medencében

Table 1. Broods can be found in the Hungarian oological collections

1. táblázat A magyarországi tojásgyűjteményekben található kövirigó-fészekaljok adatai

No. of eggs	Place of collection	Date of collection	Name of collector
5	Pécs	11 Jun 1949	Szilárd Cseresnyés
6	Pécs	01 Jun 1952	Szilárd Cseresnyés
5	Pécs	22 May 1953	Márton Németh
5	Pilisszentkereszt	27 May 1926	Frigyes Cerva
5	Budakeszi	25 May 1930	Dezső Szalók-Navratil
5	Magyarürög	27 Apr 1952	Szilárd Cseresnyés
5	Csór	17 May 1953	László Máté
5	Budakeszi	13 May 1934	?

## Observation data

### Hungary

A male was shot on 6 May 1894 in Cák, Vas County (Csaba 1963), and the species bred there then and in 1895 (Fromm 1929). In 1884, 1 pair nested in the castle moat at Kőszeg (Chernel 1899). A nest was found in Ság Hill on 12 July 1979, but no previous records have been reported from that area (Faragó 1981, Gyurác & Kóta 2020). In May 1988, a nest was found in Mesteri, on a rock wall (Gyurác & Kóta 2020) (Figure 1).

On 26 April 1905 a migrating individual was seen at Balatonboglár. This was the first sighting of the species in the Balaton region, previously it had only been observed breeding

in Inota (Csörgey 1905). In the early 1970s, in Badacsony, only 1–2 pairs were breeding in the basalt quarry, while previously it had also nested in the vineyards (1 June 1952, two feeding males) (Schmidt 1972a). Also here, 4–5 pairs used to nest annually, but in the 1990s, only one pair bred (Schmidt 1980, 1994). A male was seen on Szentgyörgy Hill in the Tapolca Basin on 1 June 1980 (Nagy 1980) (*Figure 1*).

According to Agárdi (1942), it nested on three occasions in E Mecsek: on 1 June 1909 in a quarry under cultivation, on 26 April 1919 in the wall of a demolished press house, and once in the wall of the castle garden. In 1955, an individual was observed for several days in the disused chimney of a sawmill in E Mecsek, and it was considered likely that it had nested there (Péterfay 1957). In May and June 1918, it was heard singing several times in the vicinity of the National Theatre and Town Hall of Pécs, and probably nested there (Radetzky 1919) (*Figure 1*).

In 1905 it was breeding in the Villány Hills (Csörgey 1905). In 1960 it was an uniformly widespread breeder in the area (Csaba 1963). On 20 April 2022 a male was seen in Nagyharsány on Szársomlyó ([www.birding.hu](http://www.birding.hu)) (*Figure 1*).

Dorning (1944) mentions that in 1834 it was a widespread breeder in the Buda Hills. It also nested here later, for example on Sashegy in May 1926 and in the quarry on Kis-Gellérthegy in early May 1927. It was not seen here before May, but Madarász sighted it as early as 16 April 1881. He wrote that in recent years the population of the species had declined considerably in the vicinity of Budapest, e.g. due to disturbance by construction works and the activities of egg collectors. On 20 September 1943, an individual was seen in the Eskü square in Budapest. A nest was found near Nagymaros on 13 May 1954 (Kiss 1955). According to Sággy (1955), it nested in the quarries of the Gerecse. On 8 June 1954, Bókai (1955) found two nests at Pilisvörösvár, 60 m apart. One of them had four and the other five chicks. One of the males also had a ring, which was ringed locally on 15 April 1951 by the author. A juvenile was also captured at the same site on 1 August 1954 and was ringed on 8 June as a juvenile sitting in a nest about 2 km from the capture site also by the author. Bókai (1957) studied the behaviour of the species in detail. He was observed breeding in the early 1950s in the Buda Hills, Dunabogdány, Pilisvörösvár, and in the Kis- and Nagy-Kevély areas. The population was larger and denser in the volcanic mountains than in dolomite rocks. It was assumed that the adult males and females arrived at the breeding site in pairs. In 1971 a pair raised two broods in Budaörs (Schmidt 1972b). In 1937, Sággy (1968) observed a juvenile in the Diósvölgy quarry in Süttő, while no sightings were made in the red marble quarries in Tardos. In Budaörs and its surroundings, 5–6 pairs nested regularly in the 1950s, but since the mid-1960s only one pair has been recorded, and since 1978, it has disappeared as a breeder (Schmidt 1980, 1994). In 1975, the following nesting population were recorded in the vicinity of Budapest: Budaörs 1, Dunabogdány 3, Gánt 4, Páty 1, Pilisvörösvár 1, Remeteszurdok 1, Sóskút 2 pairs (Schmidt 1976). One pair was observed on the Sashegy in Budapest on 6 May 1976 (Simig 1978). One bird was sighted in Budakalász on 10 August 1980 (Anonymus 1981b), and another vagrant individual in Vértesboglár on 13–14 May 2017 (MME NB 2017) (*Figure 1*).

It nested in the Velence Hills between 1958 and 1967 (Radetzky 1979) (*Figure 1*).

Between 4 and 8 August 1958, a female was observed several times in Börzsöny (Gárdonyi 1958). Between 1968 and 1979, breeding was rare in the Börzsöny (Homoki-Nagy 1980). A feeding pair and one male were observed in the same area on 3 June 1977. On 21 June 1979 a nest with four eggs was found. On 29 May 1978, one male and on 19 May 1979, two males and one female were observed in the area (Dénes 1979) (*Figure 1*).

A few pairs bred every year in the 1920s on the Szanda Hill, Cserhát (Habán 1959) (*Figure 1*).

According to Moskát (1975), it was a sporadic nesting species in the Karancs-Medves in basalt, andesite and rhyolite quarries, in castle ruins and rocky hillsides. On 3 September 1972, 10–12 individuals were seen moving in the quarry at Eresztvény. It also nested in the Medves according to Varga (1980). By the early 1980s, it had ceased breeding in the area (Varga 1984) (*Figure 1*).

In the Mátra, between 1949–1954, a stable population bred in abandoned mines, on the rocky streamsides and stony pastures. In 1948, seven pairs nested on the border of Gyöngyössolymos, nine in 1949, eight in 1950, eleven in 1951, nine in 1952, seven in 1953 and two in 1954. The author highlighted the weather and hunting as the reasons for the decline (Nagy 1955). Three males were seen on the Sár Hill in Gyöngyös on 24 April 1980 (Anonymus 1980) (*Figure 1*).

On 12 July 1923, a female with a hatched young was clearly seen on the Diósgyőr castle ruins (Mauks 1924). In the same place, the species was observed several times in 1955 during the breeding season. In the same year, two pairs were observed breeding in the Mexikói-völgy near Miskolc (Bársony 1957). Mauks (1928) also observed an individual in the limestone quarry above the bathing resort of Görömböly – Tapolca, at the eastern foot of the Bükk Mountains on 13 May 1926. One bird was sighted at Bél-kő on 5 July 1980 (Anonymus 1981a), where the species was also observed during breeding season between 2005 and 2007 ([www.birding.hu](http://www.birding.hu)), but its breeding was not confirmed in neither case (Gál 2021). Another individual was sighted on 20 August 2010 (MME NB 2013, but the data was not validated by the Hungarian Rarities Committee). An immature bird was found in Miskolc, also in the Bükk, on 26 August 2020 (MME NB 2020) (*Figure 1*).

It also bred in an abandoned mine in the Torna Karst (Dandl & Tömösváry 1978) (*Figure 1*).

According to Mercsák and Mercsák (1980), several pairs bred in the abandoned quarries of the Nagy-Kopasz Hill in Tokaj in 1979. In the same area, two males died in vineyards between 10 and 15 May 1980 as a result of pesticide spraying (Mercsák 1980). Also in Tokaj in 1982, seven pairs were definitely breeding in 8 out of 25 different quarries, and breeding of two other pairs was uncertain. In that year, the author did not receive breeding data from other parts of the country (Mercsák 1983). The last observation of the species (male) from Tokaj was on 17 May 2000 ([www.birding.hu](http://www.birding.hu)) (*Figure 1*).

It was observed in Békéscsaba in spring 1894 (Tarján 1930). A male was observed at Hortobágy Fishponds on 4 August 1992 (Konyhás 1993, 2004). Hadarics and Zalai (2008) mention its occurrence on the Hevesi plain without any specific data. On 30 March 2020, one male was seen in Debrecen, followed by another individual on 6 April (Endes 2019, data not accepted by the Hungarian Rarities Committee, MME NB 2020). On 6 May 2022, a male was observed near Baja ([www.birding.hu](http://www.birding.hu)) (*Figure 1*).

### *Transylvania, Romania*

The bird collection of the Bethlen College in Aiud, organised by Miklós Zeyk, included two specimens taken on 20 April 1845 in Kakova, while Elek Buda's collection included also two specimens taken on 5 May 1846 in Vajdahunyad (Schenk 1916). In 1916 it was only sighted in June near Sibiu (Mannsberg 1918). According to Miklós Zeyk, it was not uncommon in rocky and crevice areas. It was also seen in small numbers in high mountains, sometimes above the pine belt. It was found nesting on the cliffs of Tur, Torda, Torocko and Kakova, and also breeding on the Várhegy in Deva (Schenk 1920). Around the 1930s, the birds' spring arrival period in Transylvania was typically between 8–10 April, but sometimes they were seen as early as the end of March. In several areas of Transylvania, in the northeastern tip of Maros-Torda County, along the upper reaches of the Nyárád and Kisküküllő rivers, in many parts of Udvarhely County, in a few pairs in Csík at the eastern foot of the Harghita, below the Nagy-Hagymás, in the immediate vicinity of Brasov, in the gorge of Tömös, at the foot of the Suller Mountains. He has also observed the species on Mamuth Hill near Gyulafehérvár, in the gorges of Poklos, near Aiud, in the Torda and Túr rifts, at several points on the Királyhágó, near Deva, on the rocky slope above the Örváralja, near Hátszeg and above Malomvíz at the foothill of the Retyezát. However, it has not been recorded on the Paring, Seben and Fogaras Mountains (Dobay 1935). Korodi Gál (1959) observed a family of five individuals on the eastern side of Bélavára on 18 June 1957. He had collected only one male from the area of Vladeasa. According to Béli and Mannsberg (1970), it occurred in open rocky areas along the Kis-Szamos river. It was also recorded in similar localities (Sólyomkő, Bacsitorok) during migration in the hilly areas (21 and 28 April). In recent times, the species only breed in Torockó-Székelykő, Torda, Csalhó and Cserna Valley. The total Romanian breeding population is estimated by 45–200 pairs (Fântână *et al.* 2021) (*Figure 1*).

### *Slovakia*

It occurred in small numbers in the Tavana region. It bred in the walls of the castle ruins of Csicsvaalja in 1911 (four chicks on 4 June) and in 1913 (five chicks in July) (Szeöts 1922). According to Turcek (1942), it nested in the vicinity of Vágújhely. Turcek (1959) observed it on 10 May 1958 in Szitnya, Selmecebánya (*Figure 1*).

## **Discussion**

The Common Rock Thrush was probably never a common species in Hungary (Csörgő & Gyurácz 2009), as confirmed by the fact that the earliest sources we found (e.g. Chernel 1899) did not mention Hungary as a regular nesting area, in contrast to the mountainous areas of the Carpathian Basin in Slovakia and Romania. However, as time progresses, the spring observation records from the late 19<sup>th</sup> and early 20<sup>th</sup> centuries include more and more records from Hungary. The increase in the number of sightings does not correspond to an



increase in the population of the species, but is due to the expansion of the observation network. In the mountainous areas where it nested later in the 20<sup>th</sup> century, it was probably already breeding at that time. In Hungary, it also nested in the Alpokalja, Villány Hills, Mecsek, the Transdanubien Mountains and the Northern Mountains. Interestingly, although the last confirmed nesting was in the Zemplén Hills in 2003, no occurrences were previously reported from there.

Several sightings of the spring migration have been made in lowland and hilly areas where it does not breed. Similar observations were made later in the 20<sup>th</sup> and 21<sup>th</sup> centuries, indicating that the species can occur anywhere during migration. The most recent observations are probably the result of spring overshoot, but in the past, individuals from the Carpathian Basin population appeared regularly, if not in large numbers, in other parts of the region. A century ago, the first individuals appeared in the Carpathian Basin as early as the end of March, and the peak of migration was in mid-April. These data are consistent with the general migration patterns of the species in Europe (Collar & Bonan 2020).

There are very few published data on its autumn migration. The few observations suggest that individuals of the former population were sometimes still present on breeding grounds in early August, and by September they were very rare. The latest observation we found was on 20 September 1943, which also fits in with the European migration of the species (Collar & Bonan 2020).

The exact cause of the drastic decline of the species in the Carpathian Basin and its complete extinction in some countries (Slovakia, Hungary) is not known. According to Schmidt (2000), no changes occurred in the Hungarian breeding sites that would have justified the decline of the species, so he considered that the cause of the decline was linked to changes in the wintering grounds (poisoning of insects) or natural fluctuations in the population. This is supported by a comparison with the related species, the Blue Rock Thrush (*M. solitarius*), which uses similar habitats, is also insectivorous and has a similar distribution range to the Common Rock Thrush in Europe. The main difference between the two species is that a significant proportion of the Blue Rock Thrush's population remains on nesting sites in winter, rather than migrating (Collar 2020). This species is expanding in Europe in general, most likely due to warmer weather in higher mountainous areas as a result of climate change (Pedrocchi 2020). Climate change is likely to be changing the species' distribution area, with its range shifting further north (Gál 2021). A similar process is currently taking place in the case of the Black-headed Bunting (*Emberiza melanocephala*) (Kókay 2021). Comparing the status and life history of the two species in Europe, it seems that changes in wintering sites or on migration routes may play an important role in the decline of the Common Rock Thrush. The picture is somewhat nuanced by the fact that other populations of the species in the vicinity, which presumably use the same wintering grounds, are stable (Volet & Keller 2020). This is because the Carpathian Basin population is only an edge population and negative impacts, even if not strong, affect these populations first.

Volet and Keller (2020) mention habitat conversion due to climate change and the abandonment of grazing as a background mechanism, but this could not be a significant influencing factor in the Carpathian Basin. Mercsák (1980) drew attention to the fact that chemical treatments in vineyards had locally completely forced to extinction the species.

The decline of insects may already be a locally influencing factor, and as the decline of the species largely affects its western populations, it is likely that the disappearance of the species may have been caused by increasingly intensive agriculture. As there are examples of reintroduction of the species in certain geographical regions (Bauer *et al.* 2003), in the long term, a reduction in chemical use may lead to positive changes in the population.

The reason for the disappearance of the Common Rock Thrush from the largest part of the Carpathian Basin is not clear, but the fact that the species has been observed several times in Hungary in recent years gives us hope for optimism for the future.

### Supplemental material 1

Observations of migrant individuals from the Carpathian Basin in the spring period between 1898–1923.

Az 1898 és 1923 közötti tavaszi időszakban történt Kárpát-medencei vonuló példányokra vonatkozó megfigyelések

Year	Date	Location	Reference	Year	Date	Location	Reference
1898	25 Apr	Selmecebánya	Schenk 1901	1909	28 Apr	Nagyboldogasszony	Greschik 1910
1899	5 May	Selmecebánya	Schenk 1901	1909	25 Apr	Lakócsa	Greschik 1910
1900	12 Apr	Selmecebánya	Vezényi 1902	1909	13 Apr	Arad	Greschik 1910
1901	25 Apr	Zengg	Vezényi 1903	1909	1 May	Buttyin	Greschik 1910
1901	16 Apr	Selmecebánya	Vezényi 1903	1909	23 Apr	Eibenthal	Greschik 1910
1902	18 Apr	Zengg	Vezényi 1905	1909	10 Apr	Alsóárpás	Greschik 1910
1902	4 May	Selmecebánya	Vezényi 1905	1909	18 Apr	Úradna	Greschik 1910
1902	20 Mar	Zólyom-Lipcse	Vezényi 1905	1909	22 Apr	Telki	Greschik 1910
1902	28 Mar	Libetbánya	Vezényi 1905	1909	4 May	Nagymaros	Greschik 1910
1903	26 Apr	Selmecebánya	Schenk 1905	1909	7 May	Selmecebánya	Greschik 1910
1904	2 May	Selmecebánya	Schenk 1906a	1909	15 Apr	Köblér	Greschik 1910
1904	4 May	Dubrinics	Schenk 1906a	1909	18 Apr	Puchó	Greschik 1910
1905	26 Apr	Boglár	Schenk 1906b	1910	11 Apr	Vasboldogasszony	Lambrecht 1911
1905	26 Apr	Nádasd	Schenk 1906b	1910	14 Apr	Nagykapornak	Lambrecht 1911
1905	27 Apr	Türkös	Schenk 1906b	1910	5 Apr	Kismarton	Lambrecht 1911
1905	11 Apr	Selmecebánya	Schenk 1906b	1910	18 Apr	Dunaszekcső	Lambrecht 1911
1906	27 Apr	Budapest	Schenk 1907	1910	12 Apr	Buttyin	Lambrecht 1911
1906	23 Apr	Türkös	Schenk 1907	1910	3 May	Ungvár	Lambrecht 1911
1906	19 Apr	Kékkő	Schenk 1907	1910	19 Apr	Eibenthal	Lambrecht 1911
1907	12 May	Türkös	Schenk 1908	1910	9 Apr	Alsóárpás	Lambrecht 1911
1907	17 Apr	Oravicabánya	Schenk 1908	1910	7 Apr	Fogaras	Lambrecht 1911
1907	13 Apr	Kékkő	Schenk 1908	1910	18 Apr	Kisberivoj	Lambrecht 1911
1908	19 Apr	Tihany	Schenk 1909	1910	17 Apr	Nagyberivoj	Lambrecht 1911
1908	22 Apr	Csantavér	Schenk 1909	1910	12 Apr	Felvácza	Lambrecht 1911
1908	15 May	Türkös	Schenk 1909	1910	12 Apr	Bucsum	Lambrecht 1911
1908	24 Apr	Kékkő	Schenk 1909	1910	12 Apr	Désakna	Lambrecht 1911

Year	Date	Location	Reference
1910	30 Apr	Mojszin	Lambrecht 1911
1910	6 Apr	Pojána Rotnuda	Lambrecht 1911
1910	25 Apr	Bodony	Lambrecht 1911
1910	5 May	Felsődiós	Lambrecht 1911
1910	25 Apr	Magasmajtény	Lambrecht 1911
1910	10 May	Alsószinevér	Lambrecht 1911
1910	4 May	Felsőapsa	Lambrecht 1911
1910	18 Apr	Vittencz	Lambrecht 1911
1910	26 Apr	Felsőbotfalu	Lambrecht 1911
1910	7 Apr	Teplicska	Lambrecht 1911
1910	5 May	Jászó	Lambrecht 1911
1910	10 May	Boroszló	Lambrecht 1911
1911	10 Apr	Véménd	Lambrecht 1912
1911	10 Apr	Vasboldogasszony	Lambrecht 1912
1911	24 Mar	Nyögér	Lambrecht 1912
1911	24 Mar	Petőfalva	Lambrecht 1912
1911	18 Apr	Csorna	Lambrecht 1912
1911	10 Apr	Temesszlatina	Lambrecht 1912
1911	30 Apr	Mohol	Lambrecht 1912
1911	27 Apr	Magyarkanizsaszállás	Lambrecht 1912
1911	30 Mar	Csererdő	Lambrecht 1912
1911	8 May	Ungvár	Lambrecht 1912
1911	26 Apr	Meszies	Lambrecht 1912
1911	27 Mar	Bruckenuau	Lambrecht 1912
1911	3 May	Kereszténysziget	Lambrecht 1912
1911	25 Mar	Dezsán	Lambrecht 1912
1911	20 Apr	Sebes	Lambrecht 1912
1911	10 Apr	Detonata	Lambrecht 1912
1911	21 Mar	Székelyvarság	Lambrecht 1912
1911	20 Mar	Gyergyórékás	Lambrecht 1912
1911	4 May	Zilah	Lambrecht 1912
1911	9 Apr	Izaszacsal	Lambrecht 1912
1911	1 Apr	Majszin	Lambrecht 1912
1911	8 May	Gánya	Lambrecht 1912
1911	22 Apr	Bodony	Lambrecht 1912
1911	4 Apr	Recsk	Lambrecht 1912
1911	20 Apr	Magasmajtény	Lambrecht 1912
1911	21 Apr	Alsószinevér	Lambrecht 1912

Year	Date	Location	Reference
1911	3 Apr	Pozsarova	Lambrecht 1912
1911	1 Apr	Turbaczil	Lambrecht 1912
1911	20 Mar	Jászó	Lambrecht 1912
1911	20 Apr	Boroszló	Lambrecht 1912
1911	1 Jun	Tavarna	Lambrecht 1912
1911	20 Mar	Sóslak	Lambrecht 1912
1911	22 Mar	Likavka	Lambrecht 1912
1911	12 Apr	Parasztdubova	Lambrecht 1912
1911	2 Apr	Feketekút	Lambrecht 1912
1911	28 Mar	Szentmihályfalva	Lambrecht 1912
1912	20 Mar	Rohonc	Lambrecht 1913
1912	5 Apr	Kőszegdoroszló	Lambrecht 1913
1912	12 Apr	Csorna	Lambrecht 1913
1912	12 Apr	Alsómocs	Lambrecht 1913
1912	5 Apr	Alvincz	Lambrecht 1913
1912	11 May	Felsőárpás	Lambrecht 1913
1912	16 Apr	Sebes	Lambrecht 1913
1912	22 Apr	Türkös	Lambrecht 1913
1912	25 Apr	Zám	Lambrecht 1913
1912	19 Apr	Gyergyóalfalu	Lambrecht 1913
1912	23 Apr	Izaszacsal	Lambrecht 1913
1912	20 Apr	Vámosmikola	Lambrecht 1913
1912	29 Mar	Szirák	Lambrecht 1913
1912	23 Apr	Bodony	Lambrecht 1913
1912	28 Apr	Recsk	Lambrecht 1913
1912	29 Apr	Terpes	Lambrecht 1913
1912	5 May	Felsődiós	Lambrecht 1913
1912	19 Apr	Magasmajtény	Lambrecht 1913
1912	23 Apr	Alsópalojta	Lambrecht 1913
1912	10 Apr	Znióváralfa	Lambrecht 1913
1912	8 May	Felsőstubnya	Lambrecht 1913
1912	20 Mar	Liptóteplicska	Lambrecht 1913
1912	18 Apr	Boroszló	Lambrecht 1913
1912	30 Mar	Köblér	Lambrecht 1913
1912	15 Apr	Nagypásztély	Lambrecht 1913
1912	30 Apr	Zsolna	Lambrecht 1913
1912	19 Apr	Girált	Lambrecht 1913
1913	12 Apr	Visegrád	Schenk 1914

Year	Date	Location	Reference
1913	16 Apr	Szászabánya	Schenk 1914
1913	21 Apr	Tiszafa	Schenk 1914
1913	8 May	Petrozsény	Schenk 1914
1913	30 Apr	Türkös	Schenk 1914
1913	16 Apr	Szada	Schenk 1914
1913	9 Apr	Bodony	Schenk 1914
1913	14 Apr	Znióváralfa	Schenk 1914
1913	17 Apr	Garamsálfalva	Schenk 1914

Year	Date	Location	Reference
1918	2 May	Berkesd	Schenk 1919
1919	27 Mar	Pécsvárad	Schenk 1921
1920	12 Apr	Pécsvárad	Schenk 1921
1921	14 Apr	Pécsvárad	Schenk 1921
1922	7 Apr	Pécsvárad	Warga 1922
1923	11 Apr	Pécsvárad	Warga 1924
1923	22 Apr	Szekszárd	Warga 1928

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