Poorly studied Black-headed Penduline Tit (*Remiz macronyx*) recorded for the first time in Turkey (Aves: Remizidae)

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The first Black-headed Penduline Tit (*Remiz macronyx*) in Turkey was recorded in April 2022, where it was captured and ringed at the Aras River Ornithological Research Station. This is a poorly studied species with a disjunct range consisting of four subspecies. We provide an overview of how to identify, age, and sex individuals within this species in comparison to the similar Eurasian Penduline Tit (*Remiz pendulinus*), as well as insight into the age and sex of our bird, and summarize current knowledge on the taxonomic situation and challenges of identifying this species. This study brings awareness to a poorly known species and can be useful for others that may either be looking for or potentially encounter this species as a vagrant in the Caucasian region.

Keywords: Aras River; avian ecology; banding; ringing; moult;

Introduction

Black-headed Penduline Tit (*Remiz macronyx* Severtsov, 1873) is a small omnivorous songbird that is genetically closely related to Eurasian Penduline Tit (*R. pendulinus*) (Figure 1A; Barani-Beiranvand et al., 2017; Bot & van Dijk, 2009). *Remiz macronyx* is restricted to extensive reedbeds (*Phragmites australis*) and bulrushes (*Typha latifolia*) growing along the shores of major river systems, lakes, and inland seas in this region (Bot et al., 2011; Bot & van Dijk, 2009; Shirihai & Svensson, 2018). This is one of the most poorly known bird species to be found in the Middle East and Central Asia, with only 58 records worldwide on eBird (eBird, 2022). It has a disjointed and fragmented distribution in Central Asia, where it occurs mainly in Iran, Turkmenistan, and Kazakhstan (Figure 2) (Bot et al., 2011; Bot & van Dijk, 2009). These populations consequently comprise four recognized subspecies (Bot et al., 2011; Bot & van Dijk, 2009): *R. m. macronyx* (Severtsov, 1873), *R. m. neglectus* (Sarudny, 1908), *R. m. nigricans* (Sarudny, 1908), and *R. m. ssaposhnikowi* (Johansen, HE, 1907).

The Record

On April 6 2022, a Black-headed Penduline Tit *Remiz macronyx* (Severtzov, 1873) was captured in a mist net at the Aras River Ornithological Research Station (40.078°N, 43.358°E) in Yukarı Çýrykýl village, Tuzluca, İçdir Province, northeastern Turkey. Numerous photos (Figure 1 and Supplementary Material) and biometric measurements (Table 1) were taken of this bird, and it was ringed with a standard aluminium ring of the Turkish National Ringing Scheme (TNRS) before being released.

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The Aras River Ornithological Research Station is located along the Aras River in İğdır Province, northeastern Turkey (Figure 2), at the confluence of the Caucasus and Iran-Anatolian biodiversity hotspots and along the crossroads of three global migratory flyways that converge over eastern Turkey between Africa, Europe, the Middle East, and Asia (Kittelberger et al., 2021; Neate-Clegg et al., 2019). This ornithological station has been running the Eastern Turkey Bird Monitoring Project since 2006, through the University of Utah and the KuzeyDoğa Society in collaboration with the Koç, İğdır and Kafkas universities in Turkey (Neate-Clegg et al., 2019), recording critical data on population and migration ecology of birds in an understudied region. The station operates 500-600 meters of mist nets throughout the spring and autumn migrations for ~200 days per year, encapsulating the entire time period of seasonal land bird migration each year in the region. To date, over 160,000 birds of 204 species have been ringed at the site.

The riparian habitat of the Aras River wetlands primarily consists of a mosaic of Phragmites and Typha interspersed among scrub, orchards, and low intensity agriculture (Kittelberger et al., 2021; Neate-Clegg et al., 2019). It was near this Phragmites and Typha vegetation that this *R. macronyx* was. These wetlands, where 313 bird species have been recorded so far, provide critical habitat for birds amidst the arid plains of northeastern Turkey, and comprise an essential stopover site and ecological oasis for migrating birds in an otherwise arid landscape (Kittelberger et al., 2021; Neate-Clegg et al., 2019).

**Taxonomy and Appearance of Remiz macronyx**

There are currently four recognized subspecies of *R. macronyx*. The nominate subspecies is largely resident and occurs in Iran and Western Kazakhstan (Shirihai & Svensson, 2018). Almost all specimens of *macronyx* have a white chin, although this white is limited in Iranian birds. In fresh plumage, the black has whitish fringes that progressively wear down over winter and spring. Plumage of *macronyx* in Kazakhstan varies greatly, with white in the throat and chestnut in the crown and mantle (Shirihai & Svensson, 2018). Males from Iran, belonging to the subspecies *neglectus*, typically display a more extensive black head without traces of chestnut colouration.

Further east in Kazakhstan, around the Topar Lakes region occurs *R. macronyx ssaposhnikowi*. The status and origin of this taxon is questioned by some (Bot & van Dijk, 2009). The appearance of *ssaposhnikowi* can vary a lot, with some individuals perhaps inseparable from *R. pendulinus caspius*. Like *caspius*, some *ssaposhnikowi* display a chestnut nape and crown, a completely white throat and broad white fringes to flight feathers (Bot et al., 2011).

The subspecies *R. macronyx nigricans* is believed to have gone extinct (Shirihai & Svensson, 2018). It was dark overall, with a black head blending into a dark chestnut body.

**Moult, Ageing and Sexing**

The moult of *macronyx* is not well studied, but is thought to largely resemble that of *R. pendulinus* (Shirihai & Svensson, 2018). In *R. pendulinus*, adults perform a complete definitive prebasic (post-breeding) moult, while hatch year birds perform a partial preformative (post-juvenile) moult (Pyle, 2022; Shirihai & Svensson, 2018). The partial preformative moult includes all of the body feathers, lesser coverts, median coverts, some or all of the greater coverts, tertials, and rectrices (Shirihai & Svensson, 2018).
The bird ringed at Aras had undergone a partial moult. All body and head feathers; lesser, median, and greater coverts; and tertials (one missing in the right wing) were moulted. The moulted greater coverts have a distinct black core and a rich rufous fringe, and they appear dense and glossy. In contrast, the primary coverts are relatively pointed.
Table 1. Morphometric data from our Aras Remiz individual alongside data for R. macronyx, R. pendulinus caspius, R. p. menzbieri (the pendulinus subspecies that occurs at the Aras Bird Ringing Station), and R. p. pendulinus. μ represents the population mean from sampled individuals for a particular measurement. *Tarsus length differs from Bot et al. (2011), likely a result of using a different technique than Shirihai & Svensson (2018) to measure the tarsus. **Subspecies data come from Bot et al. (2011) for breeding individuals of the subspecies ssaposhnikowi in eastern Kazakhstan. ***Subspecies data come from birds ringed at the Aras River Ornithological Research Station. The rest of the data for macronyx, caspius, and pendulinus come from Shirihai & Svensson (2018). Length measurements in mm, weight in g.

|                | Wing | Tail | Tail/Wing Ratio | Tarsus | Hind-claw | Weight |
|----------------|------|------|-----------------|--------|-----------|--------|
| Aras individual | 55   | 48   | 0.87            | 15.3*  | 7.6       | 8.9    |
| R. macronyx (males and females same size) | 54-59 | 43-52 | μ=0.85         | 17.8-18.2** (n=2) | N/A | 10.3-11.2** (n=2) |
|               | μ=57 | μ=48.5 | (n=10)         | (n=10) |           |        |
| R. p. caspius males | 56.5-60 | 45-48.5 | μ=0.82         | 13.3-15.5 μ=14.3 (n=24) | N/A | N/A        |
|               | μ=58.5 | μ=47.3 | (n=12)         | (n=12) |           |        |
| R. p. menzbieri *** | 52-56 | 40-48 | μ=0.81         | 5.3-6.4 (n=5) | N/A | 7.0-8.9 (n=16) |
|               | μ=54.3 | μ=43.8 | (n=16)         | (n=16) |           |        |
| R. p. pendulinus males | 53.5-60.5 | 44-48 | μ=83.2         | 13.5-15.6 μ=14.4 (n=28) | N/A | N/A        |
|               | μ=56.6 | μ=46.5 | (n=17)         | (n=29) |           |        |

In shape, with dull coloration and loose texture in comparison with the greater coverts, and most primaries and secondaries appear relatively bleached and worn in comparison with the greater coverts. The tertials appeared replaced with darker cores and had less wear compared to the secondaries (Figure 1C). The shorter R1 among the rectrices is within the range of variation for most species (Figure 1D). One primary feather had been replaced, showing the contrast between a basic primary and the retained juvenile primaries (Figure 1E). The body and head feathers were determined to be replaced because this genus has distinctive plumages and this individual was not in juvenile plumage (washed out and lacking or at most with a partial black mask/head; Shirihai & Svensson, 2018). Therefore, it is possible to label the Aras bird as a second-year individual in first cycle formative (FCF) plumage (Pyle, 2022; Pyle et al., 2022).

Males display a black hood, a thin buff collar, and a rich rufous back and breast. Females are paler and duller overall, with the buff collar usually much broader and sometimes extending far up on the back of the head. Females do not have a black head but instead have a wide black mask on the face, contrasting with the grey nape (Bot et al., 2011; Shirihai & Svensson, 2018). The bird ringed in Aras can be sexed as a male based on these characters.

**Description and Identification**

The main pitfall in identifying R. macronyx is the issue of R. pendulinus caspius and the possibility of hybrids between these two taxa. This is further complicated by the fact that there is little data on hybrids between the two taxa. There are two photographed individuals of macronyx (ML152517211, ML338540311) in the Macaulay Library that could potentially be hybrids.
Figure 2. Distribution of the Black-headed Penduline Tit (*Remiz macronyx*). The range in green comes from the literature and is an amalgamation of various ranges depicted in Bot and van Dijk (2009), Barani-Beiranvand et al. (2017), and Shirihai and Svensson (2018). Locations in blue depict areas where observations have been reported to eBird (2022). The range of *R. macronyx nigricans*, which is potentially extinct in the Sistan Basin, is noted in red. An x marks the location of the Aras River Ornithological Research Station, and the vagrant 1971 record from Oman is noted with a black circle. This map was created using ArcGIS Pro (ESRI, 2021).

While females and immature birds of the two taxa can only occasionally be distinguished, it is possible to differentiate males of the two taxa. For separating breeding plumage males of *R. m. macronyx* from *R. p. caspius*, note the distribution of black in the head, the amount of white in the throat, the colour of the flight feather fringes, and biometrics [if captured]. In *macronyx*, the black hood typically includes all of the head except for some white feathers in the chin. Most males that are photographed from Iran are very dark throughout the plumage, and the black on the head can sometimes continue onto the breast. This seems to not be the case for nominate *macronyx* in Kazakhstan. Two photographed individuals examined from the Ural River had rufous feathers mixed into the black hood (ML338540351, ML338540311; ML464453051, ML464453061). Whether this variation falls within the range for *macronyx* or is an indication of a hybrid with *caspius* remains unclear. The black in *caspius* is concentrated in the mask, and males often have a reddish-brown crown that continues down to the back. While the ratio between black and rufous varies among individuals, the black should never encompass the entire head in pure *caspius* (Bot et al., 2011; Shirihai & Svensson, 2018).

The extent of white in the chin of *macronyx* also varies. Sometimes it is limited to a few feathers or even appears to be absent entirely, depending on region and population. It is currently unclear how much white can occur in a pure *macronyx* individual. *R. p.*
on the other hand has a completely white throat and no blotches of black between the throat and breast. The same individual from the Ural River (ML338540351, ML338540311) has a larger white patch at the chin than males from Iran (Bot et al., 2011; Shirihai & Svensson, 2018). *R. macronyx* of the nominate subspecies also has grey fringes to the primaries, secondaries, tertials, and rectrices. Contrastingly, *R. p. caspius* has broad white fringes to these same feathers.

Measurements such as wing, tail, and maybe hindclaw may be useful in separating *macronyx* from *caspius* (Table 1). Notably, *macronyx* has a proportionally longer tail and shorter wings than *caspius*. As a result, the mean tail and wing ratio in male *macronyx* is 0.85 whereas it is 0.82 in *caspius* (Table 1). Even though “macronyx” roughly means “long/ large claw” in Latin, little is mentioned in the literature about the hindclaw. In hand, the size of the legs and especially claws of the Aras bird was immediately noticeable (Figure 1F), as they were stronger and longer than that of *R. pendulinus menzbieri* that we frequently capture at this site. A few *R. p. menzbieri* at Aras were measured for hindclaw and the differences seem to indicate that *macronyx* indeed has a longer hindclaw (Table 1). More work needs to be done among populations of both species to assess the size ranges of the hindclaw.

The combination of a mostly black head, grey flight feathers, and the biometrics of the Aras individual rules out a pure *R. p. caspius*. The Aras bird has almost an entirely black head with a few rufous feathers mixed in at the crown and back of the head (Figure 1B,C). The flight feathers, especially the tertials, are also fringed grey rather than white (Figure 1E). Lastly, the wing length of the Aras bird was measured at 55 mm and the tail length at 48 mm (Table 1). The wing length falls 1.5 mm below the interval presented for male *caspius* in Shirihai & Svensson (2018). The tail length is also at the upper limit in length for *caspius*. Both measurements on the contrary fit well for *macronyx*. Furthermore, the tail/wing ratio of 0.87 supports *macronyx* (Table 1; Shirihai & Svensson, 2018).

**Discussion**

The Black-headed Penduline Tit ringed in eastern Turkey in April 2022 represents both the first record of this species identified in Turkey as well as the westernmost record of the species (Figure 2). While this species is largely resident across much of its range, it is likely that some of the northern and eastern populations partially migrate and winter in the Caspian lowlands of northern Iran (Madge, 2020). Passage migration through Turkmenistan in the spring occurs from late February through early March and from mid-March through early April in Uzbekistan, while autumn movements have been reported beginning in late September (Madge, 2020). The capture of this individual in Aras corresponds to the reported migration period of birds in Uzbekistan.

This *R. macronyx* captured at the Aras River Station is most likely a vagrant, and the station is situated somewhat between two populations of *R. macronyx* (Figure 2). Geographically, the Iran population on the southern shore of the Caspian Sea is slightly closer to Aras. The other population is located along the Ural River north of the Caspian Sea (Figure 2). The appearance of the Aras bird does not fit that of the males from Iran, as males here usually display an extensive black head and little white in the chin during the spring. On the other hand, there are very few photographed *R. macronyx* from the Ural River region. The two males photographed along the Ural River in the Macaulay Library (ML338540351, ML338540311; ML464453051, ML464453061) though are very similar to the bird ringed at Aras — all have a white patch on the chin surrounded by the largely black head with a few chestnut feathers mixed into the neck and crown.
Since the westernmost populations of Black-headed Penduline Tit breed close to the Western Palearctic, this species has previously been considered a candidate for vagrancy in the Western Palearctic (Bot et al., 2011). Specifically, large numbers of *Remiz pendulinus caspius* winter in Israel, so it is possible that some individuals of co-occurring *R. macronyx* could migrate with them (Madge, 2020). The species has been known to wander in the past, such as into European Russia (Redactie Dutch Birding, 2011) and to northern Oman (eBird, 2022). We recommend other field researchers to search for or be watchful for future vagrant individuals of *R. macronyx* in the Caucasus and Middle East.

**Supplementary Material**

Supplementary Material is given as a Supplementary Annex, which is available via the “Supplementary” tab on the article’s online page.

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No potential conflict of interest was reported by the authors.

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