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First records in north-west Europe of two Common Chiffchaff *Phylloscopus collybita* taxa from the Middle East and the Caucasus

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http://zoobank.org/urn:lsid:zoobank.org:pub:778BD4A4-F3DC-41B2-83FC-D2EC338E69AC

Summary.—Six subspecies of Common Chiffchaff *Phylloscopus collybita* are usually recognised, of which three are known to occur in north-west Europe: *P. c. collybita*, *P. c. abietinus* and *P. c. tristis*. Based on a newly developed mitochondrial DNA sequencing protocol, *P. c. brevirostris* and *P. c. caucasicus* were recorded in north-western Europe for the first time. Both taxa occur at the south-eastern edges of the species' breeding range, in the Middle East and the Caucasus, respectively. A single *P. c. brevirostris* was recorded in Germany in spring (May 2022), whereas the five *P. c. caucasicus* were all recorded during late autumn and early winter (between the third week of November and mid-December) in the Netherlands and Germany. The contact calls of three of the *P. c. caucasicus* as well as the single *P. c. brevirostris* supported the genetic data. We postulate that *P. c. caucasicus* might be overlooked in Western Europe, rather than an exceptional vagrant. Movements by both taxa outside the breeding season are largely undescribed.

The Common Chiffchaff *Phylloscopus collybita* forms part of a complex that currently consists of 12 taxa divided into four species (Clements *et al*. 2024, Gill *et al*. 2024): Common Chiffchaff (six subspecies), Iberian Chiffchaff *P. ibericus* (two subspecies), Canary Islands Chiffchaff *P. canariensis* (two subspecies, one extinct) and Mountain Chiffchaff *P. sindianus* (two subspecies). However, the validity of some taxa, as well as the number of species involved has been controversial, with, for example, del Hoyo & Collar (2016) treating *P. collybita tristis* at species rank under the well-known vernacular name, Siberian Chiffchaff. Also, not all populations have been assigned taxonomically, e.g., a novel lineage recently identified in Israel (Raković *et al*. 2019). Common Chiffchaff has a large breeding range across the Palearctic, covering much of Europe, Siberia and parts of the Caucasus and the northern Middle East; it winters south to sub-Saharan Africa, the Middle East and the Indian Subcontinent (Cramp 1992, Clement *et al*. 2020). For a more detailed overview of the breeding and wintering ranges of all Common Chiffchaff subspecies, see Table 1. Between 2009 and 2022, more than 1,200 DNA samples of *P. collybita sensu lato* were collected in Belgium, France, Germany, Israel and the Netherlands as part of a study into the occurrence of chiffchaff taxa outside the breeding season, and the correlation between phenotypes and genotypes, focusing on *P. c. collybita*, *P. c. abietinus* and *P. c. tristis*. Unexpectedly, five *P. c. caucasicus* and one *P. c. brevirostris* were trapped and screened in the Netherlands and Germany during this study.

Methods

The study area in north-west Europe focused mainly on five sampling sites in the Netherlands and one in Germany: Almere, Flevoland, the Netherlands (52°25′17.8″N 05°13′53.4″E), Bloemendaal, Noord-Holland, the Netherlands (52°25′09.8″N, 04°33′37.3″E),

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TABLE 1

Breeding and wintering ranges of *Phylloscopus collybita* subspecies (based on Kirwan *et al.* 2008, Clement *et al.* 2020, Babbington *et al.* 2024, Clements *et al.* 2024, Gill *et al.* 2024). * = treated as a species by some taxonomic authorities (e.g., del Hoyo & Collar 2016)

Subspecies	**Breeding range**	**Winter range**
P. c. collybita (Vieillot, 1817)	British Isles east to southern Sweden, and from France and north-central and north-east Spain to Poland, Balkans, Romania, Bulgaria and north-west Turkey.	Mediterranean Basin, north-west and western Africa, Middle East and Arabia; small numbers in north-west Europe.
P. c. abietinus (Nilsson, 1819)	Scandinavia (except south), Baltic States, Belarus and western Russia east to at least Kanin Peninsula and the Urals, possibly south-east Europe.	Balkans south to western, north-east and East Africa, and Arabia.
P. c. brevirostris (Strickland, 1837)	Highlands of western, northern and southern Turkey.	Unknown, possibly to Israel and Arabia.
P. c. caucasicus Loskot, 1991	Caucasus and Transcaucasia south to north-west and northern Iran.	Unknown, possibly to Israel and Arabia.
P. c. menzbieri Shestoperov, 1937	North-east Iran (eastern Elburz Mts. and Khorasan Mts.) and south-west Turkmenistan.	Unknown.
*P. c. tristis** Blyth, 1843	Russia, from Kanin Peninsula east to River Kolyma (possibly to River Anadyr), south to southern Urals, northern Kazakhstan, north-west China, north-west Mongolia and Lake Baikal.	Iraq, Iran and Arabia east to Indian Subcontinent.

Castricum, Noord-Holland, the Netherlands (52°32′27.1″N, 04°36′54.0″E), Meijendel, Zuid-Holland, the Netherlands (52°08′06.4″N, 04°20′00.2″E), Schiermonnikoog, Friesland, the Netherlands (53°29′00.2″N, 06°10′58.8″E) and Heligoland, Schleswig-Holstein, Germany (54°11′06.1″N, 07°52′55.6″E). These were established initially to investigate the status of *P. c. tristis*, *P. c. abietinus* and their intergrades in Western Europe (see van der Spek & de Knijff 2021). Birds trapped in the Netherlands were measured and ringed, and breast feathers were collected for DNA analysis following standard protocols from and under legislation of the Dutch bird ringing scheme (NIOO 13.03). On Heligoland, Germany, feathers that ringed birds dropped during handling were collected. From these feathers, a fragment of 945 base pairs of the mitochondrial cytochrome B gene (CYTB) was sequenced. DNA-isolation was performed using the QIAamp DNA Mini and Blood Mini kit according to the manufacturer's instructions. The CYTB fragment was amplified using PCR, run on a GeneAmp® PCR System 9700 by the Dept. of Human Genetics, Leiden University Medical Center, the Netherlands. The mtDNA sequences were aligned to birds of known provenance using ClustalW (Thompson 1994) in BioEdit 7.2.5 (Hall 1999) and manually checked for potential inconsistencies. For this investigative alignment, we used a panel of whole mtDNA genome sequences of all known taxa in the *P. collybita* complex (de Knijff *et al.* in prep.). For a full description of the protocols used for sequencing as part of the wider study, see de Knijff *et al.* (2024). The CYTB sequences have been uploaded to the publicly accessible GenBank/NCBI database (MW268652, PQ246679, OP958115, OP958135, OP958154 for the five *P. c. caucasicus* individuals and OP958182 for the single *P. c. brevirostris*). The sequences of this large CYTB fragment sequencing method separates *P. c. caucasicus*/ *P. c. brevirostris* as a single cluster (see de Knijff & te Raa 2024) from all other chiffchaff taxa, but not from each other: these two south-eastern taxa are almost indistinguishable in their mtDNA (Helbig *et al.* 1996, Marova 2021). However, to separate *P. c. caucasicus* and *P. c. brevirostris* from each other de Knijff *et al.* (2024) developed three additional sequence protocols by targeting short mtDNA fragments of ND1, ATP8/ATP6 and ND3/tRNA-ARG, each of which contained SNPs specific to *P. c. collybita*, *P. c. caucasicus* and *P. c. brevirostris*. Combined with CYTB, these three fragments enable reliable

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separation of *P. c. brevirostris* (two distinct subgroups) from *P. c. caucasicus* (de Knijff & te Raa 2024). Using mtDNA provides genetic information on the maternal line, not the paternal. Thereby the results do not provide information on any past hybridisation of taxa. For further laboratory procedure details see de Knijff *et al*. (2024). Birds were sexed by targeting the avian sex chromosomes (Z and W) with the PCR primers 2550F/2718R as described by Fridolfsson & Ellegren (1999). These were successfully used for Common Chiffchaffs earlier by Collinson *et al*. (2018) and van der Spek & de Knijff (2021). Sonograms of recorded calls were made using the Longicaudus ShinyApp and compared with Clement & Helbig (1998).

Results

On comparing all obtained CYTB sequences (Fig. 1, also see de Knijff & te Raa 2024) we identified five individuals, trapped in the Netherlands and Germany (Table 2), that matched

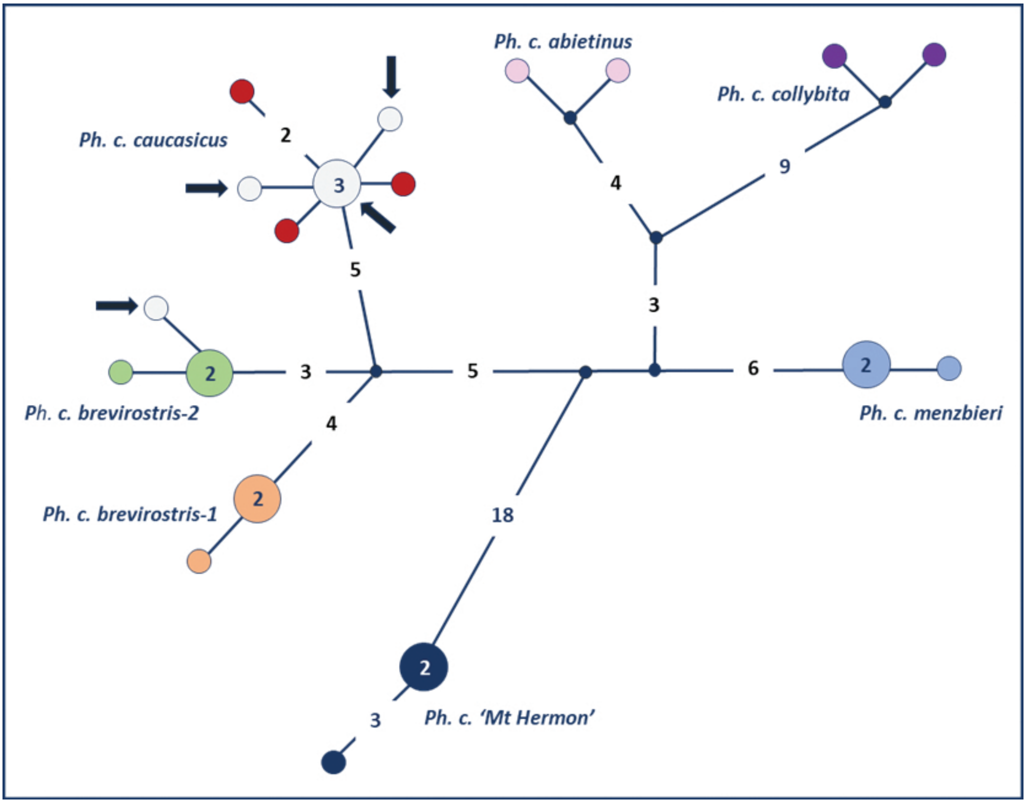

Figure 1. Network of variation in the mtDNA CYTB gene (945 base pairs) combined with three shorter mtDNA fragments of ND1 (110 bp), ATP8/ATP6 (240 bp) and ND3/tRNA-ARG (125 bp) of six Common Chiffchaff *Phylloscopus collybita sensu lato* taxa. For this network, sequences of 19 individuals of known origins (see de Knijff & te Raa 2024) were used, in addition to the six unidentified samples (shown as pale grey circles and indicated with a dark blue arrow). Each circle represents a unique combined mtDNA sequence (haplotype) of 1,420 bp. The relative diameter of each circle is an indication of its frequency in the total dataset (*n* = 19). Numbers inside circles: number of times that a haplotype was observed. Unnumbered circles: haplotypes found in just one individual. Small black dots: inferred (not observed) haplotypes necessary to construct the network. Short lines between circles without a number indicate differences between two haplotypes at one position (out of 1,420 bp), whereas longer lines indicate two or more (as numbered) different positions. The subspecies *P. c. tristis* is too divergent to show in this network. The 'Mt. Hermon population' was only recently discovered and is of mixed genetic origin, but some birds showed a unique and novel lineage that has not yet been assigned to any known subspecies (Raković *et al*. 2019).

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TABLE 2

Individuals of *Phylloscopus collybita caucasicus* and *Phylloscopus collybita brevirostris* that were trapped in the Netherlands and Germany during 2015–22 and confirmed as such via genetic screening.

Location	**Date**	**Ring no.**	**Genetic ID mtDNA 945 base pairs**	**Genetic ID SNP**	**Call heard**
Schiermonnikoog, Friesland, the Netherlands	25 November 2015	Arnhem AEL475	*caucasicus/brevirostris*	*caucasicus*	Yes (described)
Heligoland, Schleswig-Holstein, Germany	8, 9, 11 December 2015	Helgoland V120214	*caucasicus/brevirostris*	*caucasicus*	Yes (described)
Castricum, Noord-Holland, the Netherlands	14 December 2015	Arnhem AFP397	*caucasicus/brevirostris*	*caucasicus*	No
Heligoland, Schleswig-Holstein, Germany	21 November 2019	Helgoland APV160	*caucasicus/brevirostris*	*caucasicus*	Yes (not well described)
Castricum, Noord-Holland, the Netherlands	24 November 2019	Arnhem V154522	*caucasicus/brevirostris*	*caucasicus*	No
Heligoland, Schleswig-Holstein, Germany	13 May 2022	Helgoland V36058	*caucasicus/brevirostris*	*brevirostris*	Yes (sound-recorded)

TABLE 3

Mensural, sex and age data for the same *Phylloscopus collybita caucasicus* and *Phylloscopus collybita brevirostris* trapped in the Netherlands and Germany during 2015–22 as in Table 2. * = first calendar-year. ** = not a nestling, but age otherwise unknown.

Location	Date	Ring no.	Age	Wing cord (mm)	Mass (g)	**Sex**
P. c. caucasicus						
Schiermonnikoog, NL	25 November 2015	Arnhem AEL475	1cy*	58	6.0	F
Heligoland, GER	8, 9, 11 December 2015	Helgoland V120214	Full grown**	65	8.1	M
Castricum, NL	14 December 2015	Arnhem AFP397	Full grown	63	7.3	M
Heligoland, GER	21 November 2019	Helgoland V154522	1cy	65	7.5	M
Castricum, NL	24 November 2019	Arnhem APV160	Full grown	65	10.7	M
P. c. brevirostris						
Heligoland, GER	13 May 2022	Helgoland V36058	>1cy*	62.5	8.8	F

P. c. caucasicus sequences and one that matched *P. c. brevirostris* sequences: an unexpected by-catch. In three out of five *caucasicus*, contact calls were heard and described. The calls of the single *brevirostris* were also recorded. All six birds are described in more detail below. For mensural data, see Table 3.

(1) *P. c. caucasicus*: Schiermonnikoog, 25 November 2015, Genbank MW268652. The observers described the bird (Fig. 2) as uttering a flattish *peep* call on release, reminiscent of but not exactly like *tristis* (H. Bouwmeester *in litt*. 2016), and thus very unlike the rising *hu-eet* or *swee-oo* calls of *P. c. collybita* and *P. c. abietinus*. Genetic analyses revealed it to be a female *P. c. caucasicus* (also see van der Spek & de Knijff 2021).

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Figure 2. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *caucasicus*, Schiermonnikoog, Friesland, the Netherlands, 25 November 2015 (© Henri Bouwmeester)

(2) *P. c. caucasicus*: Heligoland, 8 December 2015, Genbank OP958119. This individual (Fig. 3) was ringed as a *P. c. collybita*/*P. c. abietinus* but uttered a 'flat' call, similar to *P. c. tristis* when released. This confused the ringers, as the bird's plumage did not meet the criteria generally accepted as typical for *P. c. tristis* (Dean & Svensson 2005). For example, it had greenish upperparts and a yellow supercilium. The bird was re-trapped on 9 and 11 December, and on the last date a dropped feather was collected. Genetic analyses showed it to be a male *P. c. caucasicus*.

Figure 3. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *caucasicus*, Heligoland, Schleswig-Holstein, Germany, 11 December 2015 (Jochen Dierschke)

(3) *P. c. caucasicus*: Castricum, 14 December 2015, Genbank PQ246679. By late autumn/early winter, Common Chiffchaffs are scarce in continental north-west Europe. With relatively few genetic samples available, birds trapped in November and December therefore are of special interest and, as result, this individual (Fig. 4) was sampled, despite that no calls were heard and the individual was not suspected to belong to an unusual taxon (van der Spek & de Knijff 2021).

(4) *P. c. caucasicus*: Heligoland, 21 November 2019, Genbank OP958154. This individual (Fig. 5) was sampled at the bird observatory due to its unusual vocalisations, but neither a more detailed description of the call nor sound-recordings are available. Genetic analyses found it to be a male *P. c. caucasicus*.

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Figure 4. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *caucasicus*, Castricum, Noord-Holland, the Netherlands, 14 December 2015 (© Joep van Leeuwen)

Figure 5. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *caucasicus*, Heligoland, Schleswig-Holstein, Germany, 21 November 2019 (© Klaus Müller)

Figure 6. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *caucasicus*, Castricum, Noord-Holland, the Netherlands, 24 November 2019 (© Arnold Wijker)

(5) *P. c. caucasicus*: Castricum, 24 November 2019, Genbank OP958135. As in bird 3, this individual (Fig. 6) was sampled because it was trapped so late in the year. Again, no calls were heard and its plumage did not suggest an unusual taxon, but genetic analyses showed it to be a male *P. c. caucasicus*.

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Figure 7. Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *brevirostris*, Heligoland, Schleswig-Holstein, Germany, 13 May 2022 (Jochen Dierschke)

(6) *P. c. brevirostris*: Heligoland, 13 May 2022, Genbank OP958182. A bird trapped at the bird observatory uttered 'flat' calls. Since it did not look like *P. c. tristis* (see Fig. 7), in this case *P. c. caucasicus* or *P. c. brevirostris* were suspected. Dropped feathers were collected and two calls were sound-recorded (Figs. 8–9). The shape of the notes on the sonograms, as well as their frequency and duration are very similar to those of *P. c. brevirostris* in Clement & Helbig (1998) and the genetic analyses demonstrated it to be a female *P. c. brevirostris*.

Discussion

Occurrence in Europe.—Wintering areas for *P. c. caucasicus* and *P. c. brevirostris* are not mentioned in, for example, Cramp (1992) or any of the global checklists like Clements *et al*. (2024) and Gill *et al.* (2024). Movements by both taxa are still largely unknown, although birds with 'flattish' calls are regularly heard outside the breeding season on Cyprus (sound-recordings on Xeno-canto.org [*n* = 4; recordist Colin Richardson noted that calls of all Common Chiffchaffs observed in December 2024 sounded 'flat']; VvdS pers. obs. March 2012; *n* = 1) and are even suspected to breed on Lesvos, Greece (Dally 2009; PdK pers. obs.). Flint & Richardson (2024) considered that between November and March, the commonest Chiffchaff taxon on Cyprus is *P. c. brevirostris*. Recently, based on genetic work, *P. c. brevirostris*/*P. c. caucasicus* have been recorded in winter in Saudi Arabia after genetic testing (Babbington *et al*. 2024; who did not distinguish between the two taxa). Furthermore, *P. c. brevirostris*/*P. c. caucasicus* (again not distinguished genetically) have been confirmed to occur in both summer and winter in northern Israel (Raković *et al*. 2019), where neither taxon was previously known to breed. The distances between the nearest breeding areas and the sites in north-west Europe where the taxa were trapped are >2,000 km for *P. c. brevirostris* and >2,500 km for *P. c. caucasicus*, demonstrating that both taxa are capable of moving long distances. The potential occurrence of *P. c. brevirostris* in Europe (outside Turkey) was already predicted by Copete & López (2013). As only one individual has been detected to date, the frequency of its occurrence in north-west Europe, however, remains unknown. For *P. c. caucasicus*, the records suggest that movements north and west might be reasonably regular. With five individuals trapped in two autumns, at three out of the six study sites, on a limited dataset (*n* = 554 *P. collybita sensu lato* sampled at the six sites combined during 2009–22), the relative frequency suggests that *P. c. caucasicus* is not an extreme vagrant to north-west Europe.

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Temporal distribution.—Sampling of Common Chiffchaffs occurred throughout autumn (August–December). All of the *P. c. caucasicus* were trapped between 21 November and 14 December, suggesting this subspecies arrives late in autumn. Since the study focused on autumn migration, very few individuals were (randomly) screened in spring. The Heligoland *P. c. brevirostris* was specifically sampled because its unusual calls attracted attention. It is therefore unknown whether *P. c. brevirostris* occurs more regularly in spring, or if it is only an exceptional vagrant to north-west Europe. Furthermore, it is also unknown whether *P. c. caucasicus* too occurs in spring or if records are (mostly) confined to (late) autumn.

Calls.—With calls heard in three of five *P. c. caucasicus*, and in the single *P. c. brevirostris*, there is additional evidence other than their genetics to support the identifications. For the *P. c. brevirostris*, the calls were also sound-recorded. Based on Clement & Helbig (1998), the sonograms (Fig. 8) indeed confirm the identity.

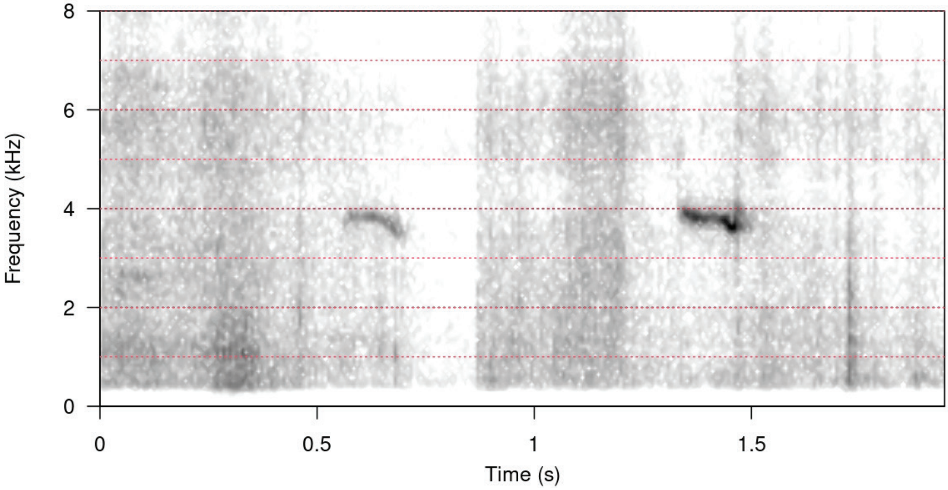

Figure 8. Sonograms of two recorded calls of a Common Chiffchaff *Phylloscopus collybita* with the genetic profile of subspecies *brevirostris*, Heligoland, Schleswig-Holstein, Germany, 13 May 2022 (M. Pfreundt)

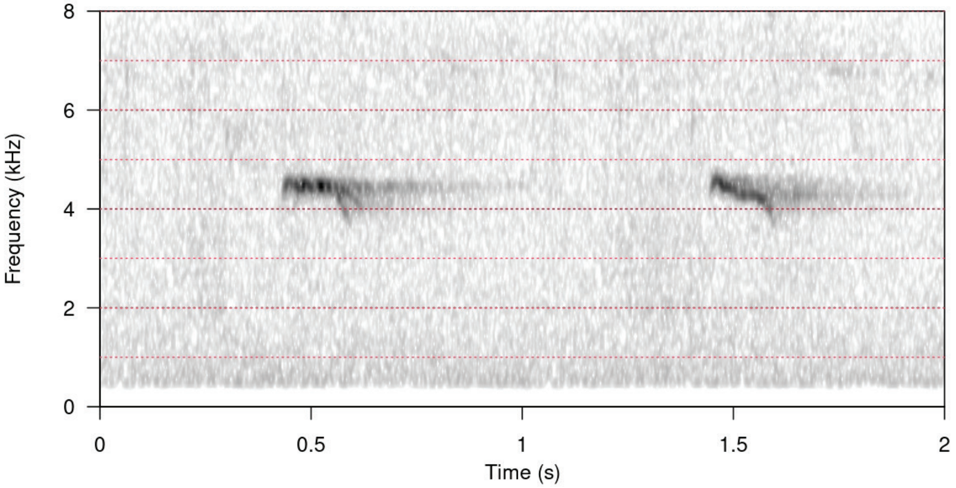

Figure 9. *P. c. brevirostris*, Osmaniye, Turkey, May 2008 (José Luis Copete). The calls are 'flattish', very unlike the rising calls of *P. c. collybita* and *P. c. abietinus* that are known from north-western Europe, but are somewhat similar to *P. c. tristis* (not shown here). Any diagnostic differences in call between *P. c. caucasicus* and *P. c. brevirostris* are not known.

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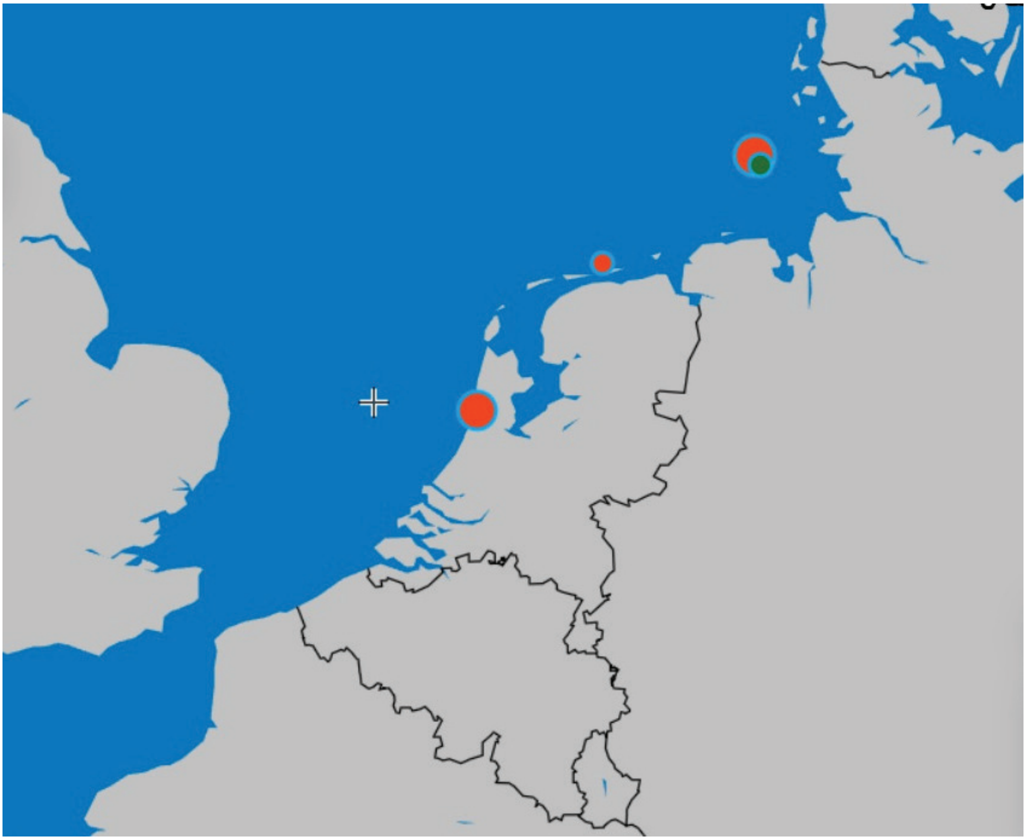

Figure 10. Sample sites in the Netherlands and Germany where individuals of *Phylloscopus collybita caucasicus* (red) and *Phylloscopus collybita brevirostris* (green) were trapped during 2015–22. Large dots: *n* = 2 records. Small dots: *n* = 1 record.

Morphology.—The plumages of *P. c. brevirostris* and *P. c. caucasicus* differ very little from *P. c. collybita* and *P. c. abietinus*. *P. c. caucasicus* should be darker and less green, more brown or grey-brown above and whiter below, with less yellow, and the belly and undertail-coverts almost entirely white (Loskot 1991, *fide* Svensson 2023). Especially birds 1–3 indeed had whitish underparts (Figs. 2–4), but bird 6 seemed quite dark (Fig. 7). Svensson (2023), however, noted that he was unable to find consistent plumage differences between *P. c. caucasicus* and *P. c. abietinus*, despite studying the holotype of *P. c. caucasicus* and trapping live birds during the breeding season. Furthermore, he was also unable to identify any consistent differences between *P. c. brevirostris* and *P. c. collybita*. Clement *et al*. (2020) mentioned both subspecies as being generally more olive-brown, with a stronger supercilium and brownish-washed flanks. Marova *et al*. (2021) reported that, mensurally, *P. c. brevirostris* differs significantly from the other south-eastern taxa (including migrant *P. c. abietinus*) in being smaller on average, in contrast to the original description by Strickland (1837), who thought that this taxon is larger than *P. c. collybita*. The sample sizes in Marova *et al*. (2021) are, however, small (*n* = 8 for *brevirostris*). The wing chord of the *P. c. brevirostris* in Germany falls within the variation they presented, but also within that of both *P. c. collybita* and *P. c. abietinus* (Demongin 2016, Svensson 2023).

Sex ratio.—Four of five *P. c. caucasicus* identified were males. In such a small sample, a skewed sex ratio might be coincidental. However, the majority of Common Chiffchaffs

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sexed in the wider study were also males (66%, $n = 454$; van der Spek & de Knijff 2021). This was believed to be correlated to the use of playback at several study sites, which in this species is known to cause an overrepresentation of males (Lecoq & Catry 2003). Playback was used at the Castricum study site, where two of the male *P. c. caucasicus* were trapped (but no female).

Hybridisation.—Marova *et al*. (2024) recently described a contact zone between *P. c. abietinus* and *P. c. caucasicus* in southern Russia. The *P. c. caucasicus* individuals in the Netherlands and Germany described here were screened only for maternal genetic information. Although there are no reasons to suspect these birds were hybrids, that hypothesis has not been excluded.

Validity of P. c. brevirostris and P. c. caucasicus.—The validity of both *P. c. brevirostris* and *P. c. caucasicus* has been challenged (e.g., Kirwan *et al*. 2008). Clement & Helbig (1998) mentioned that they are genetically extremely similar to one another, whilst Raković *et al*. (2019) found *P. c. brevirostris* and *P. c. caucasicus* to be genetically indistinguishable in ND2 and suggested that they are synonyms. Based on morphology, Svensson (2023) even included *P. c. brevirostris* in *P. c. collybita* and *P. c. caucasicus* in *P. c. abietinus*. Marova *et al*. (2021) were unable to distinguish *P. c. brevirostris* from *P. c. caucasicus* using CYTB. On the other hand, based on morphology and song acoustics, they found *P. c. brevirostris* to be the most distinctive Common Chiffchaff taxon in the Caucasus and Middle East. They, however, hypothesised *P. c. caucasicus* to represent a hybrid population between *P. c. brevirostris* and *P. c. menzbieri*. The subspecies *P. c. collybita*, *P. c. abietinus*, *P. c. brevirostris* and *P. c. caucasicus* are undeniably closely related. As also acknowledged by Svensson (2023), there are, however, consistent differences in contact calls between *P. c. collybita*/*P. c. abietinus* on the one hand, and *P. c. brevirostris*/*P. c. caucasicus* on the other (Clement & Helbig 1998), which support separate treatment from the European subspecies. The newly developed assays by de Knijff *et al*. (2024) have recovered small but consistent genetic differences between *P. c. brevirostris* and *P. c. caucasicus*, supporting their current treatment as two subspecies. Using the assay developed by de Knijff *et al*. (2024), studies of chiffchaffs in the Near East and Arabia, where *P. c. caucasicus* and *P. c. brevirostris* are expected as migrants or winterers, can now discover more concerning their non-breeding ranges. Furthermore, Common Chiffchaffs with 'flattish' calls but lacking the morphological characteristics of *P. c. tristis* in north-west Europe merit detailed observation and preferably should be trapped and sound-recorded. If genetic material is collected, this could shed more light on the occurrence of these two taxa as vagrants.

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