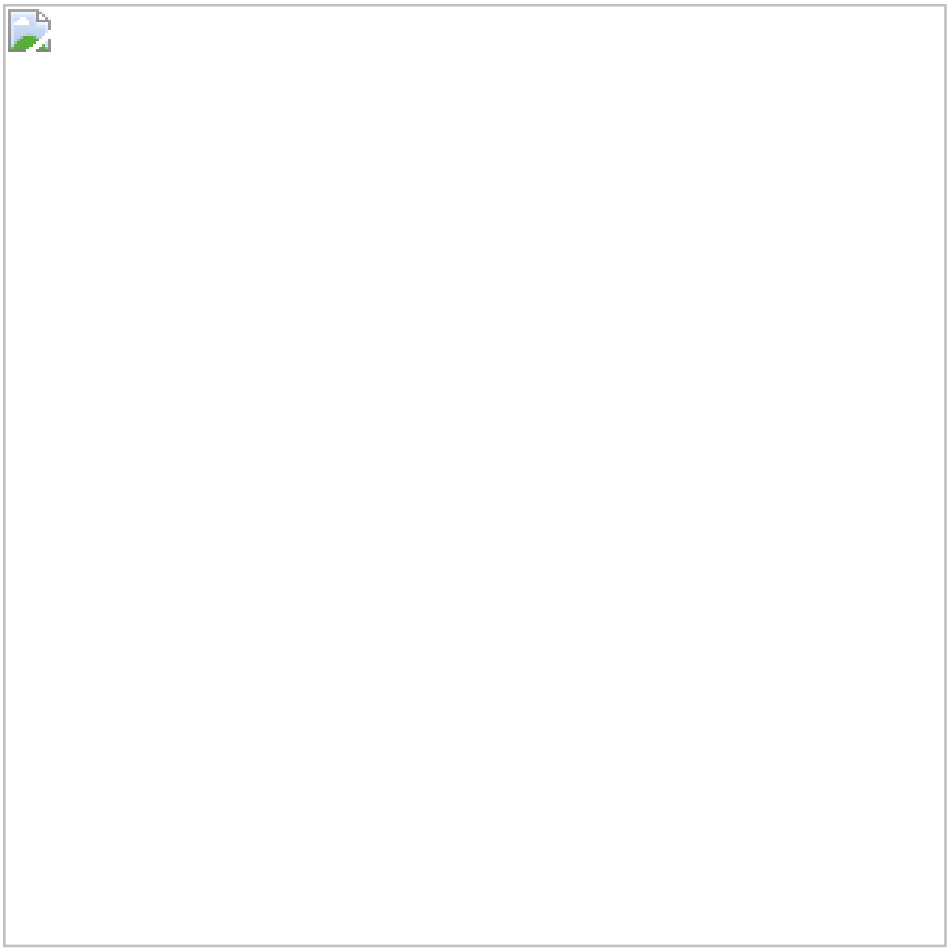

Complete Moult of an Undescribed Resident Taxon of the Reed Warbler Acrocephalus scirpaceus / Baeticatus Complex in the Smir Marshes, Northern Morocco

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Complete moult of an undescribed resident taxon of the Reed Warbler *Acrocephalus scirpaceus / baeticatus* complex in the Smir marshes, Northern Morocco

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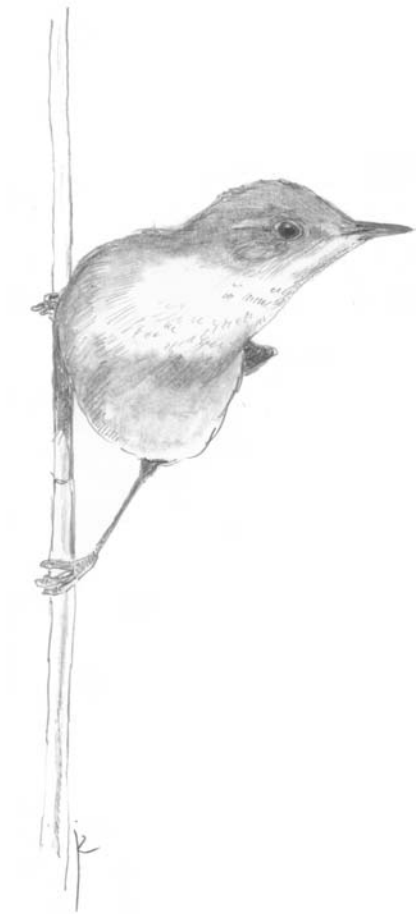

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A complete moult north of the Sahara has never been reported conclusively in the Reed Warbler *Acrocephalus scirpaceus* complex. During a ringing program carried out in the Smir marshes (northern Morocco) 140 adults and 292 juvenile Reed Warblers were examined during four autumns in the period 2004–2008. Of these birds, 8.9% of juveniles were either in active moult (n = 17) or had completed moult (n = 9) and 48.6% of adults were either in active moult (n = 32) or completely moulted (n = 22). At least some of the moulting birds were of local origin (i.e. Smir breeding population), since 14 males and one female were captured in autumn and later recaptured in spring showing signs of breeding activity, or captured in spring and recaptured moulting in autumn. Also, one juvenile captured in May was recaptured in November while moulting. Capture history of some moulting birds indicate that they over-winter locally and others most likely winter somewhere else in Morocco (i.e. north of the Sahara). Therefore, we report the discovery of a (partly) sedentary population of an as yet undescribed taxon of Reed Warblers in Smir marshes, Morocco. The relationship of these to the Eurasian *A. scirpaceus* and African *A. baeticatus* Reed Warblers remains to be investigated.

Key words: *Acrocephalus* sp. complex, Moroccan Reed Warblers, complete moult, North Africa, over-wintering, year-round resident.

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In long-distance migrant *Acrocephalus* warblers, both adults and juveniles undergo a complete moult in their tropical winter quarters. However, some studies have recently shown that a few Great Reed Warblers *Acrocephalus arundinaceus* initiate and even finish their complete moult in southern Europe, in summer and early autumn, before leaving to sub-Saharan Africa. This has been documented both in adults (Spina 1990, de la Puente & Fernández Mejías 1996, Magnani & Serra 1996, Maragna & Pesente 1997, Copete *et al.* 1998) and juveniles (King 1994, Copete *et al.* 1998). However, the Oriental Reed Warbler *Acrocephalus orientalis*, which undertakes a rather shorter migration than the Great Reed Warblers and winters in south-east Asia, is known to moult completely before its long-distance autumn migration (Svensson 1992, Dyrcz 1995, King 1996). Complete moult before crossing the Sahara has also been documented recently in Sedge Warblers *Acrocephalus schoenobaenus*, for which Zakala *et al.* (2006) found 10% of 209 adults caught at Burullus in northern Egypt were moulting primaries.

The Reed Warbler *Acrocephalus scirpaceus* complex is a Palaearctic migrant that breeds in North Africa and across Europe eastwards to central Asia, and winters mainly in sub-Saharan Africa (Cramp 1992). Some records of wintering north of the Sahara exist (Cramp

1992, Nissardi 1998, Thévenot *et al.* 2003, Rguibi Idrissi *et al.* 2006), but these are in most cases of individuals and not populations. Except for a few European recoveries (e.g. Roggeman 1977, Rguibi Idrissi *et al.* 2006), the origin of these birds is unknown. Both adult and juvenile Reed Warblers undergo a partial moult (which is limited to body-feathers and some wing-coverts) in or near the breeding grounds before the postnuptial migration (Jenni & Winkler 1994). Both age-groups then undergo a complete moult in their sub-Saharan African winter quarters (all feather tracts including remiges and rectrices). This moult takes place in September–December in West Africa and December – early March in East Africa (Ginn & Melville 1983, Dowsett-Lemaire & Dowsett 1987, Jenni & Winkler 1994).

In the Mediterranean region, the Reed Warbler has been studied extensively and no case of complete moult at a population level has ever been conclusively detected either in local breeding populations or in passage migrants (e.g. Rguibi Idrissi 2002; I.G. Peiró (pers. comm.) has no records of complete moult of Reed Warbler in El Hondo Natural Park, Alicante province, SE Spain). Nevertheless, some adults have been recorded moulting some primaries in Spain (Spencer & Mead 1979) and in southern Sardinia (Nissardi & Zucca 2001). However, Jenni & Winkler (1994) considered that the evidence presented by Spencer & Mead (1979) may concern cases of moult interruption. Also, in the Ebro delta, north-eastern Spain, D. Bigas (pers. comm.) caught six birds with some degree of flight-feather moult in August/September: three were undergoing moult of two or three inner primaries and secondaries and three others were moulting one or two tertials.

In Morocco, the local Reed Warblers differ from the Europeans birds in biometrics, coloration, moult and migration strategy (Amezian *et al.* 2009). These birds could constitute a new taxon in the Reed Warbler complex (Thompson *et al.*, unpubl., Jiguet *et al.* 2010, present study). For reasons of clarity, we refer to the Moroccan breeding birds as the 'Moroccan Reed Warbler'.

These birds are joined in late summer and autumn by migrants from Europe. The postnuptial migration of Eurasian Reed Warblers through Morocco takes place from August to mid-November with the peak in mid-September until the end of October (Rguibi Idrissi 2002, Thévenot *et al.* 2003). The Moroccan Reed Warblers breed in a limited number of wetlands including the Lower Loukkos marshes, Oued Massa Valley and Smir marshes. The latter population has existed for several decades at least (Pineau & Giraud-Audine 1979, Thévenot *et al.* 2003). The species breeds in Morocco from April to late June (Thévenot *et al.* 2003, Taillandier *et al.* 2006). Fledgelings have been observed from mid-April (e.g. recently fledged young on 16 and 24 April in the Oued Massa Valley (Taillandier *et al.* 2006) and on 23 May in the Smir marshes (present study).

In this paper, we show unambiguously for the first time that some adult and juvenile Reed Warblers present at the Smir marshes initiate and complete their moult in northern Morocco. We also show that the moulting birds are mainly or exclusively from the Moroccan Reed Warblers (Smir breeding population) and that they overwinter locally (i.e. they are year-round residents). We also discuss briefly the taxonomic position of the Moroccan Reed Warblers.

METHODS

Study area

Smir (35°43'N and 5°20'W) is a wetland complex that lies in the north-west of Morocco on the Mediterranean coast of the Tangier Peninsula. Its surface area is about 175 ha (Dakki *et al.* 2005). The wetland complex consists of a lagoon surrounded by halophytic vegetation: *Sarcocornia fruticosa, Arthrocnemum macrostachyum* and *Juncus* sp. and a fresh water marsh composed mainly of homogeneous or mixed stands of three principal emergent species: Bulrush *Typha angustifolia*, Common Reed *Phragmites australis* and *Scirpus* sp. which are prevalent in the south and north-west of the site. There are also some isolated stands of Yellow Iris *Iris pseudacorus* and *Tamarix* sp. (Dakki *et al.* 2005).

Data collection

Birds were mist-netted, ringed and aged. Wing length (maximum chord) and tail length were measured to the nearest 1 mm. Bill length (tip to skull), total head length (from base of skull to bill tip) and the length of the notch on the inner web of second primary were measured to 0.1 mm using callipers (Svensson 1992, Redfern & Clark 2001). Ageing was based on differences in plumage wear, tongue spots, eye and leg colour (Svensson 1992). Nevertheless, some birds remained unaged (Euring age code 2) in late autumn when many had already undergone a complete moult. All birds were examined for evidence of flight-feather moult as well as body-feather moult. In this paper, moult refers to the complete replacement of plumage. With the exception of autumn 2004, the majority of birds were examined simultaneously by MA and IT; the remainder were examined by MA. Feathers were num-

bered ascendantely, i.e. from outer wing towards the body (Svensson 1992).

Bird ringing was carried out during autumn 2004, 2006, 2007 and 2008 and during spring 2005, 2006, 2007 and 2008 (see Table 1 for dates). During spring, transient migrants on their northwards passage as well as local breeding birds were caught. The latter were caught also during late winter period i.e. during February ringing campaigns (Table 1).

Mist-netting was operated, with some exceptions, from sunrise until 15:00–16:00 hours. Ringing was not carried out daily throughout each period (Table 1) due mainly to unfavourable weather conditions (strong winds or rain). Length of mist nets varied between seasons and ranged between 234 m in autumn 2004 and 102–142 m in other seasons.

In the breeding season, birds were sexed according to the development of the cloacal protuberance in males and brood patch in females (Svensson 1992, Redfern & Clark 2001).

Within a season the birds were considered only once; but if a bird was recaptured in a different year, it was considered a new bird (e.g. a bird caught in 2004 and 2006 was considered a separate bird in each year). So, the proportion of recaptured birds in each season was: 9 birds out of 21 (42.8%), 5 birds out of 21 (23.8%) and 2 bird out of 56 (3.6%) in the autumns of 2006, 2007 and 2008, respectively. The difference between these figures and the total of birds examined in autumns 2006, 2007, 2008 given in the Table 3 is due to the unaged birds that were not included in the Table.

RESULTS

Description and biometrics of Moroccan Reed Warblers

Figure 1 illustrates the difference in appearance between Moroccan Reed Warblers and European Reed Warblers (see also Jiguet *et al.* 2010). Table 2 summarises the biometric data of the Moroccan Reed Warblers from Smir marshes. Compared with the European birds, the Moroccan breeding birds are short-winged and rather greyer above and more whitish below. The upperparts are brownish-grey with the mantle and head much greyer, much less rufous on the rump with only a slight contrast between rump and back. Underparts are white with much less yellowish-buff on sides of breast and on flanks. The undertail-coverts are whitish with only some yellowish tones (Fig. 1, pers. obs.).

Moult

A total of 439 birds over four autumns were examined for moult. These birds included both passage migrants from the European populations and birds from the Smir breeding population (Moroccan Reed Warblers). Of these, 140 were adults, 292 were juveniles and 7 birds remained unaged (these birds had already undergone their complete moult when caught, but the coloration of bare parts was inconclusive to age them either as adult or juvenile).

Of the 292 juveniles, 8.9% were either in active moult (n = 17) or had completed their moult (n = 9) (Table 3). Of the 140 adults, 38.6% were either in active moult (n = 32) or had completely moulted (n = 22) (Table 3). Five birds captured during or after a complete moult were doing so again when recaptured in a subsequent year (Table 4).

Table 1. Different ringing periods with the number of ringing days in the Smir marshes.

Season	Year	Periods	Ringing days
Autumn	2004	15–27 Sep	13
		12–23 Oct	11
		16–28 Nov	13
	2006	12–26 Nov	12
	2007	18–24 Oct	5
		5–10 Nov	4
	2008	18–26 Sep	6
		6–30 Oct	8
		8–10 Nov	3
		25–27 Dec	3
Spring	2005	13 Mar–28 May	25
	2006	20 Feb–26 May	28
	2007	19 Feb–25 May	35
	2008	16 Feb–03 Jun	36

Table 2. Summary of biometric data of adult Moroccan Reed Warblers from Smir marshes, measures in mm. Note that Taillandier *et al.* (2006) obtained a wing length of 61.5 ± 0.2 mm (n = 64) from the breeding population of Oued Massa Valley.

	n	Average	Minimum	Maximum	SD
Wing length	117	63.00	56.00	67.00	1.91
Bill to skull length	96	14.31	9.00	17.40	2.16
Total head length	90	31.99	30.20	33.50	0.70
Tail length	74	51.92	48.00	57.00	1.98
Notch length	81	12.21	9.00	14.20	0.92

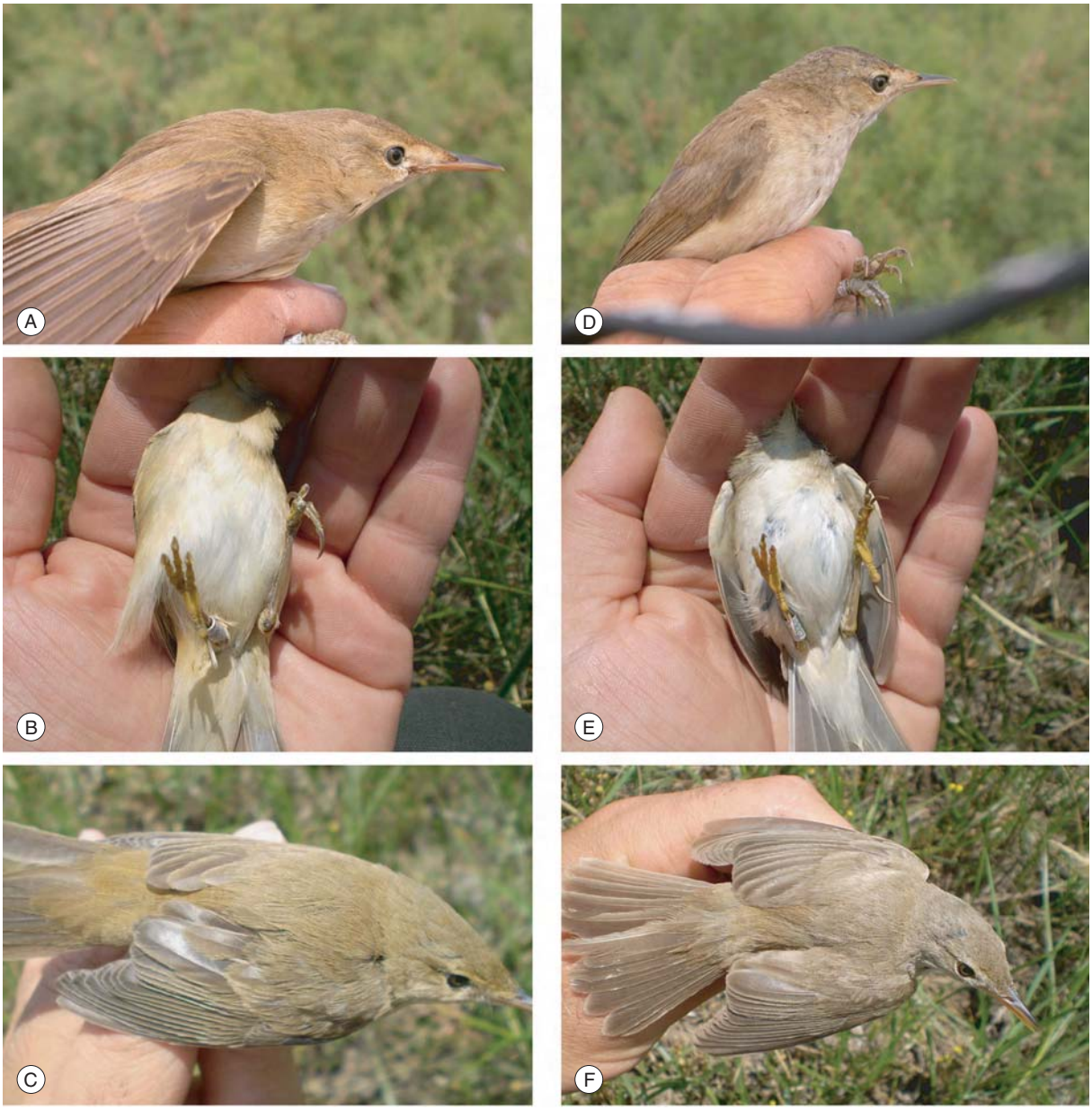

Figure 1. Photographs of a resident Moroccan Reed Warbler and a transient Eurasian Reed Warbler. Photographs B and C are of the same bird, and photographs E and F are of the same bird. (A) Profile of an adult migrant Eurasian Reed Warbler, 20 May 2005 (I. Thompson). (B) Underparts of an adult migrant Eurasian Reed Warbler, 1 June 2008 (M. Amezian). (C) Upperparts of an adult migrant Eurasian Reed Warbler, 1 June 2008 (M. Amezian). (D) Profile of an adult resident Moroccan Reed Warbler, 20 May 2005 (I. Thompson). (E) Underparts of an adult resident Moroccan Reed Warbler, 1 June 2008 (M. Amezian). (F) Upperparts of an adult resident Moroccan Reed Warbler, 1 June 2008 (M. Amezian).

During spring we captured nine birds which were still actively moulting their entire plumage. These birds had different numbers of primaries and secondaries growing. Primary moult details of six of these birds are presented in Table 5, while details for three other birds are missing. We also caught three birds in spring with suspended/arrested moult in the primaries and secondaries. T221539 had no sign of moult when caught on 16 and 25 April 2007 with unmoulted (old) primaries 1–4 and secondaries 1–4. T221452 was caught on 21

February 2007 with a suspended moult (primaries 6–10 new, the rest unmoulted). It had resumed its moult when recaptured on 23 and 25 April (see Table 5). Details for the third bird are missing.

Origin of moulting birds

At least 16 moulting birds were of local origin (i.e. from the Smir breeding population). These were 14 males, one female and one juvenile (T221971 captured on 23 May 2007 and recaptured on 6 November 2007 while moulting). The adults were captured in spring while showing signs of breeding (brood patch and cloacal protuberance) and recovered in autumn while moulting or having completed moult, or vice versa.

In addition to their breeding status, recaptures of 8 of these 14 males during spring within 5–91 days (average = 40 days, with 6 birds staying more than 31 days) further corroborated the conclusion that these birds are local birds. Moreover, six of these 14 males were caught in two or more spring seasons. For none of the moulting birds was there evidence that they were passage migrants from Europe.

To investigate the unbalanced sex-ratio of moulting birds of local origin (i.e. sexed in the breeding season), we calculated sex-ratio of all birds captured in spring. In all spring seasons combined, we caught at first capture 65 males and 43 females. This sex-ratio was not significantly different from 1:1 ($\chi^2_1 = 2.26, P = 0.132$).

Overwintering and sedentarism

Visual observations during winter confirmed the presence of numerous Reed Warblers in the area (e.g. 15 birds were present on 3 February 2006), including a ringed individual. A male was observed in song during

Table 3. Number and proportion of adult and juvenile birds captured in active moult or completed moult.

Autumn	Active moult		Completed moult		Birds examined		% of birds moulting	
	Ad	Juv	Ad	Juv	Ad	Juv	Ad	Juv
2004	22	13	9	6	100	240	31	7.9
2006	2	0	10	3	12	5	100	60
2007	2	2	2	0	6	13	66.7	15.4
2008	6	2	1	0	22	34	31.8	5.9
Total	32	17	22	9	140	292	38.6	8.9

Table 4. Moult status of five birds in their first capture and a year or more from their initial capture.

Bird ID	Capture date and moult status	Recapture date and moult status
T219884	20 Sep 2004: moulting	21 Oct 2004: completed
		14–24 Nov 2006: completed
T221436	11 Nov 2006: completed	09 Nov 2007: completed
T221398	14 Nov 2006: moulting	05 Nov 2007: completed
T221423	16 Nov 2006: moulting	24 Oct 2007: moulting
T219976	24 Sep 2004: moulting	24 Nov 2006: completed

Table 5. Birds actively moulting in late winter and spring (P = primaries).

Bird ID	Date	Old feathers	Feathers in pin	New feathers
T221398	24 Feb 2007	P 1–4	P 5	P 6–10
T221452	25 Apr 2007	P 1–3	P 4–5	P 6–10
T221500	24 Mar 2007	P 1–5	P 6–9	P 10
T221538	16 Apr 2007	P 1	P 2–3	P 7–10
T221607	20 Apr 2007	P 7–10	P 2–3	P 4–6
T222085	03 Mar 2008	0	P 1–3	P 4–10

January 2007, and another was singing in January 2008. The species was recorded during every month in which the site was visited.

Recaptures of six moulting birds suggest that these birds most likely overwintered locally in the Smir marshes. These birds were captured in November while moulting or having completed their moult and recaptured the following February or March, after a period of between 92–146 days.

Birds first captured in September (n = 8) or October (n = 3) and recaptured in November of the same season were most likely wintering birds too. These birds had stayed at least between 34 and 66 days in the area. All birds except one were either moulting (n = 6) or had completed moult (n = 4) when recaptured.

Three individuals were captured repeatedly during the study and in different seasons (Table 6). These records suggest that at least part of the Smir breeding population is sedentary.

Table 6. Capture history of the birds with period elapsed since last capture (days), state of moult and fat scores. Birds 1 and 3 were sexed as males. Moult codes follow Redfern & Clark (2001): O = Old plumage, no body or main moult, M = active moult of wings and tail (main moult), N = new plumage following main moult, B = active body moult. Fat scores according to Kaiser' (1993) 9-graded scale (0–8).

Birds	Date of capture	Days	Moult	Fat scores
Bird 1	15 Mar 2006		O	2
T221189	26 Apr 2006	42	O	2
	14 Nov 2006	202	N	3
	21 Feb 2007	99	O	3
	23 Mar 2007	30	O	2.5
	16 Apr 2007	24	O	
	23 May 2007	37	O	2
Bird 2	14 Nov 2006		M	1
T221398	24 Nov 2006	10	M	2.5
	24 Feb 2007	92	M	1
	26 Apr 2007	61	O	2.5
	27 Apr 2007	1	O	2.5
	05 Nov 2007	192	N	1
Bird 3	16 Nov 2006		M	2
T221423	22 Mar 2007	126	B	2.5
	23 Mar 2007	1	B	2
	19 Apr 2007	26	O	1.5
	15 May 2007	26	O	2
	17 May 2007	2	O	1.5
	24 Oct 2007	157	M	1

DISCUSSION

To our knowledge, this is the first study to show a complete moult of Reed Warblers north of the Sahara at a population level; previous studies reported only individual cases (Spencer & Mead 1979, Nissardi & Zucca 2001). We show that a considerable proportion of adult and juvenile Reed Warblers occurring in autumn in the Smir marshes is undergoing a complete moult. Our study also demonstrates that these moulting birds are mainly or exclusively breeding in the Smir marshes, and also over-winter there (i.e. they are year-round resident). Furthermore, our results indicate that local breeding birds may not belong to the nominate subspecies of the Eurasian Reed warblers as previously thought. Recently, Jiguet *et al.* (2010) recorded complete moult in adult local Reed Warblers at Lower Loukkos marshes in Morocco. As that study was conducted during the first two weeks of September 2009, no conclusions could be drawn about the timing of complete moult. Our results show that Jiguet *et al.* (2010) were incorrect in their assertion that "adults have a rapid complete moult at the end of the summer". Local Reed Warblers only start to moult at this stage.

Recapture data showed that the same individuals repeatedly performed a complete moult in different years and at a similar time of year (Table 4). This shows that the complete moult in these birds is a consistent phenomenon. However, there is some variability in the timing of the moult between individuals as some had already finished their moult in late autumn while a minority moulted in spring (Table 5).

Of the birds that were certainly of local origin (i.e. sexed in the breeding season), we found that more males moulted in the Smir marshes than females (14 males vs. 1 female). It remains unknown whether this is related to differential migration. We are confident that we sexed the males correctly. Moreover, most of them stayed in Smir area for a long period, thus excluding the possibility that some birds that started the development of the cloacal protuberance in Smir were of a more northerly origin (e.g. Iberian birds). This would have been possible as testicular growth during spring migration has recently been documented (Bauchinger *et al.* 2005). In addition, more northerly birds are time-constrained to reaching their breeding grounds to establish breeding territories and find mates. Thus, their faster migration during spring (e.g. Bauchinger & Klaassen 2004, and references therein) conflicts with the long stay of these males in Smir. This difference in the number of moulting birds in autumn

between the two sexes could be attributed to differential migration in the local population, with more males than females staying on the breeding grounds to moult and over-winter. Such sex-specific migration patterns are widespread among birds (Ketterson & Nolan Jr 1983, Cristol *et al.* 1999, Jenkis & Cristol 2002, Bermejo & de la Puente 2004, Leal *et al.* 2004, Catry *et al.* 2005, Komar *et al.* 2005), although it had never been reported for the Reed Warbler complex.

Our conclusion about overwintering is based on two observations. The first is that we found several moulting birds in late autumn (November). Moult is energy and time consuming, and it is well-established that it does not overlap to any great extent with other energetically demanding activities, such as breeding and migration (Jenni & Winkler 1994, Barta *et al.* 2006, 2008, but see Newton 2009). Therefore, it is very unlikely that moulting birds in late autumn/early winter subsequently migrate to sub-Saharan Africa and then return to their breeding grounds after 92–146 days. This is especially true if we consider that primary moult duration is about 70–80 days (Ginn & Melville 1983).

The second observation is that some birds stayed in the Smir marshes for the whole autumn (34–66 days). These are very unlikely to have resumed their migration to sub-Saharan Africa after their long stay in Smir. It is known in migrating species that more southerly populations generally migrate earlier during the post-nuptial migration than the northern ones (Jenni & Jenni-Eiermann 1987). Therefore birds that stayed in Smir from September/October to November, which are very likely of local origin, are very unlikely to have migrated south in late autumn-early winter. Moreover, the duration of their stay (34–66 days) in the area is much longer than previously recorded stopover duration for passage migrant Eurasian Reed Warblers through Morocco in autumn, which ranges between 8 and 13 days for juveniles in the Molouya estuary in the eastern Mediterranean coast (Schaub & Jenni 2001), and between 12.4 and 17.8 days for adults and juveniles respectively in Sidi Bou Ghaba on the Atlantic coast (Rguibi Idrissi *et al.* 2003).

Winter records are not new as there are several reports of Reed Warblers wintering in Morocco (Cramp 1992, Thévenot *et al.* 2003, Rguibi Idrissi *et al.* 2006) over at least three decades. In the Oued Massa Valley (south-west Morocco), for instance, there have been winter records in most years since the early 1980s (Thévenot *et al.* 2003). With the exception of some European recoveries (e.g. Roggeman 1977, Rguibi Idrissi *et al.* 2006) the majority of winter records of Reed Warbler in Morocco have been obtained so far by visual observations and the geographical origin of these winter records was unknown until now.

Recapture data showed that some birds were resident since they were trapped several times during the course of spring and late autumn while showing active moult or having completed it (Table 6). These birds had therefore performed two main life history stages in their annual cycle (breeding and moult) in the Smir marshes. It should be noted also that timing of moult was somewhat flexible for some individuals. For example, bird 2 (in Table 6) moulted at different times in different years: it was first captured in November 2006 while moulting and subsequently recaptured in February 2007 while still showing active moult. When recaptured in November 2007 it had finished moult. This bird had therefore either suspended moult and resumed it later or had a protracted moult time as in other sedentary birds (Helm & Gwinner 1999, 2006). In the Oued Massa Valley, Taillandier *et al.* (2006) captured some birds in winter, including two local juveniles with complete moult (new plumage) in December 1990 and 21 short-winged birds (WL = 61.3 ± 0.5 mm) between late-January and early-February 1992. These authors indicated that the two juveniles in question are very small (WL = 59 and 61 mm, Taillandier *et al.* 2006) and severely infected with parasites, and concluded that they were thus unable to reach sub-Saharan Africa. They also characterized the capture of the 21 birds as an "early arrival". We think that these birds were rather Moroccan Reed Warblers that wintered locally (i.e. resident in Oued Massa Valley). This interpretation is further strengthened by the recapture of 6 of these 21 birds in April while showing signs of breeding (Taillandier *et al.* 2006). Sedentary behaviour in the Reed Warbler has also been documented in Southern Spain. However, this involved only a single bird (Ramírez 1998).

Our study demonstrates that at least part of the Smir breeding population, including adults and juveniles, moult and over-winter locally. This establishes the presence of an as yet undescribed resident taxon of Reed Warblers complex in the Smir marshes, which we provisionally named Moroccan Reed Warblers until its taxonomic position is elucidated. Morphological data shows that these birds are distinct from European Reed Warblers. The results of Taillandier *et al.* (2006) indicate that there may be other such populations in similar habitats in the region. However, the full distribution of these birds is not known. Smir population and other Moroccan populations have not previously been studied in depth, and were not sampled for phylogenetic

studies of *Acrocephalus* warblers (Leisler *et al.* 1997, Helbig & Seibold 1999, Fregin *et al.* 2009). Therefore, it is possible that these populations have been resident in the area for a long time but were simply overlooked by researchers.

The taxonomic position of the Moroccan Reed Warblers (and North African populations by extrapolation) is currently unclear. They might belong to the African (*baeticatus*) rather than to the Eurasian (*scirpaceus*) Reed Warblers (H. Winkler, pers. comm.), or they could be a new subspecies of either species. This is especially true if we consider that the total range of genetic divergence within the *baeticatus/scirpaceus* complex is rather small (up to 2.42% sequence divergence: Helbig & Seibold 1999, see also Fregin *et al.* 2009) in comparison to other groups of taxa previously regarded as single species (cf. Helbig & Seibold 1999 for details). Also the genetic divergence between Eurasian (*scirpaceus*) and African (*baeticatus*) Reed Warblers is smaller than the genetic divergence between populations attributed to a single subspecies, *A. s. fuscus* (Helbig & Seibold 1999). A phylogenetic study which is currently in progress will help to shed light upon the phylogenetic relationship between the Moroccan Reed Warblers and both the Eurasian (*scirpaceus*) and African (*baeticatus*) Reed Warblers.

Wetland habitats on the Tangier Peninsula are threatened by development. Indeed, the Smir marshes themselves are currently being filled in. The presence of the Moroccan Reed Warbler in these habitats heightens the importance of the wetlands and the need to ensure their conservation.

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SAMENVATTING

Kleine Karekieten *Acrocephalus scirpaceus* overwinteren normaal gesproken ten zuiden van de Sahara en ruien daar hun volledige verenkleed. Tijdens ringwerk in het noorden van Marokko werden geregeld ruiende individuen gevangen. Het betrof zowel adulte als juveniele vogels. Dat dit geen uitzonderingen waren, bleek ook uit het feit dat vijf vogels in meerdere jaren ruiend werden aangetroffen. De ruiperiode was variabel. Sommige vogels hadden laat in het najaar al hun complete verenpak geruid, terwijl andere in het voorjaar nog aan het ruien waren. Ten minste een deel van de Kleine Karekieten behoorde tot de lokale broedvogelpopulatie, aangezien verscheidene vogels werden teruggevangen tijdens het broedseizoen. Ook werd een aantal voorjaarsvogels in het najaar ruiend aangetroffen. De moerassen in het noorden van Marokko herbergen veel karekieten

tijdens de winter. Het lijkt er dus op dat de lokale broedpopulatie (deels) standvogel is. De lokale broedvogels in het noorden van Marokko wijken qua maten, kleur en dus ook ruipatroon af van de Europese Kleine Karekieten. De taxonomische positie van deze populatie is momenteel onduidelijk. Het zouden Afrikaanse Karekieten *Acrocephalus baeticatus* kunnen zijn of een nieuwe ondersoort van de Afrikaanse of de Kleine Karekiet.

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