Ringing & Migration (2011) **26**, 71–73

SHORT REPORT

Autumn migration of the Red-breasted Flycatcher *Ficedula parva* through Antikythira Island, southwestern Greece

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The aim of this study was to describe the phenology of migration, biometrics and fat storage of the Red-breasted Flycatcher *Ficedula parva* in Greece, based on mist-netting studies on Antikythira Island. The data suggest that autumn passage takes place between early September and late October. Most birds that arrived on the island were carrying moderate fat reserves and only paused on Antikythira between nocturnal flights.

The Red-breasted Flycatcher *Ficedula parva* (Bechstein, 1792) breeds in continental Europe, eastwards to the Ural Mountains, Caucasus Mountains, northern Iran, western Himalayas (del Hoyo *et al* 2006) and in Asia, and winters in the north of the Indian subcontinent (Rasmussen & Anderton 2005). Sangster *et al* (2003) recognise the Siberian form as a separate species, the Taiga Flycatcher *Ficedula albicilla*, based on significant differences in morphology and vocalisations (Rasmussen & Anderton 2005) and genetic distance (Li & Zhang 2004) between the two species. In Greece, the Red-breasted Flycatcher is mainly a passage migrant from mid April to mid May and again from mid August to mid October. On average, greater numbers occur in autumn than in spring (Handrinos & Akriotis 1997). The species is classified as of Least Concern by the IUCN Red List of Threatened Species, but is one of the lesser-known species in Europe, particularly with respect to migration and biometrics (Cramp & Perrins 1993).

The aim of this study was to describe the migration phenology, biometrics and fat storage of the Red-breasted Flycatcher in Greece. Red-breasted Flycatchers were mist-netted on Antikythira island (35°52′05”N 23°18’10”E), located in the south of Peloponnese between Kythira and Crete. The area is a Natura 2000 site and it is a Special Protection Area under EU legislation. It is also an Important Bird Area in Greece (Bourdakis & Vareltzidou 2000). The dominant vegetation on Antikythira is low maquis and phrygana, while part of the island is cultivated with cereals. Mist nets were set in olive groves, maquis, tall trees (figs and almond trees) with some reeds, and also in cultivated land. Birds were caught, without the use of sound lures, on the following dates: 13–21 September 1998, 2–13 September 1999, 10–19 September 2003, 16 September–3 October 2004, and 18 August–13 October 2005. No ringing took place between 2000 and 2002. Birds were ringed and measured immediately on capture and then released. Wing length (maximum chord, accuracy 1 mm), and tarsus length (bent toes method, accuracy 0.1 mm) were measured according to Svensson (1992) and weights were recorded using a 0.1 g precision balance; fat scores (Kaiser 1993) and, for some birds, muscle scores (Bairlein 1995) were also assigned.

Biometric data were available for 157 individuals identified as first year of unknown sex, with the exception of one second-year female and one adult male. The biometric data for the 155 first-year birds of unknown sex are summarised in Table 1. Variation in body mass was related to fat score and wing length, but not to tarsus length [body mass $= -8.669 + 0.468$ fat $+ 0.167$wing, R-square $=$ 0.414 (0.308 + 0.106), df $= 124$, $F = 43.106$, $P <$ 0.001]. There were insufficient data to investigate the contribution of muscle score to overall body mass. There were no seasonal changes in body mass, fat or muscle, with the exception of fat scores in 2004 which declined with advancing date (Spearman $r = -0.362$, $P = 0.023$).

Capture data indicate a regular passage of Red-breasted Flycatchers through Antikythira at least from early September to mid October, but occurrence may extend either side of the period used for this study. Peak numbers were observed between 19 September and 4

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Table 1. Body measurements of Red-breasted Flycatchers from Antikythira, Greece.

Measure	Sample size	Mean ± SD*	Range
Wing length (mm)	155	67.60 ± 1.72	62–73
Tarsus length (mm)	124	16.84 ± 0.61	15.0–18.6
Fat score	154	1.39 ± 1.12	0–5
Muscle score	43	1.72 ± 0.59	1–3
Weight (g)	153	9.20 ± 0.89	7.0–12.1

*Statistical analyses were carried out using SPSS.

October (Fig. 1) and may represent two separate peaks of migration, one around 20 September and a second during the first days of October. In data from four British Bird Observatories, the autumn peaks of migration of the species occurred from mid-September to the first week of October (Radford 1968). Although we might expect Red-breasted Flycatchers to arrive in Greece later than in Britain, climate change since 1968 prevents meaningful comparison with these early reports from British bird observatories. Mitrus *et al* (2005) have noticed a phenological change in the migration of Red-breasted Flycatchers correlated with temperature changes, as has been observed for other bird species (Huin & Sparks 1998, 2000). For Red-breasted Flycatchers migrating through the border between the Volgograd region of Russia and western Kazakhstan, north of the Caspian Sea, 90% were captured before 24 September, and passage remained intensive between 22 August and 6 October (Chernetsov *et al* 2007).

Although there is no direct evidence, the birds caught in Antikythira are most likely to have come from central Europe, passing through the Balkans to Turkey and finishing their migration in the Indian subcontinent. Since the species winters in Asia, it is likely that eastern populations take a more direct, southeastern route. This raises the question why birds pass through Antikythira, spending extra time on migration, rather than taking a more direct route to their wintering grounds. Perhaps a proportion of young birds have chosen this route because of a lack of experience, or as a consequence of premigratory dispersal, so that they are committed to migrate over a longer distance instead of taking the shortest eastern one. Alternatively, there may be an unknown West African wintering area of the species, as proposed by Cramp & Perrins (1993).

The majority of birds (89.7%) were captured only once, suggesting that most birds only paused there between successive nocturnal flights. Of the 10.3% that were recaptured, the minimum stopover duration was one day for eight of the birds, two days for two birds, three days for three and six days for only one bird. The most likely explanation for birds remaining longer than a day is that their departure was delayed by unfavourable weather conditions such as strong winds. Half of the birds retrapped had decreased in mass and half had gained mass. In contrast, Chernetsov *et al* (2007) estimated stopover duration in autumn at the border between the Volgograd region of Russia and western Kazakhstan to be 2.94 days (95% confidence interval 1.62 – 5.70) in 2003 and 1.40 days (95% confidence interval 1.03 – 1.97) in 2004.

Fat scores were recorded on 174 capture occasions (recaptures are included) and did not differ significantly between years (Kruskal – Wallis $H = 5.27$, $df = 4$, $n = 174$, $P = 0.26$). Contrary to expectation, Red-breasted Flycatchers arriving at Antikythira were carrying only moderate fat reserves (Fig. 2). It would appear likely that these birds would have continued their migration using land or the Greek islands as stepping stones. Chernetsov *et al* (2007) also found that the species does not accumulate large fuel stores in autumn prior to desert crossing. The mean body

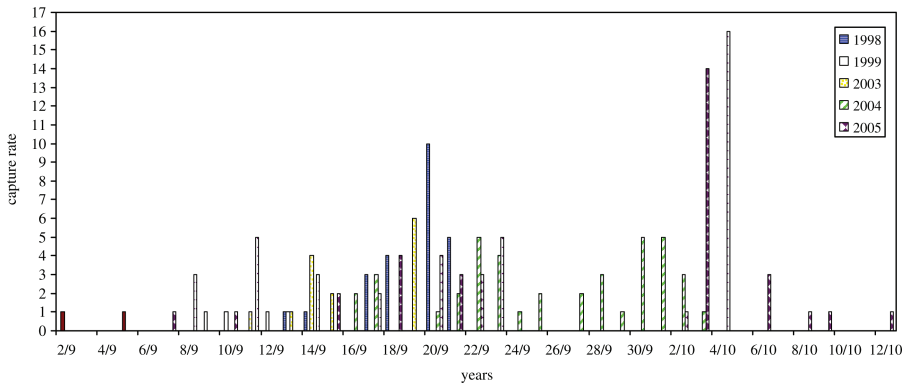

Figure 1. Autumn migration phenology of the Red-breasted Flycatcher in Antikythira Island, Greece. Filled bars = 1998, open = 1999, close cross-hatching = 2003, wide cross-hatching = 2004, diamonds = 2005.

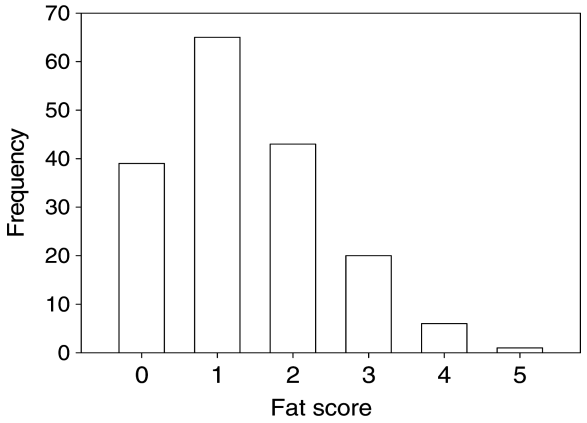

Figure 2. Frequency distribution of fat scores for Red-breasted Flycatchers passing through Antikythira in autumn.

mass of Red-breasted Flycatchers passing through Antikythira was similar to reports in the literature (Bulyuk 1985, Yablonkevich *et al* 1992, Chernetsov *et al* 2007); note, however, that it is important to take age into consideration since young males may have lower body mass than older males, a consequence of the larger linear dimensions of adults (Mitrus 2007). The Antikythira birds that were recaptured did not increase in body mass during their stay ($Z = -0.700$, ns), but their fat scores increased on average by 0.5 ($Z = -2.132$, $P = 0.033$). There was no change in mass and fat score between morning and afternoon samples (Wilcoxon matched-pairs test, for body mass: $Z = 0{,}000$, ns, $Z = -1{,}244$, ns, $Z = -0{,}654$, ns; for fat score: $Z = -1{,}000$, ns, $Z = -1{,}508$, ns, $Z = -0{,}978$, ns). Similar findings were reported by Chernetsov *et al* (2007) who suggested that birds specialised for flycatching may have difficulty foraging when they carry large fuel loads, as has been reported for the ecologically similar Spotted Flycatcher *Muscicapa striata* (Schaub & Jenni 2000).

ACKNOWLEDGEMENTS

We are grateful to the following visiting ringers: K. Wilson, J. Wilson, A.S. Copland, C.M. Hewson, J.M. Gonzalez Mulet and A. Christopoulos. Many thanks to Clairie Papazoglou who was in charge of the ringing in Antikythira for the first two years, and to the Leventis Foundation and Stephen Rumsey of the Wetland Trust who helped realise the trips to Antikythira. Also, many thanks to Chris Redfern for his valuable comments and corrections to the manuscript.

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(MS received 30 September 2009; accepted 1 September 2010)