Podoces, 2006, 1 (1/2): 27–33

The Breeding Cycle in Calendar Form of the Common Swift *Apus apus* across its Eurasian Breeding Range – A Testable Hypothesis?

ULRICH TIGGES
Erlanger Straße 11, 12053 Berlin, Germany – Email: swift@gmx.org

Received 23 May 2006; accepted 15 August 2006

Abstract: The annual length of stay of the Common Swift *Apus apus* is constant across the breeding range, largely regardless of the location. This enables us to create a "Common Swift Calendar" based on results of phenological and breeding dates in Berlin in the period of 1990-2005. Three groups of dates are shown in the calendar. The first group concerns the arrival and departure dates of possible breeders and immature birds and demonstrates the four waves of arrival; Advance Guard, Vanguard, Main Body and Rearguard. The potential breeders arrive at the beginning of the breeding season (24 April, *n*=25), whereas the immature population arrives about midway through it. Breeding pairs arrive at the nest site on 8 May, some 14 days after the potential breeders. The species' departure date is 10 August, which makes the duration stay in the breeding area 109 days, of which 95 are spent on the nest. The second group of dates concerns some key breeding events, including those for courtship, mating, egg-laying, incubation, hatching, brooding, opening of the chick's eyes, maximum chick weight and departure of fledglings. The third group of dates include some suitable dates for conservation work, the best times to census Common Swifts, and when to attract them to new nest sites.

Keywords: Common Swift, *Apus apus*, calendar, phenology, breeding dates, census, attracting, Berlin, Eurasia.

تقويم پرستو (*Apus apus*) درمنطقه جوجه‌آوري اوراسيا

چكيده: دوره اقامت ساليانه پرستو در منطقه جوجه‌آوري آن بدون ملاحظه مكان خاص تقريبا ثابت است. ايـن پديـده بر اساس تاريخ‌هاي مهـاجرتي و جوجـه‌آوري آن در بـرلين در دوره ۲۰۰۵-۱۹۹۰ مـا را قـادر مـي‌سـازد تـا تقـويمي از فعاليت‌هاي اين پرنده ارائه دهيم. سه گروه از تاريخ‌هاي مختلف در اين تقويم نشان داده شدند. در گروه اول؛ تاريخ‌هاي ورود و خروج بالغين و نابالغين كه داراي چهار موج مهاجرتي هستند (Advance Guard, Vanguard, Main Body, Rearguard). جوجه‌آوران بالغ در ابتداي فصل (۲۴ آوريل) و جمعيت نابـالغين در اواسـط دوره مـي‌رسـند. رسيدن بالغين روي آشيانه حدود ۱۴ روز ديرتر (۸ مي) است. تاريخ خروج (۱۰ آگوست) دوره اقامت آنهـا را بـه ۱۰۹ روز مي‌رساند كه ۹۵ روز را روي آشيانه مي‌گذرانند. در گروه دوم؛ چند تاريخ مهم از پديده‌هاي جوجه‌آوري شامل جفت‌يابي، جفتگيري، تخم‌گذاري، خوابيدن روي تخم، تفريخ، تولد جوجه‌ها، باز شدن چشم جوجه‌ها، حداكثر وزن جوجه‌ها و زمـان خروج جوجه‌ها از آشيانه ارائه شده‌اند. در گروه سوم؛ برخي تاريخ‌هاي مناسب براي جنبه‌هـاي حفـاظتي، بهتـرين تـاريخ سرشماري و جلب آنها به مكان‌هاي آشيانه‌سازي نيز شامل شده‌اند.

INTRODUCTION

Koskimies (1950) and Tigges (2002) surmised that the Common Swift *Apus apus* stays about the same amount of time on its breeding grounds, no matter where the geographical location. A comparison of arrival and departure dates from different sources shows a possible correlation between latitude and duration of stays, with a shorter stay in the north and a slightly longer stay in the south (Tigges in prep.). All the dates, with the exceptions of some recorded by A. Gyljazov (*in litt.*) H. Kolunen (*in litt.*) and Mathey-Dupraz (see below), occur within a 85- to 122-day span.

The mean duration of stay of 95 to 109 days (±3 days) is the most common and

occurs across the whole range (Tigges in prep.). It corresponds to the median dates from Berlin (Germany) presented here. I described earlier (Tigges 2000, 2002) that the Common Swift returns to Eurasia in summer in four waves, the first designated the Advance Guard, then the Vanguard and the Main Body, whose members all are assumed to be mature breeders. In central Europe the Rearguard follows about half-way through the breeding season, and consists of immature birds from the previous year, thus completing the return migration.

This given phenological framework enables us to define as periods on the calendar the different phases of the species' life in the Eurasian summer. The calendar remains valid for most areas and therefore can be used for research and conservation tasks throughout the breeding area. The calendar brings order to the variety of systematic observations from across the breeding range, thus making comparisons possible.

MATERIAL AND METHODS

The phenological dates, the breeding dates, and data on chick development were collected from a colony under my control in central Europe (Berlin) over a period of 15 years. From all the dates I took the median to gain comparable dates with other locations. The periods when the calendar suggests Swifts may successfully be attracted to new breeding sites were based on experiments (Tigges 1995). The dates of occupancy were largely provided by contributors. The dates of censuses of *A. apus* were gained by combining arrival dates and breeding phenology with new findings in temporal and spatial behaviour (Tigges 2003).

RESULTS AND DISCUSSION

Results from the analysis of phenological events and of breeding dates in Berlin in the period of 1990-2005 are presented in Table 1. The Advance Guard was noted as arriving on 24 April (n=25, sources in Tigges 2000). The arrival of breeding pairs at the nest is 14 days later on 8 May. The departure date is 10 August, which marks a duration of the species' stay in the breeding area of 109 days, of which 95 days are spent on the nest. The difference between the medians of arrival and departure is the same as the mean calculated from the length of the annual stays, unlike the dates for the development of the chicks, where dates differ by up to 1.5 days.

The full range of variation in stay length is recorded as 84 to 127 days in Berlin (which marks the shortest stay on the nest and the difference from the earliest arrival date of the Advance Guard until the latest departure from the nest). The phenological dates recorded in central Europe (Table 1) align with those from most other places in the summer range, except for 3 locations in Europe. A. Gyljazov (*in litt.*) quotes 77 days for the Murmansk area in northwest Russia, H. Kolunen (*in litt.*) quotes 99 (Advance Guard) and 81 (Main Body) days, respectively in Lahti, south Finland, and Mathey-Dupraz (1921) gives the arrival and departure days for the Bosporus, west Turkey as a span of about 125 days. While the Russian (44 years) and Finnish (5 years) observations were based on long term control studies, the quality of the data from the Bosporus varies – the arrival dates are based on only 6 years of observations, generally only the departure dates being given. The dates for the development of the chicks agree with those of Weitnauer & Scherner (1980), Cramp (1994) and Pellantová (1981).

The dates for attracting the species (Figure 1) are based on earlier experiments (Tigges 1995) and experiences over the years (Tigges & Mayer, undated). The recommendations for the best times for counting the species come from analyses of the phenology, as well as being based on long-term observations (Tigges 2003).

Three groups of dates are shown in the calendar (Figure 2): firstly, the arrival and departure dates of possible breeders and immature birds, demonstrating the four waves of the arrival; secondly, some key dates for breeding events, including those for courtship, mating, egg-laying, incubation, hatching, brooding, opening of the chick's eyes, maximum chick weight and departure of fledglings; thirdly, some suitable dates for conservation work, the best times to census Common Swifts, and when to attract them to new nest sites.

Figure 1. A Common Swift checking for a nest site, 2004, Berlin, Germany.

Table 1. Phenological and breeding dates of Common Swift at a nest box in central Europe (Berlin, Germany). Dates in parentheses have not been verified. * Common Starling *Sturnus vulgaris*

Year	Arrival of 1st adult on nest	First egg	Start of incubation	Hatching	Departure of 1st chick	Departure of last adult	Actual duration of adults' stay on nest	Actual duration of brooding until 1st chick hatched (hatch day not counted)	Actual duration of 1st chick stay in nest (departure day not counted)	Remarks
1990						04.08				
1991					15.08	15.08				
1992				(17.06)	23.07					Desertion of nest after ringing
1993	12.05	10.06 (08.07)	(10.07)	(29.07)	(07.09)	(07.09)	(119)	19	40	Starlings* displace Swifts
1994	08.05	28.05	15.06	(05.07)	16.08	20.08	105	(20)	(42)	16.08 both chicks left the nest
1995	05.05	26.05	30.05	17.06	27.07	06.08	94	18	40	
1996	08.05	27.05	30.05	17.06				18		2 chicks died because of bad weather
1997	16.05	03.06	05.06	24.06	03.08	07.08	84	19	40	
1998	09.05	18.05	23.05	(12.06)	22.07	10.08	94	(20)	(40)	
1999	09.05	22.05	26.05	27.06	05.08	18.08	102	32	39	
2000	08.05	01.06	03.06	21.06	07.08	11.08	96	18	47	
2001	27.04	18.05	21.05	07.06	18.07	10.08	106	17	41	
2002	02.05	(17.05)	23.05		23.07	30.07	90			
2003	30.04	12.05	16.05	03.06	15.07	05.08	98	18	42	
2004	17.05	09.06		27.06	08.08	11.08	87		42	Box moved to new site
2005	14.05	29.05	04.06	25.06	07.08	16.08	95	21	43	Nest destroyed by starlings*
Median	**08.05, *n*=13**	**27.05, *n*=12**	**30.05, *n*=11**	**21.06, *n*=9**	**03.08, *n*=13**	**10.08, *n*=13**	From median dates 95 *n*=11, from actual dates 95 *n*=11	From median dates 22 days, from actual dates 19 days *n*=11 (= average value 20 *n*=9)	From median dates 43 days, from actual dates 41 days (= average value 41.5 *n*=9)	

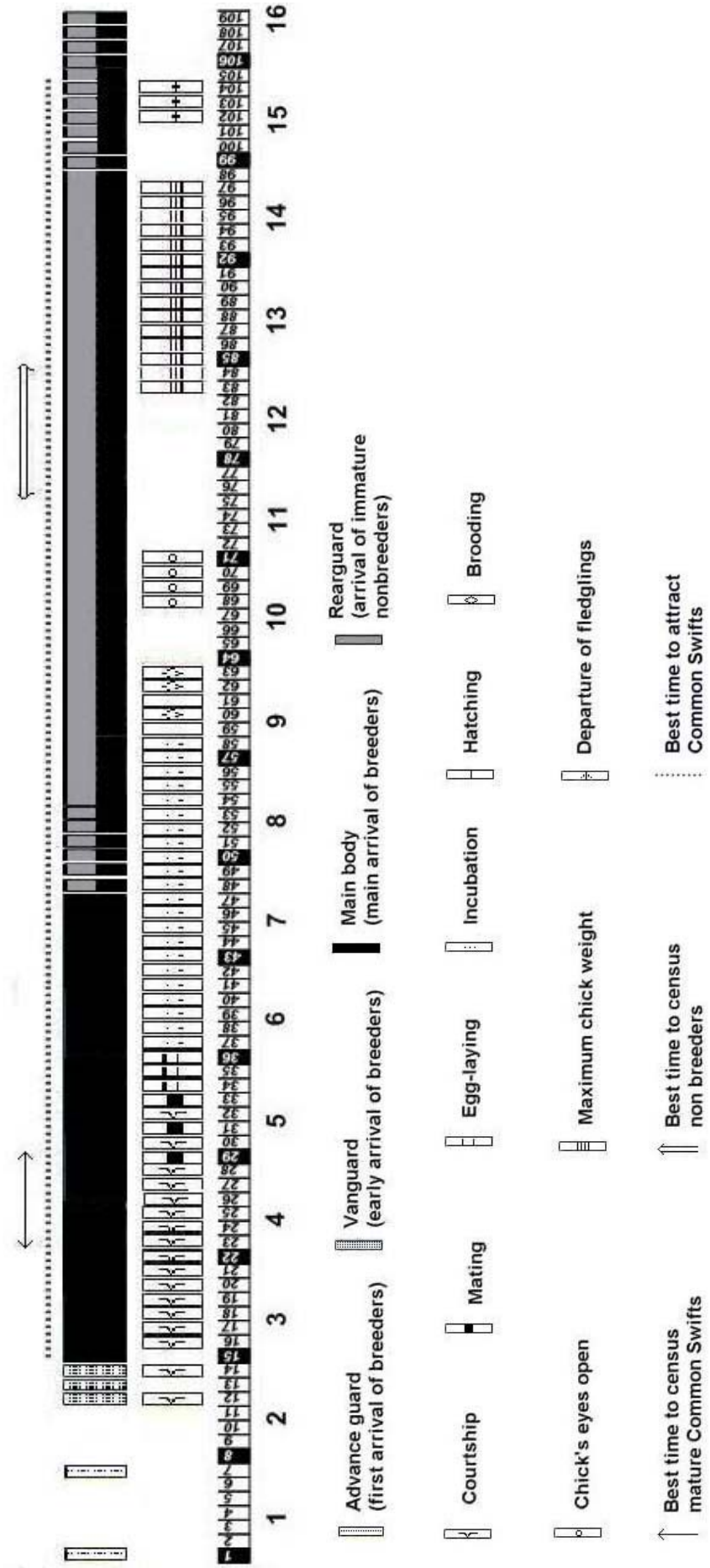

Figure 2. The Common Swift Calendar for the breeding areas. Bold numbers indicate weeks and small numbers days. For a full explanation see the text.

The first band (Figure 2) shows the presence of the species on the breeding grounds. The dates for the duration of the stay in central Europe coincide with both the averages of the dates, as well as with the differences between the medians from all years. The arrival phases of the species last for two weeks. Coinciding with the observations of von Haartman (1951) and Tigges (2000, 2001), only very few birds are to be seen at first (Advance Guard), and they may then disappear for a couple of days. They may, because of their small number, not be apparent everywhere in the breeding range (Tigges in prep.). More visible are the second (Vanguard) and the third waves (Main Body), that appear in good numbers about two weeks later.

The arrival of the Advance Guard marks the beginning of the species' stay in the breeding area and those of the Vanguard and Main Body indicate the beginning of the breeders' period of stay at their nest sites. The population becomes complete some five to six weeks later with the appearance of the Rearguard, which contains immature non-breeders.

The departure marks the loss of local birds from their colonies. Immature individuals may depart before the breeders, but they may also leave together with them (Weitnauer & Scherner 1980, pers. obser.); this is the reason for the broken bar in Figure 2.

The second band on the calendar (Figure 2) shows the breeding dates, the development of the chicks and when certain associated activities start or end. These data were all collected in central Europe (Berlin) during the period of this study. Because all the dates given here are medians, they may shift some years by a few days either way.

The median of the development of the chicks is 44 days here, but 41.5 days from the actual count and averaged value, which fits perfectly with the dates in Weitnauer & Scherner 1980 (Cramp 1994 gives 42.5 days). It is known that the development of the young depends heavily on the weather situation. This shows us why the scatter band here is distinctly larger than the phenological dates, which coincided over 13 years.

The Common Swift usually lays two to three eggs with an interval of two days between each. Brooding (Figure 3) starts after the last egg is laid. Hatching commences after 19 days (on average) from egg-laying (*e.g.* Cramp 1994), the difference in the median values here being 23 days.

Figure 3. A breeding bird on the nest in a wooden nest box, 2002, Berlin, Germany.

Swifts feed exclusively on airborne insects and when the weather turns cold, the food supply diminishes or even disappears. This is why the young Swift has evolved to develop a high body mass (weight), generally ending up too heavy to fly, and having to fast for a short period before setting off on its own migration south. This reserve aids its survival during periods of bad weather when there is little or no food to be had. Before fledging, the young Swift's weight decreases from about 50-60 g maximum to its normal or flight weight of about 40-50 g (Pellantová 1981).

The different lines above the first band on the calendar give dates useful to naturalists for their work with Swifts. The two continuous lines show the best time to count populations. The potential breeders

arrive at the beginning of the season and the immature population arrives about midway through the breeding season. While the parents are feeding the young, they do not participate in the "screaming" flights of the non-breeders. Since they rarely mix it is necessary to count each group at different times (Tigges 2003). By using this method a major census of the Common Swift was conducted in 2002 in Berlin (Falkenberg *et al.* 2004).

The dotted line shows the best time to attract the Common Swift to new nest places. It is becoming essential to try and attract Common Swift to new places fulfilling their requirements as breeding sites, because established nest sites increasingly are being destroyed when old houses are demolished or renovated and because new buildings invariably, for a variety of technical and legal reasons, are inhospitable sites. In an experiment in the 1990s, I found out that the species is responsive to duet calls from its own species, and I could attract them to an artificial nest site with such recorded calls (Tigges 1995). A survey in west and central Europe showed that the species was sensitive to this technique, and occupied new nest sites throughout the season. (Tigges & Mayer undated, Henk Haans *in litt.*, Louis-Philippe Arnhem *in litt.*, Harm Peeters *in litt.*, Hilde Matthes *in litt.*, Brian Cahalane *in litt.*, and own dates).

The aims of the calendar are to provide useful information that is broadly applicable for most breeding sites, and to show what is happening within Swift colonies, so that naturalists are helped in their work. The calendar makes supra-regional incidents comparable and helps to bring some order and coherence. It may be used with confidence anywhere during the breeding period, except possibly in the northernmost areas. If the arrival or departure date in a given location is known (Table 2), then by using the calendar it is easy to discover what Common Swifts are doing at any given time.

Table 2. Some arrival dates of the Common Swift offer orientation for the reader.

Place	Group	Date	Reference
Jerusalem, Israel	Advance Guard	20 February	Cornfeld *et al.* 2006
Damascus, Syria	Advance Guard	25 February	Baumgart 1995
Tel Aviv, Israel	Main Body	1 March	Tigges 2001
Teheran, Iran		11 March	Khaleghizadeh 2005
Madrid, Spain	Advance Guard Main Body	12 April 25 April	Bernis 1988
Barcelona area, Spain		21 April	Gordo *et al.* 2005
Paris, France		28 April	Frédéric Malher *in litt.*
Cherkasy district, Ukraine		30 April	Gavrilyuk 2002
Ulyanovsk, Russia		9 May	Moskvichev 2005
Moscow, Russia		12 May	Kalyakina 2006
Ivanovo, Russia		19 May	Gerasimov *et al.* 2000
South Irkutsk Region, Russia		21 May	Fefelov 2004
Tobolsk, Russia		15 June	Johansen 1955

Acknowledgement: I am grateful to Edward Mayer, London (UK) for editing the English text. I am thankful to Hilde Matthes, Prof. Charles Collins and George Candelin for discussion and advices.

REFERENCES

Bernis, F. 1988. Los vencejos. Su Biología, su Presencia en la Mesetas Españolas como Aves Urbanas. [The Common Swift *Apus apus* in the Spanish Plateaus, with a comparative revision of its biology and ethology]. Universidad Complutense de Madrid, Facultad de Ciencias Biológicas.

Madrid, 186 pp. [In Spanish with English summary]

Baumgart, W. 1995. *Die Vögel Syriens: eine Übersicht* [The birds of Syria: a survey. Kasparek Verlag, Heidelberg. [In German]

Cornfeld, Y., Geron, A. & Adar, M. 2006. Arrival of the Common Swift in Israel 2006. ***APUS***life 3164 http://www.commonswift.org/3164Cornfeld%20et%20al.html

Cramp, S. (Ed.) 1994. *Handbook of the Birds of Europe, the Middle East and North Africa: The Birds of the Western Palearctic, vol. 4.* Oxford University Press, Oxford-New York.

Falkenberg, M., Böhner, J., Salinger, S., Schulz, W., Strehlow, H., Witt, K. & Tigges, U. 2004. Mauersegler (*Apus apus*) in Berlin: Lebensraumtypische Dichten und Bestand 2002 [Common Swift (*Apus apus*) in Berlin: density of typical habitats and population 2002]. *Berliner ornithologischer Bericht* **14:** 166-185. [In German]

Fefelov, I. 2004. Common Swifts (*Apus apus*) in the Baikal area. ***APUS***life 2942, http://www.commonswift.org/2942Fefelov.html

Gavrilyuk, M.N. 2002. [Times of season migrations of birds in the area of Cherkasy in 1991-2002]. *Berkut*, Supplement: *Avifauna of Ukraine* **2:** 86-96. [In Ukrainian]

Gerasimov, Yu.N., Salnikov, G.M. & Buslaev, S.V. 2000. [*Ptitsy Ivanovskoi oblasti*] (*Birds of the Ivanovo Region*). Kamchatka Institute of Ecology and Land Management. Moscow, p. 54. [In Russian]

Gordo, O., Brotons, L., Ferrer, X. & Comas, P. 2005. Do changes in climate patterns in wintering areas affect the timing of the spring arrival of trans-Saharan migrant birds? *Global Change Biology* **11:** 12-21.

von Haartman, L. 1951. Die Ankunftszeiten des Mauerseglers, *Apus apus* (L.), und ihre Beziehungen zur Temperatur [The arrival dates of the Common Swift *Apus apus* (L.), and their relation to temperature]. *Commentationes Biologicae Societas Scientiarum Fennica* **11(2):** 1-21. [In German]

Johansen, H. 1955. Die Vogelfauna Westsibiriens III. Teil Pici-Cuculi [Avian fauna of West Sibiria Part III. Pici-Cuculi]. *Journal für Ornithologie* **96:** 382-410.

Kalyakina, N. 2006. Phenology of the Common Swift in Moscow. ***APUS***life 3165 http://www.commonswift.org/3165Kalyakina

Khaleghizadeh, A. 2005. Phenology of Common Swift *Apus apus* in the Middle East - Tehran, Iran. S*andgrouse* **27:** 79-82.

Koskimies, J. 1950. The life of the Swift, *Micropus apus* (L.), in relation to the weather. *Annales Academiæ Scientiarum Fennicæ*, Series A. IV *Biologica* **15:** 1-151.

Mathey-Dupraz, A. 1921. Notes ornithologiques de la région du Bosphore [Ornithological notes of the Bosphorus region]. *Ornithol. Beob.* **18:** 101-104. [In French]

Moskvichev, A.N. 2005. Arrival and departure of Common Swift in Ulyanovsk, Russia, in 1999-2004. ***APUS***life 3003, http://www.commonswift.org/3003Moskvichev.html

Pellantová, J. 1981. The growth of young of the Swift, *Apus apus*, in relation to the number of nestlings, temperature, feeding frequency and quantity of food. *Zoologické listy / Folia Zoologica* **30:** 59-73. Brno

Tigges, U. 1995. Kann man Mauersegler gezielt ansiedeln? [Is it possible to attract the Common Swift to specific locations?] *Falke* **42:** 250-252. [In German]

Tigges, U. 2000. Mauersegler in Berlin und Brandenburg [Common Swift in Berlin and Brandenburg]. ***APUS***life 2405, http://www.commonswift.org/2405Tigges.html [In German]

Tigges, U. 2001. Departure and arrival of Common Swift *Apus apus* in Tel Aviv, Israel, in 1999-2000. *Sandgrouse* **23:** 59.

Tigges, U. 2002. The migration of the Common Swift *Apus apus* to its breeding areas. *Osprey* **2:** 19.

Tigges, U. 2003. Counting Common Swift (*Apus apus*) Populations. http://www.commonswift.org/census.html

Tigges, U. (in prep.). Phenological dates of Common Swift *Apus apus* in its Eurasian breeding grounds.

Tigges, U. & Mayer, E. (undated). Using the Common Swift duets to attract them to a nesting site. http://www.commonswift.org/Attracting-Common-Swifts.html [2006]

Weitnauer, E. & Scherner, E.R. 1980. *Apus apus* (Linnaeus 1758) - Mauersegler. *In:* Glutz von Blotzheim, U. & Bauer, K.: *Handbuch der Vögel Mitteleuropas*. Akademische Verlagsgesellschaft, Wiesbaden, vol 9. [In German]