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Recent knowledge of the breeding biology of Wallcreeper (*Tichodroma muraria*) in the Malá and Veľká Fatra mts., Slovakia

Súčasný stav poznatkov o hniezdnej biológii murárika červenokrídleho (*Tichodroma muraria*) v Malej a Veľkej Fatre, Slovensko

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SANIGA M. 1995: Recent knowledge of the breeding biology of Wallcreeper (*Tichodroma muraria*) in the Malá and Veľká Fatra mountains, Slovakia. *Sylvia 31: 26-37.*

The breeding biology of the Wallcreeper (*Tichodroma muraria*) was studied from 1988-94 at eight breeding sites in the Malá Fatra mountains and from 1982-94 at six breeding sites in the Veľká Fatra mountains (Slovakia). In the regions under study, the Wallcreeper populations occupied limestone rock habitat at altitudes of 400-1550 m. Pair bonding took place during May each year mostly at the breeding sites. Both partners participated in choosing the nest-crevice. The female built the nest and hatched the clutch alone. Both parents looked after the nestlings. Nest building began in the first half of May and the fledglings left the nest-cavity in July. Double breeding was not recorded. Clutch-size varied from 3 to 5 eggs. The number of fully-fledged young varied from two (8x), three (22x), four (14x), to five (1x). The young became independent between 7 and 12 days after leaving the nest. *Sylvia 31: 00-00.*

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Hniezdna biológia murárika červenokrídleho (*Tichodroma muraria*) bola skúmaná v rokoch 1988-94 na hniezdiskách v Malej Fatre a v odbobí 1982-94 vo Veľkej Fatre. V sledovaných pohoriach obývajú populácie murárika skalný biotop v rozpätí nadmorských výšok 400-1550 m. Tvorba páru sa uskutočňovala každoročne znovu väčšinou až na hniezdiskách v priebehu mája. Na výbere dutiny sa zúčastňovali obaja partneri. Samička sama stavala hniezdo a zahrievala znášku. Hniezdenie začínalo v prvej polovici mája a lietajúce mláďatá opúšťali hniezdnu dutinu v júli. Nepomerne dlhé hniezdne obdobie vylúčilo druhé hniezdenie. Znášku tvorilo 3-5 vajec. Počet vylietaných mladých kolísal od dvoch (8x), troch (22x), štyroch (14x) a päť mláďat opustilo hniezdo len v jednom prípade. Starostlivosť rodičov o potomstvo trvala ešte 7 až 12 dní po vylietaní.

Key words: Wallcreeper, breeding biology, Malá and Veľká Fatra mountains, Slovakia

INTRODUCTION

The fact that the Wallcreeper is a typical habitat specialist, occupying rock faces often remote from human civilization explains the low level of the knowledge about the life and behaviour of its local populations in the mountains of the Slovak Republic. Literature from Slovakia about the Wallcreeper is relatively sparse, with the exception of papers concerning sightings data (PIKULA 1958, PALÁŠTHY 1961, MIHÁL 1973, MOŠANSKÝ 1974). There is an almost complete absence of data on

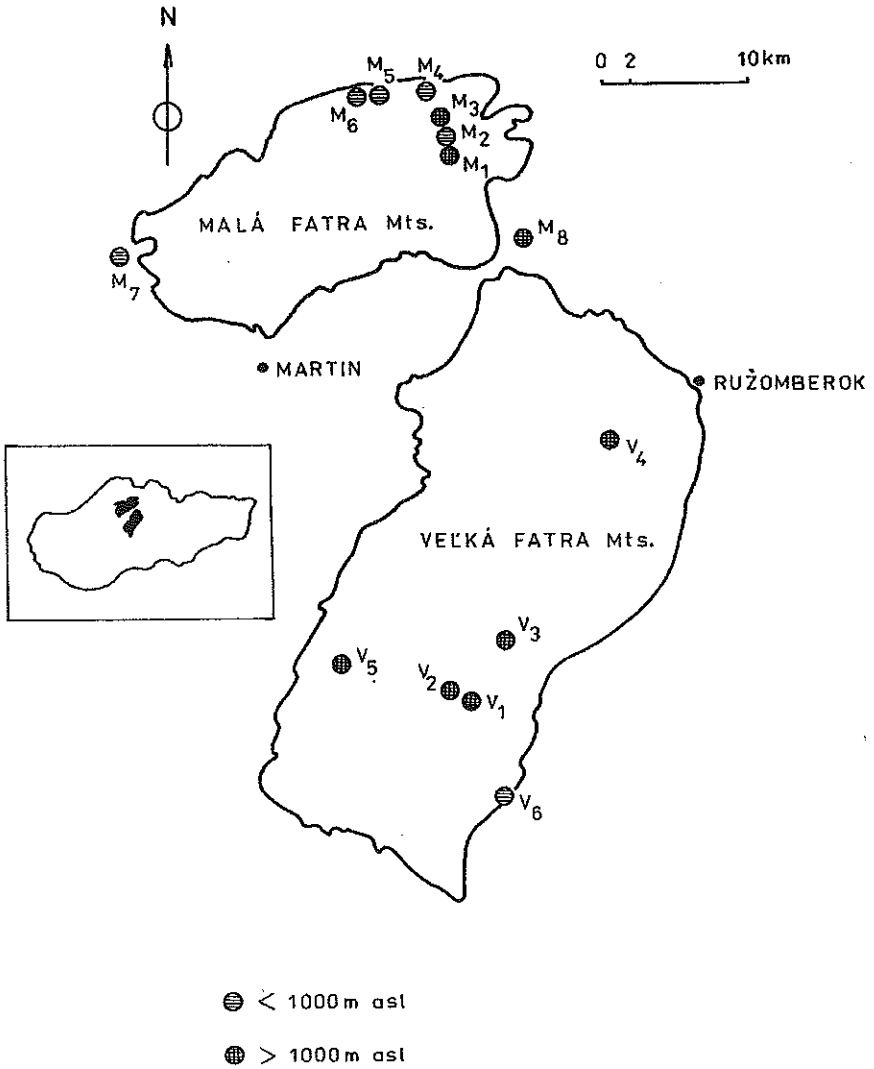

Fig. 1. Schematic map of the localities under study

Obr. 1. Schematická mapa sledovaných lokalít

the breeding biology of the Wallcreeper from Slovakia. There is only one paper which briefly deals with the breeding biology of the Wallcreeper (DVORSKÝ & PLUHAŘÍKOVÁ 1978). The knowledge about the Wallcreeper for the 1970s and 80s was summarized by FERIANC (1979) and HUDEC et al. (1983).

Also there are few studies into the breeding biology of this bird in other mountains of the Central Europe, both in the wild (ZOLLIKOFER in NOLL 1957, BEZZEL 1967, 1993, DORKA 1976, HAURI 1978, MAIRE 1987, HERNÁNDEZ *et al.* 1992), and in captivity (ZOLLIKOFER in NOLL 1956, KOTTEK 1965). The most comprehensive appraisal of the breeding biology of the Wallcreeper was given by LÖHRL (1975, 1976), who had studied birds both in the wild and in the captive state.

I have studied the breeding biology of the Wallcreeper in the Veľká Fatra mountains since 1982, and that of the Malá Fatra population since 1988. Some of the results obtained have already been published (SANIGA 1993). In this study, I report especially on the breeding biology of the Wallcreeper in the Malá and Veľká Fatra mountains. The paper provides information about the life of the Wallcreeper in the breeding season from the arrival of birds at breeding localities, to the dispersal of the brood.

STUDY AREA

The Wallcreeper population was studied at eight breeding sites in the Malá Fatra Mts.(18°50-19°14 E; 49°08-49°19 N) and at six breeding sites in the Veľká Fatra Mts.(18°50-19°18 E; 48°47-49°09 N). Figure 1 shows these localities.

1) Breeding localities (Malá Fatra)

B_1-limestone rock faces stretching for approximately 1.5 km, 50-150 m in height, at an altitude of 1100-1350 m; rock walls with a markedly structured surface (overhangs, ledges, crevices) partly covered with vegetation (grass, small shrubs); SW aspect.

B_2- limestone rocky mountain stream gorge about 300 m long at an altitude of 800-1000 m; rock faces in several tiers with many ledges, overhangs, and crevices covered with plants and trees (mainly beech); gorge axis lays E-W; the prevailing aspect of rock walls is S.

B_3- complex of limestone rock faces about 1.5 km long on the ridge and of a height of 20-30 m at an altitude of 1300-1350 m; S aspect; indivividual rocks have various orientations.

B_4- limestone gorge of approximately 2 km long at an altitude of 550-900 m; rock faces in several tiers separated by the belts of trees; the gorge axis lay N-S; individual rock faces have various orientations.

B_5- limestone rocky gorge about 400 m long at an altitude of 550-1000 m; rock walls in several tiers separated by trees; many overhangs, ledges, and crevices covered with vegetation; the gorge axis lays N-S; half of the rock faces have predominantly W aspect, the other half E.

B_6- limestone rocky mountain stream gorge about 1.5 km long at an altitude of 600-1000 m; rock walls with a considerably structured surface (crevices, ledges, overhangs) separated by belts of trees (beech and spruce); the gorge axis lays N-S, individual rock faces have various orientations.

B7- limestone rock face of about 300 m long and 100 m in height at an altitude of 400 m; rock wall with a great number of ledges and crevices covered with grass; NE aspect; limestone quarry (150 ha) nearby.

B_8- complex of limestone single rock faces at an altitude of 800-1100 m covering an area of approximately 0.25 km^2; individual sections of rock separated by trees (beech); S aspect.

2) Breeding localities (Veľká Fatra)

V_1- limestone rock face stretching for approximately 350 m, 25-50 m in height, at an altitude of 1300 m; rock walls with a markedly structured surface (overhangs, crevices, ledges) partly covered with vegetation; 2/3 SE aspect and 1/3 NW aspect.

V_2- complex of limestone single rock faces at an altitude of 1400-1550 m covering an area of approximately 10 ha; SE aspect, individual rocks have various orientations.
V_3- limestone rock face of about 800 m long and 30-40 m in height at an altitude of 1400 m; rock wall with a great number of ledges and crevices covered with grass; prevailing SE aspect.
V_4- limestone rock face about 400 m long on the ridge of a height of 20-30 m at an altitude of 1200 m; W aspect.
V_5- complex of limestone rock walls at an altitude of 700-1400 m covering an area of approximately 0.5 km^2; individual sections of rock separated by trees (beech, pine); SW aspect, individual rock faces have various orientations.
V_6- limestone rocky mountain stream gorge about 1 km long at an altitude of 550-750 m; rock faces with a considerably structured surface (crevices, ledges, overhangs) separated by belts of trees (beech, pine and spruce); the gorge axis lays E-W; individual rock faces have various orientations.

MATERIAL AND METHODS

Breeding sites were checked regularly at least five times during the breeding season (May-July) in 1988-94 in the Malá Fatra Mts., and in 1982-94 in the Veľká Fatra Mts. Main attention was paid to the following aspects of breeding biology: analysis of the breeding habitat, arrival at the breeding site, pair formation, copulation, choice of nest crevice, nest-building, incubation period, nestling period, post-hatching parental care, feeding of nestlings and fledglings until they become independent.

Altogether I observed 56 broods (27 nest-cavities). Data on hatching, and the departure of the fledglings from the nest site were ascertained in 16 cases. Furthermore, I recorded behavioural displays, including feeding behaviour, and the relationships with other bird species sharing the Wallcreeper habitat. Approximately 1000 hours of observation were spent at the breeding locations.

In the regions under study, 34 birds (including 23 chicks) were ringed in order to study the Wallcreeper's fidelity to its breeding rock face and nest crevice, and mutual faithfulness of the pairs.

RESULTS AND DISCUSSION

1) Breeding habitat

In the area under study, the Wallcreeper populations occupy two characteristic habitats. Some pairs breed in the rocky gorges of mountain streams (M_2, M_4, M_5, M_6,V_6) at an altitude of 500-1000 m above sea level (asl), while others occupy limestone rock faces which lack running water, at an altitude of 400-1550 m(M_1, M_3, M_7, M_8, V_1, V_2, V_3, V_4 ,V_5).

Individual breeding rock walls are characterised by a markedly structured and fissured surface (crevices, ledges, overhangs) often covered with vegetation (grass, trees, and in the gorges, moss). Typically, at many breeding locations, different sections of rock are bathed in sunlight at different times of day. The aspect of the breeding rock wall seemed to have no significance in nest-site selection (10 holes SE aspect; 6 crevices S aspect; 5 cavities W aspect; 3 nest-rock walls SW aspect; 3 NW aspect).

The characteristic criteria of the Wallcreeper habitat in the mountains under study corresponded to those in many other studies (DORKA 1976, LÖHRL 1976, HAURI 1978, BEZZEL 1993, GLUTZ *et al.* 1993). According to LÖHRL (1976), the rocky gorges of mountain streams and rocky, broken terrain up to 2500 m asl are typical Wallcreeper habitat. He, however, states that up to that time, all studied

sites included or were adjacent to running water, and that it is unlikely that Wallcreeper breeds on rock faces lacking water. However, in the region under study, I discovered successful broods on cliffs without running water nearby. Thus my data corroborate that of MÜLLER (1965) and BEZZEL (1993), that running water near the breeding sites is not an essential condition for Wallcreeper breeding habitat. According to DORKA (1976), the presence of moisture in the immediate neighbourhood of the nest appears to be an essential factor in the choice of a breeding site for the Wallcreeper.

2) Territory choice, pair formation, choice of nest-crevice

Nest sites were not visited daily during the period when the birds were arriving (at localities below 900 m asl mostly in the second half of March but in April above that altitude). Therefore, it has not been possible to establish whether birds commonly arrive singly (the male was seen first in 18 cases, and the female in 13 cases) in pairs (in 26 cases both were present). It is not yet clear if the males normally arrive at the breeding grounds before the females. LÖHRL (1976) came to the same conclusion.

Pair bonding occurred each year mostly at the end of April and in early May at the breeding locations (26 observations in April in 1989-94), but occasionally at winter sites (6 sightings in April in 1989-94).

After arrival, the male would often sing both on the rock face and in flight. A bird would defend a territory against intruders, advertising his presence by either a song or a display. His song became more intensive when he perceived the female, which would rarely sing. In the period before nest-building, pairs would spend most of the day separately. It was noted that the previous years nest-crevice appeared to be a favoured meeting place. Whether this indicates site-fidelity or merely the superiority of the site requires further ringing and observations. At those localities where two or more pairs bred in neighbouring territories, there were several observations of pairs threatening and pursuing individual males and females. The male would often sing at the entrance to the nest crevice and would attract the female by showing his black breast in the head-up posture. When the female came to the entrance, the male would sing sometimes from inside the potential nest-hole. He would later leave the cavity and continue singing. The male occasionally would combine the song with a demonstrative and striking acrobatic flight, beginning and ending at the nest-crevice. The female would not always enter the hole advertised by the male. At most breeding places, I established that pairs behaved in such fashion at many potential nest-crevices. It is likely that ultimately the female chose the nesting site.

In the area under study, nest crevices were often used for several years, yet not regularly every year (e.g. at locality V_3 a pair nested in the same crevice in 1979, 1980, 1988, 1989, and 1991; yet nested in another hole at the same breeding haunt in 1982, 1984, 1987, and 1993). Such observations indicate an element of site fidelity. It is likely that the same pairs (or at least one bird of the former pair) have site-memory and return to the same nest crevice. Without any means of identifying individual birds, such behaviour could be explained in terms of site superiority. However, a ringed pair (on 12th July 1989) at breeding location V_3 provided evidence of site fidelity, by breeding there in two consecutive years. Similarly, a male ringed on 16th July 1991 and a female ringed on 9th July 1992 bred

together on the same rock face in 1993 (M_1). These sparse interim ringing results should in future years help to define extent of site fidelity in the Slovak Carpathians population of Wallcreeper.

A total of 27 nest-cavities was recorded, all of which were situated from 2 to 14 metres above the ground. Only 6 nest-crevices were situated directly above running water in gorges. A majority of the nests were protected from above by overhanging rock. Nests were located 25-75 cm (n=11) deep in the cavities.

I recorded several observations of single birds occupying nesting sites, the other adult having disappeared for reasons unknown. In May, the remaining adult tended to abandon the site. Observations in few cases revealed that juveniles were being fed by the remaining parent (3x by females; 1x by male). The missing partner might have been killed by predators. The greater losses of males may be explained by the fact that they would fly more often in the open terrain (over valleys) where they are more conspicuous and vulnerable to the birds of prey (e.g. Kestrel, Sparrowhawk).

Isolated breeding locations have not been occupied regularly every year. Either member of the pair, or indeed both birds, could have found an alternative site or an alternative mate. Individual mortality in the winter season could have played its part as well. In years, in which these sites were unoccupied, these sites might have been found to be suboptimal by prospective occupators, or have remained unvisited because of their remoteness. Two occurrences of an individual bird associating with an established pair were recorded at locality V_3. These individuals formerly might have been paired, or were one-year old birds in search of a partner. In 1993, I observed two cases of broods where females nesting in close proximity (ca 800 m) had probably mated with the same male (he fed both females incubating their clutches). After hatching, the male participated in feeding only at one nest, and the other brood was not successful.

Table 1. Timing of breeding season of Wallcreeper (*Tichodroma muraria*) in sexteen broods

Tab. 1. Časové rozloženie hniezdnej sezóny murárika červenokrídleho (*Tichodroma muraria*) u 16 hniezd s máďatmi

Site *Lokalita*	Nest building *Stavba hniezda*	Hatching *Liehnutie*	Abandonment of nest *Opustenie hniezda*
V_3	7th May	4th June	1st July 1989
V_6	10th May	6th June	2nd July 1994
V_3	11th May	7th June	4th July 1985
M_1	12th May	8th June	5th July 1993
M_1	12th May	12th June	10th July 1992
V_3	12th May	16th June	14th July 1990
V_3	13th May	16th June	15th July 1984
V_2	15th May	12th June	8th July 1982
M_5	15th May	12th June	9th July 1992
V_3	15th May	18th June	16th July 1988
V_3	16th May	19th June	18th July 1982
V_1	17th May	18th June	13th July 1986
M_4	unknown	unknown	4th July 1994
M_5	unknown	unknown	5th July 1994
M_5	unknown	16th June	11th July 1991
M_1	unknown	23th June	19th July 1991

My interim results above concerning breeding location fidelity essentially correspond to those published by authors who have dealt with the same topic (DORKA 1976, LÖHRL 1976, HAURI 1978).

3) Nest-building, parental care on hatching, and breeding

Nest building took place mostly in the first half of May (commencement varied from 7 to 17 May for 12 observed pairs). The female built the nest alone. Nest material was gathered mostly in

the immediate vicinity of the nest-crevice. Only animal hair was brought from a longer distance (up to 400 m). Nests, which were quite substantial, consisted mainly of moss, and less often of blades of grass and thin root fibres. The interior of the nest was lined with animal hair. The male often accompanied the female in this activity and sang persistently. It seemed that each time the pair met, it disturbed their intended activity. The two observations of animal hair being brought by the female occured five days after the start of nest-building, which agrees with LÖHRL'S findings (1975, 1976). Copulation was observed only twice and only in the morning (on 15th May 1985 between 07.40 and 08.15 CET, twice; 17th May 1992 between 10.05 and 10.35 CET, twice). In each case it lasted only a few seconds.

Out of 10 nests checked, 5 held 4 eggs, 4 held 5, and one nest held three. Both nest and eggs resembled those of the Great Tit (*Parus major*).

The female incubated the clutch alone and was more or less regularly fed by the male at the front of the nest-cavity. The male announced his arrival at the nest-crevice with what I interpreted as a call-note. Then the female appeared outside and began to beg for food brought by her partner. After eating she either went into the hole to incubate the eggs or more often flew away to search for more food or to rest. The male brought the food to the female 399 times in 140 hours of research (intervals between visits fluctuated from 7 to 50 minutes, mean 21 minutes, STD=7.53, see Fig. 2). The female left the nest to feed herself on average every half-hour, very often just after being fed by the male.

The chicks hatched mostly in the second half of June (see Table 1). The nestlings were fed initially (first 5-6 days) exclusively by the male. During this period, the female left the nest only for short periods (2-3 minutes), but did not bring back food for the young. Later, both sexes fed the young, but the female continued to brood them for approximately two weeks. The male fed the chicks 1090 times per 486 daylight hours of research (on average every 27 minutes, STD=16.15 , see Fig. 3) and the female visited the nest with food 975 times per 486 hours of observations (on average every 26 minutes, STD=11.82 , see Fig. 4). The young were therefore fed every 15 minutes, on average.

Because insects and spiders were gathered both in the immediate vicinity of the nest and in the more remote parts of the territory, intervals between feedings varied greatly, from a few seconds to 45 minutes. The parent birds would spend some time collecting food in one area of the territory, but then they would search other areas as well. The observations confirmed that male and female used different foraging sites, but the male undertook excursions more often into more distant sections of their common territory (up to 1.5 km). This fact was already registered by ZOLLIKOFER (in NOLL, 1957), BEZZEL (1967), and HAURI (1978). It was rare for a breeding pair to search for food together, because usually when one perceived the other, this foraging bird was distracted from its foraging activity. The existence of these different subterritories may relate to their activity in the non-breeding season (winter). It seemed that every day each bird of the pair had one or two longer breaks (around 60 minutes), meanwhile the other would search for food more vigorously. The adults used this "leisure time" to hunt for food for themselves, to rest, and for comfort behaviour (i.e. sunbathing). Both ZOLLIKOFER (in NOLL 1957) and HAURI (1978) commented that at certain times, only one of the pair fed the young, and later the other behaved similarly.

The female spent more time in the nest-hole feeding the nestlings than did

the male, which corroborates HAURI (1978). Faecal pellets from the young were dropped by both adults in flight mostly a long distance from nest-rock face.

I recorded a few observations when up to 5 hours passed between successive feeds by an individual adult. Such long intervals were caused either by disputes with neighbouring pairs of Wallcreeper, or by interaction with some other bird species sharing the same habitat (e.g. *Apus apus, Cinclus cinclus, Corvus corax, Falco tinnunculus*).

Wallcreeper requires long daylight hours for successful breeding. Feeding of the nestlings began approximately at 03.30 CET and finished at 20.00-20.30 CET in late June and early July.

Four or five days before leaving the nest, the nestlings spent much of the time just outside the nest crevice being fed, but returned to roost overnight. In their last two days as nestlings, the juveniles explored the ledges around the nest-crevice. The fledglings left the nest-hole in July (in 5 cases out of 16, they were observed to leave over two consecutive days). Although fully fledged, fledglings spent several days after leaving the nest climbing on the rock wall, and flying only for short distances towards the parents bringing food.

For the Slovakian population of Wallcreeper, the time between hatching and abandoning the nest-hole varied between 26 and 30 days (n=11). LÖHRL (1975) states that fledglings do not leave the nest hole before they are 29 days old. According to HAURI (1978) the nestling period in the Wallcreeper lasted 28-30 days. My recent observations show that the cases of early nest abandonment (the 26th day) were connected with disturbances of the young by some bird species (*Apus apus, Falco tinnunculus*). LÖHRL (1975) conceded that disturbed Wallcreepers can leave the nest, but not always the nest-crevice, as early as on the 20th day of their life, and hide either elsewhere in the nest-hole, or in the immediate vicinity of the nest in another crevice.

The number of fledglings varied from two (8x), three (22x), four (14x), to five (1x). After the young left the nest-cavity, the adults or at least one of the pair (mostly the female) searched for food for the young and for themselves nearby.

The parent birds fed their fledglings for a further 7-12 days after nest abandonment. The later the young abandoned the nest-cavity (e.g. on day 30) the sooner they became independent. Fledglings often concealed themselves in a wide variety of places and the adults determined their positions by the juveniles continuously uttered call (this same call was first uttered in the nest-hole 10-12 days before leaving it). According to HAURI's (1978) observations, the Wallcreeper young become independent very soon (5-6 days after leaving the nest). After dispersal of the family (in the mountains under study, this occurred at the end of July and in early August) there were observations of solitary birds or small groups (2-4 individuals) at the breeding locations, but always the adults and juveniles kept separate. HAURI's (1978) assumption that post-breeding adults desert the nesting places has not been proved. Slovakian data concerning the length of the breeding season agree with those obtained from breeding habitats at similar altitudes in the Alps (LÖHRL 1976, HAURI 1978, BEZZEL 1993). Although some bird species of similar size oocupying the same habitat as the Wallcreeper are double-brooded (e.g. *Phoenicurus ochruros* and *Prunella collaris*), the Wallcreeper's 2-month breeding period is twice as long, thus excluding the possibility of a second brood.

I found considerable differences in the timing and the duration of the breeding period (nest-building, egg-laying, and leaving of the nest by the fledglings

in different years at the same locality (e.g. abandonment of the nest-hole varied between 1st and 15th July). HAURI (1978) also found this phenomenon, which seems to be influenced by weather, and especially by whether spring is early or late. In a cold spring, Wallcreepers breed as much as 2 weeks later than when spring is warm (Table 1). At breeding places at around 2000 m asl in the Alps (LÖHRL 1976) and in the High Tatras (PIKULA 1958) abandonment of nest-cavities occurred over a shorter period (the last ten days of July).

In some years the pairs breeding in lower altitudes began to breed earlier (on average by 5-7 days) than those which occupied nest-places at higher altitudes. Nevertheless, there were not found significant relationships between timing of the breeding period and an altitude.

4) Feeding behaviour

Food was gathered on rock faces, especially in crevices under overhangs. Birds often caught prey in the vegetation (grass) covering the ledges on the rock faces. The Wallcreeper was sometimes seen hovering close to vegetation trying to catch insects. Birds were often seen creeping into cavities and holes. Two typical modes of feeding behaviour were documented: a preference for shaded places in the rocks during hot weather periods (around the noon), and in contrast, searching for food in sunny places in cold weather (in the morning or after a rain). These findings follow LÖHRLS (1976) observations.

5) Interactions with other birds and human activities, status of Wallcreeper population

Examples of Wallcreeper interacting with Alpine Accentor (*Prunella collaris*), Black Redstart (*Phoenicurus ochruros*), House Mrtin (*Delichon urbica*), Hobby (*Falco subbuteo*), Chiffchaff (*Phylloscopus collybita*), Kestrel (*Falco tinnunculus*), Peregrine Falcon (*Falco peregrinus*), and Sparrowhawk (*Accipiter nisus*) are known from the literature (LÖHRL 1976, HAURI 1978).

I have observed several times mobbing of Wallcreeper by Swift (*Apus apus*) as far as the Walcreeper nest-crevice. The Wallcreeper seem to perceive as threats Kestrel (*Falco tinnunculus*) and Raven (*Corvus corax*) which often share the same habitat. The presence of these species may be a factor compelling Wallcreeper to use nest-holes at the foot of the rock faces. Mobbing of Wallcreeper by Dipper (*Cinclus cinclus*) has been recorded a few times in the gorges. At some breeding places, Kestrel (*Falco tinnunculus*), Sparrowhawk (*Accipiter nisus*), Pygmy owl (*Glaucidium passerinum*) and Tengmalm's Owl (*Aegolius funereus*) could be potential predators of Wallcreeper.

Wallcreepers have been endangered at some breeding sites in the mountains under study by human activities (traffic-localities M_5, M_7,V_6; tourism-M_4, M_5, M_6, V_2, V_4, V_5; mountaineering - location V_4). Nevertheless, population of the Wallcreeper is much more endangered outside breeding season when birds often visit villages and towns.

As Wallcreeper is not ranked as a numerous bird species, loss of single breeding location can negatively impact the vitality of its local population. Future such a bird species is generally problematic.

As to the category of threat to which the Wallcreeper population is exposed, there are differences between populations inhabiting mountains where pairs breed in the vicinity of other pairs (in the Malá Fatra) and populations consisting of pairs occupying localities which are separate from one another by several kilometres (in the Veľká Fatra). In the first case

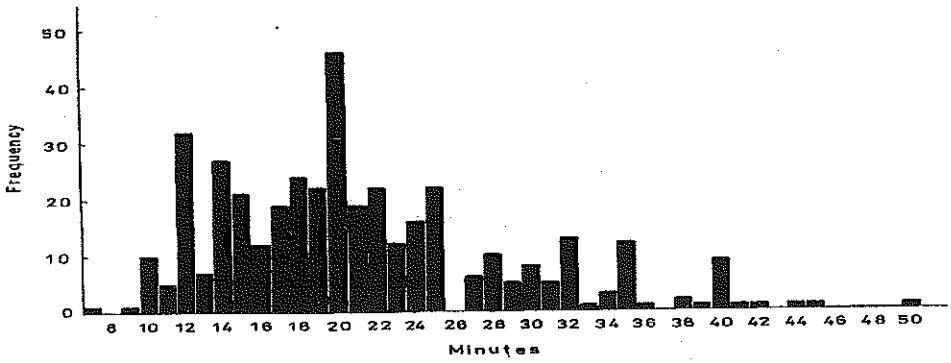

Fig. 2. Frequency distribution of the feeding of a female Wallcreeper by a male on the nest (n=399)

Obr. 2. Frekvencia kŕmenia samice sediacej na hniezde samcom

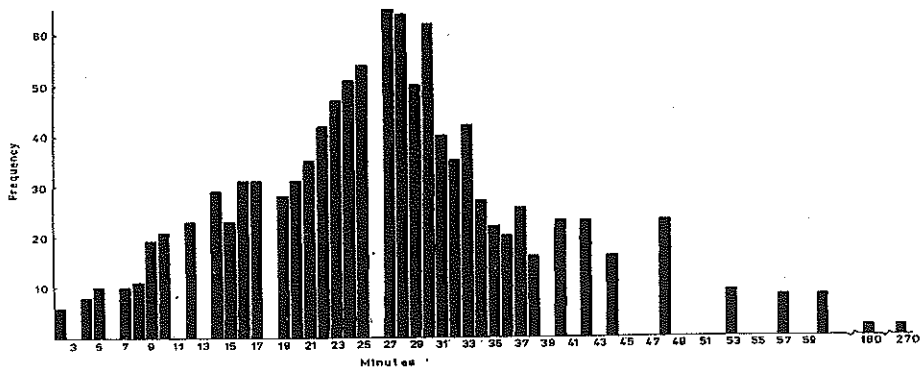

Fig. 3. Frequency distribution of the feeding of nestlings by a male (n=1090)

Obr. 3. Frekvencia kŕmenia mláďat na hniezde samcom

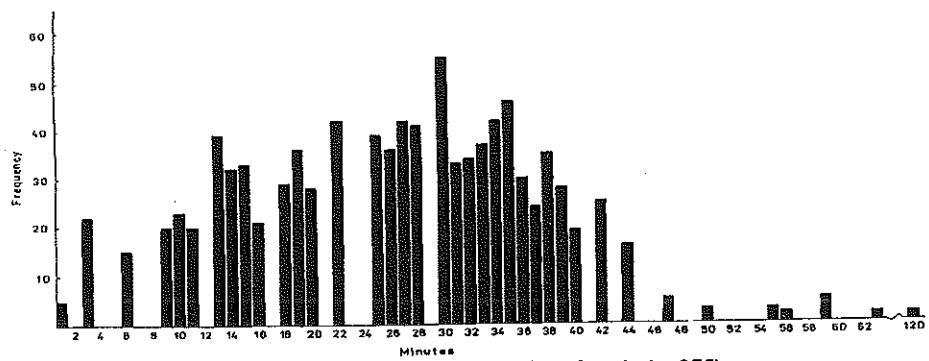

Fig. 4. Frequency distribution of the feeding of nestlings by a female (n=975)

Obr. 4. Frekvencia kŕmenia mláďat na hniezde samicou

if one bird of the former pair did not return to its previous breeding site, it would have a greater chance of finding another partner. Conversely, in the second case it would have a much poorer chance of forming a pair where individual birds are so widely scattered.

Site fidelity has an important bearing where breeding sites are subject to disturbance. If site fidelity is strong, the birds at some locations will be much more at risk than at others. It is therefore important that the extent of site fidelity of the Wallcreeper is established. This can be achieved only by a concentrated programme of ringing and observation.

SÚHRN

Hniezdna biológia murárika červenokrídleho (*Tichodroma muraria L.*) bola skúmaná v rokoch 1988-94 na ôsmych hniezdiskách v Malej Fatre a v rokoch 1982-94 na šiestich hniezdnych lokalitách vo Veľkej Fatre. Populácie murárika červenokrídleho (7 a 5 párov) obývajú v skúmaných územiach vápencový skalný biotop v rozpätí nadmorských výšok 400-1550 m.

Páry sa tvorili väčšinou až na hniezdiskách koncom apríla a začiatkom mája (26 aprílových pozorovaní) a len príležitostne už na zimných stanovištiach v predhorí Fatier (6 aprílových záznamov). Na výbere hniezdnej dutiny sa zúčastňovali obaja partneri. Samec v tom období často spieval, a to i za letu, ukazujúc samičke potenciálne hniezdne dutiny. Niektoré hniezdne škáry boli využívané viac rokov, čo nasvedčuje buď tomu, že partneri zostávajú verní hniezdnej lokalite (pár okrúžkovaný na lokalite V3 v roku 1989 tu hniezdil v nasledujúcich dvoch rokoch), alebo páry majú rovnaké nároky pri výbere hniezdnej dutiny.

Stavba hniezda pripadala na prvú polovicu mája. Hniezdo stavala samička sama. Hniezdny materiál tvoril predovšetkým mach, suché steblá tráv a jemné korienky. Vnútro bolo vystielané srsťou, ktorá bola prinášaná až zo vzdialenosti do 400 m. Znášku, ktorú tvorilo 3-5 vajec (n=10), zahrievala samička sama. Samec ju však po celú dobu inkubácie kŕmil pred hniezdnou dutinou.

Prvých 5-7 dní po vyliahnutí boli mláďatá kŕmené len samčekom, samička ich neustále zahrievala a len na krátku dobu (2-3 min.) opúšťala hniezdo. Neskôr prinášali potravu na hniezdo obaja rodičia s priemernou frekvenciou 15 minút. Keďže potrava bola zbieraná tak v bezprostrednej blízkosti hniezda, ako i vo väčších vzdialenostiach od hniezda (až 1500 m), boli intervaly medzi jednotlivými návštevami značne rozdielne (od niekoľkých sekúnd až do 45 min.). Samec a samica hľadali potravu v rozdielnych subteritóriách, samec lietal do odľahlejších miest, zatiaľčo samica využívala bližšie partie skál.

Úplne lietajúce mláďatá opúšťali hniezdnu dutinu v júli po 26-30 dňoch po vyliahnutí. Počet vylietaných mláďat na hniezdo kolísal od dvoch (8x), troch (22x), štyroch (14x), až do piatich (1 prípad). Po opustení hniezda sa mladatá stávali pomerne skoro nezávislé na rodičoch (7-12 dní) a koncom júla a začiatkom augusta sa rodinné zväzky rozpadali.

Potrava bola zbieraná na skalných stenách (prehliadané boli tak pukliny, ako i zatrávené časti skál). V horúcom letnom období boli v poludňajších hodinách slnkom osvetlené skalé partie opomínané a vtáky hľadali potravu na zatienených miestach; naopak, ráno, resp. po daždivom počasí boli slnečným lúčom vystavené časti skál najskôr navštevované.

Na hniezdiskách boli zaznamenané interakcie murárika s niektorými vtáčimi druhmi (*Apus apus, Cinclus cinclus, Corvus corax*). Potenciálnych predátorov predstavovali druhy *Accipiter nisus, Aegolius*

funereus, Falco tinnunculus, Glaucidium passerinum. Na niketorých skúmaných lokalitách boli hniezdiace vtáky ohrozené ľudskými aktivitami (doprava, turistika, horolezectvo). Kedže murárik je zriedkavým druhom a na hniezdny biotop má špecifické nároky, môže sa strata už aj jednotlivých vhodných hniezdnych lokalít negatívne prejaviť na životaschopnosti málopočetnej populácie.

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