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Breeding ecology of an urban Magpie *Pica pica* population in Zielona Góra (SW Poland)

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Abstract. Study was carried out between 1984–1987. Data were gathered on the breeding success of 162 nests observed from the ground and 22 nests by direct observation of contents. The mean clutch size was 6.0 (SD = 1.09; n = 22). Eggs measured 33.33 x 22.90 mm (n = 121).

In 1986, 42% of pairs and in 1987, 45% of pairs produced fledgelings. Total nesting failure was 49%. The most important predator was Hooded Crow *Corvus corone cornix* followed by man and conspecifics. The role of feral cats is unknown. Nest height is an important factor in the observed differences in predation pressures. Secondary nesting is common. There was a high percentage of open nests (32%). Author compared data of other authors about breeding ecology of Magpie urban and rural populations.

Key words: Magpie *Pica pica*, phenology, clutch size, breeding success, urban avifauna

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INTRODUCTION

The Magpie *Pica pica* is a common bird in the Northern Palearctic. Rapid synurbisation (= urbanisation) of this species occured since the middle of this century, a trend moving from Western Europe to Asia (author's data). Synurbisation has been observed in many species of animals (Andrzejewski *et al.* 1978, Bezzel 1985, Tomiałojć 1985, Luniak 1990) but the mechanism is still not fully understood. In the case of the Magpie there have been many ecological studies on farmland populations (e.g. Klejnotowski 1969, 1969a, Love & Summers 1973, Vines 1981, Balanca 1984, Arias de Reyna et al. 1984) and only a few on urban populations (Tatner 1982a, 1986, Kuranov 1984, Kavanagh 1986, 1987, Kavanagh *et al.* 1991).

STUDY AREA AND METHODS

This study was undertaken in Zielona Góra (SW Poland), a town with a population of about 120.000 people in an area of 20 km^2 (urbanised area = built up areas, parks, industrial areas). There are only 3 parks (below 10ha each) but there are many small green patches with trees (especially *Populus ssp., Tilia ssp., Acer ssp., Aesculus hippocastanum*). The central part of the town (9 km^2) has both old and modern buildings and is expanding. The peripheral part of the town (11 km^2) consists of old villages with new detached houses and industrial centres (N). The town is surrounded by forests.

Clutch size and eggs dimensions were measured in 22 clutches weekly between 1984 and 1986. Data on timing of breeding, clutch size and dimensions of 121 eggs were obtained.

Many nests in Zielona Góra were built very high in the trees (about 44% on *Populus ssp.*). Thus the author observed nests and Magpies from the ground. This method allowed a greater number of nests to be observed. As Magpies are territorial during the breeding and non-breeding season, fledglings could be observed after leaving the nest. Observations were made on weekends when the level of traffic (cars and pedestrians) was low. 74 nests in 1986 and 88 nests in 1987 were reccorded. The nests were observed from the 1st Febr. to the end of July. It was possible to record: a) timing of nest building; b) timing of feeding (chicks); c) timing of fledging and number of fledglings.

When the date the parents start feeding the chicks and the date the fledglings leave the nest is known, then from the literature (Goodwin 1986, Birkhead 1991) information about incubation period can be used to predict the date of egg laying. Slight deviation did not significantly change the results because the data were analysed in weekly periods. As repeat breeding attemps were usually in new nests within 20m from the old one, failure rates could also be calculated.

NEST BUILDING AND EGG LAYING

In 1986 and 1987 in Zielona Góra 126 Magpie pairs began nest building (Fig. 1). Magpies started building during the same period in both years. The average date was between 16–18 March (Tab. 1). Three nests were started on November but they were left incomplete after the first frosts and finished in spring (not shown on Fig. 1).

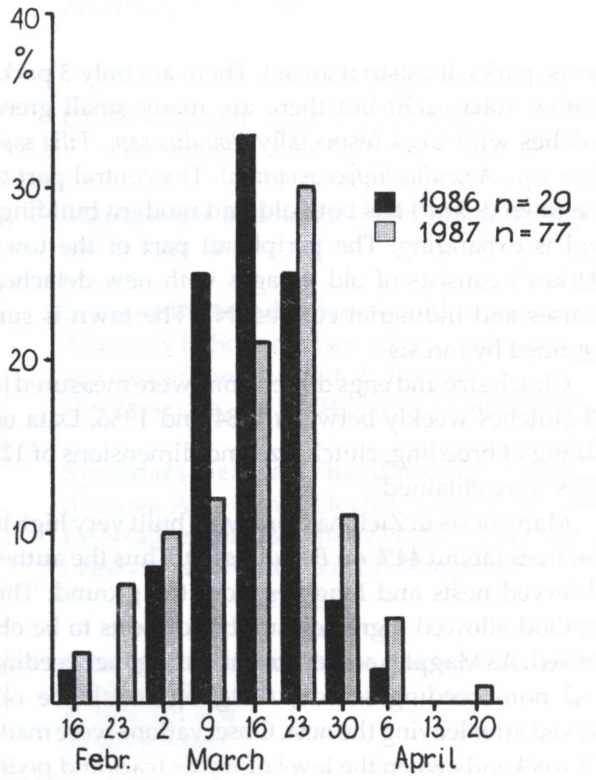

Fig. 1. Timing of nest building (%). n – number of nests.

[Ryc. 1. Dynamika przystępowania do budowy gniazd. n – liczba gniazd.]

Table 1. Timing of nest building. $\bar{x}$ – mean date (days) of start of the beginning. 1 is 1 II so 43 is 15 III.

[Tabela 1. Przystępowanie srok do budowy gniazd. $\bar{x}$ – średnia data (dni) rozpoczęcia budowy, 1 II przyjęto jako 1, tak więc 15 III to 43.]

Year	$\bar{x}$	SD	N	Begining
1986	43.6	8.76	49	9 II-6 IV
1987	44.7	12.29	77	9 II-20 IV
Total	48.6	33.75	126	

The time required to construct the nest depended on the date the Magpies started building (Fig. 2). Those started earlier took longer to build. This was due to the breaks caused by frosts, high winds and periods of rain and snow.

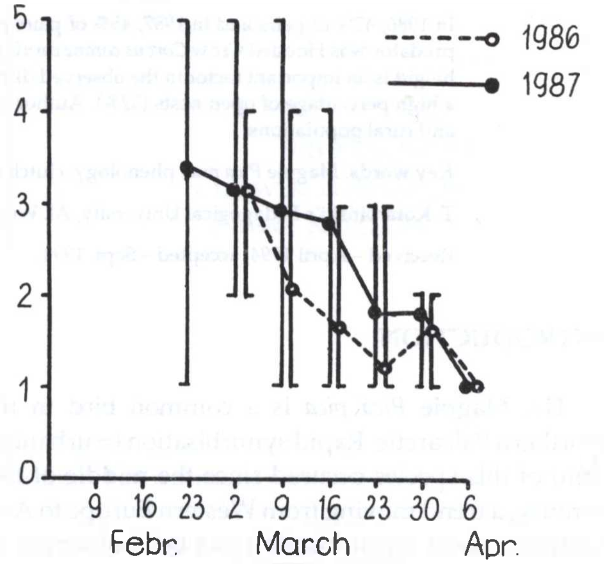

Fig. 2. Average (min.-max.) time (in weeks) for nest building from the data of start (in 1986 r=-0.871 p<0.05 and in 1987 r=-0.376 n.s.).

[Ryc. 2. Średnia (z wartościami skrajnymi) ilość czasu zużytego do budowy gniazda w zależności od daty rozpoczęcia budowy (w 1986 roku r=-0.871 p<0.05, w 1987 roku r=-0.376 n.s.).]

In most cases Magpies built a new nest each year. Some pairs did repair old ones from previous years. In 1986 22% (n = 16) of pairs use old nests and 28% (n = 25) in 1987.

Comparing the timing of nest building in Zielona Góra to farmland in Western Poland (Klejnotowski 1969, 1972) shows that the Magpie started nest building earlier in the town. Klejnotowski (1969) reported that nest building started on farmland on 7 March i.e. 3–4 weeks later than that in the urban population. The same author states that in the city of Poznań, Western

Poland, the Magpie started nest building on 25 January in 1971. Some pairs started building in November in Zielona Góra. The early onset of nest building in towns may be a part of the territory occupation demonstration at high breeding densities. These nests took longer to build due to the temporary cessation caused by low temperatures (Fig. 2).

Table 2. Timing of egg laying. $\bar{x}$ – calculated as in Tab. 1: 1 is 1 III and 48 – 17 IV.

[Tabela 2. Przystępowanie do składania jaj. $\bar{x}$ – obliczono jak w Tab.1. 1 III przyjęto jako 1, 17 IV jako 48.]

Year	$\bar{x}$	SD	N	Period of laying
1986	48.1	7.52	46	31 III-10 IV
1987	42.8	8.17	54	24 III-4 IV
Total	45.3	8.30	100	

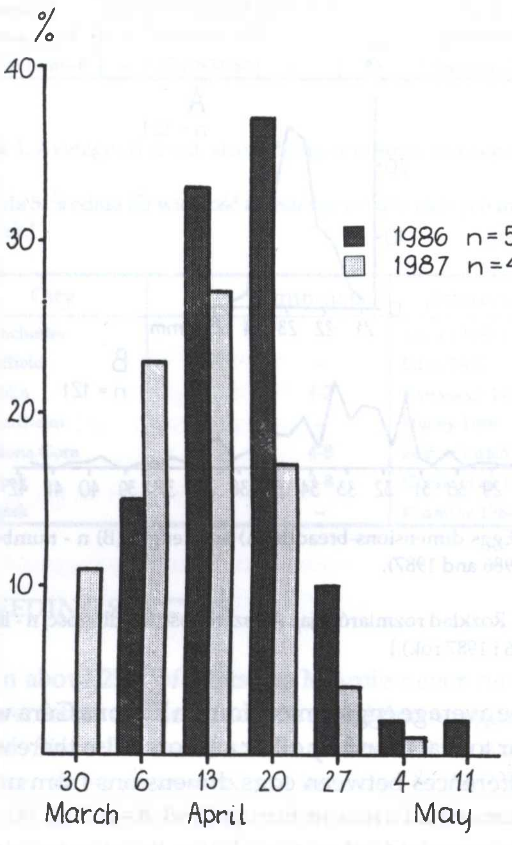

Fig. 3. Timing of egg laying calculated from the data on the start of feeding and those a nast leaving. n " number of broods, $\chi^2 = 9.46$ $p<0.1$.

[Ryc. 3. Dynamika przystępowania do znoszenia jaj na podstawie terminów rozpoczęcia karmienia piskląt i opuszczania gniazd przez podloty. n " liczba lęgów, $\chi^2 = 9.46$ $p<0.1$.]

The first eggs were layed in Zielona Góra between 31 III and 6 IV in 1986 and between 25–30 III in 1987 (Fig. 3). The average date respectively for both years was 16 and 10 IV (Tab. 2). The average date of egg laying in new nests in comparison to old nests was similar, however in the old nests it was 2 days earlier (Tab. 3).

Table 3. Timing of egg laying in new and old nests. $\bar{x}$ – mean date of first egg when 1 is 1 III, N – number of clutches.

[Tabela 3. Przystępowanie do składania jaj w nowych i odbudowywanych gniazdach. $\bar{x}$ – średni termin przystępowania do zniesień, przy którym 1 III przyjęto jako 1, N – liczba zniesień.]

Nest type	1986			1987			Total		
	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N
new	47.4	8.24	37	40.9	8.20	16	45.4	8.69	53
renovated	49.4	4.40	9	38.6	4.40	9	44.0	7.00	18

There was no significant difference between the data gathered by direct and indirect methods (test χ^2; $p<0.5$).

In the first year of study 8 nests (31% of unsuccesful first broods) were found where the pair started a new brood after the loss of first broods. At 1987 14 such nests (44% of first unsuccesful broods) were found. A further two pairs started a third brood after two failures in 1986. In 1987 there was one such pair.

Mean daily temperature was compared with the date of onset of nest building (Fig. 4). In 1987 there was a visible delay in nest building when the temperature dropped below 0°C. The delay in egg laying at the beginning of April 1986 was also the result of a sudden decline in temperature below 0°C also.

There was no significant difference between the timing of breeding on Western Poland farmland and Zielona Góra. Egg laying began between the 27th March and 7th April on farmland 1963–1969 (Klejnotowski 1969) but in Zielona Góra between 24th March and 6th April (Fig. 3 and 4). Keller (1979) reported that the Magpie started egg laying from 3th to 6th April in non-urban areas of Mazovia (Central Poland). This is later then in Zielona Góra. In research on urban Magpies in Sheffield and rural population in Rivelin Valley in England, Eden (1985) found that the urban population began egg laying about 5 days earlier (10th April). Tatner (1982) found that the urban population in Manchester began breeding 8 days earlier than the rural population in North England.

Two factors probably affected early nest building and breeding in urban Magpie: a) higher mean temperature in towns (Bezzel 1985, Eden 1985) and b) food availability. Murton and Westwood (1977) found in the Woodpigeon *Columba palumbus* that the timing of breeding was dependent on food availability. In the case of the Magpie, Hogstedt (1981) and Reese with Kadlec (1984) both showed that earlier breeding occured when extra food was supplied. In towns adult Magpies may feed all the year round on garbage. But nestlings must be fed on invertebrates (Eden 1985, Tatner 1983). Insect activity is in turn dependent on temperature. The higher ambient temperature in towns may encourage earlier activity in invertebrates in spring (Eden 1985 from Matthews *et al.* 1978) and thus provide an earlier food supply for hatching chicks.

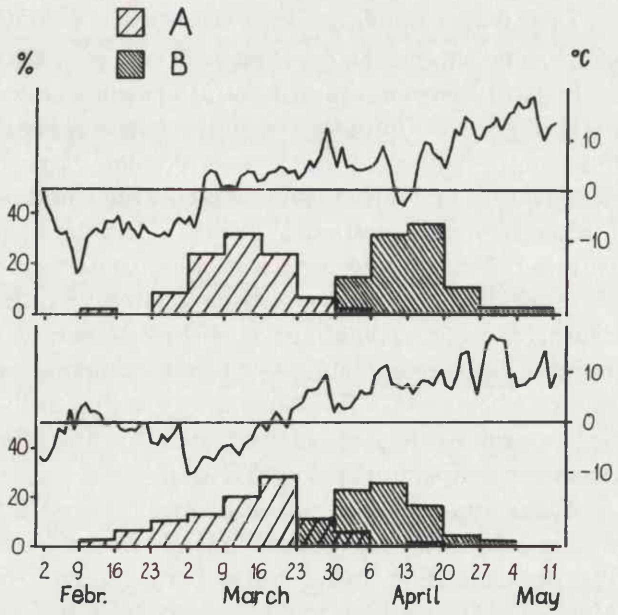

Fig. 4 Timing of nest building (A) and timing of egg laying (B) with temperature.

[Ryc. 4. Przebieg średniej temperatury dobowej oraz tempa przystępowania do budowy gniazd (A) i znoszenia jaj (B).]

The onset of nest building and egg laying was very sudden. This suggests that some common factor initiated this behaviour in the population. The main cause reported is increasing day length (Phillips *et al.* 1985). Erpino (1968, 1969) in his research on Magpie physiology cited other factors such as: a) temperature and b) mate behaviour. Jones (1986) also stressed the importance of temperature. In this study a high synchronisation between the timing of nest building and changing air temperature was found (Fig. 4), confirming temperature as one of the main factors regulating the timing of breeding. This would also explain the limited effect of food provision on laying date experienced by Hogstedt (1981).

EGGS DIMENSIONS AND CLUTCH SIZE

Magpies eggs in Zielona Góra measured: breadth 22.90±0.68mm SD = 0.062, coefficient of variation = 2.97; length 33.33±2.43mm SD = 0.222, coefficient of variation = 7.29; N = 121 (Fig. 5).

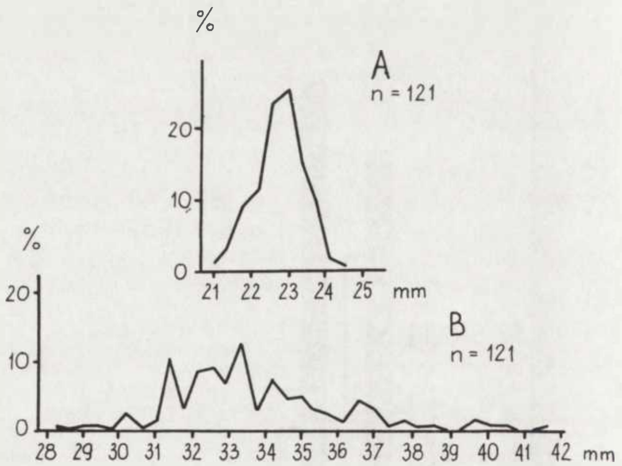

Fig. 5. Eggs dimensions-breadth (A) and length (B) n - number of eggs (1986 and 1987).

[Ryc. 5. Rozkład rozmiarów jaj. A - szerokość, B - długość, n - liczba jaj (1986 i 1987 rok).]

The average eggs dimensions in Zielona Góra were similar to that found by other authors. Also there were no differences between eggs dimensions from urban and non-urban areas in Europe and Asia (Tab. 4).

In researched urban population the average clucht size was 6.00, SD = 1.09 (span 4–8, N = 22). The average clutch size urban populations from European towns (Tab. 5) showed little difference from non-urban European areas (Tab. 6). The average clutch size in Zielona Góra was slightly bigger that from farmland in Western Poland (Klejnotowski 1969). However the largest clutch size were in Asia and North America (Tab. 6).

Table 4. Magpie eggs dimensions from other populations studied. U – urban areas, R – non-urban rural, N – number of eggs, B – breadth, L – length.

[Tabela 4. Wymiary jaj sroki podawane przez różnych autorów. U – tereny miejskie, R – pozamiejskie, N – liczba jaj, B – szerokość, L – długość.]

Country	N	Average B and L	Span B	Span L	References
Spain-R	–	23.30x33.10	–	–	Arias de Reyna *et al.* 1984
Holland-R	–	23.94x33.97	–	–	Walters 1988
		23.74x33.40			
Germany-R	–	23.61x33.30	21.3-25.0	28.0-37.5	Hund *et al.* 1981
Poland-R	125	23.50x33.45	–	–	Keller 1979
Poland-U	121	22.90x33.33	24.8-21.2	27.7-41.7	author's data
Uzbekstan-R	–	24.10x35.50	–	–	Abdreimov 1981
Kazakhstan-R	–	25.10x34.50	–	–	Smetana 1978

Table 5. Average ($\bar{x}$) clutch size of Magpie in some Eurasian cities

[Tabela 5. Średnia ($\bar{x}$) wielkość zniesienia sroki w różnych miastach Eurazji.]

City	$\bar{x}$	min-max	References
Manchester	5.6	–	Tatner 1982a
Sheffield	5.8	–	Eden 1985
Dublin	5.7	4-7	Kavanagh 1986
Trondheim	6.8	–	Husby 1986
Zielona Gora	6.0	4-8	author's data
Słupsk	5.5	3-8	Górski *et al.* 1992
Tomsk	6.9	–	Kuranov 1984

BREEDING SUCCESS

In about 25% of nests the Magpie never returned after erection of a nest and I assumed that no eggs were layed. Since the social status of those birds was unknown, those nests were not included in the calculation of group breeding success of the population (Tab. 7 and 8).

In 1986 42% of pairs and in 1987 45% of pairs produced fledgelings (Tab. 7). These results represent minimal figures because some breeding pairs were observed feeding young for 4–5 weeks but were not seen after fledging. These young may have fledged unnoticed, and may have been eaten since nests were only checked once a week. If this group with probable success is included then in 1986 54% pairs bred successfully and in 1987 52% (Tab. 7 and 8).

Finding second nests was difficult due to increased leaf cover at this time of year. For this reason the true number of second broods could be larger than shown in Table 7 and 8.

Table 6. Average ($\bar{x}$) clutch size of Magpie in non-urban areas.

[Tabela 6. Średnia ($\bar{x}$) wielkość zniesień sroki w środowiskach pozamiejskich.]

Country	$\bar{x}$	min-max	References
Britain	6.2		Eden 1985
Britain	5.6	3-8	Holyoak 1967
Britain	5.9	5-7	Holyoak 1974
Britain	5.8	2-8	Seel 1983
Britain	6.7	5-8	Love *et al.* 1973
Ireland	5.9		Holyoak 1967
Netherlands	5.3-6.3		Baeyens 1981
Netherlands	5.7	3-7	Walters 1988
Netherlands	6.2	4-8	*ibidem*
France	5.7	4-7	Balanca 1984
Switzerland	7.9	6-10	Huber 1944
West Germany	6.7	4-9	Hund *et al.* 1981
Sweden	6.0-6.5		Hogstedt 1981
Spain	6.3-6.4	4-9	Arias de Reyna *et al.* 1984
Czech & Slovakia	6.4	3-9	Hudec 1983
Poland	6.9	5-8	Klejnotowski 1969
Lithuania	7.2	6-9	Aleknonis 1976
Byelarus	5.7	2-8	Yaminski *et al.* 1979
Russia:			
– Voronezh	5.7	4-7	Malchevski 1959
– Kaluga	7.2		Voronin *et al.* 1974
– Chebogsary	5.9	3-9	Popov 1978
– Astrakhan	6.3	5-8	Kasatkin 1981
Ukraine:			
– Crimea	7.8	5-8	Kostin 1983
Uzbekstan	6.2		Abdreimov 1981
Uzbekstan	6.2	4-9	Sagitov *et al.* 1980
Kazakhstan	6.0	2-8	Smetana 1978
Russia:			
– Krasnoyarsk Region	6.3	5-8	Prokofiev 1979
– Novosibirsk	6.6	4-10	Blinov 1981
USA:			
– Idaho	7.0		Findholt *et al.* 1983
– Idaho	6.5		*ibidem*
– Wyoming	7.5		*ibidem*
– Colorado	6.6		*ibidem*
– Utah	6.5	1-9	Reese *et al.* 1985
– Wyoming	6.1-6.5	3-8	Erpino 1968

Table 7. Breeding success in I and II broods.

[Tabela 7. Sukces lęgowy w I i II lęgu.]

First brood (I)	1986		1987	
	n	%	n	%
Total nests	74	–	88	–
Nests abandoned before egg laying	17	23.0	23	26.1
Nests with eggs	57	77.0	65	73.9
Nests successful nests	24	42.1	29	44.6
Nests with probable success	7	–	5	–
Likely successful nests	31	54.4	34	52.3
$\bar{x}$ of fledglings/successful pair	2.17	–	2.10	–
$\bar{x}$ of fledglings/pair with eggs	0.91	–	0.94	–
$\bar{x}$ of fledglings/nest	0.70	–	0.69	–
Second nesting attempts (II)				
unsuccessful nests I	26	–	31	–
second broods	8	30.8	14	45.2
successful nests II	2	25.0	5	35.7
young produced	53	–	8	–
$\bar{x}$ of young/successful pair	2.50	–	1.60	–
$\bar{x}$ of young in II brood	0.63	–	0.57	–

Table 8. Breeding success (I and II broods).

[Tabela 8. Sukces lęgowy (I i II lęgi).]

	1986	1987	Total
Number of nests	74	88	162
Failure to lay any eggs (n)	17	23	40
% failure before egg laying	23.0	26.1	24.7
Number of nests with eggs	57	65	122
% of nests with eggs	77.0	73.9	75.3
Number of nests with success (I+II)	26	34	60
% successfull nests (I+II)/pair with clutch	45.6	52.3	49.2
% successfull nests (I+II)/nest	35.1	38.6	37.0
$\bar{x}$ of fledglings/successfull pair	2.2	2.0	2.1
$\bar{x}$ of fledglings/pair with eggs	1.0	1.1	1.0
$\bar{x}$ of fledglings/nest	0.8	0.8	0.8
Number of nests with success (I+II+possible success)	33	39	72
% successful pairs/nest	44.6	44.3	44.4
% successful pair/nest with eggs	57.9	60.0	59.0

The undomed nests constituted 32% (Tab. 9). The difference between the average number of fledgelings produced by successful pairs between nests (with and without roof) was not significant (test χ^2, p<0.2). The occurence of undomed nests is very rare generally (Goodwin 1986). In Idaho state, USA, only 1% of nests were undomed (Trost-pers. comm.). Baeyens (1981) suggested that the roof protects eggs and chicks from predators and that undomed nest are built by young inexperienced pairs. Baeyens (1981) showed that pairs with domed nests had a higher breeding success than pairs from open nests. In Zielona Góra this difference was not significant (test χ^2, p<0.2) (Tab. 9). It would appear that nest height, rather than the presense or absense of a dome, has a greater impact on nesting success in Zielona Góra.

Table 9. Differences in the breeding success between average number of youngs leaving domed (D) nest and undomed (U) nests (test χ^2 p<0.2).

[Tabela 9. Różnica sukcesu lęgowego między średnią liczbą młodych opuszczających gniazdo z „dachem" (D) i odkryte (U) (test χ^2 p<0,2).]

	D	U	Total
Nests	111	51	162
Successful nests	33	20	53
% of successful nests	29.7	39.2	52.7
Total of youngs	62	51	113
$\bar{x}$ of fledglings/successful pair	1.9	2.6	2.1
$\bar{x}$ of fledglings/nest	0.6	1.6	0.7

Of all Zielona Góra nests, 44% were studied in 1986 and 42% in 1987. 40 % of pairs with clutches produced fledglings. If the category of nests with probable success are included this rises to 50% of pairs fledging chicks. In other European towns there was a similar percentage of pairs with success (Tab. 10). This compared with a success of 23–26% of pairs in farmland of Western Poland (Klejnotowski 1969). This is lower than in Zielona Góra and other urban areas. In other non-urban areas the success rate was often lower (Tab. 10).

These data and those of other authors suggests that the rapid increase in the Magpie population is not due to increased clutch size or egg quality expressed by their dimensions (Tab. 4, 5 and 6). However comparing the breeding success of Magpies in urban and non-urban areas indicates that the urban population had a higher percentage of successful clutches (Klejnotowski 1969).

The average number of fledglings per pair (including repeat breeding) was higher in the urban environment (Tab. 11). In Zielona Góra there was 1.0 – 1.1 fledglings/pair (Tab. 8). These data represent minimal figures since some repeat nests were probably undetected.

Table 10. Percentage of successful broods (%) in urban and non-urban areas.

[Tabela 10. Odsetek udanych lęgów (%) w środowiskach miejskich i pozamiejskich.]

Locality	%	References
Urban:		
Manchester	45	Tatner 1982a
Dublin	55	Kavanagh 1986
Zielona Góra	42-54	author's data
Słupsk	47-59	Górski *et al.* 1992
Tomsk	51	Kuranov 1984
Non-urban:		
Britain	66	Love *et al.* 1973
Britain	42	Vines 1981
France	36	Balanca 1984
Netherlands	39	Baeyens 1981
Denmark	8-59	Moller 1982
Sweden	17-42	Hogstedt 1980
Poland	23-26	Klejnotowski 1969
Russia:		
– Smolensk	20	Bulavincev 1986
– Rostov	20	Bulavincev 1986
– Krasnodar	20	Bulavincev 1986
– Tula	30	Bulavincev 1986

Table 11. Average number of fledglings leaving nests (x) in urban and non-urban areas (* – including repeated broods).

[Tabela 11. Średnia liczba młodych opuszczających gniazda sroki w środowiskach pozamiejskim i miejskim (* – dane łącznie z powtórzonymi lęgami).]

Locality	$\bar{x}$	$\bar{x}$/pair with clutch	References
Urban:			
Manchester	2.88	1.30 1.55*	Tatner 1982a
Dublin	2.71	1.48	Kavanagh 1986
Trondheim	3.20		Husby 1986
Zielona Góra	2.10-2.17	0.91-0.94 1.00-1.20*	author's data
Słupsk	2.76		Górski *et al.* 1992
Non-urban:			
Britain	1.90	0.69-0.94	Vines 1981
Netherlands	2.00-3.30	0.60-1.30	Baeyens 1981
Netherlands		1.16-1.67	Walters 1988
France	2.89	1.00	Balanca 1984
Sweden		1.10-1.68	Hogstedt 1980a
Czech & Slovakia	5.23		Hudec 1983
Russia (near Tomsk)	2.85	1.95	Kuranov 1984

Tatner (1986) in his research on individual survival rate in urban Magpies showed a similar percentage survival in the first year of life in urban and non-urban area (about 45%). Birkhead *et al.* (1986) on the other hand found mortality in non-urban areas in the first year of life to be much higher (about 80%). Holyoak (1971) found a high mortality rate in older age classes. Thus longer life and a higher breeding success are factors likely to enable the rapid increase in urban population densities.

Of all observed nests in Zielona Góra, about 22–28% were old nests rebuilt a second-year. Some nests were constructed from metalic wire, so, were long-lived constructions (Jerzak & Kavanagh 1991). This is a high percentage but similar to that found in Manchester (Tatner 1982a). Ferens (1950) found that Magpies never use the same nest for a second time on farmland. Comparing data from new and second-year nests it was found that fledglings were produced from 69% of new and 63% of second-year nests. The average number of fledglings from second-year nests was higher than in new nests though not statistically significant (test χ^2, $p<0.9$). Tatner (1982a) suggests that the use of old nests is a new breeding strategy in urban populations. This may assist earlier breeding. In Zielona Góra Magpie using old nests start breeding earlier (Tab. 3). This may be due to a better energetic condition of these birds.

CAUSES OF BREEDING FAILURE

In Zielona Góra the most common predator of Magpie nests was Hooded Crows especially in suburban areas (Tab. 12). It is possible that domestic cats were also common predators here (Kavanagh *et al.* 1991) and also Martens *Martes foina*. Only one case of nestlings taken from a nest by Marten was seen. Martens are active by night and thus not easy to detect, so their effect is likely to be underestimated. Magpies were seen robbing other Magpies' nests. Tatner (1982a) also observed this behaviour in Manchester and believed it to be due to the higher pair density there. Conspecific predation was observed on non-urban areas (Baeyens 1981). In Zielona Góra a Squirrel *Sciurus vulgaris* was also seen to rob a nest.

An important regulator of bird numbers in the opinion of some authors is predation (Cramp 1972, Tomiałojć 1979). Both authors showed a rapid increase in Woodpigeon numbers in towns without nest predators. In non-urban areas of Europe Crow *Corvus corone* is the main predator of Magpie nests (Baeyens 1981, Balanca 1984). Many authors showed a lower breeding success among Magpies which nested near Crows' nests (Vines 1981, Baeyens 1981). Hogsted (1980a) found a similar result in areas with Jackdaws *Corvus monedula* in close proximity. Tuchin and Varshavsky (1984) found a decrease in Magpie numbers in Saratov when Hooded Crows started nesting in that town.

Table 12. Causes of breeding failure. A – % of failure without nests in which no eggs were laid, B – % of all nests.

[Tabela 12. Przyczyny strat w lęgach. A – % strat bez uwzględnienia gniazd porzuconych przed zniesieniem, B – % strat z uwzględnieniem wszystkich gniazd.]

Causes	n	A%	B%
Corvus corone cornix	11	19.3	11.2
Humans	4	7.0	4.1
Pica pica	4	7.0	4.1
Sciurus vulgaris	1	1.8	1.0
Martes foina	1	1.8	1.0
Falling down (wind)	2	3.5	2.1
Unknown	34	59.6	35.7
Total (1)	57	100.0	–
Nests in which no eggs were laid	40	–	40.8
Total (2)	97	–	100.0

Many authors suggest that Magpies like to nest close to humans because they are more protected from predators. Indeed it is in urban areas that the highest densities of this species are now observed in many areas of Europe: (e.g. Vines 1981, Baeyens 1981, Fjeldsa 1981, Fasola *et al.* 1988, Mulsow & Schroeter 1985). In non-urban areas of Zielona Góra region, Poland, majority of Magpie nests were found near human settlements (author's data). This shift from avoidance of humans to closer associations is a factor aiding the colonisation of towns by Magpies.

The impact of man on Magpie breeding success is substantial.

On farmland man is a main predator of nests (Klejnotowski 1969). People in the suburbs are known to destroy Magpie nests. This may explain the high percentage failure in lower nests and hense the correlation between nest height and breedings success ($r = +0.781$ $p<0.05$ (Fig. 6)). People from the suburb are known to use poison on pork fat to kill adult Magpies. Thus man may kill more birds than observed. In the suburb of Zielona Góra the destruction of nests by man is common place but in the city center this is not the case. Nests are very high there (author's data) and climbing of trees is too obvious.

Many cases of breeding failures in Zielona Góra's Magpie population are for unknown reasons (Tab. 12). Many nests (40%) were abandoned before egg laying. It is interesting that the Magpie starts nest building very early and then waits some weeks before egg laying. B. van de Dijk (Bossema *et al.* 1986) suggests that this is a defence mechanism. Nests constructed early and subsequently disturbed by activity near the nest can be abandoned in time to build a new nest.

Tatner (1983) and Eden (1985) suggest that many nestlings died from starvation. This could partially explain the positive correlation between nest height and average number of fledglings in Zielona Góra ($r = -0.937$; $p<0.01$). The lower nests had a greater average number of fledglins (Fig. 6). If the pair is forced to nest higher, then, they may also have problems collecting food for their chicks due to greater disturbance in this territory. Because nestlings require a high energy food (especially insects), any lack due to irregular feeding may cause starvation.

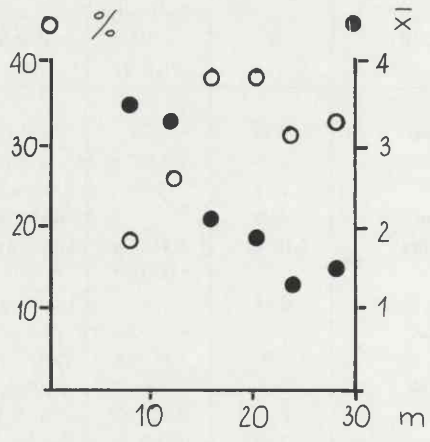

Fig. 6. Correlation between nests high and % of broods with success ($r = 0.781$ $p<0.05$) and average number of fledglings/successful pair -x ($r = -0.937$ $p<0.01$).

[Ryc. 6. Korelacje zachodzące między wysokością umieszczenia gniazd a odsetkiem (%) lęgów zakończonych sukcesem ($r = 0.781$ $p<0.05$) oraz średnią liczbą młodych przypadających na parę z sukcesem legowym -x ($r = -0.937$ $p<0.01$).]

CONCLUSIONS

The author's data on Zielona Góra's Magpie population and data of other authors on urban and rural populations show differences in breeding ecology between urban and rural populations:

1. Magpies started nest building earlier in the towns (3-4 weeks). The differences in timing of egg laying between urban and rural populations is not clear but urban Magpies begin a few days earlier.

2. Magpies who started building earlier took longer to complete their nest. Temperature was a one of the main factors regulating the timing of breeding.

3. There was not difference in eggs dimension and clutch size between urban and rural populations. So, it is not a factor affecting breeding success.

4. The Zielona Góra populations breeding success was more than 42% of breeding pairs. Other authors' data show that urban populations have higher breeding success than rural populations. The production of fledglings per pair is slight higher in urban population.

5. There was a high positive correlation between nest height and breedings success in Zielona Góra, which may explain the strong impact of man on Magpie breeding success in the urban environment.

6. The author's data and other authors conclusions suggest that the rapid increase in the urban Magpie population is due to higher percentage of successful pairs and high survival of young birds.

7. Some new behaviour was observed in the urban population:

a) More than 30% of population build undomed nests. Those may be buildt by young unexperienced birds;

b) About 25% of pairs used old nests which may be a new strategy for urban population (save energy).

c) Birds use a metalic wire as nest's building material.

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REFERENCES

Abdreimov T. 1981. Ptici tugaiev i prilegaiushchih pustyn nizoviev Amudari. Fan Uz. SRR. Tashkient.

Aleknonis A. 1976. Vielichina kladok lesnih ptic Latvii. Ekologia ptic Litevskoi SRR. Vilnius.

Andrzejewski R., Babińska-Werka J., Gliwicz J., Goszczyński J. 1978. Synurbization processes in population of *Apodemus agrarius*. I. Characteristics of population in an urbanization gradient. Acta Theriol. 23: 341–358.

Arias de Reyna L. M., Recuerda P., Corvillo M., Cruz A. 1984: [Reproduction of the Magpie (*Pica pica*) in Sierra Morena (Andalucia)]. Doñana, Acta Vertebr. 11: 79–92.

Baeyens G. 1981. Magpie breeding success and carrion crow interference. Ardea 69: 125–139.

Balanca G. 1984. Le determinisme du succes de la reproduction chez une population de pies bavardes (*Pica pica*). Gibier Faune sauvage 4: 5–27.

Bezzel E. 1985. Birdlife in intensively used rural and urban environments. Ornis fenn. 62: 90–95.

Birkhead T. R., Eden S. F., Clarcson K., Goodburn S. F., Pellat J. 1986. Social organisation of a population of magpie *Pica pica*. Ardea 74: 59–68.

Birkhead T. 1991. The Magpies.T & A D Poyser, London.

Blinov V. N. 1981. Materiali po ekologii gniezdovego perioda soroki, sieroi vorony i galki v poimie Vierhniei Obi. Ekologia i biocenoticheskie sviazi piereletnih ptic Zapadnoi Sibiri. Novosibirsk: 109–127.

Bossema L., Roell A., Baeyens G. 1986. Adaptations to interspecific competition in five corvid species in the Netherlands. Ardea 74: 199–210.

Bulavincev V. J. 1986. Soroka v iestestviennih prirodnih kompleksah evropeiskoi chasti SSSR. Ornitologia 21: 149–150.

Cramp S. 1972. The breeding of urban wood pigeons. Ibis 114: 163–171.

Eden S. F. 1985. The comparative breeding biology of magpies *Pica pica* in an urban and a rural habitat (*Aves: Corvidae*). J. Zool., London (A) 205: 323–334.

Erpino M. J. 1968. Nest-related activities of Black-billed Magpies (*Pica pica hudsonia*). Condor 70: 154–165.

Erpino M. J. 1969. Seasonal cycles of the reproductive physiology in the Black-billed Magpie. Condor 71: 267–279.

Fasola M., Pallotti E., Chiozzi G. 1988. Fattori della distribuzione locale dei nidi di Cornacchia e Gazza. Avocetta 12: 49–53.

Ferens B. 1950. [Birds of the Żywiec District]. Mater. fizjograf. Kraju 35: 1–96.

Findholt S. L., Trost Ch. H. 1983. Eggshell quality of Black-billed Magpies nesting in Idaho. The Murralet 64: 91–93.

Fjeldsa J. 1981. Population and habitat of the Magpie *Pica pica* on Zealand, Denmark. Proc. Third. Nordic Congr. Ornithol. pp. 181–188.

Goodwin D. 1986. Crows of the World. British Museum (Natural History).

Górski W., Kotlarz B. 1992. Dynamika liczebniści i efektywności lęgów miejskiej populacji sroki *Pica pica* w Słupsku w latach

1978-1989. In: Górski W., Pinowski J. (eds.) Dynamika populacji ptaków i czynniki ją warunkujące. WSP, Słupsk, p. 131.

Högstedt G. 1980. Prediction and test of the effects of interspecific competition. Nature 283: 64–66.

Högstedt G. 1980a. Resource partitioning in Magpie *Pica pica* and Jackdaw *Corvus monedula* during the breeding seasoon. Ornis scand. 11: 110–115.

Högstedt G. 1981. Effect of additional food on reproductive the magpie (*Pica pica*). J. Anim. Ecol. 50: 219–229.

Holyoak D. 1967. Breeding biology of the *Corvidae*. Bird Study 14: 153–168.

Holyoak D. 1971. Movements and mortality of *Corvidae*. Bird Study 18, 2: 97–106.

Husby M. 1986. On the adaptative value of brood reduction in birds: experiments with the magpies *Pica pica*. J. Anim. Ecol. 55: 75–83.

Hund K., Prinzinger R. 1981. Notizen zur Brutbiologie Elster *Pica pica*, Rabenkrähe *Corvus corone corone* und Dhole *Corvus monedula* in Württemberg. Ökol. Vögel 3: 261–265.

Jerzak L., Kavanagh B. 1991. Magpies nests composed of metal. Brit. Birds 84: 441–443.

Jones L. R. 1986. The effect of photoperiod and temperature on testicular growth in captive Black-billed Magpies. Condor 88: 91–93.

Kasatkin V. J. 1981. [On nesting of Magpie in sands of Lower Volga River]. Ornitologia 16: 168. (in Russian with English summary).

Kavanagh B. 1986. Populations dynamics of the magpie in an urban environment. Ph. d. thesis, Univer. of Dublin.

Kavanagh B. 1987. The breeding density of the Magpie in Dublin city. Irish Birds 3: 387–394.

Kavanagh B., Jerzak L., Górski W. 1992. Factors affecting the breeding performance of the Magpie (*Pica pica*) in three European cities. In: Pinowski J., Kavanagh B. P., Górski W. (eds.) 1991. Nestling mortality of granivorous birds due to microorganisms and toxic substances. Warszawa, pp. 71–81.

Keller M. 1979. [Intrapopulational variability of egg-size of Magpie (*Pica pica*), Song Thrush (*Turdus philomelos*), Great Tit (*Parus major*) and Blue Tit (*Parus caeruleus*)]. Not. orn. 20: 1–16.

Klejnotowski Z. 1969: [Biology of Magpie (*Pica pica L.*)]. Roczn. WSR, Poznań. Orn. Stosowana 56: 69–98.

Klejnotowski Z. 1969a. [Ekology of Magpie *Pica pica L.*)]. Ibidem, pp. 45–67.

Klejnotowski Z. 1972. [Urbanisation of Magpie (*Pica pica L.*) in Poland]. Ibidem, pp. 77–87.

Kostin Y. V. 1983: Ptici Krima. Nauka. Moskva.

Kuranov B. D. 1984: Biologicheskie osobiennosti urbanizirovannoi populacii soroki. Ptici i urbanizirovannii landshaft. Kaunus: 85–87.

Love J. A., Summers R. W. 1973. Breeding biology of magpies in Aberdeenshire. Scott. Birds 7: 399–403.

Luniak M. 1990. Avifauna of cities in Central and Eastern Europe – results of the international inquiry. In: Luniak M. (ed.) 1990. Urban Ecology Studies in Central and Eastern Europe. Ossolineum, Wrocław, pp. 131–149.

Malchevski A. S. 1959. Gniezdovaya zhizn pievchih ptic. Leningrad.

Møller A. P. 1982. Characteristics of Magpie *Pica pica* teritories of varying duration. Ornis scand. 13: 94–100.

Mulsow R., Schroeter W. 1985. Zur Biologie der Elster (*Pica pica L.*) in Hamburger Raum. Hamb. Avifaun. Beitr. 20: 97–106.

Murton R. K., Westwood N. J. 1977. Avian breeding cycles. Clarendon Press, Oxford.

Phillips J. G., Butler P. J., Sharp P. J. 1985. Physiological strategies in Avian Biology. Blackie. USA: Chapman and Hall, New York.

Popov V. A. (ed.) 1978: Ptici Volzhsko-kamskogo kraia. Vorobinyie. Moskva.

Prokofiev S. M. 1979. Osobiennosti rozmnozhenia ptic v Minusinskoi kotlovinie i nozkogornoi chasti Kuznieckogo nagoria. Tez. Vsesoiuz. Konf. "Ekologia gniezdovania ptic i metody ieio izuchenia". Samarakanda, pp. 165–166.

Reese K. P., Kadlec J. A. 1985. Influence of high density and parental age on the habitat selection and reproduction of Black-billed Magpies. Condor, 87: 96–105.

Sagitov A. K., Bakaiev S. B. 1980. Ekologia gniezdovania massovih vidov ptic iugozapadnogo Uzbekistana. Tashkient.

Seel D. C. 1983. Breeding of the Magpie on Anglesey, North Wales. Bangor Occasional Paper Nr 15, Institute of Terrestrial Ecology, Bangor.

Smetana N. M. 1978. Ekologia soroki v Naurzhumskom zapoviednikie (Severniy Kazakhstan) v period inkubacii iayc i vikarmivania ptencov. Biologia ptic v Kazakhstanie. AN Kaz. SSR. Alma-Ata. Trud. Inst. Zool. 38: 20–28.

Tatner P. 1982. Factors influencing the distribution of Magpies *Pica pica* in an urban environment. Bird Study 29: 227–234.

Tatner P. 1982a. The breeding biology of magpies *Pica pica* in an urban environment. J. Zool., London 197: 559–581.

Tatner P. 1983: The diet of urban Magpie. Ibis 125: 90–107.

Tatner P. 1986: Survival rates of urban Magpies. Ringing and Migration 7: 112–118.

Tomiałojć L. 1979. The impact of predation urban and rural Woodpigeon (*Columba palumbus L.*) populations. Pol. Ecol. Stud. 5: 141–220.

Tomiałojć L. 1985. Urbanization as a test of adaptative potentials in birds. Acta XVIII Cong. Intern. Ornith., Moscow, 1982. Nauka, Moskva, pp. 608–614.

Tuchin A. V., Varshavskij S. N. 1984. Razprostranienie i chislennost sinantropnih populacii soroki v Nizhnem Povolzhe. Ekologia, biocenoticheskiie i hoziajstviennoie znachenie vranovyh ptic. Nauka, Moskva, pp. 128–131.

Vines G. 1981. A socio-ecology of Magpies *Pica pica*. Ibis 123: 190–202.

Voronin A. A., Margolin V. A. 1974. K gniezdovoy biologii soroki v Kaluzhkoi oblasti. Materiali VI Vsesoiuz. Ornitol. Konferencii, vol. 2, Moskva, pp. 41–42.

Walters J. 1988. [Breeding data of the Magpie *Pica pica*]. Limosa 61: 33–40.

Yaminsky B. V., Kozulin A. V. 1979. K izucheniu ekologii soroki v usloviah kulturnogo landshafta Bielorusii. Tez. Vsesoiuz. Konf. "Ekologia gniezdovania ptic i metody ieio izuchenia". Samarakanda, pp. 245–246.

STRESZCZENIE

[Ekologia okresu lęgowego miejskiej populacji sroki *Pica pica* w Zielonej Górze.]

Badania prowadzono w latach 1984-1987. Zastosowano metodę obserwacji gniazd z ziemi w celu określenia terminu rozpoczęcia karmienia i opuszczenia gniazda przez młode oraz policzenia ich. Zebrano literaturę dotyczącą miejskich i niemiejskich populacji sroki na całym obszarze występowania aby porównać wybrane parametry okresu lęgowego

Sroki rozpoczęły budowę gniazd między 10 a 16 II w 1986 i 1987 roku. Szczyt przystępowania do budowy wystąpił między 10-16 III w 1986 roku (33% wszystkich gniazd) oraz między 17-23 III w 1987 roku (29% gniazd) (ryc. 1). Niektóre pary wykorzystywały stare zeszłoroczne gniazda (22% par w 1986 i 28% par w 1987). Prawdopodobnie jest to strategia zapobiegająca wydatkowaniu energii potrzebnej do jak najwcześniejszego zajęcia terytorium w warunkach wysokiego zagęszczenia par (tab. 3). Znaczna liczba gniazd była budowana bez dachu (32%). Może być to związane z mniejszą presją drapieżników na populację lub/i przystępowaniem do budowy gniazd młodych, niedoświadczonych par w których obydwoje partnerów robi to po raz pierwszy.

Do składania jaj pierwsze pary przystępowały między 31 III a 6 IV w 1986 roku i między 25-30 III w 1987 roku. Średni termin rozpoczynania zniesień wypadł 16 IV 1986 i 10 IV 1987 ((tab. 2). Różnica między średnim terminem rozpoczynania zniesień w dwóch grupach gniazd: nowych i "starych", nie była istotna statystycznie choć w drugiej grupie przypadł on na dwa dni wcześniej. Stwierdzono korelację pomiędzy średnią temperaturą dnia a liczbą par przystępujących do budowy gniazd (ryc. 4). Wymiary jaj zielonogórskiej sroki: długość 33,33±2,43mm SD = 0,222; szerokość 22,90±0,68mm SD = 0,062 (ryc. 5).

Jaja zostały zniesione w 77% gniazd w 1986 roku oraz w 74% gniazd w 1987 roku. Dla obydwu lat badań w Zielonej Górze z około 49 % zniesień (37% gniazd) pary wyprowadziły młode (tab. 7 i 8). Uwzględniając kategorię lęgów zakończonych prawdopodobnym sukcesem, odsetek ten jest wyższy i wynosi odpowiednio 59,0% zniesień i 44,4% wszystkich zbudowanych i remontowanych gniazd. Średnia liczba młodych przypadająca na parę z sukcesem lęgowym wyniosła 2,1 młodego; na parę ze zniesieniem 1,0 młodego, a na zbudowane gniazdo 0,8 młodego.

Jako przyczynę strat w lęgach zielonogórskiej populacji sroki stwierdzono niszczenie gniazd przez człowieka oraz drapieżnictwo wrony siwej, sroki, wiewiórki i kuny (tab. 12). Część srok porzuciła zbudowane gniazda przed przystąpieniem do zniesień. Mniejszy odsetek lęgów kończył się pełnym sukcesem w gniazdach umieszczonych niżej ($r = 0{,}781$ $p<0{,}05$). W gniazdach tych pary wyprowadzały jednak większą liczbę młodych na parę z sukcesem lęgowym niż w umieszczonych wyżej (ryc. 6).

Z badań własnych i literatury wynika, że populacje miejskie mają wyższy sukces lęgowy w porównaniu do populacji z terenów pozamiejskich (tab. 10 i 11). Jest to jeden z czynników przyczyniających się do szybkiego wzrostu liczebności sroki w miastach.

Redaktor pracy: prof. Maciej Luniak

1998 International Ornithological Congress XXII

(16-22 Aug. 1998, Durban, Rep. of South Africa)

[XXII Międzynarodowy Kongres Ornitologiczny]

The XXII International Ornithological Congress will be held in Durban, South Africa, from 16-22 August 1998. The following Officers were elected: Honorary President, Tso-Hsin Cheng; President, Professor Peter Berthold; Vice President, Dr. Janet Kear; Secretary, Professor Walter J. Bock. Dr. Aldo Berruti, Department of Ornithology, Durban Natural Science Museum, Durban, South Africa, was appointed the Secretary General for this congress. The Scientific Program Committee for the XXII International Congress has been appointed under the Chairmanship of Dr. Lukas Jenni, Swiss Ornithological Institute, CH - 6204 Sempach, Switzerland (Fax number +41-41-99-40-07; from 4 Nov. 1995 +41-41-462-97-10) and includes the following members: C. J. Bibby, U.K.; C. J. Brown, Namibia; A. Chandola-Saklani, India; T. M. Crowe, South Africa; D. G. Homberger, USA; A. P. MŔller, Denmark; A. J. van Noordwijk, the Netherlands; Y. Ntiamoa-Baidu, Ghana; V. A. Payevsky, Russia; F. Spina, Italy; L. G. Underhill, South Africa; J. C. Wingfield, USA, in addition to the President, the Secretary General and the Secretary. The Scientific Program Committee will meet in Durban in early October 1995 to plan the scientific program for the XXII Congress including plenary speakers, symposia and their conveners. If you have any ideas and suggestions for the program, please send them to Lukas Jenni as soon as possible. If you would like to propose a symposium, please provide the following information to Lukas Jenni as soon as possible, but no later than 31 August 1995: title of the symposium, two conveners (you can propose yourself), a short statement (less than one page) outlining the overall subject to be covered by the symposium, a list of possible speakers with titles or topics for each talk (5 talks per symposium). Symposia are intended for the general ornithologist rather than the specialist. Therefore speakers should give review papers on recent developments in the field integrating ideas and findings, rather than talks on a single specialised study. Conveners should try to obtain an international representation of speakers and a broad coverage of the subject of international relevance. Proposals for symposia for the last congresses greatly outnumbered the number of slots available in the timetable. If a person agrees to convenae a symposium or to give a talk at a symposium, he/she is committed to attend the Congress. A person can contribute as first author to only symposium talk. Round Table Discussions are for discussion between specialists and are not to be used for a formal series of presented talks. Applications for Round Table Discussions will be requested later in the general congress brochure. Questions about the scientific program may be directed to the officers mentioned above or to any member of the Scientific Program Committee.