

## Bird community in a natural beech wood of the lower mountain forest zone of Mt Babia Góra

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**Abstract.** Forty-one bird species were found in the lower mountain forest zone on the northern slope of Babia Góra in the spring-summer seasons of 1987-1989. In these successive years 16, 22 and 19 species (25 species at all) were breeding in a 12-hectare sample plot set up in a beech wood belonging to the *Fagetum carpaticum* association and the density reached in these years was respectively 54.6, 75.8 and 67.5 pairs/10 ha. *Fringilla coelebs*, *Erithacus rubecula* and *Sylvia atricapilla* were dominant species in all those years and, besides, *Certhia familiaris* and *Phylloscopus collybita* in 1987 and *Prunella modularis* and *Parus ater* in 1988.

**Key words:** birds, density, beech wood, mountains, Carpathians.

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### I. INTRODUCTION

During the last tens of years the Polish avian fauna has been undergoing continuous changes (TOMIAŁOJC 1990). Hence arises the necessity to undertake detailed faunistic and quantitative investigations. So far quantitative studies of birds of mountain biotopes in Poland have been carried out in the Karkonosze Mts (DYRCZ 1974), Gorce (KOZŁOWSKI 1974; GŁOWACIŃSKI 1990), Bieszczady (CICHON & ZAJĄC 1991), on Mt Polica (ŚLIZOWSKI 1991) and in the Tatras (GŁOWACIŃSKI & PROFUS in press).

Babia Góra is a mountain massif next to the Tatra Mts in altitude in the Polish part of the Carpathians. Natural plant communities are well preserved here. Most of them go to the making of the vegetation of the Babia Góra National Park, which has been entered on the world list of biosphere reserves.

The most complete studies of the bird fauna of Polish and Slovakian parts of Mt Babia Góra were published by now by BOCHEŃSKI (1970) and STOLLMANN and KOCIAN (1965). They do not contain, however, comparable quantitative data. The other papers are more fragmentary or even popular (FERENS 1950, 1963; RIABININ 1962; WOŁK 1978; KARASKA 1989).

The purpose of the present study was the qualitative and quantitative determination of the bird community occurring in the lower mountain forest zone of Mt. Babia Góra. A comparison of the present results with those obtained twenty years ago (BOCHEŃSKI 1970) provides information about the trends of changes in the bird fauna. Furthermore, the results obtained in an area protected by National Park can constitute a reference state for establishing normal forest management.

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## II. STUDY AREA

The Babia Góra massif (1725 m a.s.l.) extends along a line of latitude and is a culmination of the High Beskids, a range in the Western Carpathians. It neighbours upon the Pilsko range (1557 m) on the west and the Polica massif (1369 m) on the east.

The climate of Mt Babia Góra is under the strong influence of winds. It is characterized by a considerable amount of rain (the mean annual rainfall is 1259 mm) and by the length of the vegetation season, varying from 6 months at the mountain base to 3 months at the top. The protracted subsistence of the snow cover and recurrences of cold spells have a great effect on the distribution of birds. The highest loss in broods is caused by snowfall at the end of May and the beginning of June.

CELIŃSKI and WOJTERSKI (1978) separate the following main plant communities in the lower mountain forest zone of Mt Babia Góra:

Carpathian beech wood (*Fagetum carpaticum*) the most characteristic of the associations. It retains its primeval nature in the Czatożańska Forest (60 ha), near the Mokry Stawek lake (20 ha) and by the ski trail to Fitaków Groń (20 ha), where our sample plot for a quantitative study was situated. The remaining patches of beech woods are composed of poorly differentiated, usually one-species beech stands.

Lower mountain mixed forest (*Abieti-Piceetum montanum*), more abundant at the upper boundary of the lower mountain forest zone. It consists mostly of coniferous species: fir and spruce.

Non-forest communities: mountain meadows (*Gladiolo-Agrostetum*), spring marshes (*Chaerophyllotum hirsuiti*) and tall herbs (*Petasitetum albi*).

The twelve-hectare area (270 x 450 m) of quantitative studies was situated in Section 14 at a height 950 - 1050 m (Fig. 1) on the northern slope. It was grown over by a stand belonging to *Fagetum carpaticum*, formed by a very open fir, spruce and beech timber forest (120-250 years), which was whole included in the proper nature reserve. The

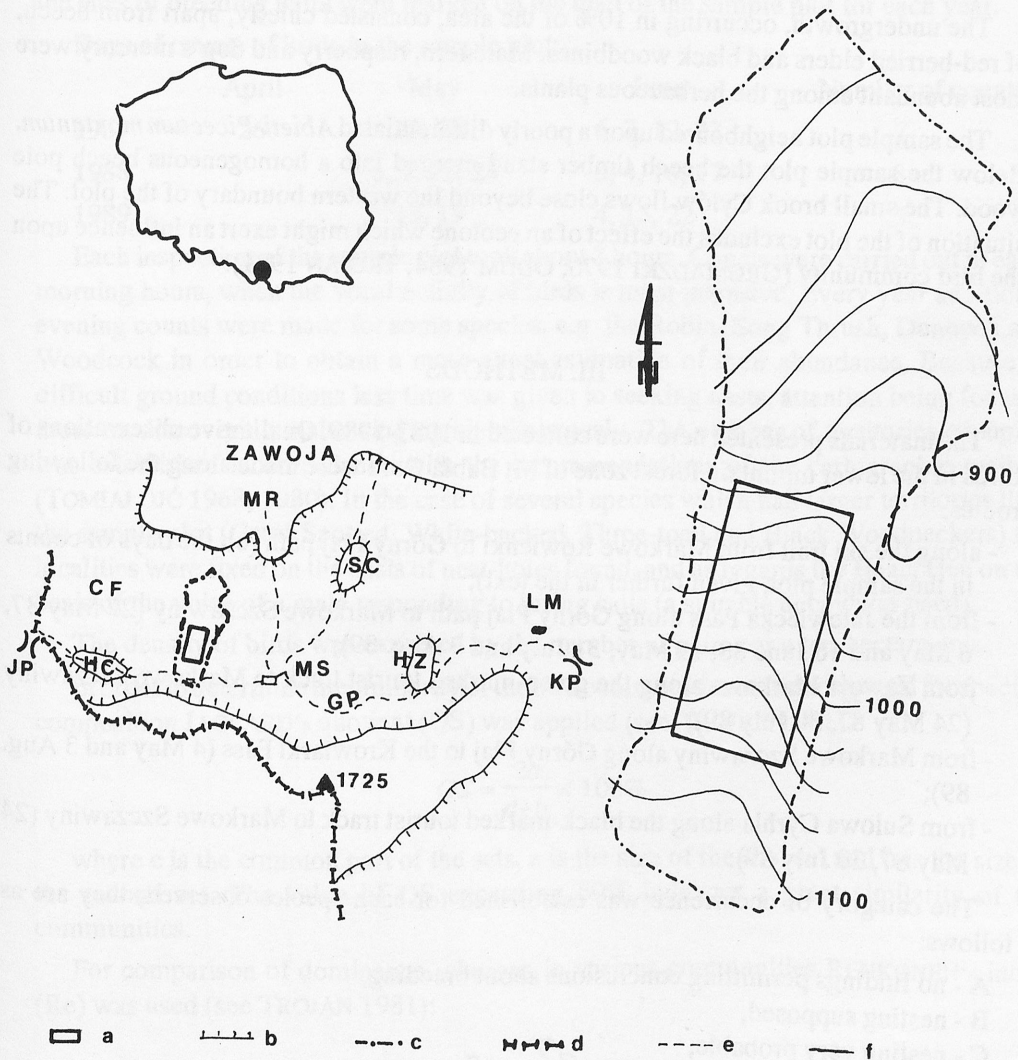


Fig. 1. Sketch map of study area. a - sample plot, b - boundaries of forests, c - boundaries of forest Division 14, d - state boundary, e - tourist tracks, f - contour lines. Abbreviations: CF - Czałozńska Forest, GP - Górny Płaj path (track), HC - Hala Czarna meadow, HZ - Hala Żarnówka meadow, JP - Jałowiecka Pass, KP - Krowiarki Pass, LM - lake Mokry Stawek, MR - Markowe Rówienki, MS - Markowe Szczawiny, SC - Sulowa Cyrhla glade.

average height of trees was 35 m. There were 9 monumental firs there, more than 1 m in breast height diameter and above 40 m in height. Noticeable were numerous withering deciduous trees and a large amount of deadwood, most of which lay on the steep slope, making up backwoods hard to penetrate. Recently, the withering of the oldest trees has increased considerably.

The undergrowth, occurring in 10% of the area, consisted chiefly, apart from beech, of red-berried elders and black woodbines. Male fern, raspberry and dog's mercury were most abundant among the herbaceous plants.

The sample plot neighboured upon a poorly differentiated *Abieti-Piceetum montanum*. Below the sample plot the beech timber stand merged into a homogeneous beech pole wood. The small brook Cylów flows close beyond the western boundary of the plot. The situation of the plot excludes the effect of an ecotone which might exert an influence upon the bird community (GROMADZKI 1970; ODUM 1984; TROJAN 1981).

### III. METHODS

The materials presented here were collected in 1987-1989. Qualitative observations of birds in the lower mountain forest zone of Mt Babia Góra were made along the following routes:

- along the ski trail from Markowe Rówienki to Górny Płaj path (on the days of counts in the sample plot, given further in the text);
- from the Jałowiecka Pass along Górny Płaj path to Markowe Szczawiny (22 May 87, 6 May and 16 June 88, 19 May, 31 July and 3 Aug. 89);
- from Zawoja Markowa along the green-marked tourist track to Markowe Szczawiny (24 May 87, 30 July 89);
- from Markowe Szczawiny along Górny Płaj to the Krowiarki Pass (4 May and 3 Aug. 89);
- from Sulowa Cyrhla along the black-marked tourist track to Markowe Szczawiny (24 May 87, 30 July 89).

The category of occurrence was established for each species observed; they are as follows:

- A - no findings permitting conclusions about breeding,
- B - nesting supposed,
- C - nesting very probable,
- D - nesting observed.

The occurrence of birds was besides characterized on the basis of the frequency of meetings in the breeding season. Species met with, at the most, several times were regarded as rare (r), those seen every year but less times than half numbers of observation rounds as fairly frequent (ff) and in the remaining cases the species were considered to be frequent (f).



The cartographic method was used in quantitative studies (TOMIAŁOJC 1968, 1980). For this purpose a twelve-hectare sample plot was marked out. It was divided into quadrats (30x30 m) and the coordinate lines were marked with letters and figures painted on trees. The sites of singing males, nests observed and other traces of the nesting of birds were plotted on a sketch map of the sample plot. On the basis of all the observations thus plotted the sites of breeding pairs were marked on the map of the sample plot for each year.

Days of counts of birds in the sample plot:

	April	May	June	Number of counts
1987	26	22, 23	6, 7, 12, 23	7
1988		6, 7, 12, 24	3, 4, 16, 17	8
1989		13, 19	4, 15, 22	5

Each inspection of the sample plot took about 3 hours. Counts were carried out in early morning hours, when the vocal activity of birds is most intensive. Every year additional evening counts were made for some species, e.g. the Robin, Song Thrush, Dunnock and Woodcock in order to obtain a more exact estimation of their abundance. Because of difficult ground conditions less time was given to seeking nests, attention being focused more on discovering males singing simultaneously. The number of territories occupied was established in accordance with the recommendations of the cartographic method (TOMIAŁOJC 1968, 1980). In the case of several species which had larger territories than the sample plot (Great Spotted, White-backed, Three-toed and Black Woodpeckers) the localities were fixed on the basis of nest-holes found, and as regards the Hazel Hen on the basis of the voice of a male responding to luring calls (a suitable decoy was used).

The density of birds was expressed by the number of pairs per a ten-hectare area.

In order to determine the similarity of the bird communities being compared for specific composition JACCARD's quotient (QS) was applied (see TROJAN 1981):

$$QS = \frac{2c}{a+b} \times 100\%$$

where c is the common part of the sets, a is the size of the first set and b is the size of the second set. The value of QS exceeding 60% indicates a great similarity of the communities.

For comparison of dominance relations in various communities RENKONEN's index (Re) was used (see TROJAN 1981):

$$Re = \sum D_{\min.}$$

$D_{\min.}$  is the smallest value of the dominance of particular species in two communities under comparison. The value of Re above 50% indicates a great similarity of the communities (TOMIAŁOJC 1970).

Table I

Birds observed in the lower mountain forest zone on the northern slope of Mt Babia Góra in the breeding seasons of 1987-1989. The symbols of the category of occurrence and frequency are explained in text.

Species	Categories of	
	occurrence	frequency
<i>Accipiter gentilis</i> (LINNAEUS, 1758)	B	r
<i>Buteo buteo</i> (LINNAEUS, 1758)	B	r
<i>Bonasa bonasia</i> (LINNAEUS, 1758)	C	ff
<i>Tetrao urogallus</i> LINNAEUS, 1758	D	r
<i>Scolopax rusticola</i> LINNAEUS, 1758	B	ff
<i>Columba oenas</i> LINNAEUS, 1758	B	r
<i>Columba palumbus</i> LINNAEUS, 1758	B	r
<i>Cuculus canorus</i> LINNAEUS, 1758	B	ff
<i>Strix aluco</i> LINNAEUS, 1758	B	r
<i>Strix uralensis</i> PALLAS, 1771	D	r
<i>Aegolius funereus</i> (LINNAEUS, 1758)	D	r
<i>Dryocopus martius</i> (LINNAEUS, 1758)	D	ff
<i>Dendrocopos major</i> (LINNAEUS, 1758)	D	ff
<i>Dendrocopos leucotos</i> (BECHSTEIN, 1803)	C	r
<i>Picoides tridactylus</i> (LINNAEUS, 1758)	D	ff
<i>Motacilla cinerea</i> TUNSTALL, 1771	B	r
<i>Anthus trivialis</i> (LINNAEUS, 1758)	B	f
<i>Troglodytes troglodytes</i> (LINNAEUS, 1758)	D	f
<i>Prunella modularis</i> (LINNAEUS, 1758)	C	f
<i>Erithacus rubecula</i> (LINNAEUS, 1758)	D	f
<i>Phoenicurus phoenicurus</i> (LINNAEUS, 1758)	B	ff
<i>Turdus torquatus</i> LINNAEUS, 1758	D	ff
<i>Turdus merula</i> LINNAEUS, 1758	D	f
<i>Turdus philomelos</i> BREHM, 1831	B	f
<i>Turdus viscivorus</i> LINNAEUS, 1758	B	f
<i>Sylvia atricapilla</i> (LINNAEUS, 1758)	D	f
<i>Phylloscopus sibilatrix</i> (BECHSTEIN, 1793)	B	f
<i>Phylloscopus collybita</i> (VIEILLOT, 1817)	B	f
<i>Phylloscopus trochilus</i> (LINNAEUS, 1758)	B	f
<i>Regulus regulus</i> (LINNAEUS, 1758)	B	f
<i>Regulus ignicapillus</i> (TEMMINCK, 1820)	B	f
<i>Ficedula parva</i> (BECHSTEIN, 1794)	B	f
<i>Parus ater</i> LINNAEUS, 1758	D	f
<i>Parus major</i> LINNAEUS, 1758	B	r
<i>Sitta europaea</i> LINNAEUS, 1758	C	f
<i>Certhia familiaris</i> LINNAEUS, 1758	C	f
<i>Fringilla coelebs</i> LINNAEUS, 1758	D	f
<i>Carduelis spinus</i> (LINNAEUS, 1758)	B	ff
<i>Loxia curvirostra</i> LINNAEUS, 1758	B	ff
<i>Pyrrhula pyrrhula</i> (LINNAEUS, 1758)	C	f
<i>Garrulus glandarius</i> (LINNAEUS, 1758)	B	ff

## IV. RESULTS

A total of 41 bird species were found in the lower mountain forest zone on the northern slope of Babia Góra in three breeding seasons. They have been listed in Table I, which also gives the categories of their occurrence and the frequency of meetings.

Some of the species, demanding more comment, are discussed below.

*Tetrao urogallus*. In March 1988 a large number of fresh faeces were found under a fir near Czarna Hala (PARUZEL, oral comm.). They are traces of the probable existence of a displaying ground in this region. On 30 July 1989 a hen with three young birds capable of flying was encountered below Markowe Szczawiny.

*Strix uralensis*. Two pairs probably nested on the northern slope of Babia Góra: one in the Czatożańska Forest (an individual heard and seen in 1987) and the other in a beech wood near Hala Żarnówka (fledglings observed in 1987) (PARUZEL, oral comm.). This species has not been reported from Babia Góra before.

*Aegolius funereus*. On 28 July 1989 three individuals were heard in a beech pole wood below the sample plot. They were recognized as *Aegolius funereus* on the basis of their voices. SPIRIDONOV (oral comm.) heard this owl several times above Markowe Szczawiny (upper mountain forest zone). This is the first reliable record of this species on Mt Babia Góra.

*Columba oenas*. Tooting heard twice: on 14 and 24 May 1988 in the sample plot. On Babia Góra it was observed earlier in the Czatożańska Forest on 26 June 1961 (BOCHEŃSKI 1970).

*Dendrocopos leucotos*. Two pairs were observed in the sample plot in 1989. One of them was found in the place where a Great Spotted Woodpecker had been seen the year before. This species is new to Babia Góra.

*Picoides tridactylus*. It was observed in all the years of this study. On 12 May 1987 a nest was found in a very old and dry fir. The nest-hole was at a height of 30 m. In the same year two simultaneously drumming individuals were heard twice. In two following years the Three-toed Woodpecker was noted more rarely. In 1988 a pair occupied a territory at the edge of the sample plot. This species was frequently seen in spruce woods in the upper mountain forest zone up to the timber line (PARUZEL, oral comm.).

*Parus major*. A pair was observed in 1988 in the sample plot. This fact and SPIRIDONOV's (oral comm.) observations of many years indicate that this species is of rare occurrence in the mixed and coniferous forests of Babia Góra.

*Turdus torquatus*. This species was observed three times in the sample plot: on 22 May 1987 and on 12 and 24 May 1988. Each year several pairs occurred above the sample plot: around Czarna Hala, along Górny Płaj and near Markowe Szczawiny. Some fledglings were seen in Górny Płaj, close to the sample plot.

*Ficedula parva*. Observed irregularly. Several pairs were noted over a one-kilometre section below the sample plot.

Table II shows the results of counts in the sample plot. Thirty-five bird species were observed in consecutive three breeding seasons. Ten of them were visitors (in the table



Table II

Results of the counts of birds in the sample plot (12 ha) in a natural Carpathian beech wood on the northern slope of Mt Babia Góra in 1987-1989.

Species	1987			1988			1989			Mean of pairs/10 ha
	No of pairs	No of pairs/10 ha	%	No of pairs	No of pairs/10 ha	%	No of pairs	No of pairs/10 ha	%	
1	2	3	4	5	6	7	8	9	10	11
<i>Fringilla coelebs</i>	22	18.3	33.8	29	24.2	31.9	28.5	23.7	35.4	22.1
<i>Erithacus rubecula</i>	14	11.7	21.5	18	15.0	19.8	16	13.3	19.0	13.3
<i>Sylvia atricapilla</i>	4	3.3	6.2	5	4.2	5.5	5	4.2	6.3	3.9
<i>Prunella modularis</i>	2.5	2.2	3.6	6	5.0	6.6	3.5	2.9	4.3	3.3
<i>Certhia familiaris</i>	4	3.3	6.2	4	3.3	4.4	3	2.5	3.7	3.1
<i>Parus ater</i>	2.5	2.2	3.8	5	4.2	5.5	4	3.3	4.9	3.2
<i>Phylloscopus collybita</i>	3.5	2.9	5.4	3.5	2.9	3.8	3	2.5	3.7	2.8
<i>Sitta europea</i>	3	2.5	4.6	3.5	2.9	3.8	2	1.7	2.5	2.4
<i>Regulus regulus</i>	3	2.5	4.6	2	1.7	2.2	3	2.5	3.7	2.2
<i>Turdus philomelos</i>	1.5	1.3	2.3	1.5	1.3	1.6	1.5	1.3	1.9	1.3
<i>Turdus merula</i>	0.5	0.4	0.8	1.5	1.3	1.6	2	1.7	2.5	1.1
<i>Phylloscopus sibilatrix</i>	1	0.8	1.5	2	1.7	2.2	+			0.8
<i>Pyrrhula pyrrhula</i>	1	0.8	1.5	1	0.8	1.1	1	0.8	1.2	0.8
<i>Troglodytes troglodytes</i>	1	0.8	1.5	1	0.8	1.1	1.5	1.3	1.9	1.0
<i>Regulus ignicapillus</i>	—			1	0.8	1.1	2	1.7	2.5	0.8
<i>Dendrocopos major</i>	—			1.5	1.3	1.6	1	0.8	1.2	0.7
<i>Turdus viscivorus</i>	—			1	0.8	1.1	1	0.8	1.2	0.6
<i>Phoenicurus phoenicurus</i>	—			1	0.8	1.1	0.5	0.4	0.6	0.4
<i>Picoides tridactylus</i>	1	0.8	1.5	0.5	0.4	0.5	+			0.4
<i>Dendrocopos leucotos</i>	—			—			1.5	1.3	1.9	0.4
<i>Carduelis spinus</i>	1	0.8	1.5	+			—			0.3
<i>Phylloscopus trochilus</i>	+			1	0.8	1.1	+			0.3



Table II ctd

1	2	3	4	5	6	7	8	9	10	11
<i>Dryocopus martius</i>	+			1	0.8	1.1	+			0.3
<i>Bonasa bonasia</i>	+			1	0.8	1.1	-			0.3
<i>Parus major</i>	-			+			1	0.8	1.2	0.3
<i>Scolopax rusticola</i>	+			+			+			
<i>Turdus torquatus</i>	+			+			+			
<i>Anthus trivialis</i>	+			+			+			
<i>Ficedula parva</i>	+			+			-			
<i>Columba oenas</i>	-			+			-			
<i>Garrulus glandarius</i>	+			-			+			
<i>Loxia curvirostra</i>	-			+			+			
<i>Strix aluco</i>	+			-			-			
<i>Motacilla cinerea</i>	-			-			+			
<i>Cuculus canorus</i>	-			-			+			
Total	65.5	54.6		91.0	75.8		81.0	67.5		66.1

marked with the symbol "+"). The number of breeding species varied from 16 in 1987 to 22 in 1988. There were 25 breeding species altogether.

The density of birds in the sample plot underwent fluctuations in successive years; there were 54.6 pairs/10 ha in 1987, 76.0 in 1988 and 67.5 in 1989. And so in this last year the density approximated to its mean value, which is 66.0 pairs/10 ha. There was a great, forty-percent, difference between 1988 and 1987. It was chiefly due to the density of dominants, which was smaller by 14 pairs/10 ha in 1987 and to the absence of the Firecrest, the Redstart, the Great Tit and the Great Spotted Woodpecker in that year. The density of the Tree Creeper, the Goldcrest, the Chiffchaff, the Song Thrush and the Bullfinch underwent only small changes.

The Chaffinch and the Robin were distinctly dominant each year (on the average 34 and 20.4% respectively). The Blackcap was several times less numerous (5.9%). Further species - the Dunnock, the Tree Creeper, the Coal Tit and the Chiffchaff - fulfilled the criterion of dominance only in some of the years. The accessory species formed 26% of the specific composition of the community; their particular contributions to the total of birds were smaller than 1% (TROJAN 1981).

Table III presents the proportion and density of birds in the community, relative to their nest sites. The most numerous represented group was that composed of scarcely 4

Table III

The density and percentage proportion of birds in the community in the sample plot relative to nest site.

Nest site	1987		1988		1989		Mean	
	No of pairs/10 ha	%	No of pairs/10 ha	%	No of pairs/10 ha	%	No of pairs/10 ha	%
On ground	15.4	28.2	21.2	28.0	15.8	23.4	17.5	26.5
Low above ground: in herb or shrub layer	8.8	16.1	14.2	18.7	13.0	19.3	12.0	18.2
On tree branches	21.6	39.6	26.7	35.3	27.9	41.3	25.5	38.6
In tree-holes	8.8	16.1	13.7	18.0	10.8	16.0	11.1	16.8

species building nests on tree branches. It numbered 41.3 pairs/10 ha. The tree-hole inhabitants with their 11.1 pairs/10 ha, were the least numerous, but they belonged to as many as 9 species.

## V. DISCUSSION

In the course of the present study several rare species hitherto unreported from this region were observed to occur on Babia Góra. In some cases we are concerned here with a westward expansion of the Carpathian populations.

The westernmost Carpathian localities of the Ural Owl, known hitherto, were in the Gorce Mts (TOMIAŁOJC 1990). Likewise, in so far as the White-backed Woodpecker is concerned, breeding pairs were fairly often observed only in the Gorce and Tatra Mts (TOMIAŁOJC 1990). This woodpecker does not seem to be a rare species on Babia Góra, which is also confirmed by the latest observations of PARUZEL (oral comm.). Now the Tengmalm's Owl, which has never been reported from Babia Góra before (BOCHEŃSKI 1970), occurs there regularly.

Out of the species recorded in the period 1960-1969 (BOCHEŃSKI 1970), the occurrence of the Hooded Crow, Crested Tit, Garden Warbler and Grey-headed Woodpecker in the lower mountain forest zone has not been confirmed at present. However, these species have been found present in the area of Zawoja Markowa, with the exception of the Pied Flycatcher, which has not been observed at all.

The small number of diurnal birds of prey observed is noteworthy (a Buzzard was seen once and a Goshawk was heard once). The northern slopes of Babia Góra are definitively less attractive for this group of birds than are the southern slopes, where, in addition to the above mentioned birds, the Sparrow Hawk, Honey Buzzard and Lesser Spotted Eagle are breeding species (KARASKA 1989; KARASKA oral comm.).

The mean density of birds in the lower mountain forest zone of Babia Góra, coming to 66,1 pairs/10 ha, is high as for mountain conditions. The densities of birds in various beech woods are compared in Table IV. the numbers of breeding species are in general

Table IV

A comparison of the results of quantitative studies made in the sample plot on the northern slope of Babia Góra Mt. and in sample areas in other beech woods of Central Europe.

Location	Source of information	Characteristics of sample plot	No of seasons	No of breeding species	No of pairs/10 ha
Western Carpathians, Beskid Wysoki, northern slope of Babia Góra	Present study	12 ha, 960-1050 m a.s.l., lower mountain natural fir-beech wood, ca 200 yrs	3	25	66.1*
Western Carpathians, Gorce Mts., Kamienica Valley	GŁOWACIŃSKI (1990)	18 ha, 810-950 m a.s.l., lower mountain beech wood, ca 200 yrs	1	28	75
Western Carpathians, Gorce Mts., Turbacz Reserve	KOZŁOWSKI (1974)	20 ha, 830-1060 m a.s.l., lower mountain fir-beech wood	2	15	34*
Eastern Carpathians, Bieszczady Mts., slopes of Bukowe Berdo Mt.	CICHOŃ, ZAJĄC (1991)	29-40 ha**, 750-1100 m a.s.l., lower mountain beech wood	2	29	41.2*
Sudetes, Karkonosze Mts., slopes of Chojnik Hill	DYRCZ (1974)	8 ha, 470-560 m a.s.l., beech wood, 90-180 yrs	1	22	67.1
Kraków-Wieluń Jurassic Ridge, Ojców N. P., slope of Sąpowska Valley	TOMEK (1979)	3.8 ha, ca 450 m a.s.l., mixed wood with dominance of beech	2	25	73.8*
Česky Ráj, Izera Valley	PELC (1989)	7.6 ha, 2809-375 m a.s.l., natural beech wood, ca 110 yrs	1	20	44.7
Wielkopolska, Buki Reserve on Lake Turowskie	BEDNORZ, BOGUCKI (1964)	32 ha, lowland beech wood, ca 300 yrs	1	27	61.4

\*mean density is used

\*\*density calculated on the basis of counts in transects







The presence of other dominants - the Blackcap and the Dunnock - is related to the well-developed shrub layer. The occurrence of the Coal Tit and Goldcrest and also, though in smaller numbers, of the Bullfinch, Firecrest and Three-toed Woodpecker is connected with the presence of coniferous trees.

The species considered to be in general characteristic of beech woods, i.e. the Wood Warbler and the Red-breasted Flycatcher, were here few in number. The Wood Warbler was distinctly more numerous in the upper parts of the mountain forest zone. The absence of the breeding Red-breasted Flycatcher is hard to explain. This species was frequently come upon in the beech pole wood situated below the sample plot. Its occurrence is perhaps limited by altitude above sea level.

A large number of accessory species (below 1% of the community each) were birds with more extensive breeding territories: the Black, Great Spotted, White-backed and Three-toed Woodpeckers and the Hazel Hen.

The least numerous species breeding in the sample plot were those inhabiting tree-holes (Table III). Such tree-hole nesters abundant in the lowlands as the Starling and the Blue Tit did not occur here either (BEDNORZ & BOGUICKI 1964; PELC 1989). The Great Tits were not numerous. Most of the tree-hole inhabitants occurring on Babia Góra belonged to species whose breeding territories exceeded the sample plot in area. And so this is not the abundance of the species of this group but the large number of the species themselves (more than 30% of the total in the community) that constitutes the character indicating the climax nature of this environment (TOMIAŁOJC et al. 1984).

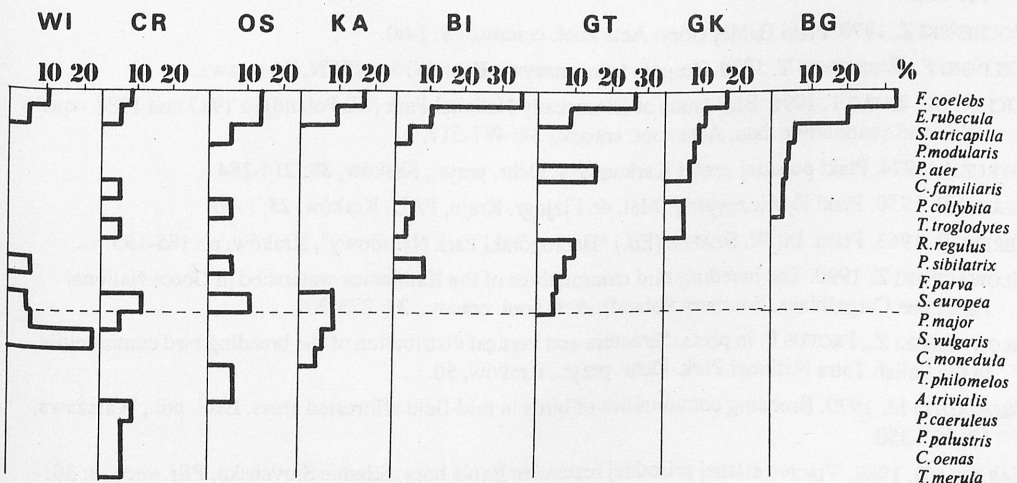


Fig. 2. Dominant species in bird communities from various beech woods: WI - Wielkopolska, CR - Český Raj, OS - Ojców: Saspowska V., KA - Karkonosze, BI - Bieszczady, GT - Gorce: Turbacz Res., GK - Gorce: Kamienica V., BG - Babia Góra. The dominants typical for lowland woods are delimited by a broken line.

The indices QS and Re (Table V) were calculated for the sample plots in beech woods on Babia Góra and in other ones used in comparison and listed in Table IV. They indicate that the bird community from the area of the present study most resembles the community found in the sample plot in the Gorce Mts (GŁOWACIŃSKI 1990) and next that described from the Bieszczady Mts (CICHON & ZAJĄC 1991). The greatest differences occur between the birds of the Babia Góra beech woods and those of the lowlands in Wielkopolska (BEDNORZ & BOGUCKI 1964).

Similarities and differences between bird communities are to a large extent dependent upon the composition of dominant species. Fig. 2 shows this group of species from the beech woods under comparison. The similarity of the Carpathian beech woods in respect of dominants is clearly visible. The group of dominants in the lower-lying woods (delimited by a broken line) is also conspicuous.

A fairly numerous non-breeding males were met with during observations made in transects and also in the sample plot; they were intensively singing throughout the season but showed no other signs of breeding activities. This is mainly true of Chaffinches, Willow Warblers, Chiffchaffs and Red-breasted Flycatchers. I failed to find how many males did not start breeding. The number of non-breeding males is probably closely related to altitude above sea level, just as it is at the border of the range of a species. The elucidation of this phenomenon calls for special detailed studies.

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