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BACULAR VARIABILITY IN THE EUROPEAN PINE MARTEN, *MARTES MARTES* FROM WESTERN CARPATHIANS

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Abstract. The aim of this study was to investigate the data on quantitative characteristics of the size of the baculum and describe baculum variability in European pine marten (*Martes martes*). This study presents the morphological variation in six traits of the baculum based on an analysis of 48 bacula of adult males from the western Carpathians. According to the descriptive statistics, bacula are variable in size. PCA analysis revealed a positive correlation between several traits. European pine marten exhibit a male-biased sexual-size dimorphism (SSD) and the results presented in this study confirmed that the baculum should exhibit isometry or negative allometry. These results are inconsistent with the prediction that the baculum is under stabilizing selection for an optimal baculum size.

Key words: Šariš Museum Bardejov, museum collections, *os penis*, Slovakia

INTRODUCTION

The heterotopic bone in the male penis called a baculum is not uniformly present across the family Mustelidae (Baryshnikov and Abramov 1997, 1998; Abramov and Baryshnikov 2000; Baryshnikov et al. 2003). Therefore, bacular morphology is suggested to be subject to sexual selection (Brindle and Opie 2016) and several analyses conducted to date supported this hypothesis (Ferguson and Lariviére 2004; Ramm 2007; Hosken et al. 2001; Krawczyk et al. 2011; Simmons & Firman 2013; Stockley et al. 2013). According to Ferguson and Lariviére (2004), baculum size can be used as an indicator of genetic quality in males. The males in better condition have bigger bacula which confirms that this bone is potentially a good indicator of viability and quality in males (Krawczyk et al. 2011; Čanády and Onderková 2016a, b). Sexually selected traits often show positive allometry and exhibit high phenotypic variation as a result of directional sexual selection (Lüpold et al. 2004). Nevertheless, when pre-copulatory selection supersedes post-copulatory

selection (such as those species with a male-biased sexual size dimorphism) the baculum should exhibit isometry or negative allometry, together with shallower allometric slopes (Kinahan et al. 2008; Čanády and Onderková 2016a, b).

Morphological variability of the baculum in the European pine martens, *Martes martes* was studied on a sample from the Western Carpathians (Slovakia). The present study contributes to the knowledge of quantitative characteristics of the size of the baculum and describes its variability. The main aim of this study was to analyse relationships between baculum characteristics. It was also investigated if the size of baculum was correlated with head-and-body length. We also predict isometry or negative allometry, because male-biased sexual-size dimorphism occurs in European pine martens.

MATERIAL AND METHODS

The penis bones used in this study were taken from the collection of the Department of Natural History of Šariš Museum Bardejov (SMB, Slovakia). The European pine martens were collected and identified by the main collector of the museum Tibor Weisz (Hromada et al. 2015) near the town of Bardejov (north-eastern Slovakia, 49°17´N, 21°17´E, western Carpathians) during the autumn and winter seasons (from November to March) in the years 1960–1980. Information about the locality, date and age was obtained from the catalogue and protocol cards attached to the specimens in the collections of the museum. Moreover, the registration cards include basic somatic measurements, i.e. head-and-body length (HBL) that was evaluated as well. All smaller penis bones (from younger individuals; damaged during preparation or storage) were excluded and only the data obtained from adult males were used for the evaluation (n = 48). The adulthood was determined according to baculum weight and the presence of a baculum protuberance (van Soest and van Bree 1970; Grue and King 1984; Elsasser and Parker 2008; Whitman 2007; Vercillo and Ragni 2011).

Baculum measurements included six variables. The length of penile bones was taken with a digital calliper with an accuracy of 0.01 mm, and their weight was taken with digital scales to the nearest 0.01 g. All baculum were measured and evaluated by (Čanády 2013; Čanády and Onderková 2016a, b): WeBa – baculum weight, LeBa – baculum length, DvThp – dorsoventral thickness proximal, DvThd – dorsoventral thickness distal, LtLtThp – laterolateral thickness proximal and LtLtThd – laterolateral thickness distal, Figures 1(a) and 1(b). In accordance to several authors (Miller et al. 1999, 2000; Oosthuizen and Miller 2000; Yurkowski et al. 2011), bacular density (BD) was computed as WeBa/LeBa (g/cm). Similarly, the bacular index (BI) as HBL/LeBa (%) which appeared to discriminate between two species in the genus *Martes* (*M. martes* and *M. foina*) was evaluated as recommended by Vercillo and Ragni (2011).

The obtained dataset (untransformed data) was evaluated using the following statistical parameters: minimum and maximum (min–max), mean (M), standard deviation (SD), and coefficient of variation (CV). The normal distribution was tested by the D'Agostino-Pearson omnibus test and the Shapiro-Wilk normality test. Principal component analysis (PCA) was performed for the dataset of measurements to discover structures in the data. Before analysis, measurements were $\log_{10}$ transformed to reduce intra-sample variation and to improve normality. Then we re-checked the normality and confirmed that the measurements had a normal distribution.

Allometry describes the relationship of components of an organism with change in overall body size and has become the focus of numerous studies on the evolution of genitalia (Yurkowski et al. 2011; Schulte-Hostedde et al. 2011). We investigated allometric (log-log) relationships in two steps. First, we used ordinary least squares regression (OLS) to determine whether slopes differed from zero. If slopes were significant, we then used reduced major axis regression (RMA) to test for deviations from isometry.

All analyses were performed using MS Excel 2003 for Windows XP and the statistical analysis system GraphPad Prism, version 5.01 (GraphPad Software, Inc., San Diego, California, USA). Ordinary least square (OLS) regression and reduced axis major (RMA) regressions were evaluated using the program PAST version 3.14 (Hammer et al. 2001). The PCA was performed using the Statistical Software OriginPro 8.6. (Microcal Software Inc., Northamptom, USA).

RESULTS

The descriptive statistics of the studied variables are presented in Table 1. Overall, the values of the CV for several baculum traits were higher than 10%, indicating a generally large variability, which is also indicated by the PCA factors. The results confirmed that the most variable parts of the baculum (with the exception of baculum weight, which was one of the most variable characters) were laterolateral thickness proximal and distal as well dorsoventral thickness proximal. The least variable were the length of baculum, less than 10%. In contrast, the value of the CV for head-and-body length was the least variable trait.

The analysis in this study confirmed a correlation between several variables (Table 2), but mainly among the baculum weight and length of the baculum ($n = 47$, $r = 0.87$, $p<0.001$), baculum weight and dorsoventral thickness proximal ($n = 47$, $r = 0.85$, $p<0.001$), laterolateral thickness proximal and dorsoventral thickness proximal ($n = 47$, $r = 0.83$, $p<0.001$) and baculum weight and laterolateral thickness proximal ($n = 47$, $r = 0.82$, $p<0.001$).

The length of baculum was the variable best correlated with dorsoventral thickness proximal ($n = 47$, $r = 0.77$, $p<0.001$) and with laterolateral thickness proximal) ($n = 47$, $r = 0.73$, $p<0.001$). Head-and-body length of individuals showed highly

negative correlation with laterolateral thickness distal (Table 2). Moreover, all of them were still strongly significant ($p<0.001$) after Bonferroni correction for multiple comparisons.

Bacular density in adult European pine marten was in the range of 0.03–0.05g/cm. Similarly, the results of bacular index (expressing a percentage of bacula length and body length) for adult males were in the range of 9.6–13.3% (Figure 2).

The results of the principle component analysis (PCA) are given in Table 3. The obtained results showed that the first two principal components (PC1–PC2) explain 79.2% of the variation. The first principal component (PC1) explained 63.7% of the total variance and was correlated mainly with baculum weight (r = 0.48), laterolateral thickness proximal (r = 0.48), length of baculum (r = 0.45) and dorsoventral thickness proximal (r = 0.46).

The second factor (PC2) accounted for only 15.5% and was correlated with laterolateral thickness distal (r = 0.75) and dorsoventral thickness distal (r = 0.50).

Finally, the third principal component (PC3) accounted for only 12.4% of the overall variation and was highly associated with the dorsoventral thickness distal (r = 0.81).

Summary results for our OLS and RMA analyses are shown (Table 4, Figure 3) and indicated and confirmed linear and relatively weak relationship between baculum length and head-and-body length. Results showed that the marten baculum exhibited isometry or negative allometry.

DISCUSSION

The baculum data about variability in the measured characters of the European pine marten obtained in this study were consistent with those given by (Vercillo and Ragni 2011). The length of the baculum ranged from 35.80-45.52 mm. For comparison, the length of the baculum of 32 individuals from Italy used in the above mentioned study ranged from 41.45-50.50 mm. By comparing our results with those reported by Vercillo and Ragni (2011), penile bones from the western Carpathians (Slovakia) had a slightly lower threshold of the interval, while samples from the Italian regions had significantly exceeded this interval. In contrast, the upper limit was higher for individuals from Italy. Individuals of *M. martes* from the western Carpathians showed shorter lengths of penis bones than individuals from Italy.

Malecha et al. (2009) reported the results of the baculum analysis of the polecat, *Mustela putorius*. They analyzed a total of three dimensions (maximum length, base width and distal tip size). The highest variability of the measured traits in polecats was shown in the width of the base (CV = 30.2%). Similarly, results stated in this study for the *M. martes*, as well for other species of Carnivores (Schwery et al. 2011; Čanády 2013; Čanády and Čomor 2013, 2015; Čanády and Onderková

2016a, b) showing that the baculum width together with the weight were more variable than the baculum length.

Results in this study confirm results of previous studies, and may be caused by various ages in the collected martens, i.e. the baculum stops its length growth, but continues in the bulk growth with age. According to Malecha et al. (2009), in some cases, it can even regenerate after an injury, which greatly affects its shape and dimensions. Due to this fact, it can be assumed that the width of the basal part of the baculum varies considerably in several species of the family Mustelidae. Consequently, studies evaluating baculum variability only in terms of the variability of its length may give inadequate results (Malecha et al. 2009; Schwery et al. 2011). Moreover, it can also explain a mechanical and functional role of the baculum and the ability of the female to detect individual differences in male genital morphology through the female reproductive tract (Tasikas et al. 2009; Schwery et al. 2011; Čanády and Onderková 2016a, b).

Whitman (2007) stated that baculum weight is one of the variables for distinguishing juveniles and adults, but only applies to juveniles under one year of age. The author of the samples taken in Alaska found that such individuals had a baculum weighing less than 0.1 grams. This procedure is more convenient and accurate than measuring body dimensions. Similarly, the higher bacular densities also confirmed for martens from the western Carpathians might be an adaptation to increase bending strength, which would decrease the risk of fracture (Miller et al. 1999, 2000; Schwery et al. 2011).

Vercillo and Ragni (2011) reported values of BI for adult *M. martes* from different areas of Italy in the range of 9.52 to 11.17%. Compared with these results, the values of BI for individuals from the western Carpathians (Slovakia) presented in this study were only slightly higher than the values of the aforementioned study. The analysis of the relationship between baculum length and head-and-body length in *M. martes* showed only a very low correlation rate, the baculum length is only 9.62-13.34% (11.42% on average) of the total head-and-body length. The relationship between these attributes was very weak and the correlation nonsignificant. Similar results have been recorded by Schulte-Hostedde et al. (2011) for *Martes americana* and *M. pennanti* with a mean baculum index of 8.5% and 15.9%, respectively.

The European pine marten exhibits a male-biased sexual-size dimorphism (SSD) (Lariviére and Jennings 2009). The results presented in this study confirmed that in species in which pre-copulatory selection supersedes post-copulatory selection, the baculum should exhibit isometry or negative allometry (Kinahan et al. 2008; Schulte-Hostedde et al. 2011). The allometric slope for baculum variables in *M. martes* indicated negative allometry and the results are consistent with the prediction that the baculum is under stabilizing selection for an optimal baculum size.

In conclusion, the present results are in line with the previous studies obtained by other authors (Abramov 2002; Baryshnikov et al. 2003; Malecha et al. 2009;

Vercillo and Ragni 2011; Krawczyk et al. 2011; Schwery et al. 2011; Čanády 2013; Čanády and Čomor 2013, 2015; Čanády and Onderková 2016a, b) and confirm the importance of the baculum for reproduction and a mating system.

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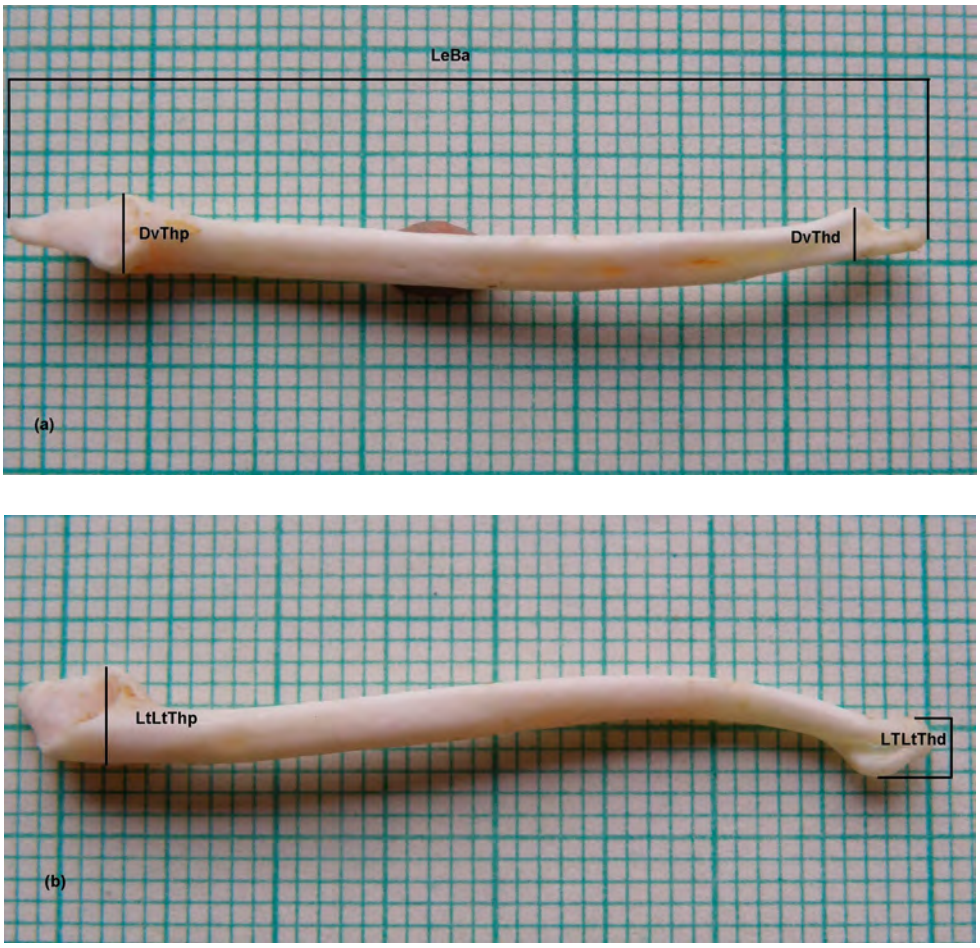

Figure 1 (a,b). *Measurements of the baculum of European pine marten, Martes martes (a: ventral and b: lateral view); one square is 1 mm. Abbreviations: LeBa – length of the baculum, DvThd – dorsoventral thickness distal, DvThp – dorsoventral thickness proximal, LtLtThd – laterolateral thickness distal, LtLtThp – laterolateral thickness proximal.*

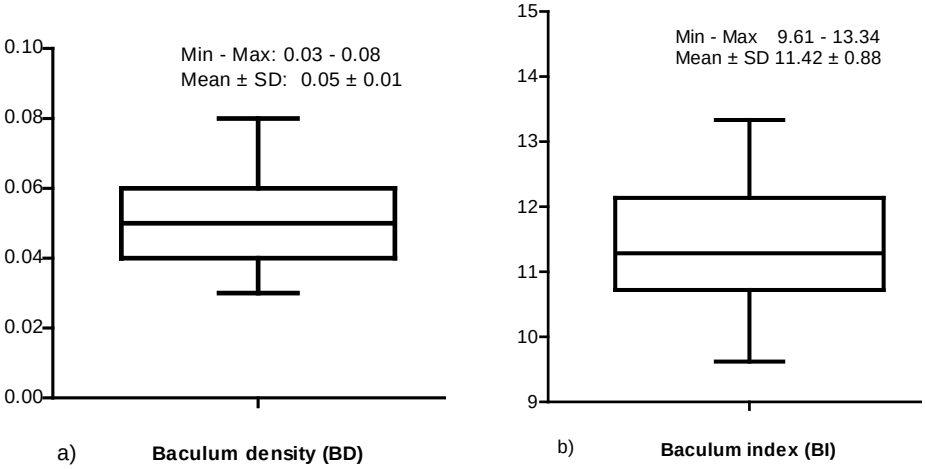

Figure 2 (a,b). *Box-plot graphs showing descriptive statistics of baculum density (BD) and baculum index (BI), the data are represented as mean ± SD.*

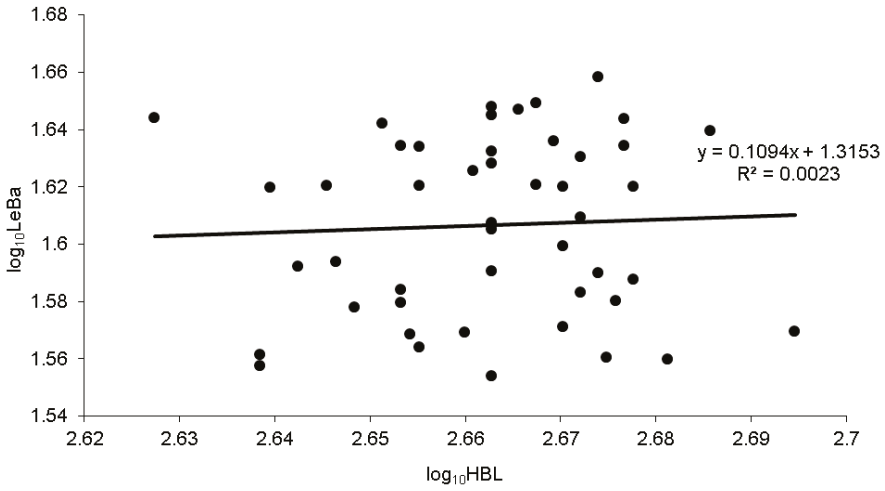

Figure 3. *OLS regression model of baculum length (LeBa) compared with head-and-body length (HBL) with regression line for European pine marten, Martes martes from western Carpathians. Both variables are log_{10} transformed.*

Table 1. *Descriptive statistics of head-and-body length and six baculum measures of European pine marten, Martes martes from western Carpathians. Legend: number (N); interval of margins (min–max); mean (M); standard deviation (SD); coefficient of variance (CV).*

Measured traits	N	min–max	M±SD	CV
HBL – head-and-body length (mm)	48	424.0–495.0	460.1±14.3	3.1
LeBa – baculum length (mm)	48	35.80–45.52	40.54±2.85	7.0
DvThp – dorsoventral thickness proximal (mm)	48	1.59–4.26	2.83±0.67	23.8
LtLtThp – laterolateral thickness proximal (mm)	48	1.27–3.36	2.22±0.56	25.2
DvThd – dorsoventral thickness distal (mm)	48	2.14–4.61	3.49±0.48	13.8
LtLtThd – laterolateral thickness distal (mm)	48	1.10–3.08	2.04±0.45	21.9
WeBa – baculum weight (g)	48	0.11–0.34	0.22±0.07	32.0

Table 2. *Correlation matrix between the head-and-body length (HBL) and six baculum measures of European pine marten, Martes martes from western Carpathians. Significant correlations are shown with the significant levels: *p<0.05, **p<0.01, ***p<0.001. All abbreviations of baculum measures are given in Material and Method.*

	HBL	WeBa	LeBa	DvThp	LtLtThp	DvThd
WeBa	0.00					
LeBa	0.05	0.87***				
DvThp	-0.01	0.85***	0.77***			
LtLtThp	-0.15	0.82***	0.73***	0.83***		
DvThd	-0.07	0.34*	0.34*	0.33*	0.47***	
LTLtThd	-0.40**	0.35*	0.28	0.21	0.46**	0.26

Table 3. *Values of Principal Component Analysis (PCA) for the three main components (PC1–PC3) in adult males of European pine marten, Martes martes: their eigenvalues, percentage (variability %) and cumulative percentage (cumulative %) expressions.*

Variables	PC1	PC2	PC3
LeBa – baculum length	0.45	-0.24	-0.04
DvThp – dorsoventral thickness proximal	0.46	-0.30	0.02
LtLtThp – laterolateral thickness proximal	0.48	0.04	-0.03
DvThd – dorsoventral thickness distal	0.27	0.50	0.81
LtLtThd – laterolateral thickness distal	0.24	0.75	-0.57
WeBa – baculum weight	0.48	-0.19	-0.11
Eigenvalue	3.82	0.94	0.74
Variance (%)	63.7	15.5	12.4
Cumulative (%)	63.7	79.2	91.6

Table 4. *Results of the linear ordinary least squares (OLS) and reduced major axis (RMA) regresions slopes, intercepts and 95% confidence intervals (CI), F_{df} and p-values for relationships between traits are shown. Legend: number (N); coefficient of determination (R^2), head-and-body length (HBL), baculum length (LeBa), dorsoventral thickness proximal (DvThp), dorsoventral thickness distal (DvThd), laterolateral thickness proximal (LtLtThp), laterolateral thickness distal (LtLtThd). Significant values are shown with the significant levels: statistically significant * p<0.05, ** p<0.01, *** p<0.001. * p<0.05, ** p<0.01, *** p<0.001.*

Log Y versus log X variable	N	R^2	OLS slope (95% CI)	Intercept (95% CI)	$F_{1, 45}$	p-values	RMA slope (95% CI)	Intercept (95% CI)	Allometry
LeBa vs HBL	47	0.0023	0.109 (-0.570, 0.789)	1.315 (-0.495, 3.125)	0.105	0.747			
DvThp vs HBL	47	0.00008	-0.067 (-2.405, 2.271)	0.618 (-5.608, 6.844)	0.003	0.954			
LtLtThp vs HBL	47	0.0229	-1.249 (-3.697, 1.190)	3.659 (-2.858, 10.18)	1.058	0.309			
DvThd vs HBL	47	0.0044	-0.2993 (-1.653, 1.054)	1.335 (-2.269, 4.939)	0.199	0.658			
LtLtThd vs HBL	47	0.1608	-2.227 (-4.678, -0.870)	7.688 (2.618, 12.76)	8.624	0.005**	-6.917 (-8.469, -5.072)	18.72 (13.79, 22.85)	negative

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FROM THE HISTORY OF ORNITHOLOGY IN POLAND – ORNITHOLOGICAL STATION OF THE INSTITUTE OF ZOOLOGY, POLISH ACADEMY OF SCIENCES (NOW THE MUSEUM AND INSTITUTE OF ZOOLOGY POLISH ACADEMY OF SCI ENCES) IN THE YEARS 1969-1973

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Abstract: Too low activity of the Ringing Bureau (no response to letters reporting the recoveries of ringed birds) at the Ornithological Station of the Institute of Zoology, PAS in Górki Wschodnie near Gdańsk caused changes in the work of this institution.

Key words: Ornithological Station MIIZPAS,reorganisation, ringing center, applied ornithology

When attending different conferences abroad in the 1960s, I was asked why our Ringing Bureau did not respond to the letters from other ringing centres concerning the history of the birds they ringed or the birds ringed in Poland and then recovered abroad. The number of such questions was increasing, so I decided to intervene. I always kept in mind the good of science and the Polish Academy of Sciences (PAS). Early in 1969, after my return from abroad or holiday, I did not know that Professor Kazimierz Petrusewicz was no longer secretary of Division II of PAS. So, when I was in the Palace of Culture and Science, I went to Division II to report this issue to the secretary of this Division, Professor K. Petrusewicz, my chairman at the Institute of Ecology, PAS. But instead, I saw Professor Włodzimierz Michajłow behind the desk of the Division secretary. I quickly explained the purpose of my visit, and Prof. Michajłow agreed with me. He said that Associate Professor Kazimierz Zieliński was now responsible for matters of field stations, laboratories and institutions, and we went to see him immediately. After several words of introduction, Prof. Michajłow left, and I told Associate Professor Zieliński that the Bird Ringing Bureau at the

onithological station, IZ PAS was not functioning well, with this being detrimental not only to science but also to Poland. Certain information on birds ringed in Poland went to our embassies. They transferred it on to the ringing centre, but they did not receive answers so they could not pass on the information about the ringing history of the recovered birds. Associate Professor Zieliński listened to me and then he said that this should be changed. He said "It is good that you are an Associate Professor, as according to regulations, you may be appointed where it is necessary for science. To facilitate the implementation of your task, the secretary of PAS will appoint you as head of the ornithological station with its Ringing Bureau, on the following terms: You will be totally independent of Professor Petrusewicz, director of the Institute of Ecology, who is your boss now, and even more so, of Professor Janusz Nast, director of the Institute of Zoology, who supervises the station. Financial support of the station will be transferred to the account of the Institute of Zoology, PAS, but you will be the only beneficiary. I will try to get money from the Academy, but you should submit a written application confirming your interest to the institution for the research to be conducted by the Ornithological Station, IZPAS so that I can document my request for additional money for the station."

I went to the director of the Department of Civil Aviation in the Ministry of Communication and explained to him the role of migrating birds in aircraft collisions, but he was not much interested in this issue. Presumably, the response of this department would have been different if I came a little later, when there were problems with a LOT aircraft which had an emergency landing after colliding with starlings at Vienna airport. Over many years, I cooperated with Jan Książek, director of the Department of Plant Protection in the Ministry of Agriculture, responsible for protection of crops from damages caused by birds. From this ministry I received a strong letter of support concerning the need for research on the ecology of corvids, starlings and sparrows, and the methods of preventing damages to agriculture (Siemaszko and Pinowski 1960). Earlier, I had been in touch with the Institute of Plant Protection (Appendix 1).

Never in my life had I planned to work in the Ornithological Station, IZPAS as its head. I developed an expansive study on the ecology of sparrows (*Passer spp*.) as a part of the International Biological Programme, requiring much time and involvement. I also organized an international conference in the Netherlands that was to be held in September, 1970 within the MPB program. Because of my private situation, I was not in a position to undertake new duties. In the coming months my wife expected a newborn, and my ageing mother needed care. However, I decided to accept the new duties although this required an increased effort.

After the discussion with Assoc. Prof. Zieliński, I addressed Prof. Janusz Nast, and related to him my decision. Director Nast was not particularly interested in the new situation of the ornithological station.

On 9 July, 1969, Assoc. Prof . K. Zieliński organized, at Division II, PAS in Warsaw, a conference on the structural and scientific problems of the ornithological station. The director, Prof Nast, and also Professor Kazimierz Kowalski from Kraków were invited to this conference (Appendix 2).

On 1 August, 1969, I submitted to the PAS authorities a paper entitled "Scientific Program of Research at the Ornithological Station, PAS for the years 1970-1975" (Appendix 3).

Under the authority of the PAS secretary, I started acting, but in such a way as to to delay, as much as possible, taking over the station to reconcile my contradictory interests described above.

I visited Górki Wschodnie, where the station is located, only on one occasion several years earlier, when Dr. Ryszard Zając worked there. Prof. Petrusewicz, Director of the Institute of Ecology, PAS, after his return from a half-year visit to the USA, delegated me to the ornithological station at Górki Wschodnie near Gdańsk on 9 August, 1969, to reorganize the station (Appendix 4). Previously, in about 1962, Prof. K. Petrusewicz proposed to me that I be head of the ornithological station, but I convinced him that I was collecting materials for my habilitation thesis and I could not change my study area. In 1969, prof. Petrusewicz lost his influence in the political arena, and I did not know how much he could help me after he lost his position as Secretary of Division II PAS.

From 1946, the head of the ornithological station at the State Zoological Museum, later renamed the Institute of Zoology, PAS, was J.B. Szczepski. His merit was the realization of an idea from before the war to move the ornithological station from Warsaw to the Baltic coast. It was he, who in the mid 1950s, together with MSc Sikora, Provincial Nature Conservationist, found a building suitable for the ornithological station on Sobieszewska Island at Górki Wschodnie. Under the supervision of Szczepski, the building was repaired, a porch was added, and finally the ornithological station was moved from Warsaw to Górki Wschodnie in 1958 (Fig. 1). Szczepski continued to be its head. On my several visits to the ornithological station at Górki Wschodnie in 1969, I never met him. I did meet the residents of the station, Mr. Zygmunt Wąsowicz, with his wife Janina employed as a charwoman, and his daughter Lucyna. In fact, this man ran the day to day operation of the station. Szczepski lived some distance away in Gdynia, and could not come to the station on a daily basis. The atmosphere in the station had to be tough. This is was reflected in a letter written by MSc. Ryszard Zając, the only scientific worker of the station, employed there till 1968 (Appendix 5). The mist nets spread in the garden of the station were not checked frequently enough, and as a result, losses of the birds captured were high, caused mainly by cats. The purpose of bird capture was the phenology of migration but this had little sense as birds were not numerous in this place, especially since not far away, masses of migrating birds were caught by the Baltic Sea Action.

The fourth member of the station's staff was Paweł Kozłowski. He knew many languages and lived in a privately rented house in Kaszuby (Kashubia). He worked at the station on a part-time bases, only coming every few days. While I headed the station, he would arrive once a week to take the selected letters, and replied to them at home. His knowledge of foreign languages was invaluable to the Ringing Bureau. Mr. Kozłowski died on 2 March, 1973.

Mr. Zygmunt Wąsowicz worked at the station from 1 August 1956 to 31 July 1973, and performed different administrative functions. When Szczepski moved from Górki Wschodnie to Gdynia, Mr. Wąsowicz became took over the daily operation of the station, and ran the estate to the best of his abbilities despite not having a scientific education. Supposedly, he "leased" to inhabitants of the village the ornithological reserve "Ptasi Raj", located in the outlet of the Vistula Śmiała. We also discovered much fishing equipment in the station, probably used for fishing on the reserve.

I suppose that this situation accounted for negligence of the work that was the goal of the existence of the station. For example, it caused delays in responses to about 600 letters concerning ringing recoveries. The building of the station required major renovation, replacement of the tiled stoves with central heating, fencing the area, etc. A great merit of J. B. Szczepski was moving the station to the seaside on a major flyway of migrating birds, and implementation of theproject by Professor Władysław Rydzewski prior to the war. Mr. Zygmunt Wąsowicz was deeply involved in politics. Every year he was a provincial master of ORMO (Voluntary Reserve of the Civic Militia) for shooting guns. His preferred occupation was writing service notes (denunciations). We had only one phone outlet, and he overheard many of my conversations with others, as indicated by poorer sound quality. He made frequent visits to the station as the head of the science department with the provincial PZPR committee. Mr. Wąsowicz undertook study in a boiler operator course, and after the installation of central heating, his additional duty was operation of the boiler room. His last "achievement" was an anonymous denunciation of the directors and heads of the scientific PAS institutions in Tricity (Gdańk, Gdynia and Sopot) in revenge for insufficient support of his application for a dwelling (they could add points when classifying applications for dwellings). Certainly, I was dreaming about a dwelling for him, so that he could leave the station. For this purpose I made efforts to find a job for Mr. Wąsowicz at the Institute of Fluid-Flow Machinery in Oliwa, and I was promised that he would be employed. The investigation into who wrote the denunciation revealed that it was written with the typewriter used by Wąsowicz, and all became clear. Nonetheless, Wąsowicz recieved living quarters and work. His wife, Janina, was employed at the station as a charwoman. She was pretty, good-hearted, and carried out her duties well. They had a daughter, Lucyna, who temporarily worked at the station.

When I appeared in Gdańsk, the provincial authorities and institutions of the Polish Academy of Sciences worked on organizing a branch of PAS in Gdańsk (this

was only accomplished in 1980), so the appearance of an associate professor (senior academic staff member) who, in addition, wanted to develop a local scientific institution was welcome. There was a "Council for Mutual Aid of PAS Institutions Rada Wzajemnej Pomocy Placówek PAS", the members of which were from large and rich institutions in Gdańsk, supported my efforts to develop the ornithological station, IZPAS (Fig. 2).

In 1969, I visited the ornithological station on several occasions (Fig.1).

I was thinking about moving with my family to Górki but the station needed renovation, and I did not find a suitable house for a temporary stay near the station. In the meantime, rumours already circulated in Poland that I intended to be head of the station. Dr. Wojciech Kania reminded me, based on his correspondence with Assoc. Prof. Stefan Strawiński (scientific research supervisor of the Action Baltic – AB) that Assoc.Prof. Strawiński planned to ask me whether I would employ at the station members of the Organization Committee of the Baltic Action. He recieved information that Toruń University, where the AB was affiliated, was eager to get rid of it. Finally, the AB remained for some time at Toruń University.

I decided to employ MSc. Wojciech Kania as the head of the Bird Ringing Bureau. In the organizational group of the AB, he was responsible, among other things, for the documentation of ringing and correspondence with foreign centres of bird ringing concerning the birds ringed or recorded by the AB. I knew that in the face of indolence of the Polish Ringing Bureau in the late 1960s, foreign centres noticed that over half of the birds ringed in Poland and recovered in their areas were ringed by the Baltic Action, and they started exchanging with the AB their ringing data and recoveries. So I decided that Dr. W. Kania was the best person in Poland to take this post. He moved to the station with a part of his earlier duties that he had as the member of the organizational group of the AB.

In the summer of 1969 (as stated by the letter of 16 August, 1969 from Dr. Maciej Gromadzki to Dr. Wojciech Kania, owned by Wojciech Kania), Maciej Gromadzki came to see me at my house in Warsaw, and said that he would be happy to work in my new, just being organized staff. We knew each other but rather superficially, so to facilitate my decision, I proposed that he write how he would see the transformation of the present station into a scientific institution of high quality. I greatly appreciated his project, and from January of 1970, he became the first full-time member of the staff of the station on my initiative. At the same time, I understood that he must live at the station with his wife MSc. Jadwiga Gromadzka and their daughter Agatka. His wife was an entomologist, and it pleased me, as in my plans I needed an entomologist. Dr. M. Gromadzki moved to the station in December 1969, and his family arrived in early spring of the following year. Already in early winter, I wanted to bring my wife with our half-year old baby, and I was looking for a dwelling with central heating. Together with Dr. Gromadzki, we arrived to the holiday centre "Relax" run by Mrs. Benigna Galer, and the result of our conversation was not a dwelling but her

employment at the station as the head of administration from 1 February, 1970. Dr. Gromadzki and Mrs. Galer started an intensive renovation of the station.

In 1970, hot water and central heating were installed, wastewater discharge installation was renovated, electrical installation was reconstructed in the main building and utility building, doors and windows were exchanged, floor and parquet floor were renovated, windows were enlarged in two rooms on the first floor, and the roof was repaired. All rooms were renovated and painted. In 1970, Mrs. Benigna Galer used up all her time for renovation, and Dr. M. Gromadzki about 75% of his work time.

From 1 February, 1970, I was appointed as head of the ornithological station, IZPAS by a notification letter on 13 February, 1970 sent by the Deputy Secretary of Division II, PAS (Appendix 6). Thus, the authorizations I had from the Secretary of PAS expired. In practice, this did not change much. Director of the Institute of Zoology, Professor Janusz Nast, wrote a letter to J. B. Szczepski, at his private address, concerning my taking over the station (Appendix 7). The date of the transfer was delayed. I remember that on 20 March, 1970 I was going to Górki with MSc. Zbigniew Świrski as a member of the committee for taking over the station. When we arrived, we found that all of the rooms were sealed with military barricades. The following day we returned to Warsaw. On the next day, I went to see the general of the Polish Army who was assigned to PAS, and explained to him the matter. He was surprised and needed time to get some information, so he asked me to come again in the afternoon. When I arrived, he told me that this was a mistake. I should remove the seals and take over the station. I asked him for a letter confiming his words. I knew from rumours that there were Russian rockets nearby on the island, and presumably, they encouraged Mr. Wąsowicz. Beyond the tourist season, I personally had to report at the police in Warsaw in order to prolong my temporary stay over the next month in the frontier zone. I did not want to loose the register in Warsaw, since, as it is known, Warsaw was a closed city at that time. Mr. Wąsowicz likely asked an officer of the Polish Army to seal the rooms of the station, but we never talked about that. The renovation started moving full steam ahead, so that on 14 April, 1970, I wrote to Lech Ryszkowski that the rooms were complete after the total renovation, and I hoped that shortly it would be possible to take over the station officially.

The station was officially taken over on 18 July, 1970 by a committee whose members were Mrs. Benigma Galer, Dr. Maciej Gromadzki and MSc. Świrski (Appendix 8).

On 1 April, 1970 MSc. Wojciech Kania started working, and on 1 July, 1970 MSc. Jadwiga Gromadzka. In the Bulletin of Bird Ringing, W. Kania wrote "the staff of the Bureau consists now of three persons: MSc. Jadwiga Gromadzka (from 8 October, 1970, Mr. Paweł Kozłowski - a long-term worker of the station, and Msc. W. Kania, head of the Bureau from 8 May, 1970."

Arrangement of the Bureau was started on 8 May when eng. J.B. Szczepski transferred a part of materials of the bureau. Reorganization began on 20 July, 1970 (Bul-

letin of the Bureau of Bird Ringing Station of the Institute of Zoology, PAS, no. 1 of 15 November, 1970).

On 1 July, 1970 Mr. Bolesław Galer, husband of Mrs. Benia Galer, was employed as a technician.

The formal report on the activity of the station in 1970 shows that in addition to the matters pertaining to the renovation, catching up to do, and reorganization of the Bird Ringing Bureau, we continued the research initiated earlier (Appendix 9), and started a new study. On 29 July 1970, based on Directive No. 29/70, the scientific director of the Polish Academy of Sciences established in the Zoological Institute and Institute of Ecology a research group "The role of birds in agrocenoses and green utility areas." The whole research program of the ornithological station was occupied within this research problem.

Corvids (*Corvidae*) are one of the most damaging pests to agriculture, both sedentary and migrating across Poland (Pinowski 1973, Pinowski and Zając 1990). We observed their flights over the station from the porch, and these were mainly abundant passages of rooks (*Corvus frugilegus)*. To know the situation across the country, I had the idea to count birds from trains going from Gdańsk to Kraków, and from Wrocław to Szczecin. I recieved a permit from the directors of the Ministry of Transportation (for electric locomotives and steam locomotives, separately) for the presence of two observers in the cab with the driver. They tape--recorded information on the corvids observed and their behaviour: foraging, in flight, the direction of flight, and when the train was running. In this way, we recorded information on the distribution of corvids during a single day but, unfortunately, not on their movements. The field of vision enabled us to record only the birds flying low.

Dr. M. Gromadzki, when largely released from the renovation duties, was getting ready to continue his research started earlier at Turew on the ecology of starlings (*Sturnus vulgaris*) living in the Vistula Żuławy region. In September of the same year (1970), I attended the 15th International Ornithological Conference in The Hague, Holland. During the congress, a meeting of "EURING" (international organization associating national ringing centres) was held, and at this meeting I declared, on behalf of Dr. W. Kania, that the Bureau of Bird Ringing was catching up in its work, and in a short time it would be acting normally.

MSc. Jadwiga Gromadzka and Dr. Wojciech Kania participated in the Baltic Action in the Vistula outlet and Mierzeja Wiślana. Unfortunately, communication means that we have now did not exist at that time, and Mr. Zygmunt Wąsowicz overheard my conversations with central in Warsaw. Among other things, this reduced the audibility, so every second week I went to Warsaw. Firstly, I arranged the matters with administrative director Bolesław Gastman, or depending on the subject, in Division II PAS, even such personal issues as the possibility of living at the station, afterwards I went to the Institute of Zoology, PAS (Appendix 10).

In October 1970, I accommodated at the station my wife, MSc. Barbara Pinowska, zootechnician graduated from the SGGW, together with our six month-old baby Agnieszka and her babysitter.

In November we organized the first working conference on the coordination of research as a part of the PAS project "The role of birds in agrocenoses and green utility areas" (Appendix 11). In 1971, the research within this project progressed rapidly (Appendix 12). In addition to the staff of the ornithological station and Institute of Ecology, PAS, this project cooperated Dr. Zdzisław Bogucki, Poznań University, and Dr. Zbigniew Jakubiec (Jakubiec 2005) (Laboratory of Nature Protection, PAS, Sudeten Branch), with their research being financed from the funds of our project. Only since 1971, inter-ministerial and governmental funds were introduced to target the research.

Dr. M. Gromadzki largely developed the research on the ecology of starlings in the Vistula Żuławy region (Gromadzki 1978,1979,1980), as did his co-workers in Warsaw (Gromadzka and Luniak 1978), and Bogucki (1977) in Turew. In total, 1100 nest boxes for starlings were provided in which 757 pairs of starlings nested in 1971. As the counts of migrating corvids from trains were abandoned because they did not yield the expected results, preliminary visual observations of the movements of rooks were initiated at the ornithological station. In 1970, attempts were made to extend them over the whole country (Dr. M. Gromadzki and J. Pinowski).

Based on 8,656 returned questionnaires, Dr. M. Józefik (1976) examined the distribution of breeding colonies of rooks in Poland, and Jakubiec (1980) analysed the density, population dynamics, and habitat preference of this species in Turew.

To evaluate whether the number of females taking part in reproduction in successive broods of sparrows (*Passer domesticus*) as estimated from the number of nests found in nest boxes corresponds to the real number of breeding females, the development of ovaries was examined, thus determined the real number of females breeding in successive broods (Pinowska 1979). Also, the role of sparrows in the Żuławy state farms (PGR) was studied (Pinowska 1975), including their epidemiological importance (Pinowska, Chyliński and Gondek 1976)

At that time, nobody was even dreaming about computers. We used perforate punched cards to facilitate and speed up calculations. Counting the cards that dropped after successive shakings provided the frequency distribution of the parameter value. In this way, ringing recoveries of starlings were analysed for the paper prepared by Dr. M. Gromadzki and Dr Kania (1976).

At the end of 1970, Mrs. Benia Galer told me about problems faced by her acquaintance who suddenly lost her home and work. She ensured me that this woman would be a useful staff member at the station. In Warsaw, I myself was sleeping at night under the desk in my office for many months, so I put myself in her place, and said: Of course, we have enough space. This person was Barbara Łachwicz, then Bielawska after getting married. From 1 January 1971, she was employed at the station,

and continued working until retirement. In addition, she "offered" to the station an excellent worker – her daughter, who has been working there to the present. We recall very warmly our work with Basia. My wife greatly appreciated her diligence, reliability and, how she put it, inner spiritual warmth.

In 1970, I employed Stefan Sumiński as a technician, and in 1971, Leszek Jaraczewski and MSc. Teresa Tomek. They all worked at Dziekanów Leśny on the bioenergetics of rook nestlings (Jaraczewski 1976, Sumiński 2010) included to the project "The role of birds in agrocenoses and green utility areas". MSc. Tomek collected materials for her doctoral thesis, and she defended it in 1976 (Tomek 1975, 1976).

Eng. J.B. Szczepski was working at home to make up for delays in the publication of reports on the activity of the station (Szczepski 1970).

There was no a formal discipline of the staff. Everybody worked according to the current needs, and during the field work, from the morning until the evening. Those who needed help could always rely on their colleagues. Bolek Galer always actively participated in catching sparrows, though he was permanently sitting behind the steering wheel of the car, as we had no job position for a driver. Presumably, it did not occur to him that he could only wait doing nothing till the end of bird catching or observation. Generally, Sunday was the free day. During a period of intensive work, it happened that I received a phone call from the wife of one of the workers, and she firmly stated that she would like to have her husband at home on Sundays. I could rely on the inner feelings of my workers.

The report of 1971 included a new subject – the importance of house sparrows in barns of PGRs in Żuławy. Already preliminary, superficial observations showed that barns were not only preferred nesting sites, but also the primary wintering sites. We observed, counted, and captured sparrows in many PGRs. The number of sparrows differed, but they were numerous on the farms. During the breeding season, there were even several tens of nests inside buildings, depending on the constructions providing suitable sites for nests. In such a barn, it was easy to catch sparrows in nets spread at the entrance door. The number of birds also depended on the care and consciousness of the farmers. The milk pipes running over feeding troughs were favourable places for sparrow perching, and their faeces dropped directly to the troughs. For a long time, I was interested in the epidemiological role of birds, especially house sparrows and tree sparrows (Pinowski 1964). We addressed Wojewódzki Zakład Higieny Weterynaryjnej (Provincial Institution of Veterinary Hygiene) in Gdańsk. Unfortunately, they could analyse only the presence of salmonella in sparrows or their transmission potential.

The study was conducted by Barbara Pinowska. Detailed analyses were made in PGR Wieniec on Sobieszewska Island. We captured and ringed adult birds in barns and in other farm buildings. The nest boxes we provided were rapidly occupied by sparrows so that we could ring nestlings. In addition to the rings of the ornithologi-

cal station, we also used colour rings with colours specific for the place of ringing so that we could identify them by binoculars. Of about 3,600 ringed house sparrows in this PGR, 27 were recorded at a distance not greater than 4 km and, in addition, two young birds were found at a distance of 30 km from the place of ringing. In winter, flocks foraging in particular buildings, spaced even only a few dozen metres apart, were largely isolated from each other. House sparrows did not leave barns over the winter as they had there plenty of food, warmth, and peace.

Of the 36 farms from which house sparrows were taken to be examined for salmonella infection or transmission, we found salmonella in 9 PGRs, including three in which from 20% to 44% of sparrows were infected (Pinowska, Chyliński and Gondek 1976). In spring, when the air temperature was greater than 8° C, sparrows would leave the barns and move to their breeding sites, carrying the salmonella with them. There is no need to be epidemiologist to imagine the role of sparrows in spreading infections. We sent male sparrows for analysis of salmonella infection, and MSc. Barbara Pinowska dissected females to determine the stage of the development of their ovaries to verify the results from checking nest boxes with respect to the clutch size and the number of breeding females (Pinowska 1979). At that time, I planned to organize a campaign for sparrow control in PGRs, and in this way, to get additional money for research. The present regulations of the European Union do not allow the presence of birds of any type of barn. The presence of sparrows in farm buildings was earlier considered natural, but we found a farm where birds were not tolerated in barns and nest were removed resulted in a strikingly clean facility in comparison to ones with birds present.

Dr. M. Gromadzki and Dr. W. Kania analysed 1,450 ringing recoveries of starlings from all of Poland. Later, this resulted in an interesting paper on movements of starlings which was useful for gardening practices (Gromadzki and Kania 1976). My comments on this paper concerning different flyways and dates of starling movements from northern, central and southern Poland greatly interested Prof. Szczepan Pieniążek, director of the Institute of Fruit-grower's (mainly with respect to the protection of orchards in the region of Tczew).

In 1971, unusually high numbers of rooks (more than 1,000) were ringed as compared with other years from the beginning of bird ringing in Poland (Bulletin of Ringing Bureau of the Ornithological Station, Institute of Zoology, PAS, No. 3, of 17 February 1972), and also extremely high numbers of starlings (according to Dr. W. Kania). No doubt, this was a success. This action was financed by the study "The role of birds in agrocenoses and green utility areas". I personally assisted in ringing rooks with Jerzy Noskiewicz (498 nestlings), and I organized the necessary equipment, for example, a lift providing access to nests. Funds for this problem covered the costs of a car lift and contract for the service of J. Noskiewicz.

In 1971, the PAS Problem "The role of birds in agrocenoses and green utility areas" was joined by full-time ornithologists of the Institute of Zoology, PAS in

Warsaw: Dr. Bolesław Jabłoński, Dr. Mieczysław Józefik, and Dr. Maciej Luniak. According to a letter from 19 May, 1972 written by Deputy-director for Science, Assoc. Professor Przemysław Trojan, Dr. B. Jabłoński was to contact Assoc. Prof. J. Pinowski to take over research in the study "The role of birds in agrocenoses and green utility areas" (Appendix 12) . In a letter from 31 July 1972, in which Dr. Maciek Luniak was appointed to the post of Asist. Professor, there is an annotation – with assignation to the problem "The role of birds in agrocenoses and green utility areas". The letter was signed Deputy Director for General Affairs, Asist. Professor Adolf Rieder (Appendix 13). And on 29 December 1972, director of the Institute of Zoology, PAS, Asist. Profesor Henryk Szelęgiewicz, informed Dr. B. Jabłoński, head of the Ornithological Laboratory, that his laboratory was to be closed down, and he thanked him for his work (Appendix 14). I received all three documents on 22 April 2016. They clearly show that director Szelęgiewicz planned to remove ornithology from the Institute of Zoology in Warsaw almost from the beginning of becoming director.

The most important bird species within the PAS research problem "The role of birds in agrocenoses and green utility areas" were rooks moving through Poland in autumn and severely damaging winter wheat.

From the literature and also from information I received during my visit to the Laboratoire des Petits Vertébrés Institut National de la Recherche Agronomique in France, I knew that at that time (the 1960s), rooks were controlled by means of α-chloralose which has a sedative effect. I decided to use this effect for mass ringing of rooks wintering in Poland to know from which region they arrived. The research team consisted of Msc. Teresa Tomek, Kazimierz Sierakowski, Stefan Sumiński and myself. This action has been described in detail by Stefan Sumiński (2010). We started the ringing of rooks that foraged at the garbage dump located in Radiowo near Warsaw. K. Sierakowski prepared the solution of α-chloralose of required concentration, and then he submerged thick pieces of bread in it. In the morning they were spread on fields around the dump to bait rooks. One hour later, we walked around the fields and collected the sleeping rooks into bags. In early afternoon, we were taken by Nyska (the car of the Institute of Zoology) and went to the ZOO, where under the open-air run for brown bears at Świerczewskiego (now Solidarności) street, there were vast cellars in which we ringed the rooks. In the morning of the following day, we opened the door of the cellar to release the rooks. We captured rooks on nine occasions from 10 November, 1970 until 11 March, 1971. In total, we ringed 371 rooks, 6 hooded crows (*Corvus corone cornix*) and 10 jackdaws (*Corvus monedula*). As a result of this ringing action, the Ringing Bureau of the Ornithological Station received several ringing recoveries from the regions of Moscow, Wiatki (Kirowa), Niżnego Nowogrodu, and Kurska (see Gromadzki and Mokwa 2005).

In 1972, we generally continued the earlier research (Appendix 15). Dr. B. Jabłoński analysed changes in numbers of rooks in agrocenoses located in various

regions of the country that differed in the structure of crop fields. We organized a network of cooperators who shot rooks, jackdaws, and hooded crows to analyse the content of food in their crops and stomachs. Also, questionnaires concerning damages to crops caused by corvids were sent out to PGRs and other agricultural institutions (Dr. Z. Jakubiec) and to inspectors of plant protection (Olech 1973). On 11 October, 1972 I submitted to the Scientific Board of the Institute of Zoology, PAS a proposal for organizing a Department of Applied Ornithology at PAS (Appendix 16). To ensure the highest possible self-sufficiency of this department, my idea was to establish a commercial point accepting services from outside. This department has never been established. We recapitulated our scientific activity in the PAS research program "The role of birds in agrocenoses and green utility areas" by organizing a seminar on 6 November, 1972.

The year 1972 started happily for us, as the administrative director of PAS, Bolesław Gastman, assigned to the station a passenger car "Wołga" in a good technical state, with the recommendation to register it as a laboratory car. Together with Mrs. Benia Galer, I went to the head of the Regional Communication Office, the same who one year earlier told us that we must employ full-time drivers to register a motorized bicycle. As soon as he knew the purpose of our visit, he immediately replied: It is impossible that the representative car such as "Wołga" was used as a laboratory car. In reply, Mrs. Benia turned towards me and said "Lets go to the voivode governor". The governor, Henryk Śliwowski admitted us soon. I explained to him that we had been waiting for car coupons for a long time already because it was difficult to run a research laboratory in such an isolated place as Sobieszewska Island. The governor asked "And who hindered you?" I told him his worker, the communication head. We all went to his office, but he was not there. If I remember well, the governor dictated a letter to the secretary in the communication department stating that this matter should be arranged immediately. In this way, thanks to Mrs. Benia Galer, our Wołga was registered as a laboratory car. Mr. Bolek Galer performed the role driver. From time to time the car was out of order, but this was not a great problem because Mr. Waldemar Pągowski appeared at the station. On 15 September,1972 he submitted a letter of application to the Institute of Zoology, PAS for employment as a scientific and technical worker at the ornithological station from 1 October, 1972. Waldek was a car technician and he worked in the transportation depot of a shipyard. He loved birds. For several years he cooperated with the Ringing Bureau, and later he helped Dr. M. Gromadzki in his field work as a volunteer (personal information from Dr Jadwiga Gromadzka). Waldek proved to be invaluable not only as ornithologist but also as a car technician.

On the same day, 1 October 1972, MSc. Maria Wieloch started working officially as a researcher at the ornithological station, IZPAS as a full-time member of the staff. Earlier she was employed at the Department of Zoology of Gdańsk University, but essentially, from 1964, she was involved in research on the ecology of house and

tree sparrows as part of the International Biological Programme in southern Poland, and in following years near Gdańsk and in Turew, Wielkopolska. Let's Dr. M. Wieloch speak: "I do not remember when I went to Turew for the first time (in 1971, the Department of Agroecology, IE PAS), but probably in March, as at that time nest boxes were provided for house and tree sparrows (Rogaczewo, Turew), and one year later at Donatowo. The results on the productivity and diet of house and tree sparrows obtained near Turew in 1971 and 1973 in this area were compared with those from the Middle Seaside (Barniewice and Owczarnia, near Gdańsk (Strawiński and Wieloch 1972, Wieloch 1975, Wieloch and Fryska 1975, Wieloch and Strawiński 1976)."

The ornithological station at Górki Wschodnie needed a fence 3 km long. I asked the administrative director of IZPAS, Mr. Michał Klisiak, to organize the funding and bidding for this. My letter to Dr. Stanisław Borowski from Białowieża implies that this was on 16 October, 1972. The first contractor who, according to Director Klisiak, won the contract was unreliable, so we replaced him with the second cheapest contractor. The new contractor could construct the fence in spring on the condition that we would provide fence pipes, as they were difficult to get. I asked Mrs. Benia Galer, who was pregnant at that time, to go to the director of the "Centrostal" in Gdańsk, and ask him for the pipes. She returned with delightful news, the director of Centrostal had Japanese high pressure pipes, certainly much more expensive than ordinary pipes. I came to the conclusion that it would be easier to get extra money than find the ordinary fence pipes. This new contractor built a solid fence, but a new problem arose, we were short of money for an internal fence separating the backyard from the experimental area. After many earlier refusals, central PAS authorities agreed that we would construct these fences as a social initiative. Under expert supervision, the male half of the station staff stretched the wire mesh. The epic of the fence was ended. This fence still serves its function at the present.

In the summer of 1971, I brought my mother to the station, who, because of her age, could not live alone in Warsaw. The Institute of Ecology covered all my costs, including travel costs of official journeys, but only the costs of tickets were reimbursed. Already, from 1972, I was thinking more and more often about moving to Gdańsk. Cooperative dwellings could be exchanged only for cooperative dwellings located in another town. Unfortunately, cooperative dwellings of the size comparable to that we had in Warsaw were found only in Oliwa, which was too far from the station. Another one, located in Gdańsk, was much smaller, and my wife did not want to accept it. More time was needed for searching for a dwelling. It never even crossed my mind that someone would give me a time-frame, but this proved to be possible.

In 1973, we continued the search from preceding years. In July of 1973, Professor K. Petrusewicz, director of the Institute of Ecology, PAS, was replaced by Professor Romuald Klekowski. In August, 1973 he gave me an ultimatum, within one week,

I should decide whether I wanted to come back to the Institute of Ecology or to move to the Institute of Zoology. No other questions, for example, how this could affect scientific matters was considered. I went out from his office not enough to say discordant, this is too delicate. I addressed Professor Henryk Szarski, who comes from the city of Kraków. Professor Szarski prolonged the ultimatum to three months. For more than one year already, Assoc. Prof. Henryk Szelęgewicz was the Director of the Institute of Zoology, and the Deputy-Director was Assoc. Prof. Przemysław Trojan. Despite my best efforts, I did not find a dwelling closer to the station than that in Oliwa over the period of Prof. Klekowski's ultimatum. I addressed Assoc. Prof. P. Trojan with this matter. To my question if I could be employed at the Institute of Zoology, he answered yes but only in Łomna. I suppose that Assoc. Prof. Trojan was motivated by Director Szelęgiewicz whose idea was to transfer ornithologists to the ornithological station or, at least to Łomna (Łomna located near Warsaw was a field station of IZPAN). I reminded myself of the year 1956 when leading the field station of the Department of Ecology in Łomna, I could get there by a draught horse (not for horseback riding) and by bike. I feel annoyed when reminding myself the hours of waiting at the bus stop in Łomna, looking at the busses going from Nowy Dwór Mazowiecki that were always full, and they did not stop. I did not like the administrative regulations of Prof. Klekowski as director of the Institute of Ecology. Nonetheless, in December 1973, I decided to leave the ornithological station. Earlier, Professor. Maciej Gromadzki (at that time doctor) replaced me during my absence, so I knew that he would continue my function without impairing the station's function. In December 1973, I went to the ornithological station by car from the Institute of Ecology, PAS, to take my private belongings and materials concerning the research on sparrows conducted by my wife and myself, as well as observations of corvids from trains, and I left the ornithological station.

Thirty eight years passed until I and my wife Barbara appeared at the station again in June 2011. What did we find? Small spruce trees 15 centimetres tall when planted in 1973, reached about 15 m. To the east there was a laboratory building so much needed. From the former staff members ,I saw only Dr. Maria Wieloch. Young managers of the station, MSc. Alicja Bielska and MSc. Zenon Rohde organized a very nice meeting of the former staff members from the 1970s with the current staff: Grzegorz Ławicki, Magdalena Nowakowska Jakub Topiak. Among the former, there were Mrs. Benia Galer, Dr. Jadwiga and Maciej Gromadzcy, Wojciech Kania, Barbara Bielawska-Łachwicz, and Maria Wieloch. Remembrances from the past were endless. Unfortunately, some former workers did not come. Bolek Galer and Waldek Pągowski had passed away (Fig. 3, 4, and 5).

If not the for enthusiasm and deep involvement of my co-workers, the station with its Ringing Bureau was likely to be unchanged for several years longer.

In this retrospection, I most often use the plural form, such as "we were doing", as now, after so many years it is difficult to recall who was doing what. For sure,

Maciej Gromadzki put a lot of effort into the renovation of the station, and Benigna Galer for many years devoted all her time, from morning till night, her skills, enthusiasm, involvement to create for us, research workers, the best conditions for working, and wonderful atmosphere. Wojtek Kania and Jadwiga Gromadzka managed to catch up with responding to all the letters that concerned ringing recoveries, which had not been answered for many years. This means that they accomplished the goal of my appearance at the station.

I wish to thank Director of the MIZPAS, Prof. Dr. Tomasz Mazgajski, for his benevolence to my project of writing the history of the ornithological station in the years 1969-1973. Grateful acknowledgement is extended toMSc. Joanna Adamiec- Siemiątkowska for a detailed revision of the text, MSc. Majka Główka for finding many documents, MSc. Tomasz Mokwa, Head of the Bird Ringing Centre, for making available materials from the archives of the station, Mrs. Benigna Galer for proofreading the text, and Dr. Wojciech Kania for the detailed revision of the earlier version of the text and for new, unknown to me or forgotten details of the station work, retraced with Dr. Jadwiga Gromadzka's assistance.

I wish to thank Professor Dr. hab. Władysław Kupiszewski for stylistic correction of the Polish text.

Z HISTORII ORNITOLOGII W POLSCE – STACJA ORNITOLOGICZNA INSTYTUTU ZOOLOGII POLSKIEJ AKADEMII NAUK (OBECNIE MUZEUM I INSTYTUT ZOOLOGII POLSKIEJ AKADEMII NAUK) W LATACH 1969–1973.

STRESZCZENIE

Wyjeżdżając za granicę w drugiej połowie lat 60. XX wieku spotykałem się z pytaniami, dlaczego polskie biuro obrączkowania ptaków nie odpowiada centralom zagranicznym na pytania o historię ptaków obrączkowanych przez centrale zagraniczne, a znalezionych w Polsce lub dotyczących ptaków obrączkowanych w Polsce, a znalezionych za granicą. Pytania te z biegiem lat narastały, dlatego postanowiłem interweniować u władz PAN. Wynikiem mojej interwencji było zaproponowanie mi od zaraz stanowiska kierownika Stacji Ornitologicznej IZPAN. Wynikiem mojej interwencji było zaproponowanie mi od zaraz stanowiska kierownika. Dzięki zaangażowaniu, całego zespołu pracowników w 1973 roku Stacja Ornitologiczna Instytutu Zoologii PAN była już normalnie działającą placówką.

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ENCLOSURES (IN POLISH)

Enclosures are in archives of the Museum and Institute Zoology Polish Academy of Sciences and in the computer of author (j.pinowski@wp.pl).

1. List dyr. Instytutu Ochrony Roślin prof. dr W.Węgorka.
2. Zaproszenie dyr. prof. J. Nasta na zebranie poświęcone Stacji Ornitologicznej I.Z.PAN w Wydziale II PAN.
3. Problematyka naukowa Stacji Orn. IZPAN w latach 1970 – 1975.
4. Oddelegowanie doc. dr J. Pinowskiego z Instytutu Ekologii PAN do Stacji Orn. IZPAN.
5. Pismo dr R. Zająca do dyr. prof. J. Nasta.

6. Powołanie doc. J. Pinowskiego na stanowisko kierownika Stacji Orn. IZPAN
7. Pismo dyr. prof. J. Nasta do inż J.B. Szczepskiego w sprawie komisyjnego przekazania Stacji Orn. IZPAN doc. hab. J.Pinowskiemu.
8. Protokół przejęcia Stacji Orn.IZPAN str 1 i ostatnia.
9. Sprawozdanie z działalności Stacji Orn. IZPAN w 1970 r.
10. Pismo dyr. adm. PAN B.Gastmana do IZPAN o sprawie przydzielenia mieszkania doc. J.Pinowskiemu w budynku Stacji Orn. IZPAN.
11. Zaproszenie dyr. J. Nasta na zebranie naukowe w Stacji Orn. IZPAN w dniu 30.XI 1970 r.
12. Skierowanie dr Bolesława Jabłońskiego do badań w problemie "Rola ptaków w agrocenozach i użytkach zielonych".
13. Powołanie dr Macieja Luniaka na stanowisko adiunkta z przydziałem do badań w ramach problemu "Rola ptaków w agrocenozach i użytkach zielonych".
14. Pismo dyr. dr hab. Henryka Szelęgiewicza do dr B. Jabłońskiego zwalniające z funkcji kierownika pracowni ornitologicznej w związku z jej likwidacją.
15. Sprawozdanie z działalności Stacji Orn. IZPAN w roku 1972 .
16. Wniosek do Rady Naukowej IZPAN o utworzenie Zakładu Ornitologii Stosowanej.

Fig. 1. *Ornithological Station Institute of Zoology Polish Academy of Sciences. View from the dune adjoining the Station in 1975 (Photo Tadeusz Płodowski)*

Fig. 2. *Scientific employees of the station in 1972. From the left: Dr. Maciej Gromadzki, Msc. Wojciech Kania with this son Bartek, Assoc. Prof. Jan Pinowski, station guests from PAS Coordination committee for Gdańsk Regional units AssocProf. Zbigniew Ciesielski, chair PAS Mathematical Institute Laboratory, Dr. Henryk Zaradny from PAS Institute of hydroingeering (Photo archive of STMIIZPAS)*

Fig. 3. *Meeting after 38 years, Ornithological Station MIIZPAS, 3 June 2011 year. Msc. Zenon Rohde Administrative Head of the Onithological Station welcomes guest. From the left: Barbara Pinowska, Grzegorz Ławicki, Wojciech Kania, Alicja Bielska (Photo3,4,5- M.Wieloch)*

Fig. 4. *The same meeting as in photo 3. From the left: Barbara Łachwicz-Bielawska, Jadwiga Gromadzka, Benigna Galer, Maciej Gromadzki, Jan Pinowski*

Fig. 5. *The same meeting as in photo 3. From the left:Jan Pinowski, Barbara Łachwicz-Bielawska, Barbara Pinowska, Grzegorz Ławicki, Wojciech Kania.*

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NESTING BIOLOGY OF THE BLACK STORK *CICONIA NIGRA* IN BELARUSIAN POOZERIE

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The black stork (*Ciconia nigra*) is included in the Red Data Books of Belarus, Russia, Ukraine, and other European countries. Monitoring of the species in Belarusian Poozerie, situated in northern part of Belarus near the Latvian and Russian border, has a long history (Ivanowski 1983; 1990; 1992; 1998; 2001; 2013). The aim of this study was to analyze nesting parameters of the Poozerie black stork population during 14 years, from 2001 to 2014.

METHODS

We applied standard methods that have been described previously for finding nests of birds of prey. Most of the statistical calculations were carried out using MS Excel software. Simpson's index B (Krebs 1999) was used to assess ecological niche breadth:

$$B = (\sum p_i^2)^{-1}$$

where p_i – the fraction of the recourse *i*, used by the black stork local population.

RESULTS AND DISCUSSION

Nesting sites of the black stork were checked in Belarusian Poozerie during 2001-2014, and 27 cases of successful reproduction were revealed (Fig.2 a-f). Nesting sites were situated in wet or considerably swamped old growths among large woodlands (89.3%), dry forested islets among pine bogs (7.1%), or near pine bog edges (3.6%).

The reproduction phenology of the black stork in Belarusian Poozerie is given below. Incubation started in the third week of April (from 24-04-2012). Hatching was observed as early as 19-05-2011 (the bird did not leave the nest despite of our presence nearby). On 7-17 of May there were downy nestlings in a nest. Lesser coverts on the shoulders had grown by 12-06, flight and tail feathers appeared from 5-06. On 11 of July, nestlings were completely feathered. By 13-07 the oldest nestling had glided to the ground. On 17-30 of July, nestlings left a nest.

Common aspens comprised 51.9% of the 27 trees identified in nest records, the remaining species were oaks 25.9%, birches 11.1% and pines 11.1%. All nests used by storks were artificial (see Fig. 1. from Ivanowski and Samusenko 1990). The height above the ground varied from 7 to 18 m, on average it was 14.9±0.6 m. Nest were located at the divarication of the main trunk for 51.9% of all nests, at the base of two or three lateral branches (40.7%), or on the trunk bend with the support of two branches (7.4%).

Black storks prefer to build their nests deep in forests, often near cleared strips or abandoned lanes, which makes it easy to access their nests. However, pairs which nested on islets among pine bogs or along bog edges built their nests as close as 20-30 m from open habitats or even closer. Once, a black stork pair occupied an artificial nest that had been constructed for a golden eagle (*Aquila chrysaetos*) and was situated just at the border of an islet and bog.

During nest surveys and bird ligatures, the following food objects were detected (n=38): undetermined frogs (*Rana* sp.) 89.5%, common frog (*Rana temporaria*) 2.6%, pike (*Esox lucius*) 2.6%, and burbot (*Lota lota*) 5.3%. A unique case of cannibalism was observed 8-06-2011 in Dymanova, and photos of the fact were taken. There were four downy nestlings including one dead. The adult bird, after a few hours without food, had consumed the dead nestling. On hot days, the parents supplied their nestlings with water by bringing it in their crop.

We did not visit nests during the incubation period, so the analysis was done for nests with downy nestlings and feathery nestlings shortly before flying out of the nest. The number of downy nestlings per nest varied from 2 to 5, comprising on average 3.7±0.2 (n=16). The number of feathery nestlings comprised 1–5, on average 3.5±0.2 (n=15) per nest. Reproductive success (the number of fledglings compared to the number of laid eggs) was 100%.

In the study period compared with the previous period of 1991-2000, the range of nesting habitats used by black storks became narrower (the Simpson's index B decreased from 1.78 to 1.20). We did not find any significant differences in the nesting phenology (df=29; P>0.05). The ecological niche breadth for the parameter "nesting tree species" became narrower (from 5.32 in 1991-2000 to 2.78 in 2001-2014). In accordance with the Student's t-test, differences in the mean height of nest replacement in 1991-2000 and 2001-2014 was not revealed. It is interesting to note that we

did not find any "classic" black stork nest that were situated at a distance of 2-3 m from the main trunk as were recorded before in 1976–2000 (Ivanowski 1983; 1990; 1992; 1998; 2001). Most likely, it is related to intensification of clear cuts including ones on dry islets among pine bogs and consequently forest rejuvenation. It is difficult for black storks to find suitable old trees with optimal crown architecture in remote forest patches. The suitable decision is to create a park of artificial black stork nests organized by forestry departments as has been already done for passerine birds.

In accordance with the Student's *t*-test, no significant differences were observed in the mean numbers of both downy and feathery nestlings in 1991-2000 and 2001-2014 (df=29; P>0.05). When comparing the number of fledglings in these two periods, the difference was also insignificant – 3.0±1.2 (n=20) in 1991-2000 and 3.5±0.2 (n=15) in 2001-2014. Concerning the diets, we revealed a two-fold increase in the portion of frogs and three-fold decrease in the portion of fish.

Almost every current ornithologist agrees with the fact that manipulations near a nest have a negative impact on reproductive success of birds (Antczak *et al.* 2005). Human disturbance of birds at a nest is especially undesirable during the early stages of reproduction. A skilled researcher spends at least 20 minutes for all manipulations needed. This time is enough for eggs or little nestlings to suffer from hypo- or hyperthermia (depending on climatic conditions, nest protection, individual behavioral reactions of adult birds, *etc.*). When checking a nest after 15th July, young birds scatter, and their further destiny remains unknown (Ivanowski 2013).

Grown black stork nestlings are quite aggressive: they peck extremely hard sometimes breaking their fragile upper mandible, or move towards the nest edge and can fall down. To prevent such cases, a researcher should use a special safety belt and act with both hands. It is necessary to avoid contact with nestling beaks and prevent their dropping out of the nest. This could be achieved by a few easy but quite effective methods. First, if a nest shape allows this, a researcher should use a tree in a 50-100 cm distance from the nest edge. From this distance it is more convenient to take a nestling over his beak or neck, pull to itself, hold the nestling head under the arm and conduct measurements and ligatures. Secondly, a researcher can use a stick with a knot to hitch up nestlings and hold them back in the nest center.

Reproductive success (the number of fledglings compared to the number of laid eggs) was higher in 2001–2014 (100%) than in 1991–2000 (72.4%). The possible explanation is that in result of clear cutting, black storks built their nests only in hidden, remote forest habitats (in swamped areas or on dry islets among pine bogs). The question arises: is there a decrease in black stork numbers or is it spatial redistribution of the local species population in Poozerie?. To answer this question, further detailed investigations of this rare and secretive species should be carried out on representative areas.

CONCLUSIONS

Comparison of the data obtained in 2001–2014 and 1991–2000 has shown that parameters such as reproduction phenology, height of nest placement above the ground, and productivity have not changed. Ecological niche breadth for parameters "nesting habitat" and "nesting tree species" has become narrower. Judging from our field study experience, the optimal period for black stork nest survey is from 20th May to 10th July. To find out if there is a decrease in the black stork numbers, further investigations should be carry out in representative areas.

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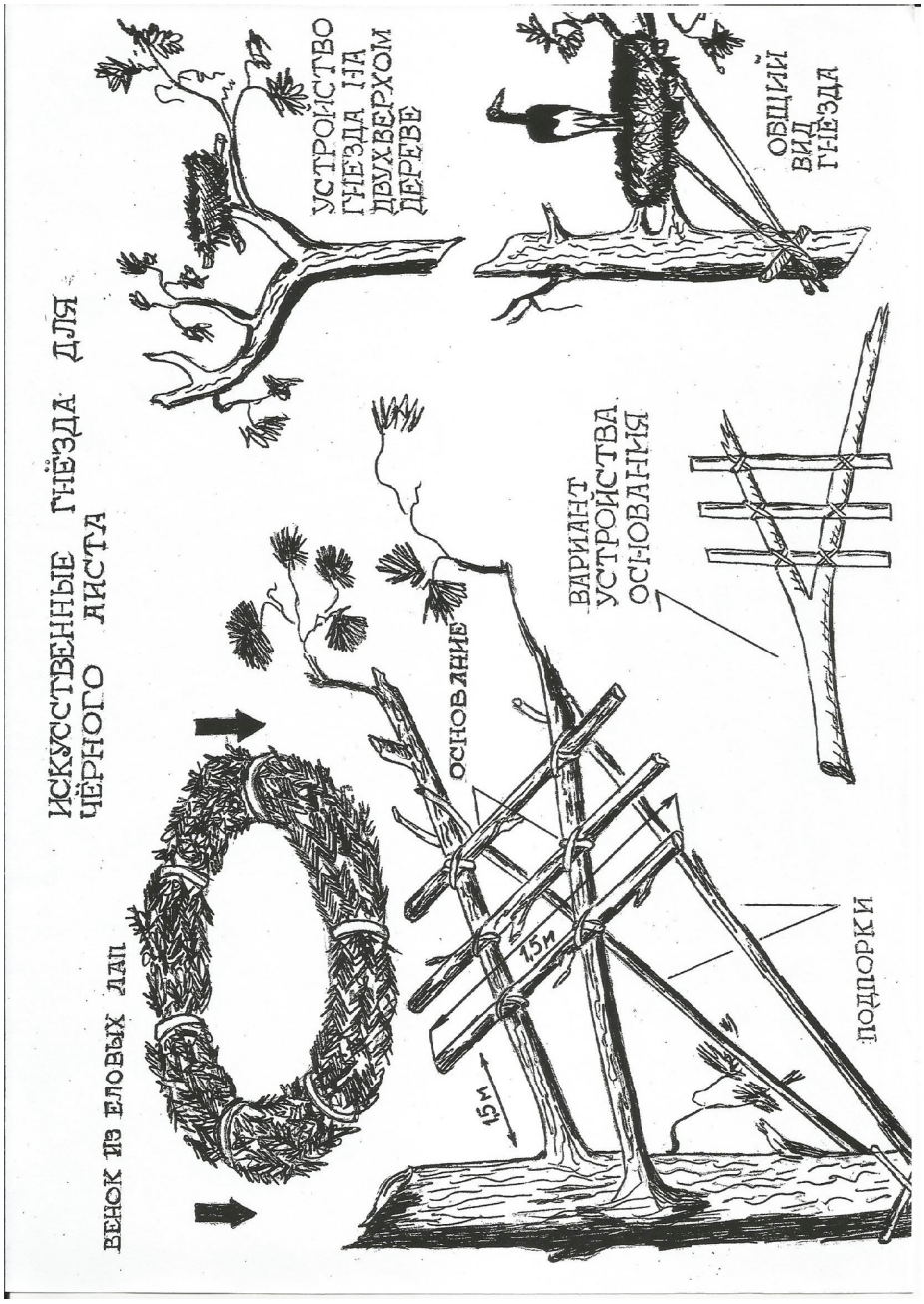

Fig. 1. *Construction of artificial nest (from IVANOVSKI and SAMUSENKO 1990, in Russian)*

a) 

b) 

c) 

d)

e)

f)

Fig. 2. *"Short breeding biology" of black stork Ciconia nigra: a) nest, b) eggs, c) nestlings, d) fledglings, e) food transfer, f) Author with young bird.*

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