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Nesting of Dunnock *Prunella modularis modularis* (LINNAEUS, 1758)

[With pls. XII—XV and 2 text-figs.]

Gnieżdzenie się płochacza pokrzywnicy *Prunella modularis modularis* (LINNAEUS, 1758)

Abstract. The dunnock nests in many species of trees and shrubs, but most often the spruce is chosen. Most of nests are usually situated in the interval of 0.5—1.0 m and mostly are slipped among twigs. In the nest construction four layers are distinguished, which differ in their composition and manner of the material setting. The comparison of Dunnock's nest with the nests of same other representatives of the genus *Prunella* reveals, that it is approximated to the nest of *Prunella atrogularis*.

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I. INTRODUCTION

The Dunnock, *Prunella modularis* (LINNAEUS, 1758) is the breeding bird frequently met in the mountains and on the plateau in southern Poland. The bird, however, leads hidden way of life and therefore in the literature may be found rather inadequate informations about its biology and its nesting. The aim of the present work was to study the manner of nest building by *Prunella modularis*. The characteristic of nest was based on the analysis of nest site, its shape and size as well as the materials used for nest construction. By

the comparison, mainly based on literature, with other representatives of the genus *Prunella*, the efforts were made to find some common traits for their nests.

The present work is one of the series of investigations carried out on birds nesting in Poland. The work is also, to some extent an introduction to the intended larger study of Dunnock's biology.

I wish to express my sincere thanks and gratitude to Dr Z. BOCHEŃSKI for his valuable advices, help and gathering of data from Moscow collections. I have to say, that the nests of other representatives of the genus *Prunella*, which are described in this paper are from Zoological Museum of Moscow University and private collection of Dr. V. V. LEONOVICH (Moscow). Therefore, I desire to thank Dr. V. E. FLINT and Dr V. V. LEONOVICH for their help and for giving me the opportunity to use all indispensable data from their collections. I also thank to Dr. J. HANZÁK for his kind consent to use the nest record cards (elaborated by eng. MOČEK) from National Museum in Prague. Finally, my thanks are due to A. MALCZEWSKA for making all necessary drawings.

II. MATERIAL AND METHOD

The materials for the present work were collected in different parts of Poland. The majority of the observations were carried out in southern Poland, mainly in Ojców surroundings (88 nests). Some data regarding nests come from the Tatra Mts. (2 nests), Przemyśl surroundings (2 nests), Białowieża forest (2 nests), Mt. Babia Góra (5 nests), Beskid Ranges (5 nests) and Szczecin surroundings (2 nests). A part of material comes from Bulgaria (Vitosha near Sofia — 8 nests). To carry out this work the nest record cards from Czechoslovakia were also used (National Museum in Prague). In the collection of materials the attention has been paid to the tree species, in which the nests were placed, the height above the ground at which they were situated and the manner of their setting. Subsequently, the shape and size of nests were examined as well as measurements were taken of the inner and outer diameters of nests, their heights and depths. The measurements of the inner and outer diameters were taken twice, and in the case when the shape of a nest was irregular (elliptic), arithmetic mean from two measurements was calculated, which accepted as its inner or outer diameter. The analysis of the material from which the nest is built, was carried out in two different ways. The nests in which were the eggs or nestlings, were described on the basis of their appearances, while the nests with destroyed hatches, nests abandoned or even those from which the nestlings already flew away, were taken out and then precisely analysed. During the analysis attention has been paid to the existence of the layers and their thickness, the material entering into the composition of particular layer, the differences in the quantities of the components setting up each layer, and finally the manner of laying the material itself. Very often there were found

some nests uncompleted, without lining or even just initiated, in which only the foundation layers were built. Therefore, not equal number of nests could be used to make their description and to carry out an adequate analysis of their layers composition. To work out this paper the data of 113 nests were used, mostly from Poland and Bulgaria, and also data of 43 nests from Czechoslovakia (record cards).

III. NEST-SITE

The Dunnock builds its nest always above the ground, some-times not enough high. Generally, the height at which the nest is situated varies in the limits from a few and so cm to 4 m. More than 2 m above the ground *Prunella modularis* builds its nest very unwillingly. In the height interval of 2—4 m only 3 nests were found (2.7%). Most often the nest is placed somewhat below 1 m. In the interval of 0.51—0.1 m 56.3% of nests were found. It was stated, that the mean height for 107 nests was 0.92 m. Quantitative distribution of nests, regarding the height above the ground, shows Table I.

Table I

Height of nest site above the ground of 107 nests
of Dunnock

Height in m	Quantity	%
0—0.5	26	24.3
0.51—1.0	57	53.3
1.01—1.5	12	11.2
1.51—2.0	9	8.4
2.01—2.5	1	0.9
2.51—3.0	1	0.9
3.01—3.5	—	—
3.51—4.0	1	0.9
Total	107	99.9

Mean height: 0.92

The Dunnock builds its nest, as a rule, in the trees or shrubs living or dead. Most often however the spruce is chosen for nesting (63.3%), then the fir (6.4%). Rarely the nests are placed in the pine (2.7%) and coniferous shrubs, such as juniper, and in leafy shrubs, such as brier-rose, gooseberry bush or the suckers of a cut trunk (the suckers have generally similar appearance as a shrub and therefore the nests, which are placed in the suckers were admitted as the nests built in shrubs). The list of various species of trees and shrubs, in which the nests were found, as well as regard their number in the particular species, shows Table II.

Table II

List of tree and shrubs species and the number of Dunnock's nests found in them

Species	The nests from									
	Ojców		Other parts of Poland		Czechoslovakia		Bulgaria		Total	
	number of nests	%	number of nests	%	number of nests	%	number of nests	%	number of nests	%
<i>Juniperus communis</i>			1	6.25	3	6.98			4	2.63
<i>Juniperus virginiana</i>			1	6.25					1	0.66
<i>Picea excelsa</i> (old)	8	9.41								
" (young)	24	28.23	6	37.50			4	50.0		
" (twigs, lying)	7	8.24	1	6.25			3	37.5		
" (dry)	15	17.65	1	6.25	33	76.74			102	67.11
<i>Abies alba</i> (young)	2	2.35	2	12.50						
" (twigs, lying)	1	1.18	2	12.50	3	6.98			10	6.58
<i>Pinus mughus</i>							1	12.5	1	0.66
<i>Pinus silvestris</i>	3	3.53							3	1.97
dry twigs	17	20.0	1	6.25					18	11.84
<i>Ribes vulgare</i>	1	1.18							1	0.66
" <i>grossularia</i>	5	5.88							5	3.29
<i>Rosa</i> sp.	1	1.18							1	0.66
<i>Fagus silvatica</i>	1	1.18	1	6.25					2	1.32
undetermined shrubs					4	9.30			4	2.63
Total	85	100.02	16	100.00	43	100.0	8	100.0	152	100.01

The manner of nest placing by *Prunella modularis* is not very much differentiated. Generally, the nest is placed among green or dead twigs. The bottom of nest is always built on a twig. Such a foundation can be enough strong, if the twig is a thick one. However, it happens sometimes, that the supporting twig is too weak, usually in the case of nests situated in young trees with very fine twigs (2—3 mm). It was stated, that the bottom of nest resting on some fine twigs is at the same time secured between two other twigs (e. g. in whorl of coniferous tree). In that case the edge of nest is a little above or just on the same level as mentioned securing twigs.

There are several categories of nest placing regarding the manner of their concealment and camouflage. The nests built in the young conifers, mainly in spruces (fig. 1-A) are situated inside the "crown", in its upper part. In such a case the nest is mostly placed near by the trunk, but does not lean against it. The Dunnock does choose for nesting the young and thick trees with a compact crown. The nest is then concealed under the higher twigs and well covered from its sides by other twigs, what causes, without opening the twigs, the nest is invisible. It happens, that *Prunella modularis* builds its nest in the old coniferous, mainly in spruces (fig. 1-B). After GOTZMAN and JABŁOŃSKI (1972) so called trees are those, which have over 2.5 m of height. The nest in the old tree is usually sited on a side twig, far from the trunk, covered from the top and sides by little twigs in the same way, as in the case when the nest is built in young tree. It was observed that the cover of nest are provided by thick offshoots of the twig, on which the nest is placed or sometimes by the low hanging down an upper twig. It was also observed, that the nest of Dunnock may be also placed on a lying spruce or fir and some-times in a heap of twigs, which were cut very not long time ago, still covered by fresh, green needles (Fig. 1-C). In that case there are predominantly chosen the spruces, rarely firs and quite exceptionally the pines. On a lying tree, the nests lean against the horizontally or obliquely situated trunk, and is covered by hanging down twigs. The nest may be also slipped among the twigs of the tree crown, particularly in the places, where the twigs lean against the trunk. It is also worth to notice that the nest may be placed in the embranchments of vertical shots of the dwarf mountain pine (Fig. 1-D, photo 1). Frequently enough, *Prunella modularis* chooses for nesting thick and young but dead spruces or heaps of dead twigs (Fig. 1-E). Both of them are usually devoided of needles or leaves. The nest is then slipped among twigs, and its foundation composed from sticks, perfectly harmonizes with the environment. Besides, the nest is almost invisible, though there are no needles or leaves to cover it. The nest built in a heap of dead twigs, in most cases situated on the skirt of the heap, is generally covered from the top by a thick or some fine twigs. The Dunnock very willingly builds the nest in the tufts of the cut twigs leaned against the tree. In that case, the nest is slipped between the trunk and dead twigs. It was observed, that for 18 nests placed in the tufts of dry twigs, a half of them was situated in that manner. Sometimes the nest is built on a few lying, dead twigs and in such case it is

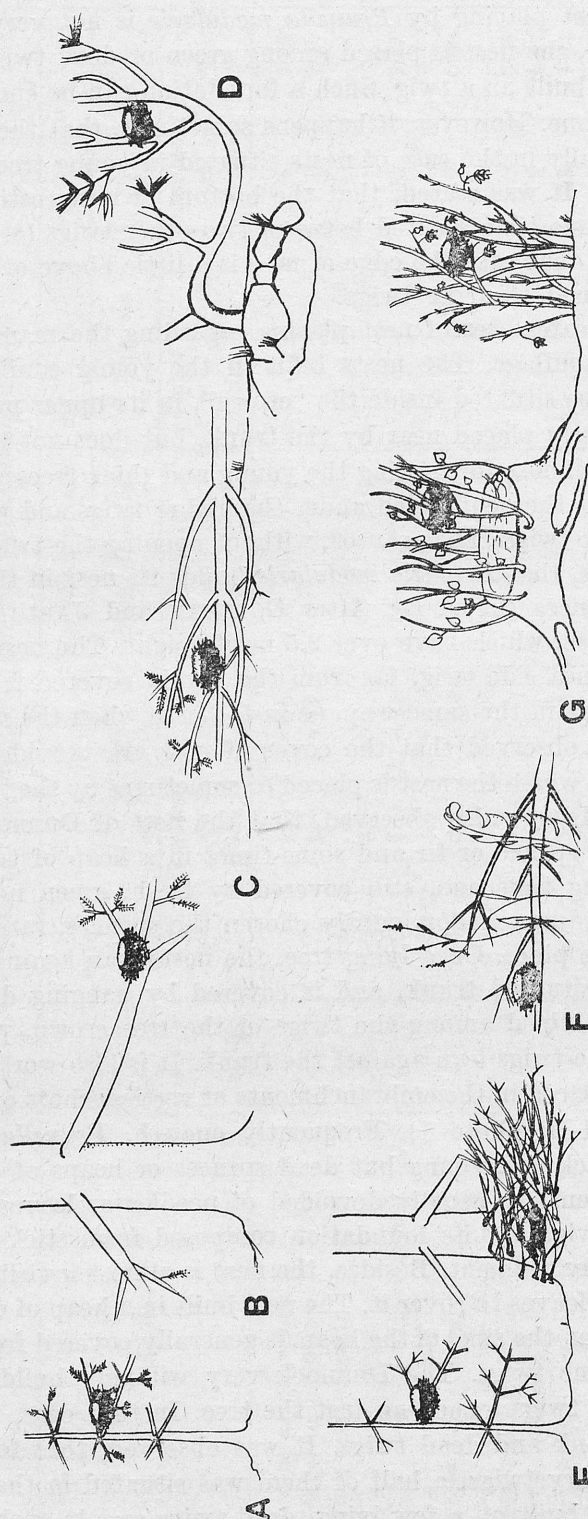


Fig. 1. Main types of the Dunnock's nests-site: A — young coniferous tree, B — on a side twig of old coniferous tree, C — lying tree or freshly cut twigs of coniferous tree, D — dead spruce or heap of dry twigs, E — dwarf mountain pine, F — green vegetation, G — leafy shrubs

covered by the green plants, leaves of fern, blackberry shrubs or by a lying coniferous twig (Fig. 1-F). To the last category of nests belong those, which are built in the deciduous shrubs (Fig. 1-G). Usually they are situated inside of the mostly spiny shrub and slipped among the twigs.

It may be possible to observe the difference in the frequency of nests founded in various places, according to the time of their foundation (Table III). The

Table III

The nest sites of 70 Dunnock's nests in dependence of the season in which they were built

Manner of placing	Time of nest building			
	I. brood		II. brood	
	number of nests	%	number of nests	%
Dead twigs, dead spruce	17	36.8	3	11.5
Lying tree, cut twigs	5	11.4	—	—
Old tree	8	18.2	2	7.7
Furze	2	4.5	—	—
Leafy shrubs	1	2.3	7	26.9
Young coniferous tree	11	25.5	14	53.9
Total	44	100.0	26	100.0

nest of the first brood are built more frequently in a heap of dead twigs or dead spruce (Fig. 1, type E) and on the lying trunks (type C), while the nest of the second brood are built rather in the young spruces and leafy shrubs (type A, G). For the nests of the first brood are recognized those, which were found at the end April and in May. The nests of the second brood and repeated one, after destruction of first brood are those which were built in June and July.

IV. SHAPE AND SIZE OF NEST

Prunella modularis builds the open nest, which has the shape of a solid, not too deep cup. Outside of the nest the sticks of spruce, stalks of fern or nettles are sticking out. All that material mostly set horizontally is loosely woven with each other and the protruding ends of the material are reaching up to 30 cm beyond the bulk of the nest, forming a characteristic "crown" which does not always appear. In the nest situated in the heaps of dead twigs or in a thick dogrose, the close neighbourhood of the nest seems to be like the first natural layer and the foundation of the nest is reduced to a few small twigs. The inside of the nest looks like not a very deep cup, which abandoned by the nestlings is often trampled and flattened. Table IV presents the range of dimensions of inner and outer diameters, height and depth, their arithmetic

Table IV

Survey of measurements of nests of the Dunnock

Measurement	Kind of nest	Number of nests	Range in cm	Mean	Standard deviation	Coefficient of variation
Inner diameter	new	63	5.1—6.5	5.8	0.4	7.19
	used	10	6.0—8.5	7.2	0.8	10.94
	total	73	5.1—8.5	6.0	0.7	11.02
Outer diameter	new	72	9.0—14.5	11.0	1.1	10.17
	used	13	10.5—17.7	12.4	1.9	15.53
	total	85	9.0—17.7	11.2	1.4	12.19
Height	new	66	4.0—13.0	7.9	1.9	24.14
	used	13	5.3—11.0	7.3	1.6	21.57
	total	79	4.0—13.0	7.8	1.9	23.83
Depth	new	59	2.3—6.0	4.1	0.7	15.99
	used	7	3.0—4.5	3.6	0.5	14.97
	total	66	2.3—6.0	4.0	0.7	16.34
Crown	total	51	4.0—32.5	17.2	6.9	39.97

means, standard deviations, coefficients of variation both for the nests newly built and the nests distorted by the nestlings. For the nests newly built, the greatest stability has the inner diameter (coefficient of variation 7.19). When the nest is inhabited by nestlings its depth changes very distinctly, while the height shows the least deformations.

V. NEST MATERIAL AND THE MANNER OF NEST CONSTRUCTION

The nest of Dunnock has a layer construction. When it is observed from the outside, there may be seen three distinct layers: the foundation, the nest-cup and the lining. All mentioned layers differ in their composition and in the manner of the arrangement of the material used for their construction. After cutting the nest, there may be often observed one additional, middle layer. The boundary between that layer and the nest cup is either very distinct or the passage of layer to another is rather gradual. The difference of the construction of the middle layer and the nest-cup is often completely invisible. So, from practical point of view in such cases there are three layers in the nest. In the case of nests, where the boundary between middle and nest-cup layers was invisible, both of them were treated as one middle + nest-cup layer. The results of the analysis regarding the composition of layers in 99 nests are presented on Table V. The material used for the construction of the middle layer and nest-cup layer was analysed in those nests, where the mentioned boundary was quite visible. The earliest build layer of the nest is the foundation mostly composed of dead sticks (Fig. 2-A). Only one of the 99 described nests had not

The results of qualitative analysis of the materials used for nest construction

Material	Layer	Foundation		Middle		Nest-cup		Nest-cup + Middle		Lining		Total	
		Number of nests	%	Number of nests	%	Number of nests	%	Number of nests	%	Number of nests	%	Number of nests	%
sticks:		98	99	16	61.5	6	23.1	22	32.8			99	100.0
of spruce		91	91.9										
others		15	15.2										
moss		27	27.3	20	76.9	26	100.0	67	100.0	36	46.8	99	100.0
grass		26	26.3	1	3.8	5	19.2	34	50.7	1	1.3	47	47.5
stalks		27	27.3	3	11.5	4	15.4	13	19.4			27	27.3
dry stems		10	10.1	14	53.8	2	7.7	14	20.9	1	1.3	35	35.3
dry leaves		20	20.2	13	50.0	6	23.1	21	31.3			49	49.5
dry leaves of fern		12	12.1	8	30.8	3	11.5	13	19.4	1	1.3	27	27.3
mould		7	7.0	13	50.0	3	11.5	29	43.3			45	45.5
needles		6	6.0	25	96.1	18	69.2	34	50.7	1	1.3	60	60.6
bast (fibres)		1	1.0	2	7.7	1	3.8	7	10.4			10	10.1
roots		7	7.0	1	3.8	6	23.1	7	10.4	10	12.9	27	23.7
bark		1	1.0	5	19.2	3	11.5	13	19.4			22	22.2
rotten leaves				13	50.0	5	19.2	19	28.3			33	33.3
animal's fur				5	19.2	20	76.9	26	38.8	64	83.1	77	77.7
hair						4	15.4	1	1.5	20	25.9	21	21.2
hulls of tillers				4	15.4	5	19.2	8	11.9			17	17.2
vegetal wool				1	3.8	3	11.5	3	4.5	1	1.3	7	7.1
sporophytes				1	3.8	8	30.8	6	8.9	23	29.9	33	33.3
feathers				3	11.5	5	19.2	5	7.5	15	19.5	16	16.2
hull of cones								1	1.5			1	1.0
clay				1	3.8	4	15.4	6	8.9			10	10.1
seeds of maple				1	3.8			1	1.5			2	2.0
threads										3	3.9	3	3.0
Number of nests with described layer		99	100.0	26	100.0	26	100.0	67	100.0	77	100.0	99	100.0

the foundation layer built of sticks, but of dead leaves and needles. The sticks are bent (12 nests) or confused (9 nests). Among dead sticks there are often the grasses, stalks, dead leaves and moss. The foundation of the nest is so loose construction, that usually after nest removal from the shrub, it easily breaks and goes to pieces. The next layer, toward the centre of the nests is the middle layer, which is almost invisible when seen from the outside. That layer is thickest at the bottom and often does not reach to the upper edge of nest (Fig. 2-B). The mean thickness of the middle layer in 6 measured nests was 13.8 mm (fluctuation: from 7 to 30 mm). The material of the middle layer is very varied, usually composed of grasses, stalks, tree-needles, moss, dead sticks, dead leaves, bark and hulls of buttons. All that stuff is often stuck together with rotten

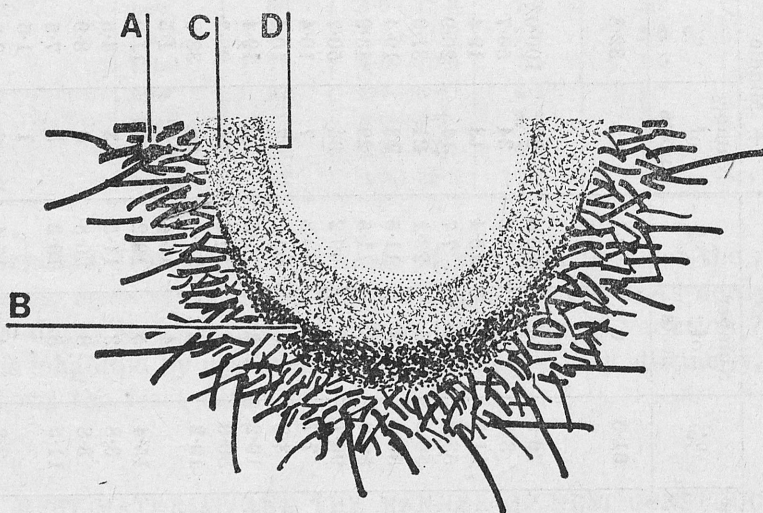


Fig. 2. Cross-section by the nest of Dunnock: A — foundation (base), B — middle layer, C — nest-cup, D — lining

leaves, mould and clay forming a very compact and hard layer. Similarly differentiated and very approximated, considering the quality of material components, is the next layer, which forms the nest-cup. It is true, that frequently the same components may be found in the middle layer, as well as in the nest-cup layer, but owing to the different proportions it may be said, that both layers are completely individuals. In the middle layer the brown colour of dead leaves and rotten parts of various plants predominates and stand in contrast with the green moss of the nest-cup layer. In the nests where the passage of the middle layer into the nest-cup layer is indistinct, the material the nearer the center of nest becomes more delicate and soft. The material consist of smaller and smaler rotten vegetal fragments, whereas the green moss interwoven with hair is predominating component. The gradual change of components causes, that very compact and stuck together the middle layer, passes unnoticeably into the soft, elastic and strongly woven nest-cup layer. The nest-cup layer

forms the shape of the nest. The thickness of that layer is more or less the same in the whole nest, but some-times slightly enlarging up to the edge of the nest. The mean thickness of the nest-cup layer in 6 measured nests was 13.2 mm, and on their edges 14.7 mm. The main component of the nest-cup layer is always the moss. Besides it, may be found hair, tree-needles, pieces of leaves, sporophytes, rootlets, grasses, hulls and feathers. Comparing the materials used for the construction of middle layer and the nest-cup layer, the material of that last one is more delicate e. g. in the middle layer may be found whole dry leaves, thick stalks, long fir needles, whereas in the nest-cup the material is softer and more delicate, such as: pieces of leaves and needles or short and fine stalks. The ring, which forms a very solid edge of the nest may be not isolated. It was observed, that only in some nests, long hair were placed round the edges of the nests.

The inner layer of the nest is the lining. Usually it is a thin layer consisted of animal's fur (hare's, wild boar's, squirrel's, roe-deer's, fox's, dog's) and moss. Frequently enough in that layer may be found sporophytes of mosses and animal's hair such as deer's, horse's hair and wild boar's bristle. The feathers and rootlets are also used for the lining layer. Some other materials such as the grasses, tree-needles, threads etc. may be found in the lining layer only occasionally. The lining layer, as it is observed, reaches the edges of the nest-cup layer, but never sticks out beyond them. So, looking down at the nest the sticks may be seen from all sides, sticking out from the foundation, as well as the green moss, which forms the nest-cup layer. The analysis of the materials of 39 nests was carried out not only to state their presence, but also the quantity of the particular components in each layer. The obtained results of the analysis are shown in Table VI (materials met only occasionally were not included). The most important differences may be observed in the quantity of sticks, moss and animal's fur. The sticks are always in large quantities in the foundation layer. In the middle layer the sticks may be frequently met, they are always short (1—4 cm) and in small quantity. It was stated, that the sticks are only sporadically built into the nest-cup layer. The constructive material of the nest-cup and lining layers is mainly the moss. In the middle, as well as in the foundation layers the moss may be met, but not always and only in small quantities. The animal's fur may be found in the two external layers of the nest, but predominantly it is the component of the lining and nest-cup layers. It was also observed, that in the nest-cup and lining layers, almost exclusively are built in, such materials as sporophytes and feathers, whereas the touchwood, stalks and dead leaves are predominant components of the external layers (the foundation and middle layers). The frequent component of the nest are also the tree-needles. That component may be found in each layer but mostly in insignificant quantity. In the composition of the nest take part several other components, such as stalks, phloem, rootlets, hair, bark, hulls and mud, but their occurrence is relatively rare and their quantities are insignificant, much smaller than the tree-needles.

VI. DISCUSSION

HANZÁK (1974) characterizes in the following way the occurrence of Dunnock: "In western Europe e. g. in England and France, Dunnock inhabits parks, gardens and squares, where it nests in the shrubs and hedges. Moving eastward, *Prunella modularis* changes the character of the environment. In middle Europe the bird inhabits higher situated coniferous and mixed forests, but mostly the spruce forests. At the end of the last century Dunnock was still a typical mountain bird. It is not long ago when the Dunnock inhabited the lowlands". The existing descriptions of the Dunnock's nesting, confirm not uniform character of its occurrence.

In the forests Dunnock nests, as a rule, in young conifers and in heaps of dead twigs. Such sites of nesting are given by the authors, who observed the bird's life in the forests little changed in their natural characters (TACZANOWSKI, 1862, 1882; DEMENTIEV, GLADKOV, 1954; FEDYUSHIN, DOLBIK, 1967; FERIANC, 1965; GOTZMAN, JABŁOŃSKI, 1972; HAARTMAN, 1969; KRZYWIŃSKI, 1965; MIKHEEV, 1976; SOKOŁOWSKI, 1958). The authors from western Europe however, inform that the Dunnock nests often in parks, gardens and hedges, which are rather not met in eastern Europe (CAMPBELL, FERGUSON-LEES, 1972; HARRISON, 1975), the bundles of poles (CAMPBELL, FERGUSON-LEES, 1972; GREVE, 1970), the stacks of corn (BANNERMAN, 1954), old nests of other birds (HARRISON, 1975; BANNERMAN, 1954; CAMPBELL, FERGUSON-LEES, 1972). On the base of the observations, chiefly in Britain, list of plants in which Dunnock builds its nest may be extended on brables, briars, gorse, holly, box, rhododendrons, privet, elder, blachthorn, stock of trees, hedge stocks trailers, such as ivy, clematis, honey-suckle, hops, ferns, nettles, fruit bushes (CAMPBELL, FERGUSON-LEES, 1972). On that background, the material actually gathered shows that Poland is the transient area for the Dunnock. Most frequently *Prunella modularis* may be seen in the mountains and the plateau region in southern Poland (GOTZMAN, JABŁOŃSKI 1972; POMARNACKI, 1962; SOKOŁOWSKI, 1958; TOMIAŁOJCZAK, 1972), but lastly more frequently it may be seen in lowlands, in the biotopes changed by the human interference such as parks, gardens and cemeteries. The list of shrubs, particularly leafy ones, in which Dunnock builds its nest is not so rich, as it is in England, but in comparison with Finland (HAARTMAN, 1969) or U. S. S. R. territories, in Poland Dunnock's nest may be more often found in leafy shrubs (8% of actually found nests). It appears that actually in Poland under observation there is significantly larger variety of the biotopes and nest sites (own material, GOTZMAN, JABŁOŃSKI, 1972; HABER, 1961; NOSKIEWICZ, 1950) than it may be seen from nineteenth century data of TACZANOWSKI (1862, 1882).

The materials gathered during actual studies confirm some few data, concerning the nesting height above the ground, shape and dimensions of the nest. The height of the nest-site above the ground, given by all authors (CAMPBELL, FERGUSON-LEES, 1972; DEMENTIEV, GLADKOV, 1954; FEDYUSHIN, DOLBIK, 1967;

FERIANC, 1965; MAKATSCH, 1959, 1976; HAARTMAN, 1969; HABER, 1961; HARRISON, 1975; HARTERT, 1905; KRZYWIŃSKI, 1965; MIKHEEV, 1975; NAUMANN, 1905; NOSKIEWICZ, 1950; READE, HOSKING, 1974; TACZANOWSKI, 1862) is contained in the height limits, actually presented. The most similar results of the measurements are given by CAMPBELL, FERGUSON-LEES (1972) and HAARTMAN (1969). The last author bases on the material, which is quantitatively approximated to the actual one. Therefore, it may be assumed, that the height at which the Dunnock places the nest, is the same in the whole area of its distribution (mean height is somewhat below 1.0 m). Most numerous groups of nests is, in the face of that fact, situated at height between 0.5—1.5 m above the ground and the nests built at height 2—4 m happen very seldom. The nests set on the ground level are very rare (BANNERMAN, 1954, HAARTMAN after HISINGER, 1969, READE, HOSKING, 1974). To the very rare exceptions belong also the nests built at height over 4 m (6.5 m — HAARTMAN after PUTKONEN, 1969). All dimensions of nests given by different authors (CAMPBELL, FERGUSON-LEES, 1972; DEMENTIEV, GLADKOV, 1954; DONČEV, 1961; FEDYUSHIN, DOLBIK, 1967; GOTZMAN, JABŁOŃSKI, 1972; KRZYWIŃSKI, 1965; MAKATSCH, 1976; MIKHEEV, 1975; TACZANOWSKI, (1862) are not only contained in the measurements limits actually given for newly built nests, but have even considerably smaller fluctuations, particularly in case of the height and depth of the nest. Only MIKHEEV (1975) and TACZANOWSKI (1862) give the value for outer diameter 7.5 cm and 8.0 cm, which is lower than the bottom limit of actually given dimension.

The most characteristic components of the nest material are stick, moss fur fragments, feathers and hair. These components are quite clearly visible when the nest is seen from the outside. It is certainly the cause, for which the sticks, moss and fur fragments are mentioned by all authors. In all papers accessible for me the description of the nest is based on the its external appearance. The differentiated composition of the material and the existence of layers was observed only by KRZYWIŃSKI (1965), who on the example of one nest, gives, after all, enough meagre list of the materials entering in its composition. Different authors characterize the composition of the lining layer in different way. According with the opinion of some researchers (DEMENTIEV, GLADKOV, 1954; FEDYUSHIN, 1976; MIKHEEV, 1975; NAUMANN, 1905; POMARNACKI, 1962) the characteristic trait of Dunnock is to line the nest with russet sporophytes of moss. Other authors (CAMPBELL, FERGUSON-LEES, 1972; DONČEV, 1961; HARRISON, 1975; HARTERT, 1905; KRZYWIŃSKI, 1965; NOSKIEWICZ, 1950; OKO, 1961) do not mention the sporophytes, stating only that the nest, as a rule, is lined with fur fragments or with moss, feathers and rootlets. On the basis of the analysis actually carried out, it may be stated, that the most characteristic component of the lining layer are hair (83% of nests) and then moss (47% of nests). The russet sporophytes of moss were met in 30% of nests, sometimes in not important quantity. There were also met the nests, which the nest-cup layers had more sporophytes than the lining layer. *Prunella mo-*

dularis often brings to the nest the whole moss stems together with sporophytes, and therefore they may be found in the whole bulk of the nest and not only in the lining layer. Probably, in the lining layer the sporophytes are most visible and as they are in contrast with blue colour of the eggs, they become an easy trait to remember as very characteristic one for Dunnock's nest. It is possible, that this phenomenon is typical only in some regions of the Dunnock's distribution (POMARNACKI, 1962). Generally however, the lining material is not the characteristic trait, for were met the nests lined only with black rootlets (nests from Bulgaria — DONČEV, 1961, and own materials) or the nests in which the lining layer consisted only of feathers.

The following characteristic traits for Dunnock's nests should be taken into consideration: the height of nesting above the ground, the nest-site in place well covered and invisible and, finally, the general construction of nest consisted of sticks and moss (these components are occurring in 100% of nests).

VII. DUNNOCK'S NEST CONSTRUCTION ON THE BACKGROUND OF NESTS OF OTHER REPRESENTATIVES OF THE GENUS *PRUNELLA*

Typical palearctic family *Prunellidae* includes 1 genus *Prunella*, to which belong 12 species (CLEMENTS, 1974; VAURIE, 1959). The distribution of some species is limited (e. g. *Prunella rubida* to the Japanese islands only) or very large one as e. g. *Prunella collaris*, which inhabits the majority of high mountain areas of Palearctic. All representatives of that family however, are nesting predominantly in the mountains, inhabiting the alpine stage (*Prunella collaris*, *himalayana*), dwarf mountain pine zone (*Prunella fulvescens*, *montanella*, *koslovi*, *rubeculoides*, *rubida* and *modularis*) or upper forest zone (*Prunella immaculata*, *strophinata*, *atrogularis* and *modularis* — VIETINGHOFF-SCHEEL, 1977). The distribution in relatively inadequately examined, from ornithological point of view, part of the world as Middle and Eastern Asia, as well as the nesting considerably height in the mountains may be the cause of very scarce informations on the nesting problem of almost all representatives of *Prunellidae*. On the basis of examined nests, gathered in Zoological Museum of Moscow University and in the collection of Dr. V.V. LEONOVICH (Moscow) and the data concerning nest construction, contained in the literature, it may be possible to describe a short characteristic of the nests of some species.

Prunella collaris (SCOPOLI, 1769). That species nests from Portugal to Japan in alpine zone through the whole Palearctic. Thanks to the widespread distribution of the bird, there are existing fairly enough descriptions of the nests (ALI, RIPLEY, 1973; DEMENTIEV, GLADKOV, 1954; DOLGUSHIN et al., 1972; DYRCZ, 1976; FERIANC, 1965; GOTZMAN, JABŁOŃSKI, 1972; HARTERT, 1905; MAKATSCH, 1976; NAUMANN, 1905; SCHIFTER, 1970; TACZANOWSKI, 1862; 1882 TICEHURST, WHISTLER, 1927; WHISTLER, 1925). On the basis of those descriptions, it may be stated, that *Prunella collaris* builds its nest every where, where

only may be found for it a good hiding conditions. The nest of *Prunella collaris* may be found in crevices, cavities, rocky cracs, landslips, among stones, under ledges and shrubs. It may be also found, but very occasionally in the tree holes. In the nest construction may be distinguished 3 layers: outer layer of grasses, stalks, rootlets and sometimes of straw, middle layer mostly built of moss and layer built of hair, vegetal wool, moss sporophytes and rootlets. The nest dimensions: outer diameter 7.5—20 cm, inner diameter 5.8—8.0 cm, height 3.5—7.0 cm, depth 2.5—4.5 cm.

Prunella himalayana (BLYTH, 1842). One nest from Alma-Ata surroundings preserved in Zoological Museum and descriptions enclosed in the works of ALI, RIPLEY (1973), DEMENTIEV, GLADKOV, (1954), DOLGUSHIN, et al. (1972), YANUSHEVICH et al. (1960), KYDYRALIEV (1965). *Prunella himalayana* nests on the ground, in hollows, cavities and niches. The nests are, as a rule, covered by the tuft of grasses, a shrub or even a stone. Three layers may be distinguished in the nest construction. The first one is loosely built of grasses, stalks, leaves, rootlets and sometimes of moss. The middle layer is compact, built of small plant fragments, such as fibres, leaves and soft stalks. That layer is closely woven and makes some sort of a mattress. The nest is lined with moss, animal's fur, hair, feathers, little leaves and grasses. The nest dimensions (6): outer diameter 9—15 cm, inner diameter 6—7.4 cm, height 4—7 cm, depth 3—5.5 cm and thickness of walls 3—3.5 cm.

Prunella fulvescens (SEVERTZOV, 1872). One nest, preserved in the collection of Dr. V. V. LEONOVICH and the nest descriptions enclosed in the works of ALI, RIPLEY (1973), DEMENTIEV, GLADKOV (1954), DOLGUSHIN et al. (1972), YANUSHEVICH et al. (1960), KOZLOVA (1975), KYDYRALIEV (1962), PORTENKO, VIETINGHOFF-SCHEEL (1977), POTAPOV (1966) and VINOKUROV (1961). *Prunella fulvescens* builds its nest on the ground level or not very high above it — up to 60 cm, sometimes at the height of 1—1.5 m and only exceptionally up to 5 m. The nest built above the ground is usually sited in shrubs, rarely in trees (fir) or in the human constructions, such as different buildings or slits in the heap of boxes. If there is lack of the suitable sites for nest construction above the ground, then they are built just on the ground, in niches, rock crevices, under stones and shrubs. In the nest may be distinguished 3 layers: the outer layer built of thin twigs, rootlets and grasses, the middle layer of delicate grasses, moss, stalks, and the lining layer built of animal's fur, horse hair, vegetal wool and feathers. Sometimes in the lining layer may be met fine rootlets, stalks and grasses. The nest dimensions (31): outer diameter 8.7—11 cm, inner diameter 5—7.6 cm, height 4.7—8 cm, depth 3—5.5 cm.

Prunella montanella (PALLAS, 1776). One nest preserved in the collection of Dr. V. V. LEONOVICH and the descriptions of nests enclosed in the works of DEMENTIEV, GLADKOV (1954), HARTERT (1905), KOZLOVA (1975), KRECHMAR (1966), MAKATSCH (1976) and WOROBIEV (1959). The nest is placed above the ground at the height of 0.4—2 m in the shrubs, young and old trees (binch, fir, larch, poplar), slipped beyond the bark of an old tree. In the nest 3 layers may be distin-

guished: the outer layer built of thin twigs, stalks, sticks, rootlets and sometimes of moss, the middle layer, which consists of grasses, moss, mould, and the lining layer made of moss, grasses, hair, animal's fur, fibres, sporophytes, feathers and sometimes dry needles. The nest dimensions (3): outer diameter 12—12.5 cm, inner diameter 5.5—6.5 cm, height 7—8 cm, depth 3.5—5.0 cm.

Prunella koslovi (PRZEWALSKI, 1887). The nesting of the bird is described by KOZLOVA (1975). The nest is placed exactly in the middle of a spiny shrub at the height of 0.25—0.5 m above the ground. There were found two nests well hidden in the *Caragana* twigs. The outer layer of the nest walls, from thin twigs and the young leaves. The base of the nest from the external side is very solid and compact. Its construction consists of many layers of vegetal material. The nest dimensions: inner diameter 3.5—5.5 cm, height 9.0—9.5 cm, depth 4.7—5.0 cm.

Prunella rubeculoides (HORSFIELD and MOORE, 1854). The descriptions of nests are enclosed in the works of ALI, RIPLEY (1973), HARTERT (1905), VIETINGHOFF-SCHEEL (1977) and WHISTLER (1923, 1925). The nest is placed under shrubs, among clumps of sedges, or low, in thorny furze bordering streams, occasionally in a hollow in the bank of a stream, in the path of the coarse tufts of rushy grass, or in the shrub. The nest is built of grasses, stalks, rootlets, moss, and is lined with moss, animal's hair and feathers. There are no data about the nest dimensions.

Prunella rubida (TEMMINCK and SCHLEGEL, 1848). According to the opinion of DEMENTIEV and GLADKOV (1954) *Prunella rubida* nests in the shrubs. The nest is built of animal's hair, feathers and fur.

Prunella strophiatea (BLYTH, 1843). The nest descriptions are in the works of ALI, RIPLEY (1973), HARTERT (1905), HUME (1890), VIETINGHOFF-SCHEEL (1977). The nest is sited above the ground in the tufts of grasses or at height up to 3 m in low shrubs, in rhododendrons in thorny furzes, dwarf shrubs or in coniferous tree twigs. The nest is built of moss, rootlets, grasses, lichens and lined with hair, animal's fur, grasses and feathers. The data of the nest dimensions are absent.

Prunella atrogularis (BRANDT, 1844). Two nests preserved in the collection of Dr. V. V. LEONOVICH and the nests descriptions (DEMENTIEV, GLADKOV, 1954; DOLGUSHIN et al., 1972; YANUSHEVICH et al., 1960; KOZLOVA, 1975; MAKATSKH, 1976; SHNITNIKOV, 1949). The nest is built above the ground at height from 0.3 to 18 m, but most frequently it is placed at height from 1 to 2 m. Usually the nest is built in the shrubs, young trees and old coniferous trees predominantly in the firs. In the nest 4 layers may be distinguished. The external layer (base) is built of dead twigs, stalks, grasses and lichens. The middle layer consists of grasses, and lichens. The middle layer consists of grasses, stalks, moss and vegetal wool. The next layer toward to the centre of nest, consists mainly of moss, animal's hair and grasses. The nest is lined with animal's fur, hair, feathers and moss. The nest dimensions (37): the outer diameter 9—15 cm, inner diameter 4—7.8 cm, height 4.6—10.5 cm, depth 2.4—7.5 cm.

Comparing above presented nests descriptions, it may be stated, that all representatives of the genus *Prunella* build open nests. Almost all nests are very well covered. All described nests include grass and in their lining there are always animal's hair, sometimes as a small addition to the rest of materials. Besides above mentioned common traits of nests, there also exist the differences in the manner of nesting. A part of *Prunella* species nests on the ground, especially those, which inhabit the alpine zone e. g. *Prunella collaris* and *himalayana*. The second group of species are those, which nests above the ground. To that group belong: *Prunella montanella*, *ocularis*, *kozlovi*, *rubida*, *strophciata*, *atrogularis* and *modularis*. There is also an intermediate group to which belong *Prunella fulvescens* and *rubeculoides*. The birds belonging to those two species, build their nests on the ground level, as well as above it. The nests of *Prunellidae* representatives differ also in the composition of nest material. The birds, which build their nests on the ground do not use sticks. Their nests are composed predominantly of grasses, stalks and rootlets. The moss not always is a component of the nest, and sometimes if it is, represents only a small quantity. It was also stated, that in the species nesting above the ground, such as *Prunella rubida*, *kozlovi*, *montanella*, *fulvescens* and *rubeculoides*, the moss not always takes part in the nest construction. Nearly all nests built above the ground have their foundation layer made of dead sticks. The moss as the main component of the nest construction is met in such species as: *Prunella modularis*, *strophciata* and *atrogularis*. The distinction of *Prunella collaris* and *himalayana* (owing to the nest site, always on the ground), as well as *modularis*, *strophciata* and *atrogularis* (owing to the presence of a thick layer of moss), remains in accordance with ecological differentiation and vertical distribution of particular species (VIETINHOFF-SCHEEL, 1977) and may be connected with their presence in different zones of the vegetation.

KOZLOVA, (1966, 1975), chiefly on the base of the classic, taxonomic traits, such as the colour of plumage or distribution of particular species, considers the Dunnock very closely related with *Prunella rubida* and *immaculata*. KOZLOVA (o. c.) also considers, that *Prunella atrogularis* together with *Prunella ocularis* and *kozlovi* form one group. Comparing the nests of *Prunella modularis* with other representatives of the genus *Prunella*, it may be stated, that owing to the manner of nesting, height at which the nest is placed above the ground, the materials used for building of the nest, the existence of layers and their particular composition, described in this paper, the Dunnock is very similar to *Prunella atrogularis*.

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STRESZCZENIE

Представiony w obecnej pracy opis gnieźdźdenia się płochacza pokrzywnicy dotyczy usytuowania, materiału, sposobu budowy oraz kształtu i wielkości gniazda. Materiał pochodzi z całej Polski, głównie jednak z okolic Ojcowa. Gniazda budowane są od kilkunastu centymetrów do 4 metrów nad ziemią. Najwięcej gniazd budowanych jest na wysokości do 2 m nad ziemią, a przeciętna wysokość dla 107 gniazd wynosi 0,92 m (tab. I). Gniazda są wciśnięte między gałązki rosnącego lub suchego krzewu lub drzewa albo np. między suchymi gałęziami leżącymi na stosie (ryc. 1). Najwięcej gniazd znaleziono na świerkach. Gniazdo pokrzywnicy jest zawsze oparte od spodu na jednej grubszej lub kilku cieńszych gałązkach. Najwięcej gniazd było zbudowanych na młodych drzewach szpilkowych. Drugie miejsce zajmują stosy suchych gałęzi. Na krzewach liściastych (przeważnie koleczastych) znaleziono 8% gniazd (tab. II). Bez względu na sposób umiejscowienia, gniazda są przeważnie bardzo dobrze ukryte. Gniazda

I lęgu budowane są częściej na stosie suchych gałęzi oraz na leżących drzewach, natomiast gniazda II lęgu znajdują się raczej na młodych świerkach oraz na krzewach liściastych (tab. III). Wymiary badanych gniazd zostały zestawione w tabeli IV. Najbardziej stałym wymiarem jest średnica wewnętrzna. Gniazda są budowane z materiału pochodzenia roślinnego i zwierzęcego (tab. V), najczęściej używane są patyki, mech i sierść. Gniazda mają budowę warstwową (ryc. 2). Warstwy różnią się rodzajem materiału i sposobem jego ułożenia. Różnice w ilości najważniejszych składników gniazda w zależności od warstwy przedstawia tabela VI.

Na podstawie obecnych obserwacji oraz w oparciu o wyniki innych autorów można sądzić, że polska populacja pokrzywnicy jest pośrednią między wschodnioeuropejską, gdzie ptaki te żyją w lasach gór i pogórza, a populacją przeważnie parkowo-ogrodową Europy Zachodniej. Jako cechy charakterystyczne dla gniazd pokrzywnicy można przyjąć wysokość umiejscowienia nad ziemią, budowanie ich w dobrze ukrytych miejscach, oraz ogólny pokrój gniazda, zbudowanego w znacznym stopniu z patyków i mchu z dodatkiem innych składników. Po omówieniu i porównaniu gnieźdzenia się *Prunella modularis* i innych przedstawicieli tego rodzaju można stwierdzić, że gniazda *Prunella modularis* są najbardziej zbliżone do gniazd *Prunella atrogularis*.

Redaktor pracy: doc. dr Z. Bocheński

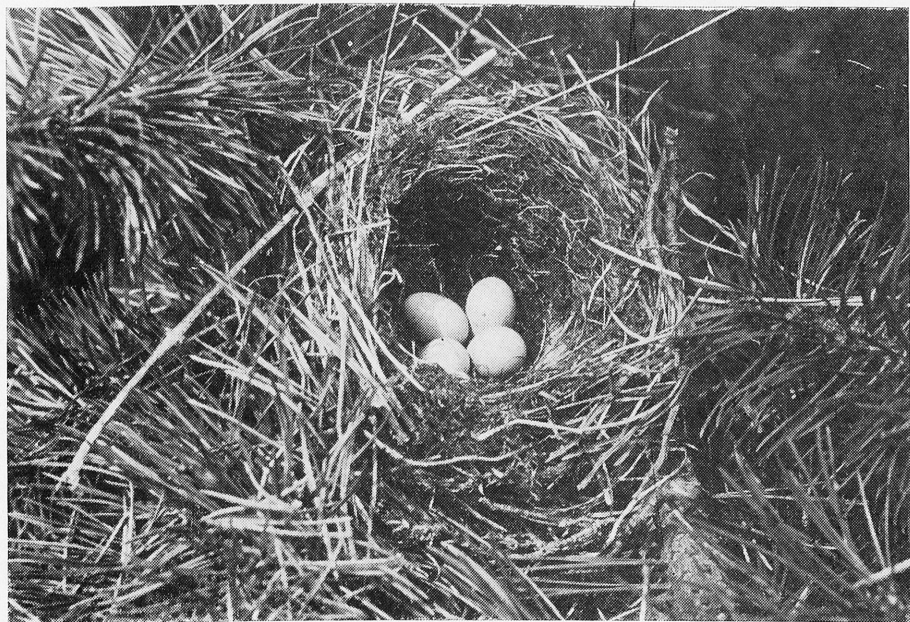
Plate XII

Phot. 1. The nest of Dunnock, *Prunella modularis* in a young spruce. The nest-site corresponds to the type A in Fig. 1. Photo: Z. Bocheński

Phot. 2. The nest of Dunnock *Prunella modularis* in dwarf mountain pine. The nest-site corresponds to the type D in Fig. 1. Photo: B. Ivanov



Phot. 1

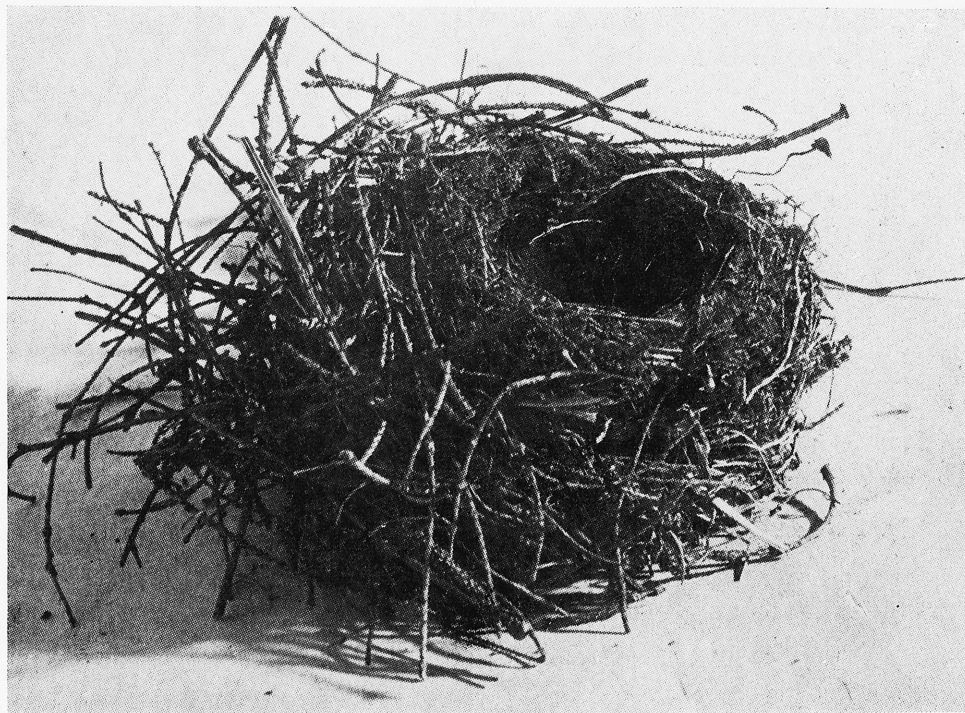


Phot. 2

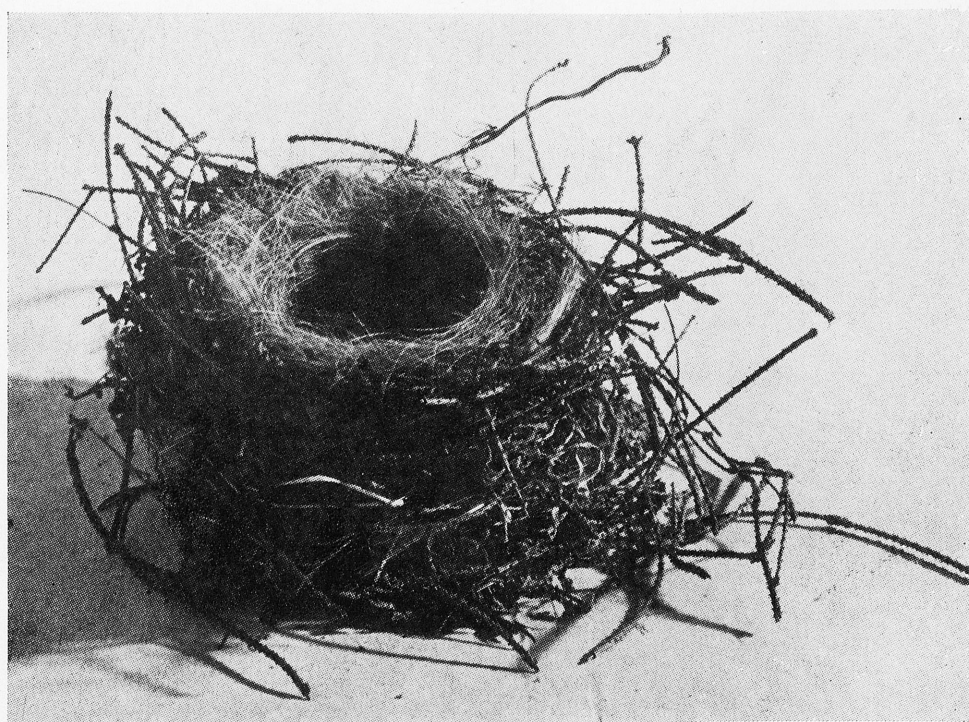
Plate XIII

Phot. 3. The nest of Dunnock, *Prunella modularis*, isolated from its environment. The nest is mainly with moss. Photo: K. Jakubek

Phot. 4. The nest of Dunnock, *Prunella modularis*, isolated from its environment. The lining layer consists mainly of hair. Photo: K. Jakubek



Phot. 3

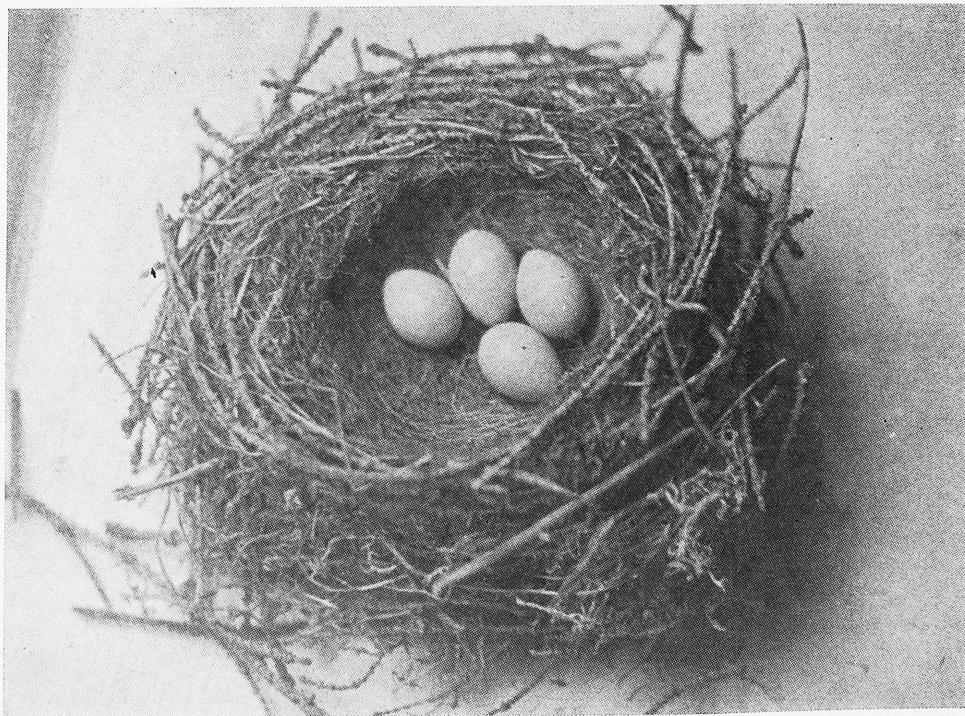


Phot. 4

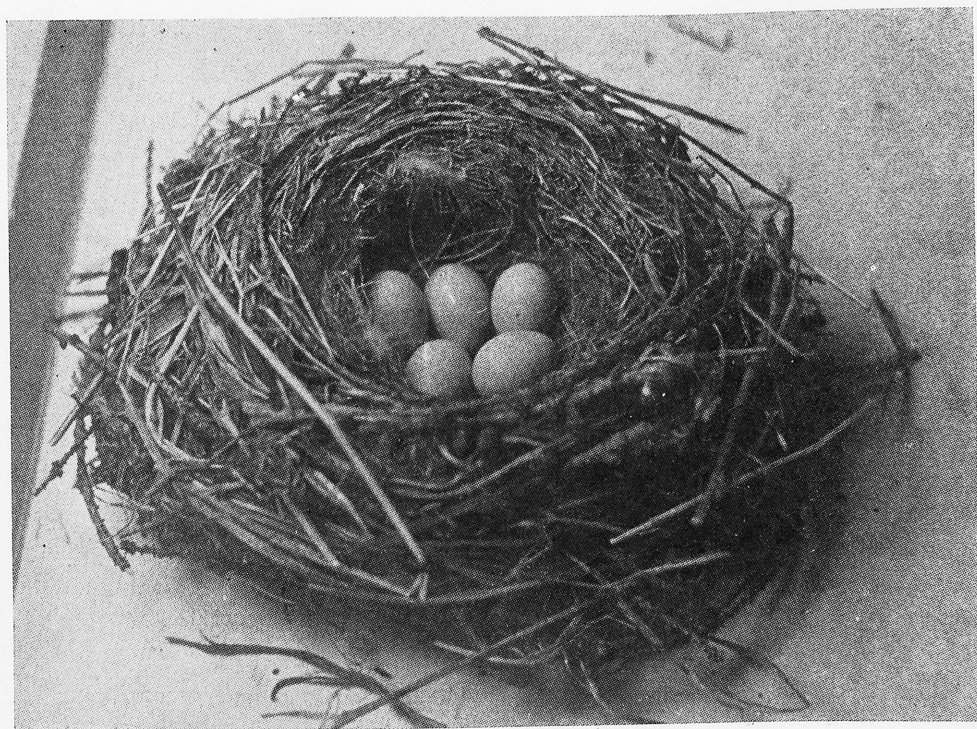
Plate XIV

Phot. 5. The nest of *Prunella atrogularis huttoni* isolated from its environment (in the collection of V. V. LEONOVICH). Photo: Z. Bocheński

Phot. 6. The nest of *Prunella montanella* isolated from its environment (in the collection of V. V. LEONOVICH). Photo: Z. Bocheński



Phot. 5

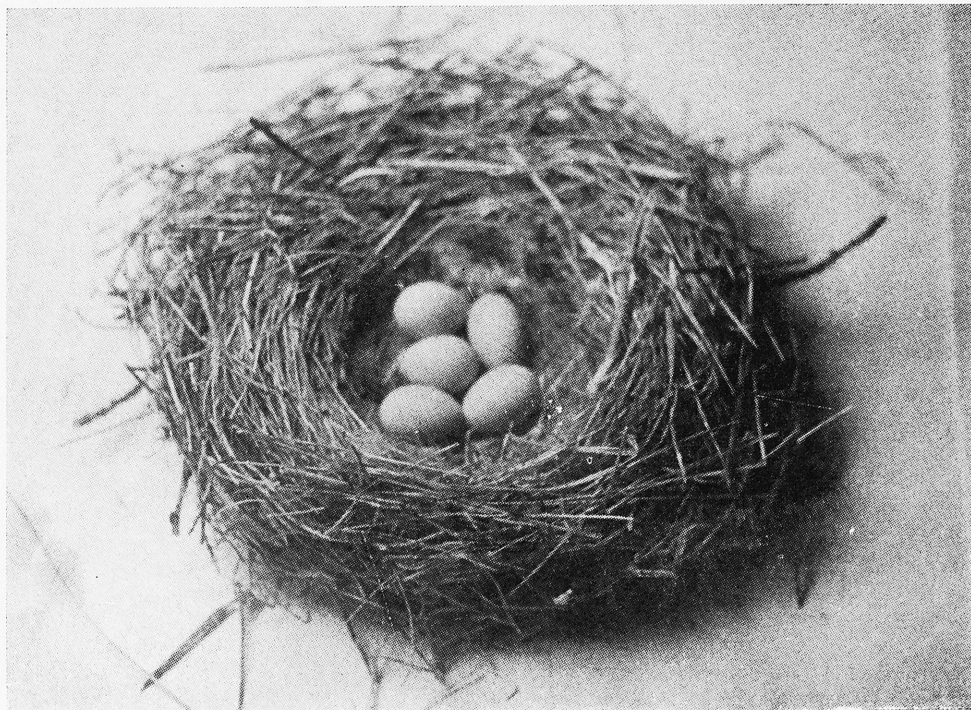


Phot. 6

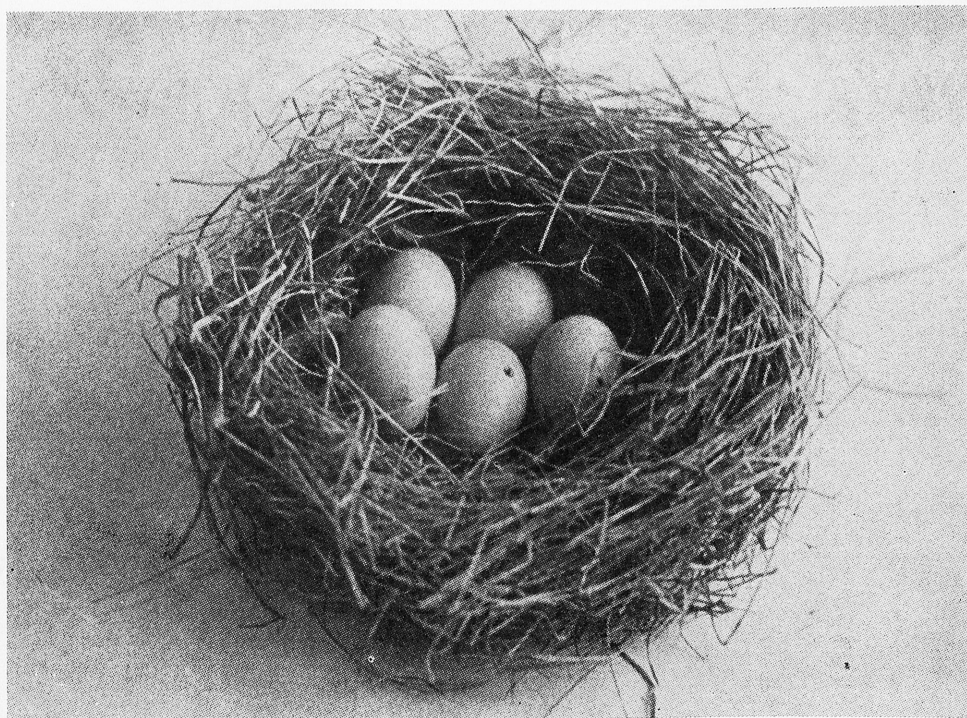
Plate XV

Phot. 7. The nest of *Prunella fulvescens* isolated from its environment (in the collection of V. V. LEONOVICH). Photo: Z. Bocheński

Phot. 8. The nest of *Prunella himalayana* isolated from its environment (in the collection of Zoological Museum, Moscow University). Photo: Z. Bocheński



Phot. 7



Phot. 8