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The Ringing of Trees by Some European Woodpeckers.

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Introduction.

The ringing or drilling of some trees by woodpeckers in the Old World has been known long ago and in the last century BREHM and ALTUM had mentioned it as a »rare phenomenon» among the European woodpeckers. In the third decade of the present century this habit of some woodpeckers was widely discussed in some German and Swiss technical papers; later on STRESEMANN noted data on the ringing in his excellent »Aves» of Kükenthals' Handbuch, and in the Handbook of British Birds are some data on the subject also. In the Soviet literature mention is made of the ringing in FORMOZOV's papers (not referred to here), while the most complete paper dealing with the matter is by OSMOLOVSKAJA (1946) based on her own investigations.

From the Carpathians there are some data on ringing in TURČEK's (1949) papers.

Up to the present time a compilation of these very interesting data has been wanting. The present paper will contribute to the unsolved problem of tree-ringing and sap-sucking by woodpeckers in Central Europe, according to the author's own observations in the forested areas from the Danube to the Carpathians. Attention is paid to the data found in the literature available.

Woodpeckers (species) ringing.

It is generally assumed that the ringing (drilling) and sap sucking is a peculiarity of the food habits of some Nearctic *Picidae,* a property of the New World woodpeckers due to their wider ecological divergence (HUXLEY 1948). While the acorn-storing and catching

insects on the wing — mentioned by HUXLEY, l.c., as habits characteristic of American species only — are uncommon among European woodpeckers, egg stealing and sap-sucking is known in European species, too. A difference between the American and European woodpeckers — regarding ringing — is, however, in the extent and intensity of ringing, and the work of European species not so striking. Finally, in Europe — so far as is known — ringing is restricted to the green part of the year, from about early March to summer, just as the flow of sap is restricted in the temperate zone. It is of some interest that in North America there are (BENT 1939) 1 family, 10 genera and 22 species of woodpeckers, while in Central Europe there are 1 family, 4 genera and 9 species of these birds. Of the American species 5 (about a quarter) drill and suck the sap, while in Europe 4 species do so, thus about half of the species.

Concerning the woodpecker species that do drill trees in Europe we can find little authentic data in the literature. The majority of them concern the Great Spotted Woodpecker, *Dryobates major* (HEINZ 1926, OSMMOLOVSKAJA 1946, TURČEK 1949, WITHERBY et al. 1945) and it is certain that this species drills the most. OSMOLOVSKAJA (l.c.) does mention the two further spotted species: *D. medius* and *D. minor,* but not from her own experience. The second ringing specis is the Black Woodpecker, *Dryocopus martius* (HEINZ l.c., NECHLEBA 1928, WINKLER 1931 and the author's own observations in the Carpathians). As regards the Green Woodpecker *(Picus viridis)* mention is made in OSMOLOVSKAJA lc., WITHERBY et al., l.c. and TURČEK l.c. Finally the Three-toed Woodpecker (*Picoides tridactylus*) was found ringing by OSMOLOVSKAJA l.c. and the author is aware of it from the Carpathians. Of these species that ring trees, *Dryobates major* is the most herbivorus (seeds), *Picoides tridactylus* the most insectivorous species. As to community, *Picoides* and *Dryocopus* are the most stenotopic, *Dryobates* and *Picus* more eurytopic. It is, further, probable that some other species of European woodpeckers also feed on sap or cambium and further investigations are needed.

Trees ringed.

In the literature there is a list of tree species ringed by woodpeckers which indicates the preference of some species. In the following list the tree species aren given, compiled from various (cited)

authors' while the species with an asterisk, hitherto not mentioned in the literature as ringing, have been found by the author in the area studied.

Species	Authority
x *Taxus baccata*	Turček.
Abies pectinata	Pauscher, Osmolovskaja, Schwerdtfeger 1944, Turček.
Picea excelsa	Knuchel, Leibundgut, Winkler, Schwerdtfeger, Hess—Beck 1927, Osmolovskaja.
x *Larix decidua*	Turček.
Pinus silvestris	
Pinus nigra	Knuchel, Leibundgut, Schwerdtfeger, Hess—
Pinus cembra	Beck, Osmolovskaja, Witherby, Turček.
x *Pterocarya sorbifolia* (exotic) .	Turček.
Betula pendula	Hess—Beck, Osmolovskaja, Turček.
Alnus sp.	Hess—Beck, Osmolovskaja.
x *Carpinus betulus*	Turček.
Fagus silvatica	Hess—Beck, Osmolovskaja, Pauscher.
Quercus robur, sessilis et al. .	Hess—Beck, Groessinger, Nechleba, Osmolovskaja, Schwerdtfeger.
x *Ulmus campestris*	Turček.
Sorbus aria, S. aucuparia	Groessinger.
Prunus domestica	Osmolovskaja.
Acer pseudoplatanus	Osmolovskaja, Pauscher.
x *Acer campestre, A. negundo* ..	Turček.
Pyrus malus	Osmolovskaja.
Tilia platyphyllos, cordata ...	Hess—Beck, Osmolovskaja, Witherby *et al.*, Turček.

Table 1. *Technical names of tree species, ringed by European woodpeckers.*

Among the conifers the most preferred species for sap sucking is the pine, while among deciduous trees the oaks, basswoods (limes), birch and maple are the species mostly ringed. The preference exists but is not general, for I have found the fir mostly ringed in mountains (beech-fir-maple virgin forest) and similarly Osmolovskaja, l.c., has found this species ringed in 22 out of 27 cases. Trees are ringed everywhere: in virgin stands as well as in regenerating ones and single trees in parks, orchards or hedges in the field. The majority of authors agree that the trees most attacked are those »mixed in», thus »foreign to the community», *mutatis mutandis* as the »mixed-in», trees are attacked by red and roe deer, by hare, etc. This might be considered as the resistance of the environment

against »intruders», against foreign species or kinds not belonging to the community. This is a property of biocoenoses and in another paper (in the press) I have shown that there exists in forest biocoenoses a group of both plants and animals functioning just like a filter: this is the edge of the forest as such.

A further question is the part of the tree drilled. While some authors are of the opinion that the top-parts are more often ringed, others think that the basal parts are more attacked, the majority of authors agree that — regardless of the vertical location of the rings — the southern surface of the trunk is the most attacked. It is true — according to my own experiences — that the southern surface of the trunk is preferred sometimes (because there is an earlier flow of circulating sap in the spring), but I have found most ringed trees without any preference. Probably the northern part of the trunk is the least attacked of all. I have only exceptionally found drilled branches on maple and basswood. No significant preference in drilling could be found for different types of bark, smooth or rough, although it seems to me that trees with a smooth, thin bark are more often injured.

Cause and effects.

It is well known that woodpeckers mostly drill in spring: I have observed a *Dryobates major pinetorum* ringing in early March to early April and in other cases I have found newly ringed trees at that time. From the punctures or wounds the sap flows so that in the whole vicinity of the wounds the bark was wet. The punctures are more or less in horizontal rows around the trunk or are interrupted on one side. They reach the cambium and the last 1—2 annual-rings of the wood. It is not certain whether the woodpeckers eat the cambium, and the fine, jelly-like substance cannot be found or identified in the stomach. I have directly observed that the woodpeckers (*Dryobates* and *Picus,* at least) fed on the sap. In a woodlot I have found a newly ringed maple *(A. campestre).* I have spent a couple of hours watching it. A male *Dryobates major* arrived four times in three hours before noon, drank for some minutes from the punctures located on different parts of the trunk and major branches, made some new punctures and flew away. Moreover, about every ten

minutes tits came in small flocks (*Parus palustris, Aegithalos caudatus)* or singly *(Parus major, P. caeruleus)* readily found the punctures and fed on the sap. This commensal habit was observed some days later in an arboretum, when a marsh tit drank the sap in the top of a *Pterocarya.* It is of some interest to note that chaffinches and buntings were also present on the maple but displayed no interest in the sap. About this time the temperature dropped and at the next visit I found on the maple several icicles which hung down from the punctures: the sap had frozen.

It can be stated that the purpose of the drilling is sap-sucking. In the spring, before the leaves open, from about the end of February or early April in Central Europe, there is a powerful basifugal streaming of sap, as a result of the root-pressure; from the cells of the root the sap containing various forms of sugar is forced toward the top through the bast and probably the last two or three wood-rings — according to the species. It is probable that the sap at this time also contains vitamins and oils. The whole problem of sap and water circulation in trees has not so far been fully solved. In early spring the woodpeckers ring near the base of the tree. Later on, when the sap, containing the assimilates, flows downward, basipetally, the woodpeckers ring from the top downwards, for the concentration of some assimilates, e.g. sugar, sinks progressively downwards.

In my opinion the major interest lies in the quality of the trees ringed. I have nowhere found any mention of this. The following table shows the state or location of the trees which I have found ringed in the area studied: mainly forests, with a few exceptions of ringed trees in parks (1 *Pinus nigra,* 1 *Taxus baccata,* 2 *Tilia platyph.,* 1 *Acer negundo,* 1 *Pterocarya*).

Although the number of ringed trees observed is hardly sufficient for statistical treatment, Table 2 shows that the vast majority of these trees were abnormal in shape and appearance and a few only were apparently normal. The first column of the state of trees contains oppressed trees, the top or crown of which grew between or in crowns of other, dominant trees. The second column contains injured trees: wounded by lumberjacks, barked by big game, or struck by lightning, with multiple top or without any top (owing to breaking by ice and snow), injured in the young stage by browsing cattle, trees of abnormal growth *a priori* (a function of seed-

Tree species	The number and state or location of trees ringed:					
	No.	oppressed	injured	mixed in	apparently normal	from the previous groups-in monoculture
Pinus silvestris	14	—	1	14	14	—
Pinus nigra	2	—	1	2	1	—
Pinus cembra	4	—	4	1	—	3
Abies pectinata	14	8	6	14	—	—
Picea excelsa	4	—	4	1	—	3
Larix decidua	1	—	—	1	1	—
Taxus baccata	12	7	5	12	—	—
Quercus spp.	3	—	1	2	—	1
Carpinus betulus	5	1	4	4	—	1
Betula pendula	3	—	1	3	2	—
Tilia sp.	7	—	5	2	—	—
Acer campestre	5	2	3	5	—	—
Acer negundo	1	—	1	1	—	—
Populus tremula	1	—	—	1	1	—
Ulmus campestris	100>	—	—	100>	—	—
Pterocarya sorbif.	1	—	1	1	—	—
S:	177	18	37	164	19	8

Table 2. *State and location of trees ringed.*

provenience). The »mixed in» group contains trees mostly »foreign to the community», thus striking in appearance and — in many cases — growing in specifically unsuitable stands. This column also contains the several hundred elms, here noted as 100>, found near the Danube in a forest (willow, poplar, aspen, ash — community): these trees were attacked by elm disease (*Ceratostomella graphium-ulmi*) with their twigs decaying in the periphery of the crowns. Apparently normal trees are not numerous and the smallest group represents trees in a monoculture.

From these data we may conclude that vast majority of trees ringed by European woodpeckers are abnormal trees and therefore there are two possible causes for their being ringed:

1. The ringed trees have a biochemically changed physiology regarding their sap.

2. Trees with abnormal appearance are attacked by woodpeckers in this manner; thus the ringing habits of woodpeckers could be an eliminative function: the community does eliminate »foreign» (as

to appearance) trees, for the woodpeckers are not the only agents of this elimination. After the ringing is done there appear insects (I have found on firs small loculi of attack of the fir-barkbeetle, *Ips curvidens)* and fungi, which continue the eliminative work.

Finally, a further possibility conung under the first-mentioned heading is that the abnormal trees may differ as to the time and quantity of the flow of sap.

The effects of the ringing depend on the repetition of the ringing on the same tree. It was observed that woodpeckers come to the rings year after year in the spring. In this case the *callus* is wounded and destroyed again and also the *cambium* growth is locally interrupted or some hypertrophy occurs above the wounds and, in some cases (in conifers), dark resinous vacua occur in the wood. Later on such a tree is attacked by fungi (and cancer) and xylophagous insects. In those cases where the ringing was done only once, the wounds filled with *callus* and — except the case of bark beetle attack — the ringing had no harmful effects.

Generally, we can say that repeated ringing is always of economic loss (cf. FECHNER 1941, LEIBUNDGUT 1934, OSMOLOVSKAJA 1946, TURČEK 1949) — another problem is the biocenological effect, which need not coincide with the economical one. It is well known to gardeners that ringing, or girdling, does increase crops if a small ring is made around the trunk and if done early enough in the year, e.g. before the buds for the following year appear. Girdling of forest trees in order to increase seed production has been done by some English and German silviculturalists*) — with noticeable success. The ringing of trees by woodpeckers resembles this artificial ringing, but no similar effects have so far been observed, owing to lack of observations. I have found one Scotch pine only ringed in the previous year, with an enormous crop of seeds, but I found no other trees for comparison in the neighbourhood. It would be an interesting piece of research to find whether any correlation exists between ringing by woodpeckers and the seed crops of the ringed tree. If the effects of ringing the trees by woodpeckers should prove to be an increase of the seed crops, the biocenological function of woodpeckers here (plus the successional complex) would then be double: elimination of the tree with lowered vitality from the com-

*) HOLMES-MATTHEWS 1951; SOND 1936; LANTALME 1933.

munity, and simultaneously the assurance of offspring and maintenance of the species, provided that this is not foreign to the community.

Summary.

The ringing of trees by woodpeckers is a characteristic of these birds in the whole Holarctic region. In Europe the ringing is not so common as in North America.

The author shows the European woodpecker species which drill trees, compiling data from the available literature and from his own investigations made in the Carpathian basin. Among the European woodpeckers, the following drill: *Dryobates major, Dryocopus martius, Picus viridis and Picoides tridactylus,* in descending order of the occurrence of these habits. It is not yet proved wheter some other species (especially the spotted ones) drill, too.

There is given a list of tree species ringed in Europe, containing 24 tree species, of which 7 are coniferous, 17 deciduous. The most preferred spesies are: pine, fir, yew (poisonous!), oaks, basswood, maple and birch.

The ringing appears mostly (in the author's own experience, exclusively) in early spring, from the end of February or early April in Central Europe. At first — in the author's opinion — the basal parts of the trunk are ringed, later on from the top downwards. The author has observed an interesting commensalism, when four kinds of titmice visited a ringed maple and drank the sap.

The author has observed that the majority of ringed trees were abnormal in appearance: they were wounded, broken-tipped trees, oppressed trees or mixed in, and thus foreign to the community, or, finally, the ringed trees were diseased, attacked by elm disease. Only a few of the ringed trees were apparently normal, and simirarly a few lived in monoculture. The immediate purpose of the ringing is sap-sucking (and probably *cambium* eating); the author assumes that the abnormal trees may have a changed physiology, especially as regards the biochemistry of their sap and/or the time and quantity of sap circulating in the bast. A further possibility for selective ringing is the resistance of the community against foreign organisms and in this connection mention is made of the "filter of the forest community" — in the form of the forest edge group of organisms.

The ringing results in economic loss of timber, if the ringing is repeated year after year on the same tree. From the standpoint of the community the effect is problematical, but may be beneficial, if some diseased, or even foreign trees are eliminated. A further beneficial effect might be in increasing the crops of seeds of the ringed trees in the year following the ringing — if the woodpeckers' ringing functions in the same manner as the artificial ringing done by gardeners or foresters.

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Piirteitä kohosoittemme linnustosta.

P. K. SEISKARI

Maamme kohosuot ovat lintufaunistisesti hyvin puutteellisesti tunnetut ja niiden linnustosta tehdyt tutkimukset koskettelevat pääasiassa yksittäisiä soita tai tiettyjä lajeja (FINNILÄ 1915, PYNNÖNEN 1930, PAASIO 1932, HYTÖNEN 1934, SIIVONEN 1937, LUMIALA 1943). Erikoistyöni yhteydessä olen pyrkinyt kesinä 1951—52 selvittämään pesivän linnuston kokoomusta kolmella kohosuolla Eurajoen, Euran ja Kiukaisten pitäjissä Satakunnassa. Kesällä 1953 suoritin edellisten kesien kokemusten nojalla koealamenetelmään pohjautuvan kvantitatiivisen arvioinnin 27:llä eri kohosuolla keskittyen näiden soiden enemmän tai vähemmän aukeisiin keskiosiin. Tutkitut suot on osittain valittu silmälläpitäen HYTÖSEN (1934) mainitsemia harmaalokkien asuttamia kohosoita, osittain silmälläpitäen käytännöllisiä syitä, joiden takia hieman yli puolet tutkituista