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**Ecological and ethological determinants of Syrian woodpecker
Dendrocopos syriacus occurrence in urban habitats**

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Summary of doctoral thesis

Urban environments are considered as the least important for the nature. However, such environments are crucial for some species. Among European woodpeckers, the only fully synanthropic species is Syrian woodpecker *Dendrocopos syriacus*. This species occupies Middle East, but in XIX-XX centuries it had expanded across the Balkans and Middle and Eastern Europe. In Europe, this species occupies mostly rural and urban landscapes, inhabiting woods of anthropogenic origin. The most probable explanation of such distribution is related with the history of its evolution as well as competition with congeneric Great spotted woodpecker *D. major*, which inhabits mainly forests. Hybridization of these two species was also reported. Syrian woodpecker is still the least examined European woodpecker, but it is also a species protected under European Union law (Bird Directive). Therefore, broadening of the knowledge about Syrian woodpecker is highly desirable as the only data about this species are known from its rural populations.

There are presented the results of doctoral studies published already in four articles (Kajtoch Ł., Figarski T. 2017. *Folia Zool.* 66: 29–36; Figarski T., Kajtoch Ł. 2008. *Acta Ornith.* 53: 23–36; Figarski T. 2017. *Behaviour* 154: 981–996; Figarski T., Kajtoch Ł. 2018. *J. Ornith.* 159: 311-314) in this elaboration. These studies were focused on following topics: i) differences in distribution of Syrian and Great spotted woodpeckers in various landscapes, ii) determination of environmental factors crucial for the occurrence of both species in cities, iii) differences in behavioral reactions of both species in responses to playback stimulation, iv) scope of mixed pairs and hybrid occurrence in urban populations. These studies were executed in 2013-2015 in four sampling plots localized in selected cities in central and southern Poland. Birds were localized and observed in the networks of stimulation points (of 500 m distance). Moreover, data about wood structure and landscapes were noted in these points. Collected data were statistically analyzed in the way to find answers for questions listed above.

Studies undertaken in various types of landscapes proved that Syrian woodpecker is dominating over Great spotted woodpecker only in large cities, whereas in towns, rural landscape and river valleys more abundant was the latter species. It was estimated that Syrian woodpecker

needs less than 40% coverage of woods in the landscape, whereas the threshold for Great spotted woodpecker was over 70%. In cities, both species occupies mostly single-housing districts and the only Syrian woodpecker was found also in city centers.

Niches of both species overlapped in only 29%, what prove that they occupy different areas. Syrian woodpecker preferred scattered woods with high share of walnuts, fruit trees, poplars and willows, especially of older age. On the other hand, Great spotted woodpecker, chose larger woods (e.g. parks) and could breed also in coniferous trees.

Behavioral studies showed that in pairs of Syrian woodpecker both sexes defend their territories and that females could be even more active than males (Great spotted woodpecker did not show such pattern). Moreover, Syrian woodpeckers were more active in direct interspecific interactions than Great spotted woodpeckers.

Among observed pairs of both woodpeckers, 2,1% were formed by mixed pairs (of “pure” species) or 5,3% if considered pairs in which one of bird was identified as hybrid. Among individuals observed in the field 3,6% were found to have intermediate plumage, whereas if examined dead birds such mixed individuals constituted 6,9% of all birds. Majority of mixed pairs (92,8%) were formed by females identified as Syrian woodpecker, what indicates not random mating. Sex ratio among hybrids was equal, what proves that there is the same number of females and males of mixed origin.

Presented studies, beside broadening knowledge about ecology, ethology and hybridization among Syrian and Great spotted woodpeckers in urban populations, showed that co-occurring woodpeckers and their hybrids should not be omitted in population research, which are executed on only one of these species in sympatric populations.

Moreover, it was proved that urban environments are important and undervalued sites for Syrian woodpecker occurrence and that for effective conservation of this species crucial is maintenance of old orchards and softwood trees.