

***Meconema meridionale* COSTA, 1860 (Orthoptera: Tettigoniidea:
Meconematidae) – the first record in Poland**

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ABSTRACT. This first record of *Meconema meridionale* in Poland comes from Kraków, where several specimens were observed in the urban greenery of a housing estate in the autumn of 2013. A total of 24 adult specimens were collected, most of them within a relatively small area in the city district of Prądnik Czerwony, and two in the district of Podgórze. All specimens were recorded in circumstances indicating a relatively recent accidental introduction of this species.

KEY WORDS: Southern Oak Bush-cricket, *Meconema meridionale*, southern Poland, Kraków, urban greenery, range expansion.

INTRODUCTION

The Southern Oak Bush-Cricket (*Meconema meridionale* COSTA, 1860) is a species of Mediterranean origin whose expansion towards the north of Europe has been observed since the 1960s. Currently, the presence of this species has been reported throughout western Europe as well as in some countries of central Europe. A few years ago, the species was reported from Berlin (SCZEPANSKI 2008) and London (HAWKINS 2001), and recently – after being recorded in the Czech Republic and Slovakia (CHLÁDEK 2009, VLK et al. 2012), it may be expected to be found in Poland quite soon. The authors of successive publications signaling the progressive expansion of *M. meridionale* have noted its occurrence within

large urban areas, usually near car parks and main roads with high traffic. On this basis, an anthropochorous passive dispersion mode has been hypothesised for this species. The newly recorded location in the south of Poland seems to confirm this hypothesis.

The species is worthy of interest also for practical reasons, namely as a component in the predator complex of the Horse Chestnut Leafminer (*Cameraria ohridella* DESCHKA & DIMIĆ, 1886), in which, however, a major role is played by birds, namely Great Tit *Parus major* LINNAEUS, 1758 and Eurasian Blue Tit *Cyanistes caeruleus* (LINNAEUS, 1758) (GRABENWEGER et al. 2005). In Poland, this pest of Horse Chestnut has appeared relatively recently, and the possibilities of its biological control have not yet been explored or used.

STUDY AREA AND METHODS

The newly discovered sites of *M. meridionale* in Poland were situated in two urban districts of Kraków: Prądnik Czerwony (Strzelców Street, Słoneckiego St. and Dobrego Pasterza St.) within an area of about 5.5 ha; and Podgórze near Myśliwska Street, where only two individuals were collected. Almost all the specimens were collected personally by JAKUB MICHALCEWICZ.

The housing estate of Prądnik Czerwony, a former village, lies a few kilometres north of the city centre. The dominant type of housing consists of blocks of flats, with a few older buildings. The blocks of flats are surrounded by well-designed and lush greenery rich in species of trees and shrubs. Near Strzelców St. is the Batowicki Cemetery, one of the largest cemeteries in Kraków. This locality is relatively close to the “Zaczarowana Dorożka” Park, which has an area of about 2 hectares. One of the sites of *M. meridionale* was the garden of the company Polsad, located on a former Benedictine farm with a rich tree stand.

In the district of Podgórze, two specimens *M. meridionale* were found in the Płaszów River Park Garden near the Vistula River floodplain. Płaszów used to be a village. Later, an important railway station and marshalling yard were built in this area. After the incorporation of Podgórze as part of Kraków, housing estates and industrial plants, transport and repair facilities were built there. Nevertheless, it is still a district with plenty of greenery, especially near the Vistula, where some meadows have been converted into allotment gardens.

The first specimen was found by accident on a pavement in a residential housing estate on Strzelców St. Then a deliberate search effort was started, searching for the insects on tree trunks, the walls of buildings and in vegetation, mainly in the immediate vicinity of the first locality. Sweep nets were also used in bushes and trees.

All the specimens have been deposited in the collection of the Museum and Institute of Zoology in Warsaw.



Fig. 1. *Meconema meridionale* (female) collected in October 2013 in Kraków. Photo by J. MICHALCEWICZ.

RESULTS

A total of 24 imagines (5 ♂♂, 19 ♀♀) of *M. meridionale* (Fig. 1) were collected in Kraków between 14 September 2013 and 26 November 2013. The individuals were recorded in two districts of Kraków, Prądnik Czerwony and Podgórze, which are situated about 5 km apart. In Prądnik Czerwony, *M. meridionale* specimens were found within relatively short distances of each other over a total area of about 5.5 hectares, near blocks of flats (pavements, fences) or directly on the outer walls of buildings. Some individuals were collected from plant leaves or tree trunks. One of the sites where the species occurred on the Prądnik Czerwony housing estate is shown in Fig. 2. Searches were also carried out in

other parts of the city (including the Rakowicki Cemetery and Kamienna St.), but to no effect.

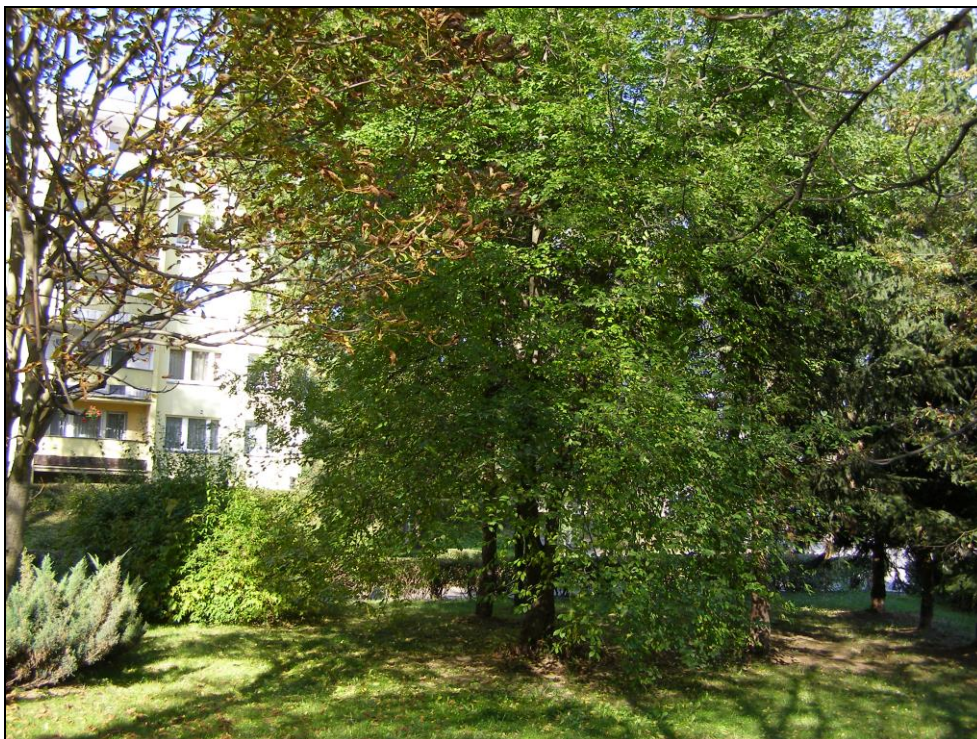


Fig. 2. One of the sites where *Meconema meridionale* was found: the Prądnik Czerwony housing estate in Kraków in 2013. Photo by J. MICHALCEWICZ.

A list of findings of *M. meridionale* in Kraków is presented below (JM – specimens collected by JAKUB MICHALCEWICZ).

Kraków-Prądnik Czerwony, Strzelców St., 1♀, 14.09.2013, on the pavement, JM; Kraków-Prądnik Czerwony, Strzelców St., 2♀♀, 05.10.2013, by sweeping from *Padus avium* MILL., JM; Kraków-Prądnik Czerwony, Słoneckiego St., 1♂, 16.10.2013, on a security roller shutter on the outer wall of a building, ZUZANNA KIEREPKA leg.; Kraków-Prądnik Czerwony, Strzelców St., 1♂, 16.10.2013, on the outer wall of a building, JM; Kraków-Prądnik Czerwony, Słoneckiego St., 5♀♀, 16.10.2013, on a security roller shutter and on the outer wall of a building, JM; Kraków-Podgórze, near Myśliwska St., 1♀, 23.10.2013, on a leaf of *Corylus avellana* L., JM; Kraków-Prądnik Czerwony, Słoneckiego

St., 1♀ (dead), 24.10.2013, outside a building, JM; Kraków-Prądnik Czerwony, Strzelców St., 1♀, 24.10.2013, on the entrance door to a building, JM; Kraków-Prądnik Czerwony, in the Polsad business area, 1♀, 25.10.2013, on the outer wall of a building, JM; Kraków-Prądnik Czerwony, in the Polsad business area, 1♂, 26.10.2013, on the trunk of *Ulmus laevis* PALL., JM; Kraków-Prądnik Czerwony, Strzelców St., 1♀, 26.10.2013, on a fence near a building, JADWIGA MICHALCEWICZ leg.; Kraków-Podgórze, near Myśliwska St., 1♀ (dead), 28.10.2013, on a root neck of *U. laevis*, JM; Kraków-Prądnik Czerwony, Słoneckiego St., 1♂, 30.10.2013, on the outer wall of a building, JM; Kraków-Prądnik Czerwony, in the Polsad business area, 1♀, 2.11.2013, on the outer wall of a building, JM; Kraków-Prądnik Czerwony, near Bareja Roundabout, 1♂, 1♀, 07.11.2013, on a root neck of *U. laevis*, JM; Kraków-Prądnik Czerwony, near Bareja Roundabout, 1♀ (dead), 07.11.2013, on the bark of *Syringa vulgaris* L., JM; Kraków-Prądnik Czerwony, Strzelców St., 1♀, 12.11.2013, on the outer wall of a building, JM; Kraków-Prądnik Czerwony, Dobrego Pasterza St., 1♀ (dead), 26.11.2013, on the ground near a *Betula pendula* ROTH trunk, JM.

All the collected specimens were measured. In two cases, the measurements were incomplete as the specimens were damaged. The dimensions are within the limits given earlier for this species by other authors, but they are generally at the lower end of the range (HARZ 1969) (Table 1). The characteristics of the species are clearly visible in the specimens. The tegminae are squamous, short, reaching only as far as the first tergum of the abdomen (Fig. 1), the hind margin of the female subgenital plate is emarginate, and the male cerci have a small dorsal tooth at the apex.

In the laboratory, it was noted that leaf-mining larvae had disappeared from the bottom layer of the leaves and the protective cuticle of viburnum and bird cherry twigs placed in a terrarium together with adults of *M. meridionale*.

Table 1. Measurements of 19 females and 5 males of *M. meridionale* (ranges in mm).

Dimension	Females	Males
length of body	8.0-12.0	10.5-12.0
length of postfemur	8.0-9.9	8.2-9.0
length of tegmina	1.3-2.5	1.8-2.0
length of pronotum	2.5-3.5	2.6-2.9
length of ovipositor	7.0-8.3	–
length of male cercus	–	3.5-4.0

DISCUSSION

The finding of more than twenty specimens of *M. meridionale* in a small area suggests that a local population was already in existence, though probably not abundant and relatively young. However, the first “import” of the species to Kraków must have taken place a few years earlier. As usual in such cases, it is hardly possible to clearly establish the origin of this population. It should be noted, however, that a gardening store and a large nursery are situated nearby. The greenery in this district of Kraków (Prądnik Czerwony) is very diverse.

The circumstances of this first report of *M. meridionale* in Poland are very similar to the observations made in other countries in western and central Europe, namely, the Czech Republic and Slovakia (VLK et al. 2012), Germany (RICHARD et al. 2007, SCZEPANSKI 2008), Luxembourg (PROESS 2010) and Austria (KALTENBACH 1970). Everywhere, the species was discovered in large cities under typically synanthropic conditions. The insects were found most often in modern housing estates with lush greenery formed and maintained by humans. The neighbourhoods invariably included large car parks and roads with heavy traffic. In contrast, in Hungary this species was found far from traffic, in natural or semi-natural environments (NAGY 2001).

It is worth emphasizing that most of the specimens in central Europe were found at sites that are not natural for *M. meridionale*: on the walls of buildings and on the pavements in housing estates. Publications on this species show that *M. meridionale* has been observed in such places in many urban locations to the end of the growing season. TRÖGER (1986) noted several locations in the Upper Rhine Valley and in almost all cases, the insects were found on the walls of houses, and even inside buildings. The author also quoted earlier reports of *M. meridionale* in Austria and southern Germany, which reported non-natural habitats such as walls, houses, windows and interiors of buildings (KALTENBACH 1970, THALER 1977).

In its original area of occurrence, the Mediterranean, *M. meridionale* prefers natural environments like forests and scrubs. In the newly colonized areas, the species occurs almost exclusively within large cities, rarely in the suburbs. Of course, the climate of cities is generally warmer than in the surrounding areas. On the other hand, a characteristic phenological trait of this species is the presence of adults in late autumn until the first severe frost occurs, so it cannot be an extremely thermophilic species. During the coldest period, the oak-bush crickets are observed to abandon vegetation and appear on warm parts of vehicles, on the walls of buildings and even inside flats.

The changes in the ranges of many invertebrate species observed in recent decades are often attributed to climate change, the so-called global warming. The importance of contemporary climate change (perhaps only transient fluctuations) in the extension of the

range of *M. meridionale* (as in other species) has been emphasized by RICHARD et al. (2007) in a paper investigating the expansion of this species in the Mosel valley (Germany). The northward expansion of the distribution range of *M. meridionale* can only partly be explained by the increase in average temperature, as the beginning of the expansion was recorded in the 1960s and in the 1980s, when decreases of temperature were in fact noted.

The northernmost location of *M. meridionale* in Europe is Bremen in Germany (53°04'N, 08°48'E), where GRÜNITZ & HOCHKIRCH (2007) found this species in the district of Vahr rich in green. The authors observed about ten specimens between July and the end of November 2006. They pointed out that *M. meridionale* proved to be even more resistant to cold than *M. thalassinum*, which could not be found in late November. Also, other authors, such as VLK et al. (2012), based on observations from the Czech Republic, emphasize the resistance of *M. meridionale* to cold. It should be noted that, of the six specimens of *M. meridionale* gathered in Kraków in November, only two were dead. It seems likely that one of the factors facilitating the success of the northward expansion of *M. meridionale* is the extension of the growing season in some countries of Central Europe, especially the shift of the frost-free period. It should be noted, however, that for wingless and not very mobile species, the prolongation of the growing season may be the only factor that facilitates the emergence of a population at a new site. So the rapid spread of *M. meridionale* observed in the last decade can only have occurred through of human activities.

KALTENBACH (1970) recalled a case of finding one specimen in a railway carriage in Vienna as early as 1900. In 1968, the same author captured a female of this species in his Vienna flat. NADIG (1981) observed a female *M. meridionale* on a car window in the town of Aigle in south-western Switzerland. TRÖGER (1986) described a case of an individual of *M. meridionale* being inadvertently transported from Freiburg for a distance of 300 km under the bonnet of a car. Taking into consideration these and similar cases, DETZEL (1998) emphasized the role of anthropochory in the range extension of *M. meridionale*. On the other hand, VLK et al. (2012) drew attention to the semi-political aspect of this phenomenon: in the countries of central Europe located behind the so-called Iron Curtain, *M. meridionale* appeared only after 1989, when the free flow of people and goods started between the so-called West and East. This hypothesis is confirmed, in particular, by the example of Bulgaria and Hungary, where *M. meridionale* appeared only after 2000 (CHOBANOV 2003, NAGY 2001), despite the neighbourhood of Slovenia and Austria, where the species had already been known since the seventies.

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