

Original Article

# CONTRIBUTION TO BEE FAUNA (HYMENOPTERA: APOIDEA: ANTHOPHILA) OF POLAND. V. THE GENUS *ANDRENA* FABRICIUS, 1775. PART I

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## Abstract

The paper presents new records of the following six very rare or scarcely recorded species of short-tongued bees of the genus *Andrena* Fabricius, 1775 in Poland: *A. (Notandrena) nitidiuscula* Schenck, 1853; *A. (Lepidandrena) pandellei* Perez, 1895; *A. (Lepidandrena) paucisquama* Noskiewicz, 1924; *A. (Notandrena) pontica* Warncke, 1972; *A. (Poecilandrena) potentillae* Panzer, 1809 and *A. (Poecilandrena) viridescens* Viereck, 1916. The studies were based on museum collections as well as the author's own collections. During the research approximately 21,000 specimens, representing 95 taxa, of mining bees of the genus *Andrena* from Poland were identified. The species discussed in the paper are known from single or just a few stands in the country. The following information is provided for each species: short diagnosis, remarks on general distribution, bionomics, published records from Poland and confirmed Polish records based on studied collections. The text is accompanied by SEM micrographs showing diagnostic characters and distribution maps.

**Keywords:** *Andrena*, Andrenidae, Apoidea, bionomics, distribution, Poland

## INTRODUCTION

The genus *Andrena* Fabricius, 1775 is the largest bee genus in Poland with 95 species recorded so far (Dylewska, 2000; Motyka & Bystrowski, 2016). There are approximately 1,500 representatives of the genus described in the world fauna (Falk, 2015), most species occur in the Palearctic region (Osytschnjuk et al., 2005, 2008). Their common name 'mining bees' is derived from their nesting habit: females are 'miners' when making nest in soil. Most species usually nest in light soils, but some even in pure sand, usually in sunny and dry locations. The representatives of the genus vary in size: from 5 mm body length in some representa-

tives of the subgenus *Micrandrena*, up to 20 mm in case of *Andrena morio* Brullé, 1832 (Falk, 2015). The genus was surveyed in Poland by Prof. Miroslawa Dylewska (1987a, 1987b, 2000) and other entomologists, but more information is required to assess the actual endangerment status of mining bees.

The aim of the paper is to provide data on the distribution of six rare species of the genus *Andrena* in Poland and summarize information about their bionomics and general distribution.

## MATERIAL AND METHODS

The research was carried out during the years 2010-2015 mainly in the entomological collec-

tions of the following institutions:

- Museum and Institute of Zoology, Polish Academy of Sciences in Warsaw, Research Station Łomna-Las (specimens collected mostly by Marian Bielewicz, Paul Blüthgen, Robert Wilhelm Grünwaldt, Tomasz Huflejt, A. R. Paul, and G. Schröder),
- Institute of Systematics and Evolution of Animals, Polish Academy of Sciences in Kraków (main collectors: Miroslawa Dylewska, Waldemar Celary, Paweł Łoziński, Jan Zabłocki, and Antoni Wierzejski),
- Natural History Museum of Wrocław University, Wrocław (collections of Rudolf Dittrich, and Jan Noskiewicz),
- Upper Silesian Museum in Bytom (main collectors: Edmund Broczkowski, Roland Dobosz, Eberhard Drescher, Franz Kirsch, Jan Kowalewski, Hans Nowotny, and Waldemar Żyła).

Also, specimens from some private collections were studied, most of which were collected during the years 2000-2010. The bees were identified and the data from the labels were stored in a database. The information about distribution and bionomics of mining bees was also gathered from published papers (e.g. Dylewska, 2000; Osytshnjuk et al., 2005, 2008; Falk, 2015). For each species, the information of known Polish localities is presented with the UTM coordinates. Distribution in Poland is also shown on maps, each with symbols representing various types of records:

- published ones - taken from available papers,
- confirmed published ones - when we could verify voucher specimens of published studies,
- unpublished records - based on studied material in various collections, apparently not published earlier.

The zoogeographical partitioning of the regions of Poland follows the one used in Catalog of Polish Fauna (Burakowski et al., 1978). SEM images were taken at the Laboratory of Scanning Electron Microscopy, Museum and Institute of Zoology, Polish Academy of Sciences, Łomna (Hitachi S-3400N).

Abbreviation used in the text:

NP - National Park [eg. Ojców NP = Ojców

National Park]

USMB - Upper Silesian Museum in Bytom

\* - missing data, e.g. day, month or year

## RESULTS

### Systematic part

During the research about 21,000 specimens of mining bees of the genus *Andrena* from Poland were identified. In a later part of the paper, information about six either very rare or scarcely recorded species in the country is presented.

#### Subgenus: *Lepidandrena* Hedicke, 1933

##### *Andrena pandellei* Perez, 1895

###### Diagnosis

In both sexes, the last tarsomere of the hind leg is almost straight and equal in length or shorter than the combined length of 3<sup>rd</sup> and 4<sup>th</sup> tarsomeres. Apical fasciae of terga of female dense and distinct. The sternum VIII of male without teeth and incision in the middle.

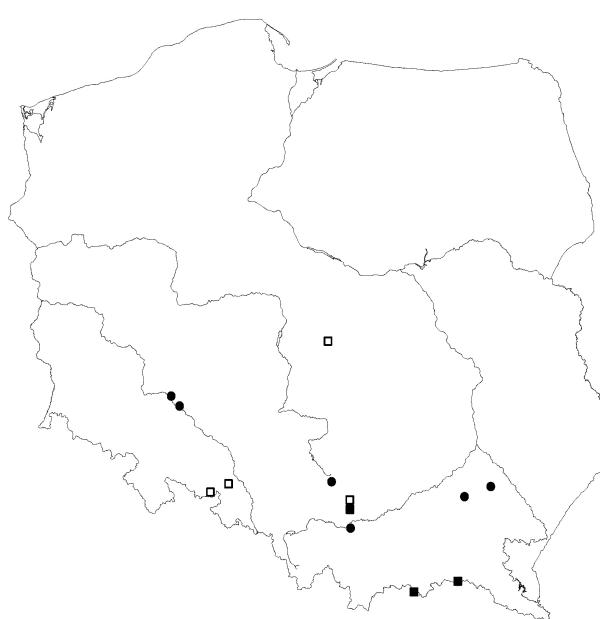
Distributed in north-west Africa, and southern, central and eastern Europe, as well as in Turkey and the Caucasia. Southern Poland is on the northern limit of distribution (Scheuchl & Willner, 2016). Univoltine. Bees fly in May and June (Dylewska, 2000). *A. pandellei* prefers sunny open habitats and forest edges. Oligolectic species, collects pollen from flowers of the genus *Campanula*, mainly *C. patula* (Scheuchl & Willner, 2016). Nests in aggregations of various size in open or sparsely vegetated areas (Osytshnjuk et al., 2008). Kleptoparasites are the cuckoo bees *Nomada braunsiana* Schmiedeknecht, 1882 and *N. striata* Fabricius, 1793 (Celary, 1995).

Published records (Map 1): **Lower Silesia** (YR08 Głogówek - Torka, 1926), **Western Sudety Mts.** (XR87 Prudnik - Torka, 1926), **Kraków-Wieluń Upland** (DA15 Będkowice Valley - Celary, 1991. DA16 Ojców NP: Grodzisko - Dylewska, 1988), **Małopolska Upland** (CC93 Łódź - Kowalczyk et al., 2008), **Western Beskydy Mts.** (DV86 Żegiestów - Dylewska & Zabłocki, 1972), and **Eastern Beskydy Mts.** (EV37 Magura NP: Ciechania - Wiśniowski & Werstak, 2009). Verified published records (Map 1): **Kraków-**

**Wieluń Upland** (DA15 Będkowska Valley: 2.VI.1984 - 1♀, leg. W. Celary), **Western Beskydy Mts.** (DV86 Żegiestów: 19.VI.1965 - 1♀, leg. M. Dylewska), and **Eastern Beskydy Mts.** (EV37 Magura NP, Ciechania: 4.V.2005 - 1♀ and 1♂, 15.VII.2005 - 1♀, leg. B. Wiśniowski).

Unpublished records (Map 1): **Lower Silesia** (XS37 Szewce: 25.V.1884 - 1♂; XS46 Wrocław-Karłowice: 1.VI.1890 - 1♀; XS46 Wrocław-Sołtysowice: 28.V.1911 - 1♀, ex coll. R. Dittrich), **Kraków-Wieluń Upland** (CA98 Ryczówek: 19.V.2013 - 1♂, leg. W. Celary), **Sandomierz Lowland** (EA46 Hucisko near Niwiska: 13.VI.2006 - 1♂; EA77 Kolbuszowa Forest district, Kamień Forest unit, Forest compartment 19: 25.V.2000 - 1♂, leg. T. Huflejt), and **Western Beskydy Mts.** (DA13 Skawina: 12.VI.2004 - 5♀♀, leg. B. Wiśniowski).

Remarks: The studied specimens of *A. pandellei* were collected mainly in southern Poland. Only one record comes from Central Poland (Łódź), possibly due to expansion of the species. The bee is rarely noticed. In the Polish Carpathians (Magura National Park) reaches as high as around 620 m a.s.l.



Map 1. Distribution map of *A. pandellei* in Poland: □ - published records; ■ - verified published records; ● - unpublished records.

### *Andrena paucisquama* Noskiewicz, 1924

#### Diagnosis

In females: basal area of labrum trapezoidal, top of the basal area of labrum only gently narrowed, apical fasciae of terga sparse and indistinct. In males: sternum VIII with deep, triangular incision (Fig. 1).

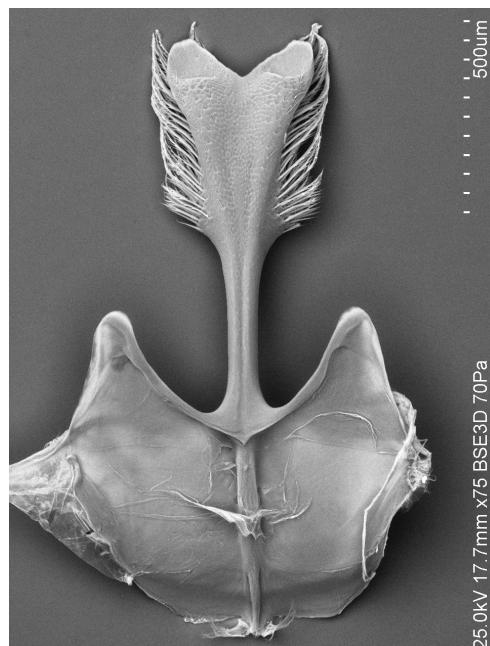


Fig. 1. *A. paucisquama*, male sternum VIII (SEM)

Spread out over Europe except in its northern parts, as well as in Turkey and the Caucasus. Univoltine. Bees fly in May and June (Scheuchl & Willner, 2016). They prefer sunny and dry habitats, both unforested and with sparse shrubs and forest edges. Oligoleptic species: collects pollen from flowers of the genus *Campanula*, mainly *C. sibirica* (Scheuchl & Willner, 2016). They nest in sparsely vegetated ground. The cuckoo bee *Nomada braunsiana* Schmiedeknecht, 1882 is a kleptoparasite in nests of *A. paucisquama* (Celary, 1995). Stylopised adults are sometimes observed (Scheuchl & Willner, 2016).

Published records (Map 2): **Pomeranian Lakeland** (CE20 Zbocza Płutowskie reserve - Banaszak, 1975, 1980, 1982; Pawlikowski & Kowalewska, 1998; Banaszak et al., 2006), **Wielkopolska-Kujawy Lowland** (CE10 Kozieliec reserve - Banaszak et al., 2006, CD29 Unisław, CD37 Toruń-Przedmieście Chełmińskie, CD73 Kulin - Pawlikowski & Hirsch, 2002), **Małopolska**

**Upland** (EB51 Góry Pieprzowe reserve near Sandomierz – Noskiewicz, 1959; Banaszak, 2003), **Eastern Beskyd Mts.** (EA11 Racławice, FA21 Przemyśl – Noskiewicz, 1959), and **Pieniny Mts.** (DV57 Sromowce Niżne – Dylewska & Noskiewicz, 1963).

Verified published records (Map 2): **Wielkopolska-Kujawy Lowland** (CE10 Kozielec reserve: 27.V.2000 – 2♀, leg. R. Kriger), **Pieniny Mts.** (DV57 Sromowce Niżne: 15.VI.1958 – 1♀, leg. M. Dylewska).

Unpublished records (Map 2): **Kraków-Wieluń Upland** (DB01 Lelów: 18.V.2013 – 1♂, leg. W. Celary), **Małopolska Upland** (DA28 Biała Góra reserve by Tunel: 14.VI.2006 – 5♀; EB51 Góry Pieprzowe reserve by Sandomierz: 14.V.2008 – 6♀ and 4♂, 30.V.2008 – 15♀; DA47 Wały reserve by Racławice: 20.VI.2006 – 4♀, leg. B. Wiśniowski), and **Pieniny Mts.** (DV57 Szczawnica-Piaski: 17.VI.1965 – 1♀, leg. M. Dylewska).



Map 2. Distribution map of *A. paucisquama* in Poland:  
□ – published records; ■ – verified published records;  
● – unpublished records.

Remarks: The known localities of *A. paucisquama* in Poland are grouped in two regions – the south-eastern part of the country as well as along the valley edge of the Lower Vistula river in Northern Poland. It is quite possible that the species migrates along the Vistula river valley, as well as those of its tributaries,

e.g. the Dunajec and San rivers. The specimens were collected in steppe-like vegetation of dry and sunny locations. Among known localities, the Góry Pieprzowe nature reserve has a quite numerous population of the bee.

#### Subgenus: *Notandrena* Pérez, 1890

##### *Andrena nitidiuscula* Schenck, 1853

###### Diagnosis

In females: Facial foveae reach halfway between the upper margin of compound eyes and lateral ocelli, and metasomal terga II-IV shiny and smooth. In males: Mesoscutum and scutellum smooth, gonostyles in comparison to *A. pontica* broader and shorter (Fig. 2).



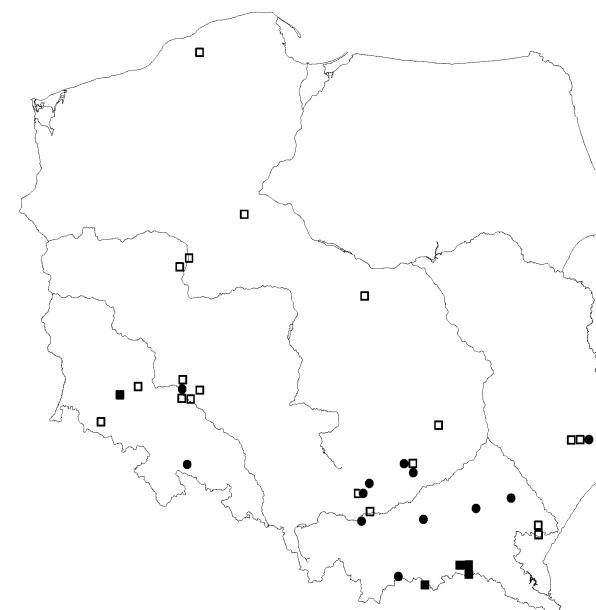
Fig. 2. *A. nitidiuscula*, male genitalia (SEM)

Transpaleartic species, distributed in the temperate and boreal zones of Eurasia from Spain to the Far East and northern China (Scheuchl & Willner, 2016). Univoltine. Bees fly from the end of June till August (Dylewska, 2000). The bees occur in various habitats, from meadows and sandy grassland to gardens, parks, forest edges and forest clearings (Dylewska & Wiśniowski, 2003). Oligoleptic species, collects pollen from flowers of the carrot family (Apiaceae), e.g. *Aegopodium podagraria*, *Angelica sylvestris*, *Anthriscus sylvestris*, *Daucus carota*, *Falcaria vulgaris*, *Heracleum sphondylium*, *Laserpitium*

*latifolium*, *Selinum carvifolia* (Dylewska, 2000; Celary & Wiśniowski, 2003; Scheuchl & Willner, 2016). They nest in either bare or sparsely vegetated ground, usually solitarily, sometimes in small aggregations (Scheuchl & Willner, 2016). The cuckoo bee *Nomada errans* Lepeletier, 1841 was recorded as the kleptoparasite in nests of *A. nitidiuscula* (Celary, 1995). Adults were sometimes stylopised by *Stylops hammella* Perkins, 1918 (Scheuchl & Willner, 2016).

Published records (Map 3): **Pomeranian Lakeland** (XA33 Słupsk - Blüthgen, 1919), **Wielkopolska-Kujawy Lowland** (XU20 Poznań - Banaszak-Cibicka & Banaszak, 2011. XU31 Mechowo - Banaszak, 1982. XU96 Lubostroń - Banaszak, 2008), **Mazovian Lowland** (DC27 Łowicz - Drogoszewski, 1936), **Lower Silesia** (WS66 Jerzmanice Zdrój-Podgórnik, WS87 Legnica, XS36 Wrocław-Osobowice, XS46 Wrocław-Karłowice, XS57 Mirków - Dittrich, 1903), **Trzebnica Hills** (XS38 Oborniki Śląskie - Dittrich, 1903), **Kraków-Wieluń Upland** (DA16 Ojców NP: Prądnik Valley, Sąspów Valley, Grodzisko - Dylewska, 1988. DA24 Kraków: Sikornik Hill - Łoziński, 1920. DA24 Kraków vicinity - Moroń et al., 2009), **Małopolska Upland** (DA79 Gacki - Banaszak, 1984), **Świętokrzyskie Mts.** (EB03 Cząstków-Zapusty - Banaszak & Kowalczyk, 2007), **Roztocze** (FB51 Lipsko, FB61 Łabunie - Anasiewicz, 1976), **Sandomierz Lowland** (FA12 Węgierka - Banaszak, 1984), **Western Sudety Mts.** (WS43 Jelenia Góra-Sobieszów: Chojnik Mt - Dittrich, 1903), **Western Beskydy Mts.** (DV86 Żegiestów - Śnieżek, 1910), and **Eastern Beskydy Mts.** (FA11 Wola Krzywiecka - Banaszak, 1984. Magura NP: EV28 Nieznajowa, EV37 Ciechania, EV38 Huta Krempská, EV38 Hałbowska Pass - Wiśniowski & Werstak, 2009).

Verified published records (Map 3): **Lower Silesia** (WS66 Jerzmanice Zdrój-Podgórnik: 1.VIII.1885 - 1♀, ex coll. R. Dittrich), **Western Beskydy Mts.** (DV86 Żegiestów: \*VIII.1868 - 1♀, ex coll. A. Wierzejski), and **Eastern Beskydy Mts.** (Magura NP, EV28 Nieznajowa: 2.IX.2005 - 1♀; EV37 Ciechania: 30.VII.2005 - 5♀♀ and 5♂♂, 12.VIII.2005 - 6♀♀; EV38 Huta Krempská: 3.IX.2005 - 1♀, EV38 Hałbowska Pass: 1.IX.2005



Map 3. Distribution map of *A. nitidiuscula* in Poland:  
□ - published records; ■ - verified published records;  
● - unpublished records.

- 6♀♀, leg. B. Wiśniowski).

Unpublished records (Map 3): **Lower Silesia** (XR49 Ligota Wielka: 30.VII.1911 - 1♀, leg. E. Drescher. XS37 Szewce: 7.VI.1896 - 1♂, ex coll. R. Dittrich), **Kraków-Wieluń Upland** (DA16 Ojców NP: Sąspów Valley, 12.VI.2004 - 1♀, leg. B. Wiśniowski), **Małopolska Upland** (DA69 Góry Pińczowskie Zachodnie: 14.VII.2006 - 2♀♀, 24.VII.2006 - 2♀♀, 9.VII.2007 - 1♀; DA78 Prześlin reserve near Chotel Czerwony: 20.VI.2008 - 1♂; DA78 Skorocice reserve: 26.VII.2006 - 1♂; DA69 Skowronno reserve: 14.VII.2007 - 2♀♀; DA27 Rzeźuśnia near Gołcza: 26.V.2008 - 1♂, leg. B. Wiśniowski), **Lublin Upland** (FB71 Tomaszówka near Zamość: 20.VII.1966 - 1♀, leg. M. Dylewska), **Sandomierz Lowland** (DA83 Wojnicz: 15.VI.2004 - 10♀♀, leg. B. Wiśniowski. EA44 Ropczyce-Czekaj: 19.VII.2008 - 1♀; EA85 Czarna-Podbórz: 26.VII.2008 - 1♀, leg. T. Huflejt), **Western Beskydy Mts.** (DA13 Skawina: 16.VII.2001 - 1♀, 8.VIII.2004 - 1♀, on Apiaceae, leg. B. Wiśniowski), and **Pieniny Mts.** (DV57 Gojny Las: 05.VII.1961 - 1♀; DV57 Goła Góra: 11.VIII.1959 - 1♀; DV57 Grabczycha: 5.VIII.1960 - 3♀♀; DV57 Kotłowy Potok: 8.VIII.1960 - 1♀, leg. M. Dylewska).

Remarks: *A. nitidiuscula* was recorded in more than half of the zoogeographical regions in

Poland, but quite much of the data is outdated. Recent records come from Wielkopolska-Kujawy Lowland and mostly from south-eastern Poland. More observations are needed to assess the distribution trend of the species.

### *Andrena pontica* Warncke, 1972

#### Diagnosis

In females: The hind tibiae brownish, mesoscutum very densely punctate. In males: The mesoscutum and scutellum shagreened, and gonostyles in comparison to *A. nitidiuscula* narrower and longer (Fig. 3).



Fig. 3. *A. pontica*, male genitalia (SEM)

Subpontic species, distributed throughout central, eastern, and south-eastern Europe; isolated record in north-eastern Turkey (Scheuchl & Willner, 2016). Probably bivoltine: the first generation occurs from May till the beginning of July, the second in August (Dylewska, 2000); in Germany there is one generation (Scheuchl & Willner, 2016). The bees prefer forest edges and flowering meadows (Dylewska & Wiśniowski, 2003). Oligoleptic species, collects pollen mainly from flowers of the carrot family, e.g. *Aegopodium podagraria* and *Anthriscus sylvestris* (Dylewska, 2000; Scheuchl & Willner, 2016). There were no data on nesting and klep-

toparasites.

Published records (Map 4): **Kraków-Wieluń Upland** (Ojców NP: DA15 Skała Krzyżowa, DA16 Grodzisko, DA16 Pieskowa Skała - Celary & Wiśniowski, 2003. DA24 Kraków - Dylewska, 1987b; Moroń et al., 2009), **Małopolska Upland** (DA27 Gołcza - Celary & Wiśniowski, 2003), **Roztocze** (FB71 Tomaszówka - Dylewska, 1987b), **Sandomierz Lowland** (DA95 Konary - Dylewska, 1987b), **Western Beskydy Mts.** (DA71 Roztoka - Dylewska, 1987b; DA93 Zgłobice - Dylewska, 1987b).

Verified published records (Map 4): **Kraków-Wieluń Upland** (DA15 Ojców NP: Skała Krzyżowa, 29.VI.2001 - 1♀; DA16 Ojców NP: Grodzisko, 5.VII.2001 - 1♀, Pieskowa Skała, 7.VI.2001 - 1♀, Sąspów Valley, 12.VI.2003 - 2♀♀, leg. B. Wiśniowski. DA24 Kraków: 14.VI.1908 - 3♀♀, ex coll. J. Śnieżek; 1.VI.1939 - 3♂♂, 3.VI.1939 - 1♀, 5.VI.1939 - 1♀, 3.VIII.1941 - 1♂, 30.V.1942 - 1♀ and 1♂, 1.VI.1942 - 1♂, 4.VI.1942 - 2♂♂, 16.VI.1942 - 1♂, 18.VI.1942 - 2♀♀, 1.VII.1942 - 2♀♀, 5.VII.1942 - 1♀, leg. J. Zabłocki; DA24 Kraków, botanical garden: 15.V.1934 - 1♀, leg. J. Zabłocki; DA24 Kraków, Sikornik Hill: 30.V.1918 - 1♀, ex coll. P. Łoziński), **Sandomierz Lowland** (DA95 Żabno-Konary: 16.VI.1966 - 7♀♀, leg. M. Dylewska), and **Western Beskydy Mts.** (DA71 Roztoka-Brzeziny: 11.VI.1966 - 1♀, leg. M. Dylewska).

Unpublished records (Map 4): **Lower Silesia** (XS37 Szewce: 7.V.1882 - 2♂♂; XS46 Wrocław-Karłowice: 24.VI.1888 - 1♂, ex coll. R. Dittrich), **Małopolska Upland** (DA68 Krzyżanowice reserve: 15.V.2008 - 6♂♂; DA69 Polana Polichno reserve: 15.V.2008 - 4♂♂; DA47 Wały reserve near Racławice: 20.VI.2006 - 1♂; DA27 Rzeźuśnia near Gołcza: 21.VI.2005 - 1♀, and 26.V.2008 - 1♂ on *Inuletum ensifoliae*; DA28 Uniejów Rędziny by Tunel: 14.VI.2006 - 2♂♂, leg. B. Wiśniowski), **Sandomierz Lowland** (DA85 Goruszów: 16.VI.1966 - 1♀, leg. M. Dylewska. DA93 Bogumiłowice: 6.VI.2011 - 1♀ and 1♂, EA55 Huta Przedborska: 10.VI.2003 - 1♀, leg. T. Huflejt).

Remarks: *A. pontica* is known only from localities in the southern part of the country, mainly from lowland areas. In the uplands, e.g. in the Ojców

National Park, it reaches around 450 m a.s.l. The presence of the species in Lower Silesia, where three males were collected in the 1880s, requires confirmation.



Map 4. Distribution map of *A. pontica* in Poland: □ - published records; ■ - verified published records; ● - unpublished records.

#### Subgenus: *Poecilandrena* Hedicke, 1933

#### *Andrena potentillae* Panzer, 1809

##### Diagnosis

In both sexes, the distance between lateral ocelli and the edge of the head equals half of the diameter of the ocelli. In males, the dorsal lobes of gonocoxites weakly developed (Fig. 4). Occurs in Europe except its northern parts, as well in Southern Russia and Kazakhstan (Scheuchl & Willner, 2016). Univoltine. Bees fly in April and May (Dylewska, 2000) and prefer sunny and dry habitats, gravel pits, sand pits and sandy grasslands (Dylewska & Wiśniowski, 2003). Oligoleptic species, collects pollen from flowers of *Potentilla* sp., e.g. *Potentilla erecta*, *P. neumanniana* and *P. tabernaemontani* (Ruszkowski & Gosek, 1999; Dylewska, 2000). Nests in aggregations of various sizes (Dylewska & Wiśniowski, 2003). The cuckoo bees *Nomada guttulata* Schenck, 1861; *N. ruficornis* Linnaeus, 1758 are listed as kleptoparasites in nests of *A. potentillae* (Celary, 1995; Dylewska & Wiśniowski, 2003).

Published records (Map 5): Pomeranian



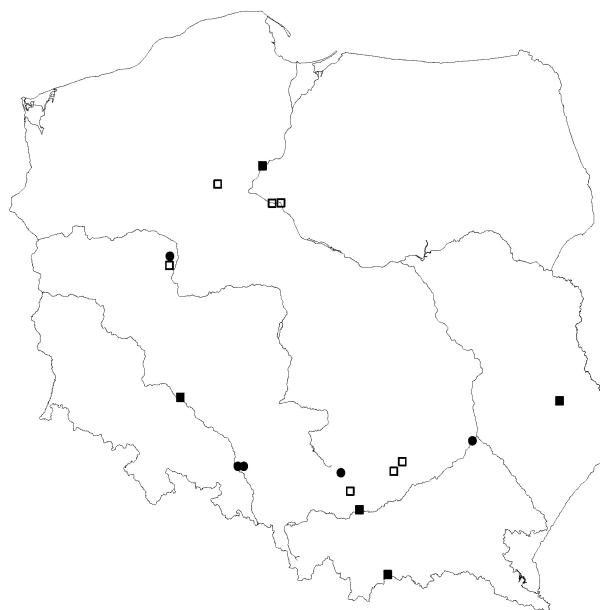
Fig. 4. *A. potentillae*, male genitalia (SEM)

Lakeland (CE21 Gruczno - Pawlikowski & Hirsch, 2002), Wielkopolska-Kujawy Lowland (XU20 Poznań - Banaszak, 1974, 1982; Banaszak-Cibicka & Banaszak, 2011. XU79 Nakło nad Notecią - Torka, 1913. XU79 Trzeciewnica - Torka, 1933. CD37 Toruń - Pawlikowski, 1985. CD37 Toruń-Przedmieście Chełmińskie, CD47 Toruń-Kaszczorek - Pawlikowski & Hirsch, 2002), Lower Silesia (XS46 Wrocław-Karłowice - Dittrich, 1903), Kraków-Wieluń Upland (DA16 Ojców NP: Grodzisko - Dylewska, 1988. DA24 Kraków: Krzemionki Dębnickie - Łoziński, 1920), Małopolska Upland (DA79 Gacki - Banaszak, 1984. DA68 Nadnidziański Landscape Park - Bąk-Badowska, 2012), Lublin Upland (FB55 Krasnystaw - Noskiewicz, 1924), and Pieniny Mts. (DV57 Zamczysko Mt - Dylewska, 1987b).

Verified published records (Map 5): Pomeranian Lakeland (CE21 Gruczno: 11.IV.2001 - 1♀, 20.IV.2001 - 1♀, leg. J. Wendzonka), Lower Silesia (XS46 Wrocław-Karłowice: 24.IV.1887 - 3♀♂ and 4♂♂, 19.V.1887 - 2♀♀, 21.IV.1895 - 1♂, ex coll. R. Dittrich), Kraków-Wieluń Upland (DA24 Krzemionki Dębnickie: 17.IV.1919 - 2♂♂, ex coll. P. Łoziński), Lublin Upland (FB55 Krasnystaw: 13.IV.1920 - 1♂, coll. J. Noskiewicz), and Pieniny Mts. (DV57 Zamczysko: 13.V.1960 - 1♀, leg. M. Dylewska).

Unpublished records (Map 5): Wielkopolska-Kujawy Lowland (XU21 Poznań-Golęcin:

20.IV.1940 - 1♀, leg. W. Grünwaldt), **Lower Silesia** (BA89 Gogolin: 15.IV.1938 - 1♂, ex coll. USMB; 15.IV.1938 - 1♂, leg. H. Nowotny), **Upper Silesia** (BA99 Kamienna Góra by Ligota Dolna: 7.V.1926 - 1♀, leg. H. Nowotny), **Kraków-Wieluń Upland** (DA08 Ryczów: 19.V.2013 - 1♀, leg. W. Celary), **Małopolska Upland** (EB51 Góry Pieprzowe reserve near Sandomierz: 14.V.2008 - 1♀, leg. B. Wiśniowski).



Map 5. Distribution map of *A. potentillae* in Poland: □ - published records; ■ - verified published records; ● - unpublished records.

**Remarks:** During research on the published records of the species as well as specimens in collections, most information about the distribution turned out to be rather old. Current localities of *A. potentillae* are grouped in two regions - one is the area between Poznań and Toruń, and the other covers southern parts of both the Kraków-Wieluń and Małopolska uplands. As with *A. paucisquama*, the species seems to migrate mainly along valleys of big rivers, including the Vistula and Odra and their tributaries.

#### *Andrena viridescens* Viereck, 1916

##### Diagnosis

In both sexes head and thorax with a green-blue gloss. Gonocoxites of the males with well-developed dorsal lobes (Fig. 5).

The bee is distributed in Europe except in its northern parts, and it was recorded also in the

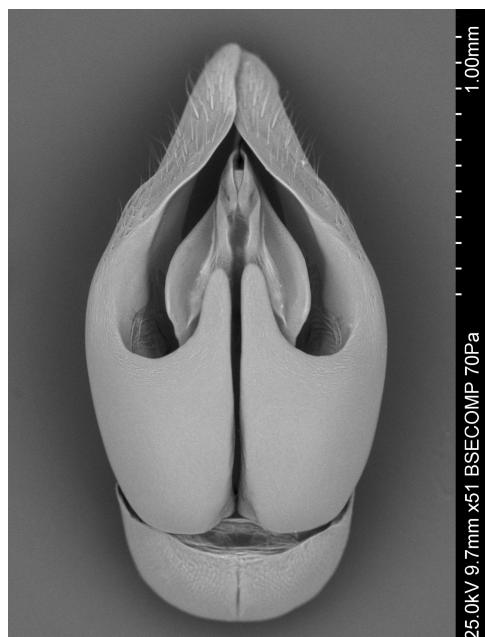


Fig. 5. *A. viridescens*, male genitalia (SEM)

Caucasus (Scheuchl & Willner, 2016). Univoltine. Bees fly from April till June (Dylewska, 2000). *A. viridescens* inhabits extensively managed grassland areas, ruderal habitats, sand pits, gravel pits, clay pits, forest edges, parks and orchards. Oligolectic species, collects pollen from flowers of *Veronica* sp., mainly *Veronica chamaedrys* (Scheuchl & Willner, 2016). Other plants may be the source of nectar, e.g. *Crataegus* sp., *Fragaria vesca*, *Lamium purpureum*, *Medicago* sp., *Potentilla neumanniana*, *Taraxacum* sp. They usually nest in small aggregations in sparsely vegetated ground from sand to loess (Scheuchl & Willner, 2016). The cuckoo bee *Nomada atroscutellaris* Strand, 1921 is known as the kleptoparasite in nests of *A. viridescens* (Celary, 1995). Published records (Map 6): **Wielkopolska-Kujawy Lowland** (XT29 Wielkopolska NP - Banaszak, 1982, 1987. XU20 Poznań - Banaszak, 1982; Banaszak-Cibicka & Banaszak, 2011), **Mazovian Lowland** (DC59 Kampinos NP - Szczepko & Wiśniowski, 2009), **Lower Silesia** (WS87 Legnica, XS14 Mietków, XS46 Wrocław, XS64 Oława - Dittrich, 1903), **Trzebnica Hills** (XS38 Oborniki Śląskie - Dittrich, 1903), **Kraków-Wieluń Upland** (DA15 Będkowice Valley - Celary, 1991. DA16 Ojców NP - Dylewska, 1988. DA24 Kraków: Krzemionki Dębnickie - Łoziński, 1920. DA24 Kraków vicinity - Moroń et al., 2009), **Lublin Upland** (EB68 Kazimierz

Dolny - Minkiewicz, 1935), Świętokrzyskie Mts. (DB93 Świętokrzyski NP - Bąk-Badowska, 2012), Sandomierz Lowland (FA24 Jarosław - Banaszak, 1973), and Eastern Beskydy Mts. (FA11 Reczpol - Banaszak, 1984).



Map 6. Distribution map of *A. viridescens* in Poland:  
■ - published records; ■ - verified published records;  
● - unpublished records.

Verified published records (Map 6): **Mazovian Lowland** (DC59 Kampinos NP: Pieklice: 1-7.V.2004 - 1♂, 18-26.V.2004 - 1♀, 10.VI.2004 - 1♀, 31.V-14.V.2006 - 1♂, leg. K. Szczepko),

**Kraków-Wieluń Upland** (DA15 Dolina Będkowska: 14.V.1984 - 1♀, 2.VI.1984 - 1♀, leg. W. Celary. DA16 Ojców NP: Grodzisko: 10.V.1968 - 1♀, 3.V.1969 - 1♂, leg. M. Dylewska. DA24 Kraków: \* - 3♀♀ and 8♂♂, ex coll. P. Łoziński; 28.IV.1934 - 1♂, leg. J. Zabłocki).

Unpublished records (Map 6): **Upper Silesia** (CA48 Segiet reserve: „Hałda Popłuczkowa”, 30.IV.2011 - 1♂, leg. H. Szołtys), **Kraków-Wieluń Upland** (DA16 Ojców NP, Sąspów Valley: 2.V.2004 - 1♂; 8.V.2004 - 1♀, on *Taraxacum* sp., 1.V.2000 - 1♂; Grodzisko: 5-16.V.2003 - 1♂; 6.V.2003 - 1♀, 16-27.VI.2003 - 1♀; Zabugaje: 2.V.2004 - 1♂, on *Taraxacum* sp., leg. B. Wiśniowski), **Małopolska Upland** (DA69 Polana Polichno reserve: 15.V.2008 - 1♂, leg. B. Wiśniowski. EB45 Czekarzewice by Tarłów: 22.V.2005 - 1♂, leg. A. Liana), **Sandomierz Lowland** (EA49 Tarnobrzeg-Machów: 5.V.2003

- 1♂; EA55 Cierpisz near Przedbórz: 9.V.2003 - 1♂; EA57 Mechowiec: 7.V.2003 - 1♂; FA05 Grodzisko Dolne near Leżajsk: 6.V.2001 - 1♂; FA06 Piskorowice: 30.IV.2011 - 1♂, leg. T. Huflejt).

Remarks: *A. viridescens* is distributed in lowland and upland areas of western, central and southern Poland. In uplands, the species goes up to around 400 m a.s.l. The records from Lower Silesia need confirmation, but the species definitely still occurs there. Current localities of *A. viridescens* are situated from Upper Silesia, through the southern parts of Kraków-Wieluń and Małopolska uplands, to the Sandomierz Lowland. More observations are required to judge the changes in the distribution of the species.

## REFERENCES

- Anasiewicz, A. (1976). Dzikie błonkówki pszczołowate (Apoidea, Hymenoptera) występujące w biocenozie kwitnącej koniczyny czerwonej. *Polskie Pismo Entomologiczne*, 46(1), 145-153.
- Banaszak, J. (1973). Materiały do znajomości fauny pszczołowatych (Hymenoptera, Apoidea) Rzeszowszczyzny. *Polskie Pismo Entomologiczne*, 43, 55-60.
- Banaszak, J. (1974). Pszczołowate (Apoidea) okolic Poznania. *Badania Fizjograficzne nad Polską Zachodnią. Seria B - Biologia*, 26, 33-78.
- Banaszak, J. (1975). Materiały do znajomości fauny pszczół (Apoidea, Hymenoptera) siedlisk kserotermicznych nad dolną Wisłą. *Badania Fizjograficzne nad Polską Zachodnią. Seria C - Zoologia*, 28, 109-122.
- Banaszak, J. (1980). Pszczoły (Apoidea, Hymenoptera) siedlisk kserotermicznych rejonu dolnej Wisły. *Fragmenta Faunistica*, 25(18), 335-360.
- Banaszak, J. (1982). Pszczoły (Apoidea, Hymenoptera) Nizin Wielkopolsko-Kujawskiej. *Fragmenta Faunistica*, 27(7), 75-92.

- Banaszak, J. (1984). Materiały do znajomości pszczół (Hymenoptera, Apoidea) fauny Polski. III. *Badania Fizjograficzne nad Polską Zachodnią. Seria C – Zoologia*, 34, 127-147.
- Banaszak, J. (1987). Pszczoły (Hymenoptera, Apoidea) wybranych zespołów roślinnych Wielkopolskiego Parku Narodowego. *Badania Fizjograficzne nad Polską Zachodnią. Seria C – Zoologia*, 35, 5-23.
- Banaszak, J. (2003). „Góry Pieprzowe” Hills in the vicinity of Sandomierz (SE Poland) as the European refuge of xerothermic bees (Hymenoptera: Apoidea). *Polskie Pismo Entomologiczne*, 72, 111-130.
- Banaszak, J. (2008). Zróżnicowanie owadów zapylających w parku pałacowym w Lubostroniu. In *Przyroda parku pałacowego w Lubostroniu* (eds Banaszak J. & Ratyńska H). (pp. 113-121). Bydgoszcz, Poznań: Oficyna Wydawnicza Branta.
- Banaszak, J., Cierzniak, T., Kriger, R., & Wendzonka, J. (2006). Bees of xerothermic swards in the lower Vistula valley: diversity and zoogeographic analyses (Hymenoptera: Apoidea: Apiformes). *Polskie Pismo Entomologiczne*, 75(1), 105-154.
- Banaszak, J., & Kowalczyk, J. K. (2007). Notes on bees (Hymenoptera: Apoidea: Apiformes) of central Poland. *Fragmenta Faunistica*, 50(1), 1-18.
- Banaszak-Cibicka, W., & Banaszak, J. (2011). Pollinating insects of cities (Hymenoptera: Apoidea: Apiformes). Part II. Fauna of cities in comparison with natural habitats. In *Urban Fauna. Studies of animal biology, ecology and conservation in European cities* (eds Indykiewicz P, Jerzak L, Böhner J, & Kavanagh B). (pp. 237-250). Bydgoszcz: Wydawnictwo Uniwersytetu Technologiczno-Przyrodniczego.
- Bąk-Badowska, J. (2012). *Ekologia zgrupowań pszczół (Hymenoptera: Apoidea: Apiformes) wybranych obszarów chronionych Wyżyny Małopolskiej*. Kielce: Wydawnictwo Uniwersytetu Jana Kochanowskiego.
- Blüthgen, P. (1919). Die Bienenfauna Pommerns. *Stettiner Entomologische Zeitung*, 80, 65-131.
- Burakowski, B., Mroczkowski, M., & Stefańska, J. (1978). Chrząszcze – Coleoptera: Histeroidea i Staphylinoidea prócz Staphylinidae. In *Katalog fauny Polski. Część 23, 5*. Warszawa: Państwowe Wydawnictwo Naukowe.
- Celary, W. (1991). Wild bees (Hymenoptera, Apoidea) of the Będkowice Valley (Kraków-Częstochowa Upland). Part II. Andrenidae, Melittidae, Megachilidae, Anthophoridae, Apidae. *Acta biologica cracoviensis. Series: Zoologia*, 33, 19-37.
- Celary, W. (1995). *Nomadini (Hymenoptera, Apoidea, Anthophoridae) of Poland*. Monografie fauny Polski. 20. Kraków: Wydawnictwa Instytutu Systematyki i Ewolucji Zwierząt Polskiej Akademii Nauk.
- Celary, W., & Wiśniowski B. (2003). Contribution to bee fauna (Hymenoptera: Apoidea) of Poland. II. *Acta zoologica cracoviensis*, 46(4), 359-364.
- Dittrich, R. (1903). Verzeichnis der bisher in Schlesien aufgefundenen Hymenopteren. I. Apidae. *Zeitschrift für Entomologie, Neue Folge*, 28, 21-54.
- Drogoszewski, K. (1936). Nowe dla Polski środkowej Żądłówki. *Polskie Pismo Entomologiczne*, 13(1-4) [1934], 125-131.
- Dylewska, M. (1987a). Die Gattung *Andrena Fabricius* (Andrenidae, Apoidea) in Nord- und Mitteleuropa. *Acta zoologica cracoviensis*, 30(2), 359-708.
- Dylewska, M. (1987b). Rodzaj *Andrena Fabricius* (Andrenidae, Apoidea) w Polsce. *Polskie Pismo Entomologiczne*, 57, 495-518.
- Dylewska, M. (1988). Apoidea of the Ojców National Park. Part I. Colletidae, Halictidae, Andrenidae, Melittidae, Megachilidae, Anthophoridae. *Acta biologica cracoviensis. Series: Zoologia*, 30, 19-72.
- Dylewska, M. (2000). Pszczołowate – Apidae. Podrodzina: Andrenidae. Klucze do oznaczania owadów Polski. XXIV. Błonkówki – Hymenoptera, 68d, 153. Toruń: Polskie Towarzystwo Entomologiczne.

- Dylewska, M., & Noskiewicz, J. (1963). Apoidea of the Pieniny Mts National Park. Part II. Colletidae, Andrenidae, Halictidae, Melittidae, Apidae (Nomada Scop.). *Acta zoologica cracoviensis*, 8(13), 477-532.
- Dylewska, M., & Wiśniowski, B. (2003). *Żądłówki (Hymenoptera: Aculeata) Ojcowskiego Parku Narodowego*. Ojców: Ojcowski Park Narodowy.
- Dylewska, M., & Zabłocki, J. (1972). Nowe i mało znane Apoidea (Hymenoptera) z obszaru Polski. *Acta zoologica cracoviensis*, 17(18), 405-414.
- Falk, S. (2015). *Field guide to the bees of Great Britain and Ireland*. British wildlife field guides. London, New York: Bloomsbury Publishing Plc.
- Kowalczyk, J.K., Szczepko, K., & Kurzac, T. (2008). Stan poznaniapszczoły (Hymenoptera, Apoidea, Apiformes) Łodzi. In *Fauna miast. Ochronić różnorodność biotyczną w miastach* (eds. Indykiewicz, P. & Barczak, T.). (pp. 246-252). Bydgoszcz: Wydawnictwo SAR „Pomorze”.
- Łoziński, P. (1920). Błonkówki pszczoliołate okolic Krakowa. *Sprawozdanie Komisji Fizjograficznej*, 53-54, 125-137.
- Minkiewicz, R. (1935). *Myrmosa brunnipes* Lepel. tutzież inne żądłówki południowe lub rzadkie, wykryte w Polsce środkowej. *Fragmenta Faunistica Musei Zoologici Polonici*, 2(21), 189-227.
- Moroń, D., Lenda, M., Skórka, P., Szentgyörgyi, H., Settele, J., & Woyciechowski, M. (2009). Wild pollinator communities are negatively affected by invasion of alien goldenrods in grassland landscape. *Biological Conservation*, 142(7), 1322-1332. DOI: 10.1016/j.biocon.2008.12.036
- Motyka, E., & Bystrowski, C. (2016). *Andrena saxonica* Stoeckert, 1935 (Hymenoptera: Apoidea: Andrenidae) – nowy gatunek pszczoli z rodzaju *Andrena* w Polsce. In *Proceedings 50 Zjazd Polskiego Towarzystwa Entomologicznego oraz VIII Ogólnopolska Konferencja Naukowa z cyklu „Ochrona owadów w Polsce” nt. „Entomofauna leśna – różnorodność, ochrona i kierunki badań”*. Sękocin Stary – Polska. 16-18 września 2016. Poznań: Polskie Towarzystwo Entomologiczne, 38.
- Noskiewicz, J. (1924). Nowe dla fauny Polski i rzadkie błonkówki. *Polskie Pismo Entomologiczne*, 2(4), 176-186.
- Noskiewicz, J. (1959). Nowe dla fauny Polski gatunki błonkówek (Hymenoptera) i muchówek (Diptera) i nowe stanowiska gatunków rzadko obserwowanych. *Polskie Pismo Entomologiczne*, 29(14), 201-214.
- Osytshnjuk, A. Z., Romasenko, L., Banaszak, J., & Cierzniaik, T. (2005). *Andreninae of the Central and Eastern Palearctic. Part 1*. Polish Entomological Monographs, 2. Poznań, Bydgoszcz: Polish Entomological Society.
- Osytshnjuk, A. Z., Romasenko, L., Banaszak, J., & Motyka, E. (2008). *Andreninae of the Central and Eastern Palearctic. Part 2*. Polish Entomological Monographs, 5. Poznań, Bydgoszcz: Polish Entomological Society.
- Pawlakowski, T. (1985). Zgrupowania dzikich pszczoliołatych (Hymenoptera, Apoidea) na kserotermicznych siedliskach wydmowych Kotliny Toruńskiej. *Studia Societatis Scientiarum Torunensis, Sectio B - Zoologia*, 10(4), 257-311.
- Pawlakowski, T., & Hirsch, J. (2002). Bees (Hymenoptera: Apoidea) as indicators of xerisation processes in the lower Vistula Valley. *Acta zoologica cracoviensis*, 45(4), 321-336.
- Pawlakowski, T., & Kowalewska, B. (1998). Atrakcyjność środowisk krawędziowych dla pszczół (Hymenoptera: Apoidea) na Zboczach Płutowskich koło Chełmna. *Wiadomości Entomologiczne*, 16(3-4) [1997], 165-176.
- Ruszkowski, A., & Gosek, J. (1999). Rośliny pokarmowe i znaczenie gospodarcze pszczolinek (*Andrena Fabri*cii) z podrodzajów *Poecilandrena* Hedicke, *Margandrena* Warncke i *Carandrena* Hedicke (Hymenoptera, Andrenidae). *Pszczelnicze Zeszyty Naukowe*, 43, 351-360.

- Scheuchl, E., & Willner, W. (2016). *Taschenlexikon der Wildbienen Mitteleuropas. Alle Arten in Porträt*. Wiebelsheim: Quelle & Meyer Verlag.
- Szczepko, K., & Wiśniowski, B. (2009). Interesujące gatunki żądłówek (Hymenoptera: Aculeata) związane z terenami uprawnymi i drewnianymi zabudowaniami. In *Rola Kampinoskiego Parku Narodowego w zachowaniu różnorodności biologicznej i krajobrazowej dawnych obszarów wiejskich* (eds Michalska-Hejduk D., & Bomanowska A.). (pp. 91-98). Łódź-Izabelin: Kampinoski Park Narodowy.
- Śnieżek, J. (1910). Błonkówki pszczoliołówate (Apidae), zebrane w Galicyi. *Sprawozdanie Komisji Fizyograficznej*, 44(II), 31-46.
- Torka, V. (1913). Die Bienen der Provinz Posen. *Zeitschrift der Naturwissenschaftlichen Abteilung (des Naturwissenschaftlichen Vereins)*, 20, 97-181.
- Torka, V. (1926). Zur Bienenfauna Oberschlesiens. *Internationale Entomologische Zeitschrift*, 20(16), 125-130.
- Torka, V. (1933). Nachträge zu meiner Veröffentlichung über "Die Bienen der Provinz Posen". *Deutschen Wissenschaftlichen Zeitschrift für Polen*, 26, 83-94.
- Wiśniowski, B., & Werstak, K. (2009). Wstępne wyniki badań nad pszczoliołówatymi Hymenoptera: Aculeata: Anthophila (z wyjątkiem Apidae) w Magurskim Parku Narodowym. *Roczniki bieszczadzkie*, 17, 319-338.