

Original Article

THE WILD BEES *ANDRENA GALLICA* SCHMIEDEKNECHT, 1883 AND *ANDRENA ASSIMILIS* RADOSZKOWSKI, 1876 (APOIDEA: ANDRENIDAE) IN POLAND

Ewelina Motyka¹Bogdan Wiśniowski^{2*}Katarzyna Szczepko³¹Department of Genetics, Institute of Experimental Biology, Kazimierz Wielki University, 30 Chodkiewicza Av., 85-064 Bydgoszcz, Poland²Ojców National Park, Ojców 9, 32-045 Sułoszowa, Poland³ Department of Biodiversity Studies, Didactics and Bioeducation, University of Łódź, 1/3 Banacha Str., 90-237 Łódź, Poland

*corresponding author: bogdan.w@hotmail.com

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Abstract

The wild bees *Andrena assimilis* RADOSZKOWSKI, 1876, and *Andrena gallica* SCHMIEDEKNECHT, 1883, are morphologically very similar species and by some authors they are treated as one taxon - *A. assimilis*. Some other authors treat *A. gallica* as a subspecies of *A. assimilis*, others assert that both *A. gallica* and *A. assimilis* are valid species. After analysing the morphological features, we confirm that they should be treated as two distinct species. The following characters help to separate *A. gallica* from *A. assimilis*: in the case of females - the colouration of the stigma and veins in the forewing, in the case of males - the microsculpture of the surface of the metasomal terga, the punctuation of terga II-III, and the width of theedeagus. *Andrena gallica* was reported in Poland in the first half of the twentieth century from the following regions: Baltic Coast, Kraków-Wieluń Upland, Małopolska Upland, and Wielkopolska-Kujawy Lowland. Due to the synonymy, these records were included in the distribution of *A. assimilis*. After more than 50 years, the occurrence of *A. gallica* in Poland has been confirmed. The new record of the species is reported based on the specimen collected in Kampinos National Park (Mazovian Lowland). In 2004, one male was collected on fallow land. Water pan-traps (Moericke traps) were used to do the collecting. Diagnoses of both species, data on their biology, as well as distribution, are provided.

Keywords: *Andrena*, Andrenidae, distribution, Hymenoptera, *Melandrena*, Poland

INTRODUCTION

Andrena assimilis RADOSZKOWSKI, 1876, and *Andrena gallica* SCHMIEDEKNECHT, 1883, are species of wild bees belonging to the family Andrenidae, and the subgenus *Melandrena* Pérez, 1890, in the genus *Andrena* Fabricius, 1775. The status of the two species was not certain for a long time. According to some authors, e.g. Osytshnjuk (1978), Gusenleitner & Schwarz (2002), Osytshnjuk et al. (2008), as well as Amiet et al. (2010), *A. gallica* is the valid species. Some other researchers, e.g. Warncke (1986) and Dylewska (1987, 1997), treat *A. gallica* as a subspecies of *A. assimilis* - thus *A. assimilis gallica*

SCHMIEDEKNECHT, 1883. In other papers published by Dylewska (1974, 2000), as well as Schmid-Egger & Scheuchl (1997), *A. gallica* is considered as the synonym of *A. assimilis*. In the published checklists of Polish bee species, only *A. assimilis* was listed, and it was listed either as *A. assimilis gallica* (Dylewska, 1997; Banaszak, 2000) or *A. assimilis* (Banaszak, 1991, 2000; Bogdanowicz et al., 2004).

The known distribution of both taxa in Europe is the result of their systematic position according to various authors. Here are some examples: *Andrena gallica*: recorded from Austria, Germany, and Switzerland (Schwarz et al., 1996); recorded also from Bohemia, Moravia, and Slovakia (Straka,

Bogusch, & Přidal, 2007). According to Fauna Europaea Web Service (Fauna Europea, 2014) the species in Europe is known from Austria, the Czech Republic, the French mainland, Germany, the Italian mainland, Slovakia, the Spanish mainland, Switzerland, and Ukraine.

Andrena assimilis: Not recorded from Austria, Germany, and Switzerland (Schwarz et al., 1996); not recorded also from Bohemia, Moravia, and Slovakia (Straka, Bogusch, & Přidal, 2007). According to Fauna Europaea Web Service (Fauna Europea, 2014) the species in Europe is known from Austria, the Czech Republic, the French mainland, Germany, the Greek mainland, Hungary, the Italian mainland, Lithuania, Poland, Northwest and South Russia, Slovakia, the Spanish mainland, Switzerland, and Ukraine; the species is known also from Near East and Eastern Palearctic.

This paper presents the diagnoses, data on biology, general distribution, and Polish localities of *Andrena assimilis* Radoszkowski, 1876, and *Andrena gallica* Schmiedeknecht, 1883.

MATERIAL AND METHODS

The research was carried out during the 2008-2014 time period using various entomological collections in Poland. The specimens representing the genus *Andrena* were studied and identified by one of the authors (EM), as a part of her forthcoming dissertation. The following collections were studied (abbreviations in parentheses):

- Museum and Institute of Zoology, PAS, Warszawa, Research Station Łomna-Las (MIZ PAS),
- Institute of Systematics and Evolution of Animals, PAS, Kraków (ISEZ PAS),
- Natural History Museum of Wrocław University, Wrocław (MPUW),
- Upper Silesian Museum, Bytom (MGB),
- Chair of Ecology of Kazimierz Wielki University, Bydgoszcz,

as well as collections of Katarzyna Szczepko (KS) and Bogdan Wiśniowski.

Diagnoses of the species, body length, distribution in Poland, and biological data are based

mainly on verified specimens from the studied collections. They are completed by information from published papers, e.g. Dylewska (1974, 2000), Osytshnjuk (1978), Schmid-Egger & Scheuchl (1997), Guseleinertner & Schwarz (2002), Dylewska & Wiśniowski (2003), Osytshnjuk et al. (2008), as well as Amiet et al. (2010).

RESULTS

During the study, ca. 20 000 specimens from Poland representing the genus *Andrena* were identified to species level. Both *Andrena assimilis* Radoszkowski, 1876, and *Andrena gallica* Schmiedeknecht, 1883, were found to occur in Poland.

Andrena gallica Schmiedeknecht, 1883

Diagnosis. The female can be distinguished from the very similar *Andrena assimilis* Radoszkowski, 1876, by the following characters: wings transparent; stigma and veins of the forewing orange. Terga II and III of the male more sparsely punctate than the terga of *A. assimilis*; surface of metasomal terga distinctly shagreened;edeagus somewhat broader than in *A. assimilis*. **Female.** Body length: 14-16 mm. Basal area of labrum trapezoidal. Clypeus very densely punctate, granulate between punctures. Facial foveae occupy 3/4 of ocellular distance. Mesoscutum densely and regularly punctate and granulate. Horizontal part of propodeal triangle finely undulate and granulate, vertical part granulate. Metasomal terga II-IV shiny, punctate and shagreened; marginal zones of these terga occupy about 1/3 of tergal length. Tergum I more sparsely punctate than the remaining terga. Marginal zones of terga II-IV more sparsely punctate than the basal part of terga.

Vestiture. The head, facial foveae, lateral part of mesosoma, metasoma, and abdominal part of body have brown hairs. Mesosoma and propodeal corbicula with reddish-brown hairs. Flocculus and scopa brown. Metasomal terga II-IV with short pubescence, terga V-VI with long pubescence.

Colouration. Body brown. Stigma and veins of

forewing orange. Wings transparent. Male. Body length: 12-14 mm. Basal area of labrum very broad and very similar to *Andrena thoracica* (FABRICIUS, 1775). Clypeus black, very densely punctate, and granulate. The first flagellar segment somewhat longer than the second one. Mesoscutum and scutellum irregularly punctate and granulate. Horizontal part of propodeal triangle undulate, vertical part granulate. Metasomal terga II-IV shiny and sparsely punctate, shagreened between punctures. Marginal zones of these terga occupy about 1/3 of tergal length. Gonocoxites have well-developed dorsal lobes, rounded at the ends. Gonostyles elongate. Edeagus at the level of gonocoxites broad; broader in comparison with *A. assimilis*, narrowed in the apical part (Fig. 1a).

Colouration and vestiture. Body colouration and vestiture as in the female, except for stigma in forewing, which is light brown.

Distribution in Poland (Fig. 2).

Published records from Poland:

- Baltic Coast: CF56 Jastarnia (Noskiewicz, 1924).

- Wielkopolska-Kujawy Lowland: XT50 Sułów (Noskiewicz, 1949, 1954).

- Kraków-Wieluń Upland: DA16 Ojców (Noskiewicz, 1954; Dylewska, 1974; Dylewska & Wiśniowski, 2003).

- Małopolska Upland: DA89 Busko Zdrój (Drogoszewski, 1936).

Material examined (1♂):

- Mazovian Lowland: DC59 Kampinos National Park, Bromierzzyk: 16-23.04.2004 - 1♂ collected on a 3-year old fallow field. Oats and beets were previously cultivated in the field. The specimen was collected with the use of water pan-traps (Moericke trap), leg. K. Szczepko (coll. KS).

Other material (1♂):

Ukraine: 27.04.1869 - 1♂, ex coll. A. Wierzejski (coll. ISEZ PAS).

General distribution.

The distribution of *Andrena gallica* covers Southern, Central, and Eastern Europe, the Caucasus, Russia (Siberia, south to Baikal) (Osytschnjuk et al., 2008; Amiet et al., 2010).

Biology.

According to Noskiewicz (1954) - bivoltine. Flight

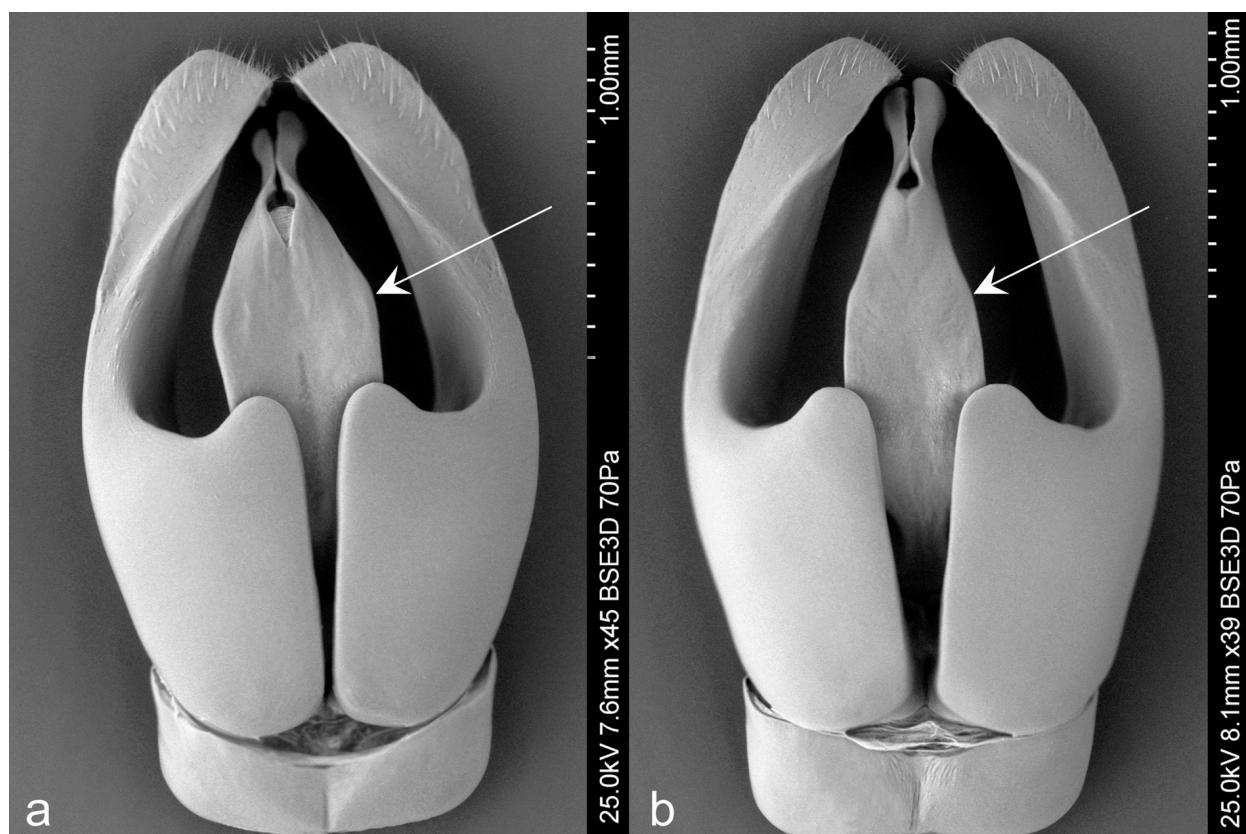


Fig. 1. Genital capsules of males, dorsal view: 1a - *Andrena gallica* SCHMIED., 1b - *Andrena assimilis* RAD.

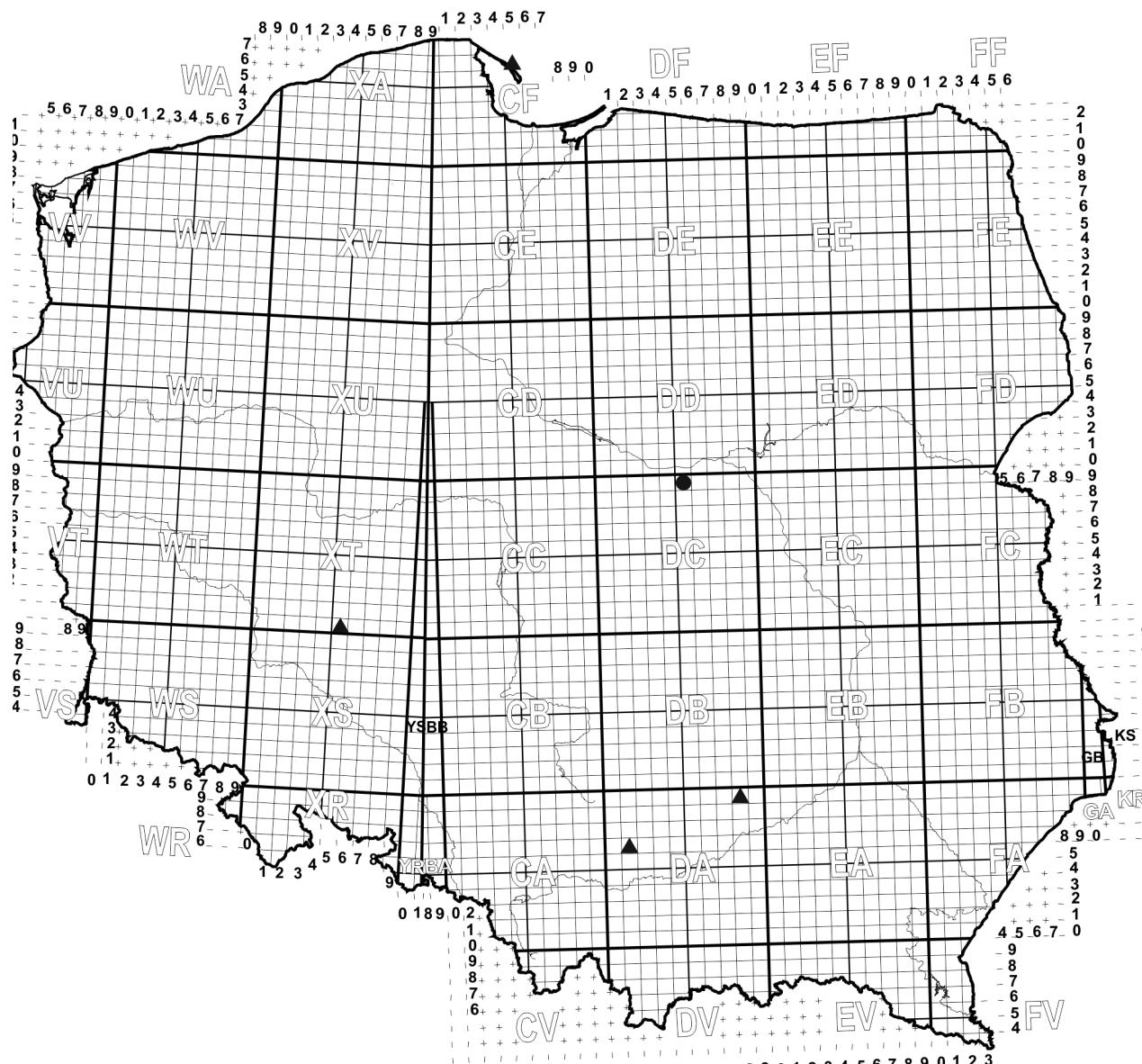


Fig. 2. Distribution map of *Andrena gallica* SCHMIED.: ▲ – published records; ● – verified specimen.

season: from April till August. Range element: Euro-Siberian. Biotope: open habitats with loose vegetation, fallow land. Nesting: sandy loose soils or dense soils – for instance loess soils, chernozem (Noskiewicz, 1954). *Andrena gallica* is a host of the kleptoparasitic bees *Nomada italicica* Dalla Torre & Friese, 1894, and *N. marshamella* (Kirby, 1802) (Amiet et al., 2010). The females pollinate flowers of *Potentilla verna* and *Salix* (the first generation), as well as *Berteroa incana*, *Centaurea rhenana*, *Centaurea scabiosa*, *Eryngium planum*, and *Veronica spicata* (the second generation) (Noskiewicz, 1954).

Andrena assimilis RADOSZKOWSKI, 1876

Diagnosis. Wings darkened; in the female, the stigma in the forewing is orange, veins are darkened, almost black. Terga II and III of the male more distinctly and more densely punctate than terga of *A. gallica*; surface of metasomal terga smooth or finely shagreened; edeagus narrower than in *A. gallica*.

Female. Body length 14–16 mm. Basal area of labrum trapezoidal. Clypeus very densely punctate and granulate. Facial foveae occupy 3/4 of ocellocular distance. Mesoscutum densely punctate and granulate. Horizontal part of propodeal triangle undulate, vertical part granulate. Metasomal terga shiny, punctate, and

shagreened. Tergum I more sparsely punctate than the remaining terga. Marginal zones of terga II-IV more sparsely punctate than the basal part of those terga. Marginal zones of those terga occupy about 1/3 of tergal length. Vestiture. Brown pubescence on the head, facial foveae, lateral parts of propodeum, metasoma, and abdominal part of body. Mesosoma with rusty hairs. Dorsal part of propodeal corbiculae rusty. Flocculus and scopa brown. Metasomal terga with long pubescence.

Colouration. Head and mesosoma black, metasoma and legs brown. In forewing - stigma orange and veins black. Wings infuscate.

Male. Body length 12-14 mm. Basal area of

labrum narrower than the basal area of labrum of *A. thoracica*. Clypeus black, very densely punctate and granulate. The first flagellar segment as long as the second one. Mesoscutum and scutellum irregularly punctate and granulate. Horizontal part of propodeal triangle finely undulate and granulate, vertical part granulate. Metasomal terga shiny and densely punctate, and smooth or finely shagreened. Marginal zones of those terga occupy about 1/3 of tergal length. Gono-coxites have well-developed dorsal lobes, rounded at the ends. Gonostyles long. Edeagus at the level of gonocoxites broad, narrowed in the apical part (Fig. 1b).

Vestiture and colouration of the body as in the

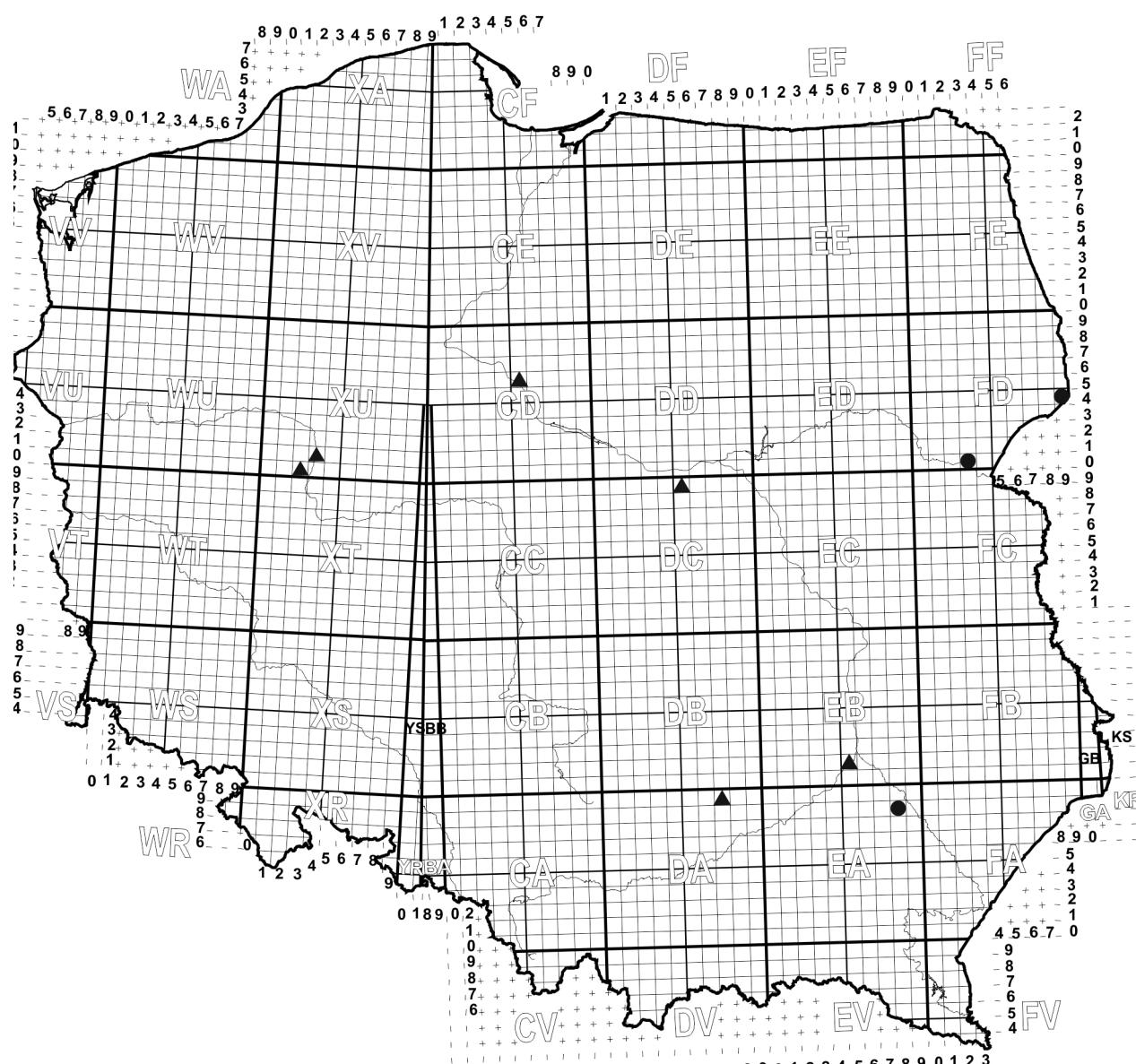


Fig. 3. Distribution map of *Andrena assimilis* RAD.: ▲ - published records; ● - verified specimens.

female, only in forewing – stigma light brown and veins dark orange; wings transparent.

Distribution in Poland (Fig. 3).

Published records from Poland:

- Wielkopolska-Kujawy Lowland: XU20 Poznań, Botanic Garden (Banaszak, 1976a, 1976b). CD56 Ciechocinek (Banaszak, 1980). CD56 Ciechocinek; XU20 Poznań; XU31 Janikowo (Banaszak, 1982). XU20 Poznań (Banaszak-Cibicka & Banaszak, 2011).
- Mazovian Lowland: DC56 Kampinos National Park (Szczepko & Wiśniowski, 2009).
- Małopolska Upland: DA79 Gacki (Banaszak, 1984).
- Sandomierz Lowland: EB51 Góry Pieprzowe (Banaszak, 2003).

Material examined (3♀♂):

- Podlasie: FD30 Mielnik by Siemiatycze: 19.07.2007 – 1♀, leg. M. Łuszczak (coll. MIZ PAS).
- Białowieża Forest: FD94 Białowieża: 15.07.1972 – 1♀, leg. M. Bielewicz (coll. MGB).
- Sandomierz Lowland: EA88 Jeżowe: 8.05.1999 – 1♀, leg. T. Huflejt (coll. MIZ PAS).

General distribution.

Andrena assimilis is distributed from North Africa in the South-West, through Poland and Ukraine in the North, and the Caucasus in the East (Osytshnjuk et al., 2008).

Biology.

Bivoltine. Flight season: from mid April to the beginning of June (the first generation), July and in August – the second generation (Dylewska, 2000). Range element: The Mediterranean-Caucasian. Biotope: open areas. Nesting: sandy and clay soils (Noskiewicz, 1954). *Andrena assimilis* is the host of the same kleptoparasitic bees as *A. gallica* (Celary, 1995). The females visit flowers of *Potentilla*, *Salix*, *Solidago graminifolia*, *Taraxacum*, and *Tussilago farfara* (Banaszak, 1976a; Dylewska, 2000).

On the basis of the morphological characters between the specimens, we interpret *A. gallica* and *A. assimilis* to be valid species. The occurrence of *A. gallica* in Poland was recorded from Jastarnia (Baltic Coast) (Noskiewicz, 1924), Sułów (Wielkopolska-Kujawy Lowland) (Noskiewicz, 1949), Ojców (Kraków-Wieluń

Upland) (Noskiewicz, 1954), and from Busko Zdrój (Małopolska Upland) (Drogoszewski, 1936). Up to now, these were the only reports about the occurrence of the species in Poland. Research conducted in Kampinos National Park in 2000-2006 showed the presence of *A. gallica* and thus confirmed, after more than 50 years, the occurrence of this species in Poland.

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