



Review of the genus *Psilota* (Diptera, Syrphidae) in Poland

Przegląd rodzaju *Psilota* (Diptera, Syrphidae) w Polsce

DOI: 10.5281/zenodo.1450939

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ABSTRACT. This work presents new data, distribution maps and colour photographs of all *Psilota* species present in Poland, based on the revision of the material from institutional and private collections. *Psilota exilistyla* SMIT ET VUJIĆ, 2008 is published as new species for Poland and for Central Europe, revealing a more continuous distribution of the species in its range in Europe. An identification key for all *Psilota* species occurring in Poland has been proposed, containing some new characters helpful in determination. To better expose differences between species, high resolution photographs of male genitalia are presented.

KEY WORDS: Diptera, Hoverflies, *Psilota*, review, new records, Poland

INTRODUCTION

The genus *Psilota* MEIGEN, 1822 (Diptera: Syrphidae) is represented by medium sized and in most cases shiny-metallic, black or bluish species. In field they are easily mistaken with flies of other families, e.g. *Lauxauniidae* or blue-black *Muscidae*, although in the air they behave (hover) like other *Syrphidae*. So far, around 40 species in total have been described worldwide, with a note that recent revision of Australian collections revealed more than 50 additional, not yet described species from that area (SKEVINGTON *et al.* 2014). In the Palearctic region eight *Psilota* species are present according to SMIT & VUJIĆ (2008), all very rare within their range, however SPEIGHT (2014) suggests that more than one taxon remains confused under the name “*anthracina*”. In Poland only three species of *Psilota* have been known so far: *P. anthracina* MEIGEN, 1822, *P. atra* (FALLÉN, 1817) and *P. innupta* RONDANI, 1857.

The first two have been considered synonymous for a long time, until the revision of SMIT & ZEEGERS (2005), who finally confirmed the validity of both species and stabilised their

nomenclature. The third species, *P. innupta*, was always easily distinguishable from the other two species, due to the bright dusting of the face and other parts of body.

Adults of *Psilota* willingly visit inflorescences of *Crataegus*, *Sorbus* and *Apiaceae*. Larvae develop in decaying sap runs under bark, crevices, hollows or rot holes of trees, where they are probably filter feeders on yeasts and bacteria (BALL & MORRIS 2014). The systematic position of the *Psilota* genus is not clear and based on the shape of male genitalia this genus seems to be quite unique among hoverflies. Lack or rudimentary *vena spuria* (the false vein) is characteristic of the whole *Psilota* genus, and in the case of hoverfly species occurring in Poland known also only in the *Eristalinus sepulchralis* (L.) or, to a lesser extent, also in *Neoascia* sp., *Orthonevra* sp.

Species of the genus *Psilota* tend to reflect some internal variability of key characters, e.g. in the length and shape of the antennae, length and coloration of body pubescence and thickness of the 3rd femur, making construction of identification keys (VAN VEEN 2004; SMIT & ZEEGERS 2005; SMIT & VUJIĆ 2008; SPEIGHT 2014; SMIT *et al.* 2015; VAN DER ENT 2017) and determination of some specimens challenging.

There has never been a review of the genus *Psilota* in Poland. Due to dynamic taxonomy in the genus and some contradictory information in Polish literature, summary of knowledge about *Psilota*, as well as revision of the material in Poland is highly desirable. The aim of this work was to publish all information and data about *Psilota* from our country in accordance with the current concept of species, including verification of all available material from Poland previously published.

MATERIAL AND METHODS

In 2017-18 the author has made a review of *Psilota* specimens in Poland. The following institutional diptera collections were studied: ISZP - Institute of Systematic Zoology, Polish Academy of Science, Krakow; NHUL - Natural History Museum of the University of Lodz; ZMPA - Museum of the Institute of Zoology, Polish Academy of Science, Warsaw. Thanks to cooperation with other dipterologists, material from private collections was analysed and added to the research: J.K. KOWALCZYK (Gdynia), Ł. MIELCZAREK (Włoszczowa), M. MIŁKOWSKI (Radom), R. ORZECOWSKI (Zielona Góra), B. SOSZYŃSKI (Łódź) and R. ŻÓRALSKI (Reda), constituting the majority of records presented here.

Syrphidae literature was reviewed with the purpose of finding all data and information about *Psilota* from the current territory of Poland and match it with specimens deposited in collections.

Terminalia were extracted from males to support accurate determination. After revising specimens and supplementing data from literature, localities were marked on distribution maps, based on information from labels.

Based on the material analysed, a new identification key for all *Psilota* species occurring in Poland has been constructed, containing some new characters helpful in determination. High resolution colour photographs (incl. terminalia of males) were prepared to better visualise and expose differences between species.

RESULTS

Information and data about *Psilota* specimens, from within of the current borders of Poland, can be found in SCHROEDER (1912), KARL (1935), MALSKI (1959), BAŃKOWSKA (1963, 1980), SOSZYŃSKI (1981, 1999), KOWALCZYK & KURZAC (2000, 2002), KOWALCZYK & GARBALEWSKI (2004), SMIT & ZEEGERS (2005), WITEK *et al.* (2015), ŻÓRALSKI & KOWALCZYK (2015, 2017) and ŻÓRALSKI *et al.* (2016, 2017), but only 6 specimens mentioned in those works were given with an exact date and locality.

During the revision of material deposited in collections it turned out that most of the specimens known from literature survived and are in good condition. An exception is one female specimen published by MALSKI (1959) as *P. atra*, that was not verified, for it could not be localized in ISZP. It may be potentially located in ZMJU (Zoological Museum of Jagiellonian University, Kraków) together with the major part of NOWICKI's collection, or lost.

Even though some labels of the old material were handwritten and some specimens required re-determination, only minor inconsistency was encountered when trying to match literature information with exact specimens in collections. For example, two females of *P. atra* (originally published as *P. anthracina*) from the O. KARL collection deposited in ZMPA have common label "*Stolp i.P.*" (= Stolp in Pommern), with dates, but without more detailed locality, so 3 of 6 of localities published by KARL (1935): "*Stolp i.P., Freichow*" (= Orzechowo Morskie n. Ustka), "*Stolp i.P., Waldkatze*" (= Słupsk: Lasek Południowy) and "*Stolp i.P. Veddin*" (= Widzino n. Słupsk), cannot be confirmed based on information from labels only. In these cases, further tries of comparison by date, with labels of other *Syrphidae* and *Stratiomyidae* specimens deposited in ZMPA did not give any more accurate match to localities.

One male specimen of *Psilota* deposited in NHUL, published by KOWALCZYK & KURZAC (2000, 2002) as *P. anthracina* was unfortunately not available in 2018 for examination and confirmation of determination, due to the renovation of the museum. The exact date and gender of the specimen is, however, provided here based on photographs of the collection taken in the museum a year earlier, then confirmed with J.K. KOWALCZYK.

In total 52 specimens of *Psilota* from the current territory of Poland were found. Despite the number of specimens is small, distribution maps show very interesting pattern: *P. atra* (locus typicus: Sweden) was reported in Poland mainly in the lowlands, with most records from the northern Poland, whereas *P. anthracina* (locus typicus: Germany) was found mainly in the uplands and mountain areas. *P. innupta* is in Poland very rare, found only in Spała Landscape Park and primeval forests of Białowieża and Augustów.

One of specimens was found to be *P. exilistyla* SMIT & VUJIĆ, 2008, a species new to the Polish fauna and new to Central Europe.

Psilota anthracina MEIGEN, 1822

MATERIAL EXAMINED (2♂♂ 13♀♀). **POLAND.** Świętokrzyski National Park: Święty Krzyż [EB03] 6♀♀ 24.6.1978, 1♀ 16.6.1980, leg. J.K. KOWALCZYK (ŻÓRALSKI *et al.* 2017). Jeleń Nature Reserve [DC30] 1♂ 4.5.1986, leg. B. SOSZYŃSKI, *Figs 1a-c*. Grabowiec Nature Reserve [DA79] 1♀ 14.5.2009, leg. Ł. MIELCZAREK, *Fig. 1d*. Łaznów Nature Reserve [DC12] 1♀ 25.5.2009, leg. M. SOSZYŃSKI. Bieszczady Mountains: Bystre [EV96] 1♀ 6.2014, leg. Ł. MIELCZAREK. Gorce Mountains: Grywałd [DV57] 1♀ 2.6.2017, 1♀ 6.6.2017, 1♀ 29.6.2017, leg. Ł. MIELCZAREK. Odra Forest: Krępa n. Zielona Góra [WT36] 1♂ 22.4.2018, leg. R. ORZECOWSKI.

Not examined (2♂♂). **POLAND.** Milicz, park [XT51] 1♂ 25.5.1996, on *Crataegus*, leg. T. ZEEGERS, col. J.T. SMIT (SMIT & ZEEGERS 2005). Załęcze Landscape Park: Bobrowniki [CB46] 1♂ 9.5.1998, leg. J.K. KOWALCZYK, in coll. NHUL (KOWALCZYK & KURZAC 2000, 2002).

Other material examined for comparison (2♂♂ 2♀♀): **ALBANIA.** Hotolisht 2♂♂ 30.4.2017, leg. Ł. MIELCZAREK. **HUNGARY.** Kisgyőr [20045] 1♀ 30.4.2011, leg. Ł. MIELCZAREK. **UNKNOWN LOCALITY.** „Sp??? 3” = locality, date and collector unknown 1♀, in coll. ISZP.

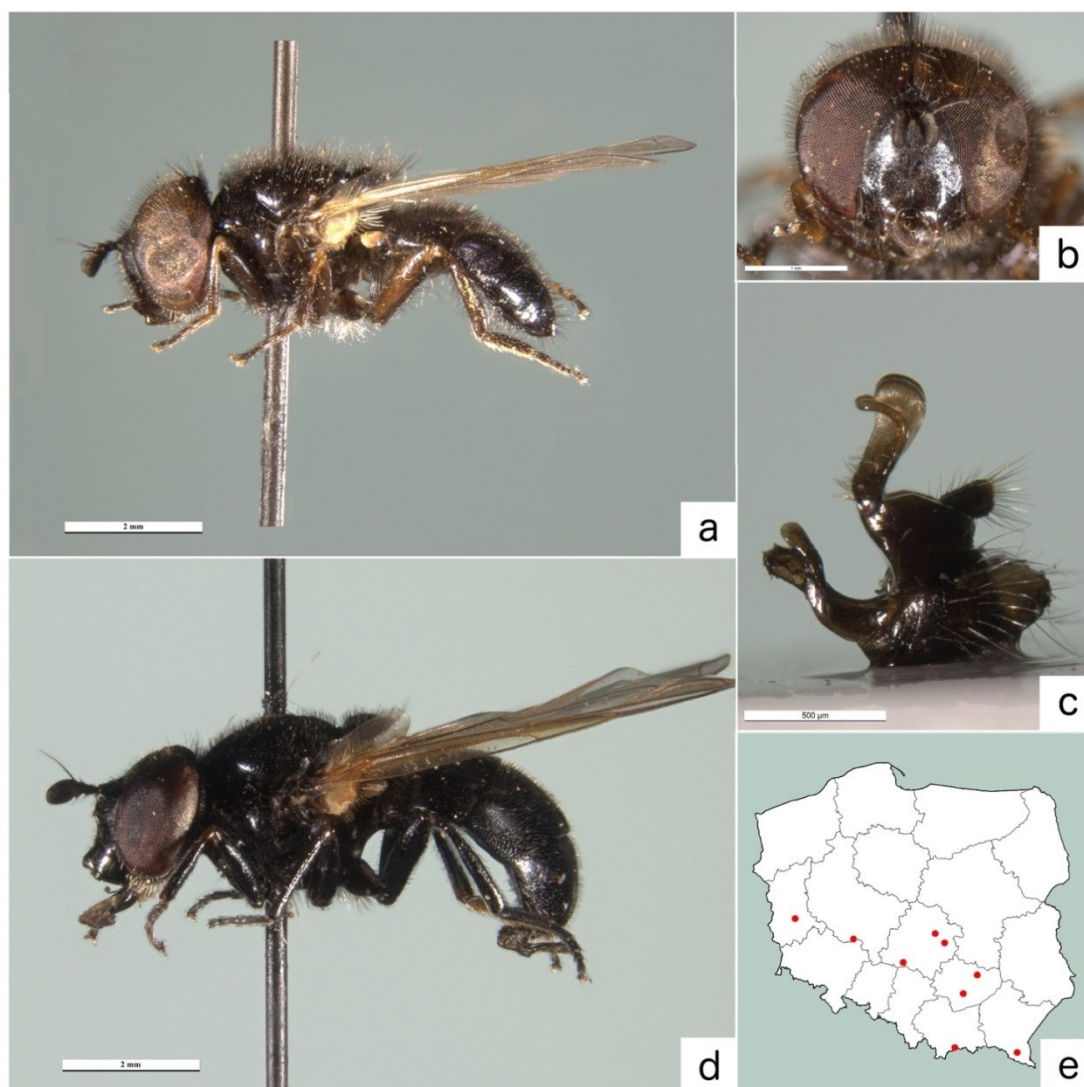


FIG. 1. *Psilota anthracina* MEIGEN. a) male, side view (teneral specimen); b) male, head; c) male, hypopygium; d) female, side view; e) distribution in Poland.

European species, confirmed from Austria, Belgium, Croatia, France, Germany, Great Britain, Greece, Italy, Liechtenstein, Montenegro, Netherlands, Spain and Switzerland (SMIT & VUJIĆ 2008; SPEIGHT 2014).

Both males and females differ morphologically from *P. atra* by multiple characters: no - or only slightly swollen 3rd femora without clear spinose ridge, a combination of usually more or less oval postpedicel and black hairs on the sides of the second tergite. In males it differs from *P. atra* also by the face widening down towards mouth edge in a frontal view, however the best set of characters useful for determination is visible in the shape of male hypopygium (Fig. 1c). *P. anthracina* differs from *P. exilistyla* by the shape of hypopygium in males, and in females by having black haired anterior anepisternum. From *P. innupta* it differs by having face and body without heavy silver dusting, not elongated face in lateral view and in males with an undusted hypopygium. Among Palearctic species, the male genitalia of *P. anthracina* are surprisingly more similar to *P. innupta* than *P. atra*.

Psilota atra (FALLÉN, 1817)

MATERIAL EXAMINED (13♂♂ 11♀♀). **POLAND.** “Stolp i.P., Kl. Strellin” = Strzelinko n. Słupsk [XA24] 1♂ 18.5.1911, leg. O. KARL, in coll. ZMPA (SCHROEDER 1912, KARL 1935, published as *P. anthracina*). „Stolp i.P., Loitz” = Łysomice n. Słupsk [XA42] 1♀ 26.6.1921, 1♂ 28.5.1926, leg. O. KARL, in coll. ZMPA (KARL 1935, published as *P. anthracina*). “Stolp i.P., Scharfenstein” = Kolonia Starkowo n. Krzemienica [XA14] 1♂ 16.5.1921, leg. O. KARL, in coll. ZMPA (KARL 1935, published as *P. anthracina* as from Steinwald). “Stolp i.P.” (without more detailed locality) 1♀ 6.7.1928, 1♀ 18.7.1930, leg. O. KARL, in coll. ZMPA. Drożkowe Łąki n. Międzyzdroje [VV67] 1♀ 9.6.1965, leg. R. BAŃKOWSKA, in coll. ZMPA. Rogów (A) [DC24] 1♀ 7.6.1977, leg. B. SOSZYŃSKI, Fig. 2d. Spała Landscape Park: Konewka Nature Reserve [DC41] 1♂ 23.5.1985, 1♀ 2.06.1987, 1♂ 3.6.1987, leg. J. KURZAWA. Tricity Landscape Park: Krykulce Glade [CF34] 2♀♀ 27.5.2003, leg. J.K. KOWALCZYK (KOWALCZYK & GARBALIEWSKI 2004, ŻÓRALSKI & KOWALCZYK 2015). Tricity Landscape Park: Green Valley [CF42] 1♀ 29.5.2003, leg. J.K. KOWALCZYK (ŻÓRALSKI & KOWALCZYK 2015). Coastal Landscape Park: Widowo Nature Reserve [CF17] 1♂ 29.5.2003, leg. B. SOSZYŃSKI. Gdynia-Redłowo: Polanka Redłowska [CF44] 1♂ 18.6.2012, leg. J.K. KOWALCZYK (ŻÓRALSKI & KOWALCZYK 2017). Błędów Desert: Klucze - Czubatka Hill [CA97] 1♂ 5.2014, leg. A. WITEK. Wigry National Park: Czerwony Krzyż (Suche Bagno) [FE48] 1♂ 23.5.2016, on *Sorbus*, leg. R. ŻÓRALSKI, 2♀♀ 23.5.2016, on *Sorbus*, leg. Ł. MIELCZAREK (ŻÓRALSKI *et al.* 2016). Wigry National Park: Sarnetki [FE48] 1♂ 23.5.2016, leg. Ł. MIELCZAREK (ŻÓRALSKI *et al.* 2016). Small Pieniny Mountains: Homole Gorge Nature Reserve [DV67] 1♂ 31.5.2017, leg. Ł. MIELCZAREK. Vistula Spit Landscape Park: Więlbłędzi Garb near Krynica Morska [DF02] 1♂ 3.6.2017, on *Anthriscus*, leg. R. ŻÓRALSKI. Wigry National Park: Leszczewek-Siedlisko [FE39] 1♂ 16.6.2017, on *Anthriscus*, leg. R. ŻÓRALSKI, Figs 2a-c, (ŻÓRALSKI *et al.* 2017).

Not examined (1♀). **POLAND.** Tatra Mountains: Kościeliska Valley (1000m) [DV15] 1♀ 27.7.1953, on *Valeriana tripteris* L., leg. R. WOJTUSIAK (MAŁSKI 1959).

Other material examined for comparison (1♀). **UKRAINE.** “Hołosko ??? 2.VI.46” = Lwów: Hołosko 1♀ 2.6.1946, leg. J. NOSKIEWICZ, in coll. ISZP.

A widely distributed European species. Confirmed from Belgium, Denmark, France, Germany, Netherlands, Norway, Romania, Sweden, and Mediterranean area: Greece, including Crete and Lesbos, Cyprus and Morocco (SMIT & VUJIĆ 2008, SPEIGHT 2014, VAN DER ENT 2017).

Both males and females differ from *P. anthracina* and *P. exilistyla* by visibly swollen 3rd femur having spinose ridge. From *P. anthracina* also by the combination of elongated postpedicel (more than 1.5 times as long as wide) and in most cases by existence of white long hairs on the sides of the first tergite of abdomen. It differs from *P. innupta* mainly by having a shiny face and body. Based on the material analysed, the narrow and almost parallel-sided face of males in frontal view, is a stable character for distinguishing *P. atra* from all other *Psilota* species present in Poland.

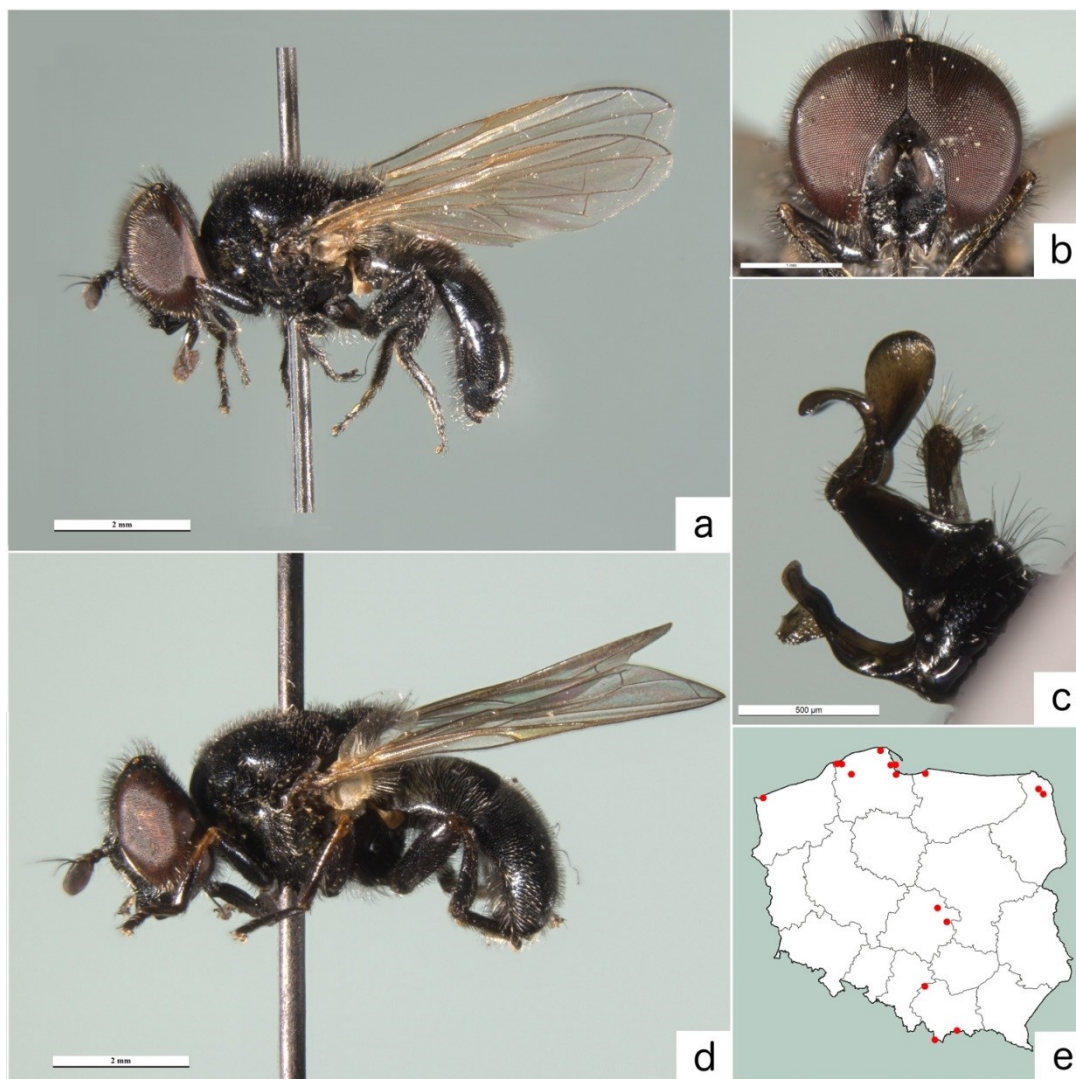


FIG. 2. *Psilota atra* (FALL.). a) male, side view; b) male, head; c) male, genitalia; d) female, side view; e) distribution in Poland.

Psilota exilistyla SMIT ET VUJIĆ, 2008

MATERIAL EXAMINED (1♂). POLAND. Kozienice Landscape Park: Kieszek [EC20] 1♂ 18.5.2015, leg. M. MIŁKOWSKI, Figs 3a-c.

Until now, this species was reported only from France and Greece (SMIT & VUJIĆ 2008), Belgium (VAN DE MEUTTER & REEMER 2012) and Netherlands (SMIT *et al.* 2015, VAN DER ENT 2017). Discovering it in Central Europe (Poland) is a sign of wider and more continuous distribution range of *P. exilistyla* in Europe.

The male specimen presented in this work was taken resting inside the hollow of mature, still living, but heavily damaged fir tree (Fig. 3d) in the *Abietetum polonicum* plant community (Fig. 3e). MAREK MIŁKOWSKI, who collected that specimen, visited the exact locality again in 2017 at the same time, to potentially find other specimens and document the characteristic tree. He could unfortunately not find any new specimens, reporting that the hollow has been completely taken over by ants *Lasius fuliginosus* (LATR.).

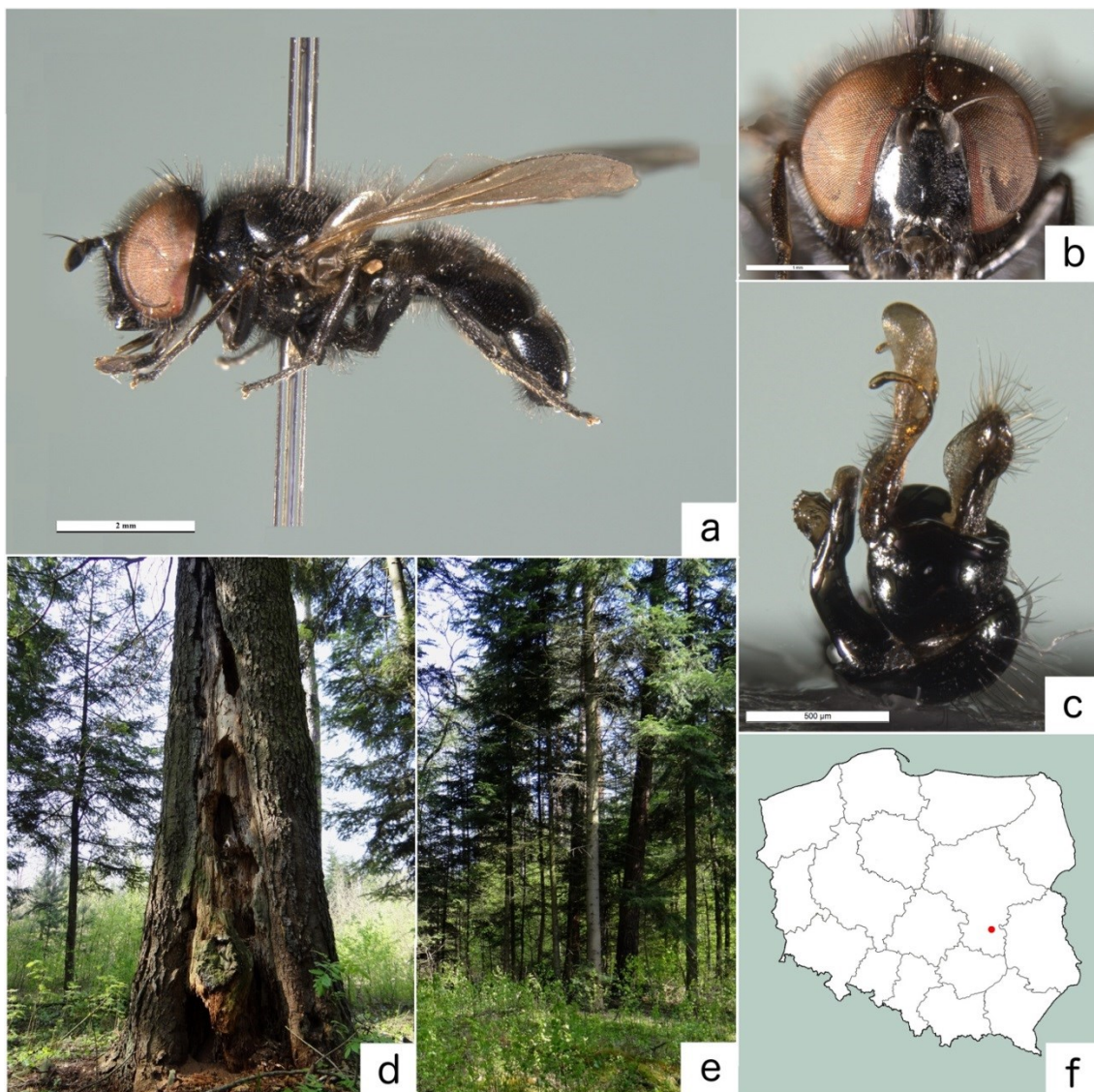


FIG. 3. *Psilota exilistyla* SMIT ET VUJIĆ. a) male, side view; b) male, head; c) male, hypopygium; d) fir tree on which the specimen was caught; e) *Abietetum polonicum* with that fir; f) distribution in Poland.

Psilota innupta RONDANI, 1857

MATERIAL EXAMINED (9♂♂ 3♀♀). **POLAND.** Białowieża Primeval Forest: Czerlonka [FD84] 3♂♂ 1♀ 7.5.1977, leg. B. SOSZYŃSKI *Fig. 4d*, (SOSZYŃSKI 1999). Augustów Primeval Forest: Starożyn Nature Reserve [FE57] 1♀ 28.5.1978, leg. B. SOSZYŃSKI (SOSZYŃSKI 1981). Spała Landscape Park: Konewka Nature Reserve [DC41] 1♂ 13.5.1979, leg. M. SOSZYŃSKI. Spała Landscape Park: Spała n/G [DC41] 1♂ 9.6.1980, leg. B. SOSZYŃSKI. Spała Landscape Park: Spała Nature Reserve [DC41] 1♂ 2.5.1993, leg. B. SOSZYŃSKI. Spała Landscape Park: Ceteń [DC50] 1♂ 25.4.2006, leg. M. SOSZYŃSKI; 1♂ 22.4.2015, on *Prunus padus* L., leg. Ł. MIELCZAREK (WITEK *et al.* 2015), 1♀ 22.4.2015 leg. A. WITEK (WITEK *et al.* 2015), 1♂ 27.4.2015, leg. R. ŻÓRALSKI, *Figs 4a-c*, (WITEK *et al.* 2015).

Other material examined for comparison (2♀♀). **GERMANY.** Dessau 1♀ 28.5.1923, leg. E. HEIDENREICH, in coll. ZMPA. **RUSSIA.** Baikal, Bolszyje Koty (Большие коты) 1♀ 12-14.6.2012, leg. Ł. MIELCZAREK.

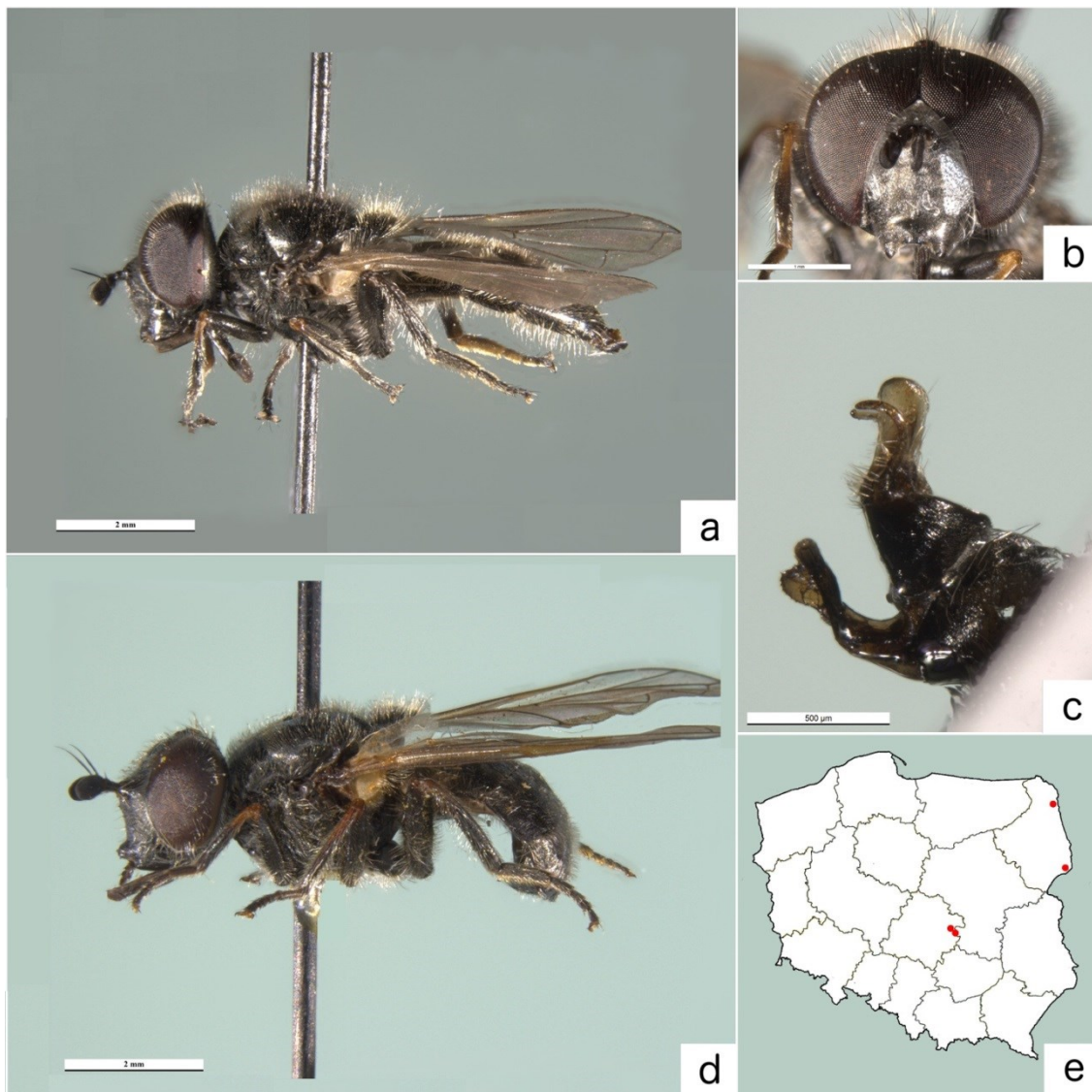


FIG. 4. *Psilota innupta* RONDANI. a) male, side view; b) female, side view; c) male, head; d) male, genitalia; e) distribution in Poland.

Widely distributed Palearctic species having a range from Spain and Algeria, through Europe (including Poland, Germany, Sweden, Romania and Greece), through European Russia and Siberia to Sakhalin, Japan and South Korea (SMIT & VUJIĆ 2008, SPEIGHT 2014).

It can be easily separated from all other species present in Poland by heavily light dusted face and all other parts of body. It also has a slightly more protruded face (in a lateral view) and mouthparts comparing to all other species of *Psilota* present in Poland.

KEY TO *PSILOTA* SPECIES IN POLAND

1. Face heavily dusted (Fig. 4b) and below the antennae slightly protruded, for a distance above 1/3 of width of the eye (side view). Body dusted (Figs 4a, 4d) and bright haired all over. Male hypopygium (Fig. 4c) dusted; inner surstyle lobes only slightly widening towards tip; outer surstyle lobes not club-shaped at the tip ***Psilota innupta* RONDANI**

- Face and body not dusted. Face below the antennae not so protruded, much less than for a distance of 1/3 of width of the eye. Male hypopygium not dusted; inner surstyle lobes widening towards tip; outer surstyle lobes slightly club-shaped at the tip **2**

2. Third femur swollen, having spinose ridge, more than 1.5 times as thick as mid femur. White, dense patch of hairs on the sides of the 2nd tergite present in most of specimens. Face and body not dusted. Male: face almost parallel sided in a front view, not widening down towards the mouth edge (Fig. 2b). Male hypopygium (Fig. 2c): epandrium distinctly longer than broad and elongated; inner surstyle lobes very broad and rounded in the apical part, more than 2x wider than in the middle; outer surstyle lobes C-shaped ***Psilota atra* (FALLÉN)**

- Third femur not swollen, without clear spinose ridge. Male: face widening down towards the mouth edge in a front view. Male hypopygium: epandrium as long as broad; inner surstyle lobes not so broadened in the apical part **3**

3. Male hypopygium (Fig. 1c): inner and outer surstyle lobes not heavily elongated; outer surstyle lobes L-shaped. Female: anterior anepisternum black haired. Postpedicel in most cases short, no more than 1.5 times as long as broad, almost rounded, but variable ***Psilota anthracina* MEIGEN**

- Male hypopygium (Fig. 3c): inner and outer surstyle lobes heavily elongated; outer surstyle lobes S-shaped. Female: anterior anepisternum light haired. Postpedicel elongated ... ***Psilota exilistyla* SMIT ET VUJIĆ**

ACKNOWLEDGEMENTS

This work is dedicated to BOGUSŁAW SOSZYŃSKI (1947-2018), great mentor and syrphidologist, who supported me with material and gave valuable information required for this review. I'd like to also thank to other entomologists: J.K. KOWALCZYK, Ł. MIELCZAREK and his wife ANNA, M. MIŁKOWSKI, M. SOSZYŃSKI, J. KURZAWA and R. ORZECOWSKI for

sharing material from their private collections, for K. SZAWARYN (University of Gdansk) for an access to stereomicroscope Leica M205A with Leica DCF 495 camera used to take pictures of representative specimens, also for T. HUFLEJT and A. PALACZYK for their support when reviewing institutional Syrphidae collections in Warsaw and Krakow. Special thanks for J. SMIT, Ł. MIELCZAREK and A. WRIGHT for a careful review and valuable comments to the final version of this work.

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STRESZCZENIE

Przegląd rodzaju *Psilota* (Diptera, Syrphidae) w Polsce

Dokonano przeglądu okazów *Psilota* (Diptera: Syrphidae) ze zbiorów muzealnych oraz prywatnych, w wyniku czego możliwe było prezentowanie nowych danych oraz map rozmieszczenia wszystkich gatunków występujących w Polsce. Gatunek *Psilota exilistyla* SMIT ET VUJIĆ, 2008 został stwierdzony jako nowy dla fauny Polski i centralnej Europy. Po analizie materiału zaproponowano klucz do oznaczania gatunków *Psilota* stwierdzonych w Polsce, zawierający nowe cechy pomocne w ich identyfikacji. Aby jak najlepiej uwidocznić różnice między gatunkami, dołączono kolorowe fotografie poszczególnych gatunków, w tym zdjęcia aparatów genitalnych samców.

* *Editorial remarks:*

* This paper is dedicated to the late BOGUSŁAW SOSZYŃSKI.