



New records of two alien mud daubers *Sceliphron destillatorium* (Ill.) and *Sceliphron curvatum* (Sm.) (Hymenoptera, Sphecidae) from Poland with comments on expansion of their ranges

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Abstract: The paper presents information on two species of digger wasps, *Sceliphron destillatorium* (Illiger, 1807) and *S. curvatum* (Smith, 1870), alien for the fauna of Poland (within its present borders). Both species are presently spreading in the country. *Sceliphron destillatorium*, a South-Palaeartic species, has been observed in Poland since 1960. *Sceliphron curvatum* was introduced to Europe from Asia in the 1970s, and at present it is known from many South- and Central-European countries. The species was found for the first time in Poland in 2003. New localities of the two species in Poland are given and issues connected with their present distribution are discussed.

Key words: Hymenoptera, Sphecidae, *Sceliphron curvatum*, *Sceliphron destillatorium*, alien species, new localities, Poland

INTRODUCTION

Polish fauna is characterized by large, but usually not clearly perceived biodiversity, which is in the easiest way expressed by the number of recorded taxa. According to the Ministry of the Environment there are ca. 35.5 thousand species of animals recorded so far in the country and their total number may exceed 47 thousand (Biodiversity of Poland 2004). This provides a perspective of faunal studies and justifies the need for further research. Apart from the obvious creation of an image of fauna of an area, faunistic studies provide information about changes in the fauna. These include the eventual impoverishment, but also the appearance of migrant species, together with potential invasive ones, which may in one way or another threaten native species. Biological invasions are another significant hallmarks of modern ecology. In Poland, studies on invasive species are carried out by several institutions. However, the list of 774 foreign species of plants, fungi and animals found in our country, created by the Institute for Nature Conservation of Polish Academy of Sciences (Solarz 2007), is still far from being completed.

There are 35 species described in the genus *Sceliphron* Klug, 1801 worldwide (Pulawski 2013). In Europe, there are seven species; as many as three of them are alien species introduced to Europe from Asia and North America (Schmid-Egger 2005). In Poland, two alien species of the genus occur: *Sceliphron destillatorium* (Illiger, 1807) (Fig. 1) and *S. curvatum* (Smith, 1870) (Fig. 2). Females of all species of the genus *Sceliphron* hunt spiders, which then are brought to nests (nest cells) as food for the developing larvae. The nests are constructed of clay or mud (hence the common name of this wasp group is mud daubers) attached to various

substrata, e.g. wood or rocks. Shape of the nests built by each of the two species in Poland clearly differs in appearance. Females of *S. destillatorium* form individual nest cells within a large body of substrate, so the single cells are unrecognizable until the young wasps leave the nest (Figs 3 and 4). On the other hand, females of *S. curvatum* build single cells which are separated from each other (Figs 5 and 6). Both species show high adaptive plasticity, using for nesting a variety of places, most often within human settlements including even insides of buildings (Gayubo & Izquierdo 2006, Mader 2013, and authors' own observations).

Sceliphron destillatorium is a South-Palaeartic species, which original distribution range includes southern and south-eastern Europe (the Mediterranean Region), North Africa as well as south-western and southern Asia (reaching Mongolia and China in the East). The species is known as native in the countries neighbouring Poland: Belarus, Ukraine, Slovakia, the Czech Republic; it was also recorded in southern Germany, where it was probably introduced (Schmid-Egger 2005).

Sceliphron curvatum was originally distributed in southern and central Asia. Its natural occurrence area includes India, Nepal, Pakistan, Kazakhstan and Tajikistan, where it resides in the foothill regions of the world's highest mountain ranges (Himalaya, Karakoram and Pamir) (Bogusch et al. 2005, Pulawski 2013). The species has been introduced to Europe by the end of the 1970's of the twentieth century; for the first time its presence was reported from the south-eastern Austria in 1979 (Vecht 1984), where its nest cells have been probably accidentally brought attached to some objects (Schmid-Egger 2005). Since then its quick spontaneous spread in Europe is observed, especially in the southern and central parts of the continent. So far *S. curvatum* has been recorded in the following countries: Spain, France, Italy, Switzerland, Austria, Germany, Slovenia, Croatia, Serbia, Montenegro, Bulgaria, Greece, Slovakia and the Czech Republic (e.g. Gogala 1995, Scaramozzino 1995, Grillenzoni & Pesarini 1998, Gonseth et al. 2001, Gepp 2003, Ćetković et al. 2004, Jacobi 2005, Schmid-Egger 2005, Bitsch & Barbier 2006, Foucart 2006). In countries neighbouring Poland the species was for the first time registered in the years 2002–2004 (2002 – Central Moravia, 2003 – Saxony, 2004 – Bardejov in Slovakia; Bogusch et al. 2005, Schmid-Egger 2005).

The aim of the paper is to present information on the occurrence in the Polish fauna two species of sphecid wasps of the genus *Sceliphron*, which were originally foreign to our fauna. All published distribution records of the species are summarized and new data on distribution are added.

MATERIAL AND METHODS

The query of known distribution data was based on published papers. The new records were obtained during authors' field research in the following regions of Poland: Podlasie Lowland, Krakowsko-Częstochowa Upland, Małopolska Upland, Lubelska Upland, Sandomierska Lowland, Eastern Beskidy Mts and Pieniny Mts. Some specimens were made available for the determinations by various collectors: W. Piotrowski, A. Liana, M. J. Łuszczak, A. Klasa, T. Sztuba, J. Michalcewicz, M. Skrzypczyńska, R. Pelka, K. Sobkowicz and N. Baran.

Altogether, 212 specimens were studied including 130 specimens not published previously. The specimens are housed in the collection of the Museum and Institute of Zoology PAS in Warsaw, as well as in the authors' collections. Abbreviations used in the text: BW – Bogdan Wiśniowski, HB – Hanna Babik, TH – Tomasz Huflejt, WCz – Wojciech Czechowski.

The following identification keys were used: Vecht & Breugel (1968) and Schmid-Egger (2005). The nomenclature follows Pulawski (2013).



Fig. 1. A female of *Sceliphron destillatorium* in the Ojcowski National Park (phot. B. Wiśniowski).



Fig. 2. A female of *Sceliphron curvatum* in the Pieniński National Park (phot. B. Wiśniowski).



Fig. 3. Clay nest of *Sceliphron destillatorium* built on an old air filter in the Bieszczady Mts (phot. B. Wiśniowski).



Fig. 4. Clay nest of *Sceliphron destillatorium* taken off wooden construction in Pieniny Mts; exit holes made by emerging adults are visible (phot. R. Ciešlik)



Fig. 5. Clay nest cells of *Sceliphron curvatum* on a window frame in Wrocław (phot. D. Gurdak).



Fig. 6. Clay nest cells of *Sceliphron curvatum* in a carton in Warsaw (phot. R. Pelka).

RESULTS

Occurrence of *Sceliphron destillatorium* (Fig. 7)

Published data. In Poland, *S. destillatorium* was part of native fauna in the first half of the 20th century: it was observed on the rocky cliffs of the Podolian canyons in the environs of Czerwonogród (Урочище Червоне), Zaleszczyki (Заліщики), Bilcze (Більче-Золоте), Sinków (Синьків), Krzywce (Кривче), Mielnica (Мельниця-Подільська), Horoszowa (Горошова), Dźwinogród (Дзвенигород), Okopy św. Trójcy (Окопи), and Skala Podolska (Скала-Подільська) by the Zbrucz River (Kuntze & Noskiewicz 1938) which are now in the borders of the contemporary Ukraine. The species has been removed from the list of native fauna for as a result of the change of Polish borders in 1945. It was back on the list in the 1960's of the twentieth century due to spontaneous expansion of its range (Wiśniowski 2004).

For the first time within the current Polish borders, the species was found near Lublin in the 1960's of the twentieth century (Vecht & Breugel 1968). Later Soszyński and Soszyński (1985) clarified the information about this record on the basis of data provided by W. Puławski: Czesławice near Nałęczów [EB88]. These authors also gave some new localities of *S. destillatorium* in the Carpathians: Ustrzyki Dolne [FV17], Ustrzyki Górne [FV24], Wetlina [FV04] and Łubne [EV96] (Soszyński & Soszyński 1985). After a decade W. Celary in his two papers announced a few new localities of the species from the southern Poland: Eastern Beskidy Mts (Szymbark [EV09], Ropa [EV09]) (Celary 1996), and the Western Beskidy Mts (Muszyna [DV96]) (Celary 1998). Several new records were then published from Bieszczady Mts by Wiśniowski (2000): Berehy Górne [FV14], Moczarnie [FV14], Nasiczne [FV14], and Suche Rzeki [FV15].

The first record of the species out of south-eastern Poland has been given from the Ojcowski National Park [Ojców; DA16] in the Polish Jura Chain (Krakowsko-Częstochowska Upland) (Wiśniowski 2007); subsequently *S. destillatorium* has been found in the Spalski Landscape Park [Inowlódz; DC40] (Kowalczyk et al. 2009). New records in the area of previously known occurrence of *S. destillatorium* were given by Bury et al. (2009) in the following zoogeographical regions of Poland: the Roztocze Upland – Tomaszów Lubelski [FA79], Józefów [FA49], Wola Mała near Biłgoraj [FB20]); the Sandomierska Lowland – Markowa [EA93], Głogów Małopolski [EA65], Tarnów [DA94], Rudnik nad Sanem [EA88]; the Eastern Beskidy Mts – Żurawica near Przemyśl [FA21]); the Bieszczady Mts – Łupków [EV75].

At the same time Kosibowicz (2009) published records from Kraków-Łagiewniki [DA24], Głojsce [EV49], Końskie near Dydnia [EA80], Teodorówka [EV48], Dukla [EV48] and Zboiska [EV59]. All the records were located within the already known area of the distribution of *S. destillatorium*. In his paper Kosibowicz (2009) published an image of four nest cells of *S. curvatum*, which were undersigned incorrectly as the nest of *S. destillatorium*; it became a source of later mistakes.

The known distribution of *S. destillatorium* in Poland was summarized by Bilański et al. (2012). The authors gave also a number of new localities of the species in south-eastern Poland: the Eastern Beskidy Mts – Rozpucie [FV09], Pakosówka [EV79], Żyznów [EA62], Bażanówka [EV79], Biała Niżna [DV99], Hermanowice [FA20], Husów [EA93], Lubla [EA41], Orzechówka [EA60], Pielgrzymka [EV39], Posada Zarszyńska [EV79], Woźniczna [DA93], Zagórz [EV98], Magurski National Park [Żydowskie; EV37], Janowice [DA82], Rymanów [EV69], Uherce Mineralne [FV08]); the Western Beskidy Mts – Kamionka Mała [DV89], Tymowa [DA72], Buczyna [DA53], Kalwaria Zebrzydowska [DA02]; the Bieszczady Mts – Chrewt [FV16], Lutowska [FV25], Mchawa [EV96]); the Nowotarska Basin (within a

region of the Western Beskidy Mts – Czerwienne [DV26]; the Sandomierska Lowland – vicinity of Rudnik nad Sanem [EA98]; Krzeszów, Koziarnia and Pocyrczle, Rudka [FA16], Dybków [FA15], Cieplice [FA16], Turza [EA76], Czajkowa [EA38], Niwiska [EA46], Ocieka [EA45], Siedlanka [EA46], Wilcza Wola [EA67], Zabno [DA95], Zmysłówka [FA05]; the Lubelska Upland – Świdnik [FB17]; the Małopolska Upland – Okołówice [DB03]; the Świętokrzyskie Mts – Cisów [DB92]; Upper Silesia – Młoszowa [CA95].

In the same year one more new record of *S. destillatorium* from the Western Beskidy Mts [Żywiec; CA70] was given by Jarosiewicz (2012).

Recently all known records of the species in Poland were summed up by Mader (2013). At the same time the author gave a detailed information about the occurrence of *S. destillatorium* in other countries. He also evaluated probable migration routes of *S. destillatorium* to Poland from neighboring areas and the ways of its dispersion on Polish territory from the south-east to the west and north. Based on unpublished relationships obtained from many persons, as well as on the basis of his own explorations in south-eastern Poland in 2000, Mader (2013) gave a number of new localities of *S. destillatorium*: Chotel Czerwony, the reserve “Prześlin” [DA78], Krzyżanowice [DA68], and Skowronno [DB60] in the Małopolska Upland; Antoniówka near Zamość [FB71] in the Roztocze Upland; Dębów [FA04], Lubaczów [FA55], Przeworsk [FA04], Stare Oleszyce [FA45], and Tarnów [DA94] in the Sandomierska Lowland; Lubień [DA20], Nowy Sącz [DV79], Przemyśl [FA21], Ropa [EV09], and Sopotnia Wielka [CV79] in the Western Beskidy Mts; Bachórz [EA92], Biecz [EA10], Ciężkowice [DA91], Krosno [EA50], Lipnik [EA93], Łopuszka Mała [FA03], Srogów Górny [EV89], Targowiska [EV59], and Wietrzno [EV59] in the Eastern Beskidy Mts; Mików [EV86] in the Bieszczady Mts.

Furthermore, the author provided information about the occurrence of *S. destillatorium* in the Warsaw quarter of Mokotów [EC08], which would be the first record on the Mazovian Lowland, and the northernmost locality of the species in Poland. However, this information was considered doubtful by the author himself and needs confirmation, as the two species of *Sceliphron* occurring in Poland may be confused with each other. The author had already dealt with such mistakes several times in southern Poland (Mader 2013).

New records. A total of 108 specimens was recorded in the following regions:

Podlasie Lowland: Polesie National Park, Dębowiec [FB59], 25.07.2011, 1 ♀, leg. W. Piotrowski; Komarówka [FC40], 19.07.2013, 1 ♀, leg. BW.

Krakowsko-Częstochowska Upland: Ojcowski National Park, Grodzisko [DA16], 27.06.2011, 3 ♀♀, leg. BW, and numerous observations in Ojców [DA16] in 2012; Skala [DA16], 24.07.2011, 1 ♀, leg. BW; Olsztyn ad Częstochowa [CB72] by the Biakło Hill, 4.08.2011, 1 ♀, leg. BW.

Małopolska Upland: Charsznica [DA28], 30.06.2011, 2 ♀♀, leg. BW; reserve “Krzyżanowice” [DA68], 13.07.2006, 1 ♀, leg. BW.

Lubelska Upland: Tarnogóra [FB44], 18.07.2013, 1 ♀, leg. BW.

Roztocze Upland: reserve “Góra Machnowska” [FA88], 17.07.2013, 1 ♀, leg. BW.

Sandomierska Lowland: Forest Inspectorate Leżajsk, Forest District Wydrze [EA86], inter-forest meadow, 10.08.2003, 1 ♂, leg. A. Liana; Małców [EA55], herbs along the bank of the Tuszymka river, caught on an umbel of *Apiaceae*, 18.07.2007, 1 ♀, 2 ♂♂, leg. TH; Budy Głogowskie [EA65], meadows along the bank of the Osina river, caught on an umbel of *Apiaceae*, 18.07.2007, 1 ♂, leg. TH; Nowa Wieś [EA56], border of a meadow, caught on flowers of common hogweed (*Heracleum sphondylium*), 19.07.2007, 1 ♂, leg. TH; Domatków [EA56], umbellifers at the border of a meadow, 19.07.2007, 1 ♀, leg. TH; Przedbórz, Dworskie [EA56], roadside umbellifers on the edge of a cropland field, 19.07.2007, 1 ♀, 1 ♂, leg. TH; Kamionka [EA45], herbs on the shore of the recreational reservoir in the Tuszymka

river valley, 22.07.2007, 1 ♂, leg. TH; Niwiska, Podkościele [EA46], idle land on the edge of the village, 26.07.2007, 1 ♂, leg. TH; Bukowiec [EA56], idle land alongside a road, 27.07.2007, 1 ♀, leg. TH; Mechowiec [EA57], umbellifers at a drying ditch, 2.08.2007, 1 ♀, leg. TH; Ocieka [EA45], herbs and shrubs, on an umbel of *Apiaceae*, 17.07.2008, 1 ♂, leg. TH; Hucina [EA46], waterlogged meadow, on flowers of *Peucedanum palustre*, 22.07.2008, 1 ♀, leg. TH; Rogóźno [EA94], herbs alongside a railway-track, on an umbel of *Apiaceae*, 26.07.2008, 1 ♂, leg. TH; Mrowla [EA64], herbs and shrubs, on an umbel of *Apiaceae*, 26.07.2008, 1 ♂, leg. TH; Forest Inspectorate Tuszyna, Forest District Przeclaw [EA36], border of a mixed forest, 27.07.2008, 2 ♀♀, 1 ♂, leg. TH; Hucisko [EA99], umbellifers at the border of meadow, 28.07.2008, 1 ♀, leg. TH; Mokradło [EA98], herbs near old ruined brick factory, 28.07.2008, 1 ♂, leg. TH; Łoiny [EA86], herbs along the bank of the Trzebośnica river, 28.07.2008, 1 ♀, 1 ♂, leg. TH; Czarna [EA14], umbellifers between adjacent country houses, 29.07.2008, 1 ♀, 2 ♂♂, leg. TH; Brzyska Wola [FA17], meadow near a pond, 30.07.2008, 1 ♂, leg. A. Liana; Różaniec [FA37], caught on an umbel of *Apiaceae* near a clump of alders (*Alnus* sp.) close to a river-bank, 30.07.2008, 1 ♀, leg. TH; Molas [EA57], shrubbery alongside a railway-track, on an umbel of *Apiaceae*, 31.07.2008, 1 ♀, leg. TH; Czarna Sędziszowska [EA55], roadside umbellifers at a country house, 31.07.2008, 1 ♀, leg. TH; Manasterz [FA25], umbellifers on a meadow, 17.06.2010, 1 ♂, leg. TH; Piwoda [FA24], common nettle (*Urtica dioica*) and ground elder (*Aegopodium podagraria*) community on the edge of the village, 17.06.2010, 1 ♂, leg. TH; Korzenica [FA34], herbs and shrubs alongside a stream, 17.06.2010, 1 ♂, leg. TH; Lipiny Górne - Borowina [FA08], deciduous trees on the margin of a pine forest, 24.06.2010, 1 ♂, leg. TH; Cierpisz [EA55], trees at the side of the Tuszynka river, caught while flying above the road bridge, 27.06.2010, 1 ♂, leg. A. Liana; Chwałowice [EB62], roadside umbellifers near a pasture, 29.06.2010, 1 ♂, leg. TH; Karolówka [FA55], herbs and low-growing bushes between a forest and a countryseat, 30.06.2010, 1 ♀, leg. TH; Cetula [FA25], waterlogged forest glade, on flowers of *Peucedanum palustre*, 30.06.2010, 1 ♀, 1 ♂, leg. TH; Wiązownica [FA24], roadside lime tree (*Tilia* sp.) at the edge of a crop field, collected from a leaf, 30.06.2010, 1 ♂, leg. TH; Podleszany [EA37], common butterbur (*Petasites hybridus*) community at the side of the Wisłoka river, 7.06.2011, 1 ♂, leg. TH; Podlesie Dębowe [DA95], wet meadow, 23.08.2011, 1 ♀, leg. TH; Ruda [EA25], streamside woodland, on an umbel (*Apiaceae*), 12.06.2012, 1 ♂, leg. TH; Forest Inspectorate Głogów, Forest District Hucisko [EA76], roadside umbellifers at the border of a heath, on flowers of *Peucedanum oreoselinum*, 5.07.2013, 1 ♀, leg. M. J. Łuszczak.

Western Beskidy Mts: Powroźnik [DV96], 3 ♀♀ reared from nests located inside a lump of clay, found on November 2006 by K. Czuba in old jacket's pocket hanged in a loft at his house, imagines emerged on 21st, 23rd, and 28th May 2007 (cult. TH); Muszyna, reserve "Obrożyska" [DV96], at the margin of the lime forest reserve, 23.07.2007, 1 ♀, leg. M. J. Łuszczak; Gorce Mts., Poręba Wielka [DV39], streamside vegetation, on an umbel (*Apiaceae*), 26.07.2012, 1 ♀, leg. A. Liana.

Eastern Beskidy Mts: Folsz [EV29], 2.08.2003, 2 ♀♀, leg. A. Klasa; Ustrzyki Dolne [FV17], 24.08.2003, 4 ♀♀, 1 ♂, leg. BW; Magurski National Park, Krempna [EV38] at route to Żydowskie, 15.07.2005, 2 ♀♀ leg. BW; Błażowa Górna [EA72], meadow, 23.07.2007, 1 ♀, 1 ♂, leg. A. Liana; Kąkolówka [EA72], 23.07.2007, 1 ♂, leg. A. Liana; Forest Inspectorate Łosie, Forest District Regietów [EV17], while drinking water from a roadside puddle, 28.07.2007, 1 ♀, leg. M. J. Łuszczak; Łuczyce [FA31], herbs and shrubs in the Wiar river valley, 26.08.2011, 3 ♀♀, leg. TH; Kwaszenina [FV19], meadows in the Wyrwa stream valley, 27.08.2011, 1 ♀, leg. TH; Bandrów Narodowy [FV27], 26 individuals (♂♂, ♀♀) reared from clay nests collected on 1.09.2011 (leg. T. Sztuba, cult. J. Michalcewicz et M. Skrzypczyńska); Szymbark-Bystra [EV09], meadow in the Raba river valley, on an umbel (*Apiaceae*),

1.08.2012, 1 ♀, leg. A. Liana; Świątkowa Mała [EV38], scrubs on the bank of the Wisłoka river, on an umbel (*Apiaceae*), 25.07.2013, 1 ♂, leg. A. Liana.

Pieniny Mts: Pieniński National Park, Szopczański Gorge [DV57], 25.08.2011, 1 ♀, leg. BW.

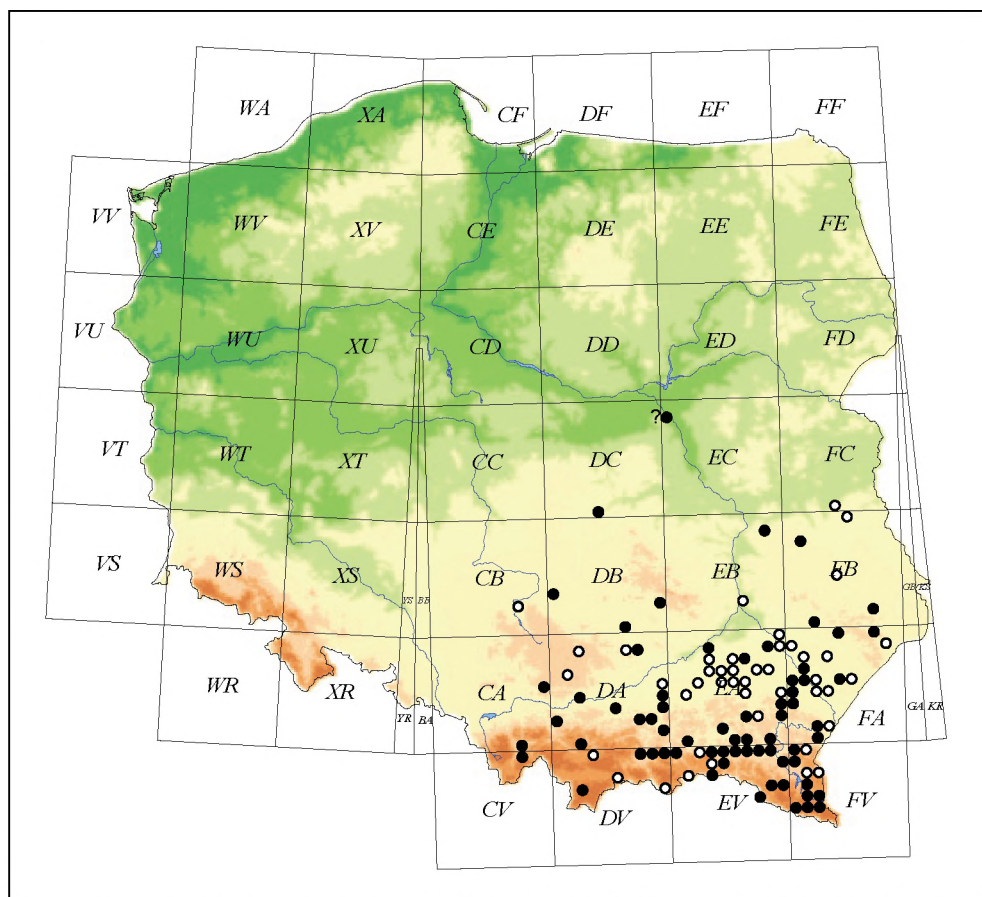


Fig. 7. Distribution of localities of *Sceliphron destillatorium* in Poland (● – literature data, ?● – doubtful literature datum, ○ – new records).

Occurrence of *Sceliphron curvatum* (Fig. 8)

Published data. In Poland, *S. curvatum* was recorded for the first time in October 2003. M. Kadej has found nine nest cells on the inside of the window frame of a building in the centre of Wrocław city [XS46] (Lower Silesia). After some time, five males and four females have emerged from the collected cells, what allowed identification of the species (Olszewski et al. 2013). *Sceliphron curvatum* arrived in this city probably migrating from the Czech Republic and/or Slovakia along the valleys of the Oder and Vistula rivers and its tributaries. The presence of the species in Wrocław was recorded also in subsequent years. The rearing of the clay cells found on the inside of the windows in 2005 brought five males, and that in 2006 two females and a male.

Recent years brought other records of the species in various regions of Poland. Bury et al. (2009) recorded it in the Sandomierska Lowland – in Tarnów [DA94] and Dębica [EA24]) as well as in the Lubelska Upland – in Wólka Lubelska [FB18]). Dobosz (2010) has found *S. curvatum* in Upper Silesia [Widów; CA18], and published another locality from the Western Beskidy Mts [Limanowa; DA50]. Next locality in Upper Silesia [Knurów; CA36] was published by Mader (2013). Later Olszewski et al. (2013) gave information about localities in the Krakowsko-Częstochowska Upland – in the Ojcowski National Park, Ojców [DA16]), the Małopolska Upland – in Proszowice [DA46]), and in the Pieniny Mts – Pieniński National Park, Wąwóz Szopczański [DV57].

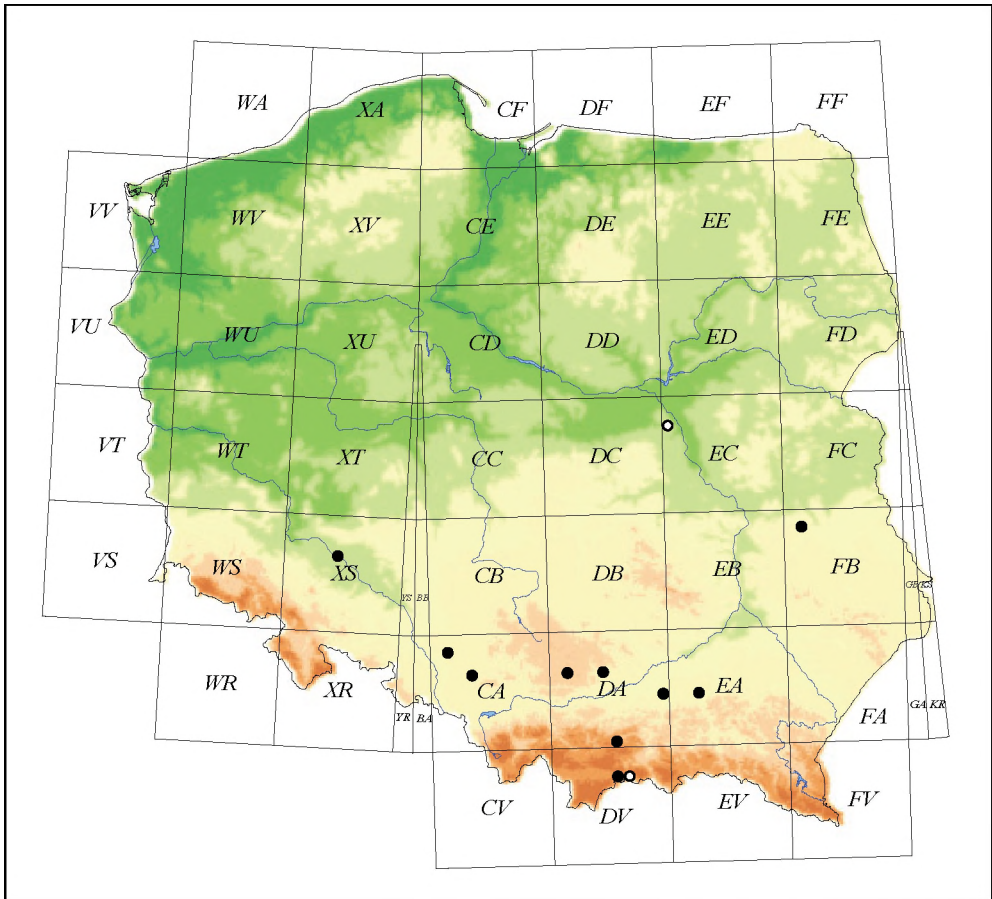


Fig. 8. Distribution of localities of *Sceliphron curvatum* in Poland (● – literature data, ○ – new records).

New records. A total of 22 specimens was recorded in the following regions:

Mazovian Lowland: Warszawa [EC07], 17 individuals (6 ♂♂, 4 ♀♀ among 10 specimens checked) reared from 18 cells collected on 05.09.2012, emerged from 28.05 to 11.06.2013 (leg. R. Pelka, cult. BW, HB and WCz).

Pieniny Mts: Szczawnica [DV67], 5 ♂♂ reared from eight cells collected on 26.04.2011, emerged in May 2011 (leg. K. Sobkowicz, cult. N. Baran and M. Skrzypczyńska).

In the case of Mazovia a cluster of 18 clay cells attached to a carton (Fig. 6) was found on 5th September 2012 in a storage space in the residential district Wyczółki within the Ursynów quarter located in the southern part of Warsaw. The cells were closed. The finder, Mr Rafał Pelka, crushed one of them, and seeing inside a living larva of a wasp and paralyzed spiders, delivered the find to the Museum and Institute of Zoology PAS. The carton was in the storage space since about two years before the cells were noticed. In February 2012, it was handled and no cells were seen. It means that the cells must have been built and eggs laid by a female just in that place, and not brought from somewhere.

DISCUSSION

In recent years, in Europe more and more South European aculeate species can be observed to expand their ranges to the North. At the same time some extra-European, accidentally introduced species, settle here for good. Since the aculeate hymenopterans (ants, wasps, bees and relatives) are, in general, a thermophilic group of insects, this process may be connected with supposed climate warming within our latitude and occurrence of some aculeates in new areas can be regarded as an indicator of this process. On the other hand, however, the phenomenon might be the effect of spontaneous increase of ecological tolerance of the locally occurring species (in the case of the species extending their ranges) or the expression of potential abilities of some species (in the case of exotic species).

Referring to ants and Poland, one can mention, as examples, *Temnothorax affinis* (Mayr), *Camponotus truncatus* (Spinola) and *Lasius neglectus* Van Loon, Boomsma et Andrasfalvy. *Temnothorax affinis* is a Euro-Caucasian species, recently thought to be extinct in Poland (Głowaciński & Nowacki 2004); for a long time it was known only basing on one finding in the Krakowsko-Częstochowska Upland in the beginning of the 20th century (not taking into account a single male caught in the Pieniny Mts. in the mid of the century). Meanwhile in recent years the species was reported from two other regions of Poland including the Pomeranian Lakeland, which is one of the northernmost known localities of *T. affinis* in Europe. *Camponotus truncatus* is a Mediterranean species, which compact range includes the countries bordering on Poland in the south: the Czech Republic, Slovakia and Ukraine. It is supposed to currently extend its range in Europe. The species was reported from Poland in the first decade of the 21st century. It was found in Wrocław and surroundings (Lower Silesia), where it appears to occur quite numerously, and in the Rogalin Landscape Park (Wielkopolsko-Kujawska Lowland); the latter locality is the northernmost known locality of *C. truncatus* in Europe. *Lasius neglectus*, unlike the two former species, is a species evidently originally alien to the European myrmecofauna; it originates from Asia Minor (Anatolia). The species is supposed to get to Europe and expansively spreads from town to town with commercial plants, locally being an invasive species. In Poland, it occurs in Warsaw, which until recently was the most northern locality of the species in Europe (for all the three species mentioned compare Czechowski et al. 2012).

The facts and the history of the occurrence of the two sphecid species under discussion, *S. destillatorium* and *S. curvatum*, resemble these of the above mentioned ants, especially *Camponotus truncatus* and *Lasius neglectus* respectively. *Sceliphron destillatorium*, alike *C. truncatus*, has appeared in Poland as a result of spontaneous widening of its range, and – taking into account the historical aspect – it can actually hardly be called an alien species. It is also worth to add that *S. destillatorium* extends its range in the present-day Poland (Wiśniowski 2007). The rate of expansion of *S. destillatorium* assessed on the base of the published data from Poland (the distance between known localities in the last 50 years) is around thirty-five

kilometres per a decade toward north-western Europe. The number of known localities is high within distribution area. This expansion seems not to be supported directly by human activities.

Sceliphron curvatum, just like the ant species *Lasius neglectus*, is an alien species in the Polish fauna. The species came to Poland probably from the Czech Republic, where it was recorded earlier (Bogusch et al. 2005). As already mentioned, *S. curvatum* probably migrated along the valley of the Oder and now it can be found on localities distributed in the southern, eastern and central Poland. It is not excluded that now it is even more widely distributed in Poland than it seems based on published data. This can be inferred from the dynamics of its expansion in recent years in neighbouring countries (Bogusch et al. 2005, Schmid-Egger 2005). Characteristically, this species has a strong commitment to human settlements, especially cities (Wrocław, and now Warsaw), which are suitable for *S. curvatum* due to both a warmer climate and availability of a large number of potential nesting sites. In central Europe *S. curvatum* nests in sheltered places, often in homes, which certainly favours the survival of *S. curvatum* during the cold winters. The analysis of the expansion suggests that the spread of *S. curvatum* is supported by human activities by moving the nest cells attached to various items. This is evidenced by the formation of secondary outbreaks of expansion (Schmid-Egger 2005). It may also partly explain the relatively frequent occurrence of this species in the cities, what additionally makes the case of *S. curvatum* similar to *Lasius neglectus*. Strengthening of a population of *S. curvatum* in Poland and all around Europe is probably reinforced by the phenomenon of global warming testified for some time by many authors. The rate of expansion of *S. curvatum* assessed on the base of the published data is more than four hundred kilometres per a decade in all possible directions in Europe starting from the first known locality in Austria. The rate is more than ten times higher than the rate of expansion of *S. destillatorium*, probably because it seems to be highly supported by human activities. It is also possible, that the introduction of the species to Europe took place several times in various locations.

For the time being, we do not see any reasons for calling either *Sceliphron destillatorium* or *S. curvatum* invasive species, although some authors use the term for *S. curvatum* (e.g. Bogusch et al. 2005, Gayubo & Izquierdo 2006). The species is similarly treated by The European Network on Invasive Alien Species (NOBANIS 2002), which lists *S. curvatum* from Germany as a species of both unknown invasive abilities and unknown frequency of occurrence. According to the European Union's definition "invasive species" are those alien species, whose introduction and/or spread threaten local biological diversity: "invasive species negatively affect biodiversity e.g. by competing with other organisms and changing habitat structure, being toxic, being a reservoir for parasites or a vector for pathogens" (Commission of the European Communities 2008). We believe that none of the species of *Sceliphron* occurring in Poland meets these conditions.

None of the two *Sceliphron* wasps seem to compete with any native species with similar biology – both in terms of space for nesting and feeding base. The mud daubers do not occur in large numbers, and they do not make colonies. They use spiders of different families as food for their offspring hunting (Dorow & Jäger 2005), therefore not threatening any particular species. Moreover, there has been recorded a natural factor limiting the development of *S. curvatum* in Europe: the chalcidoid wasp *Mellitobia acasta* (Walker) of the family Eulophidae, a common parasitoid of larvae of various species of Aculeata (Madl & Vidlar 2005).

It seems that – so far – the only real effect of the occurrence of both species of *Sceliphron* in Poland is increasing the biodiversity of aculeate hymenopterans in the country (Weigle 2000). Still, as in other alien species of plants and animals, observations on *S. destillatorium* and *S. curvatum* are needed to assess both their invasive potential and their relationships with native species.

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STRESZCZENIE

[Nowe stanowiska w Polsce dwóch obcych gatunków jaskółców *Sceliphron destillatorium* (Ill.) i *Sceliphron curvatum* (Sm.) (Hymenoptera, Sphecidae) wraz z uwagami na temat rozszerzania się ich zasięgów]

Rodzaj jaskółec *Sceliphron* KLUG, 1801 jest reprezentowany na świecie przez 35 gatunków, z czego w Europie odnotowano dotychczas występowanie siedmiu. Trzy z nich to gatunki introdukowane z Azji i Ameryki Północnej. W Polsce stwierdzono dotychczas dwa gatunki: *Sceliphron destillatorium* (ILLIGER, 1807) i *S. curvatum* (SMITH, 1870). Samice jaskółca polują na pajaki, które stanowią pożywienie dla rozwijających się larw. Gniazda są budowane z gliny; znaleźć je można w różnych miejscach, przyczepione do różnych podłoży – drewnianych ścian, murów, a nawet luźnych przedmiotów. Wiele gatunków cechuje się plastycznym behawiorem; gniazda zakładają często w obrębie osad ludzkich, czasem nawet wewnątrz budynków.

Jaskółec naścienny *Sceliphron destillatorium* zamieszkiwał pierwotnie południową Palearktykę, sięgając na wschodzie po Mongolię i Chiny. W okresie międzywojennym był składnikiem rodzimej fauny, gdyż był notowany w polskiej części jarowego Podola. W

granicach powojennej Polski został odnotowany po raz pierwszy w latach 60-tych XX wieku na Lubelszczyźnie i od tego czasu jest coraz częściej widywany w południowo-wschodniej Polsce. Ostatnio jego stanowiska stwierdzono na Wyżynie Małopolskiej i Podlasiu. Pojedyncza informacja o zaobserwowaniu tego gatunku na Nizinie Mazowieckiej nie jest pewna i wymaga potwierdzenia.

Jaskólec wschodni *Sceliphron curvatum*, drugi z przedstawicieli rodzaju stwierdzony w Polsce, występował początkowo w południowej i środkowej Azji. W latach 70-tych ubiegłego wieku został zawleczony do Europy (Austrii), skąd zaczął się rozprzestrzeniać po całym kontynencie. W Polsce po raz pierwszy został znaleziony w 2003 r. we Wrocławiu. W latach następnych był notowany na rozproszonych stanowiskach w południowej części Polski, a ostatnio także w Polsce środkowej (w Warszawie).

Pojawienie się dwu gatunków z rodzaju *Sceliphron* w Polsce to jeden z wielu przykładów ekspansji gatunków południowych (rozszerzanie zasięgów) bądź egzotycznych (świadome introdukcje lub przypadkowe zawleczenia) w ostatnich latach. Zjawisko to w odniesieniu do ciepłolubnych żądłówek (os, mrówek, pszczoł) można powiązać z postępującym ocieplaniem się klimatu. Może też być wyrazem spontanicznych zmian w behawiorze (wzrost zakresu tolerancji środowiskowej gatunków). Podobne wzory zachowań znaleźć można u mrówek. *Sceliphron destillatorium*, podobnie jak pierwotnie śródziemnomorska mrówka *Camponotus truncatus*, pojawił się w granicach obecnej Polski w wyniku spontanicznego rozszerzania areалу występowania i z historycznego punktu widzenia nie jest gatunkiem obcym w rodzimej faunie. Tempo ekspansji tego gatunku, odbywające się bez bezpośredniego udziału człowieka można ocenić na około 35 kilometrów na 10 lat w kierunku północno-zachodnim. Liczba znanych jego stanowisk w obrębie arealu występowania jest duża.

Jaskólec wschodni *Sceliphron curvatum*, podobnie jak mrówka anatolijska *Lasius neglectus*, jest gatunkiem obcym w faunie krajowej, gdyż pochodzi z odległych rejonów geograficznych, a do Europy trafił w wyniku zawleczenia. Gatunek ten wykazuje silne przywiązanie do siedlisk ludzkich, zwłaszcza do miast (Wrocław, a obecnie także Warszawa); *S. curvatum* znajduje tu sprzyjające warunki termiczne, które pozwalają mu przetrwać zimy. Z analizy ekspansji wnosić można, że niebagatelny udział w rozprzestrzenianiu się tego gatunku odgrywa działalność człowieka i transport przedmiotów, do których mogą być przyczepione komórki gniazdowe (pojawianie się wtórnych ośrodków ekspansji). Ekspansja tego gatunku odbywa się we wszystkich kierunkach od miejsca pierwszego stwierdzenia, a jej tempo jest nawet kilkunastokrotnie wyższe niż *S. destillatorium*; można je oszacować na ponad 400 km na dekadę. Nie jest wykluczone, że *S. curvatum* był zawlekany do Europy wielokrotnie w ciągu kilku ostatnich dziesięcioleci.

Obecnie trudno jest uważać oba gatunki jaskółców za inwazyjne, gdyż wydaje się, że nie konkurują one z gatunkami rodzimymi ani o miejsca do gniazdowania (budują gniazda w miejscach rzadko wykorzystywanych przez inne zwierzęta), ani o pokarm (pająki są bardzo obfitym źródłem pożywienia). Żaden gatunek pająka nie jest zagrożony przez jaskółce, gdyż nie są one wyspecjalizowane pokarmowo. Ponadto stwierdzono już spasożytność larw *S. curvatum* przez błęskotkę *Melittobia acasta* (WALKER) z rodziny Eulophidae.

Dotychczas pojawienie się obu gatunków jaskółców w Polsce zwiększyło różnorodność biologiczną fauny krajowej. Dalsze obserwacje powinny dać odpowiedź na pytanie o ich potencjalną inwazyjność oraz interakcje z gatunkami rodzimymi.

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