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The First Record of *Sceliphron curvatum* (Smith, 1870) (Hymenoptera: Sphecidae) in Belgorod Region, Russia

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Abstract. The Asian species *Sceliphron curvatum* (Smith, 1870) (Hymenoptera: Sphecidae), spreading over territory of European part of Russia, was first reliably recorded in Belgorod region (Center of European part of Russia).

Keywords: Eastern Europe, European part of Russia, Central Russian Uplandd, invasive species, new records.

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Первая находка *Sceliphron curvatum* (Smith, 1870) (Hymenoptera: Sphecidae) на территории Белгородской области (Россия)

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Аннотация. Сообщается о первом достоверном обнаружении на территории Белгородской области *Sceliphron curvatum* (Smith, 1870) – азиатского вида сфецид, распространяющегося по европейской территории России. Самка *S. curvatum* была поймана в жилом помещении в марте 2021 года, в мае – было обнаружено гнездо, состоящее из двух одиночных ячеек. Приводятся данные о содержимом ячеек. Регистрация вида в г. Белгороде является на данный момент наиболее северной в Центральной зоне европейской части России.

Ключевые слова: Восточная Европа, Европейская часть России, Среднерусская возвышенность, инвазивный вид, новые находки.

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Introduction

The genus *Sceliphron* Klug, 1801 in the modern world fauna is represented by 35 species, in which two subgenus are distinguished: *Sceliphron* s. str. and *Hensenia* Pagliano et Scaramozzino, 1990 [Catalog of Sphecidae, 2021]. The subgenus *Hensenia* includes 11 species with

a predominantly Asian distribution [Hensen, 1987]. 6 species of the genus *Sceliphron* in the European part of Russia have been recorded: *S. destillatorium* (Illiger, 1807), *S. madraspatanum* (F., 1871), *S. spirifex* (L., 1758), *S. caementarium* (Drury, 1773), *S. curvatum* (Smith, 1870), *S. deforme* (Smith, 1856) [Danilov, 2017]. Among them, three species are invasive or expanding their range in this area. *S. caementarium* is an American species registered in Crimea; *S. curvatum* and *S. deforme* are Asian species: the first one is recorded in the south of Russia, the North Caucasus and Crimea; the second one is in the center and east of the European part of Russia and in the North Caucasus [Danilov, 2017]. Digger wasps in Belgorod region were studied by A.V. Prisniy [2012]. *S. curvatum* in the list of species of Sphecidae given in this publication is not noted. But this species already in the late 1990s – early 2000s was registered in Kharkov region (adjacent to the Belgorod region) of Ukraine [Shorenko, 2002].

The natural area of *S. curvatum* from the east of Central Asia to India and Nepal extends [Hensen, 1987]. However, over the past few decades, the distribution of the species has expanded significantly, covering Central and Southern Europe [Ćetković et al., 2011; Tymkiv et al., 2015], also it's noted on American continent in Chile [Barrera-Medina, Garcete-Barrett, 2008]. In Russia *S. curvatum* was recorded in 2010 in the Krasnodar Territory for the first time [Prokofiev, Skomorokhov, 2010].

S. curvatum is currently distributed throughout Ukraine [Tymkiv et al., 2015], it's noted in the southeast of Belarus [Ostrovskiy, 2017], in Lithuania [Budrys, Orlovskytė, 2016], it's founded in the southern regions of Russia – Astrakhan region, Krasnodar Territory, Crimea [Danilov, Mokrousov, 2017; Shorenko, Konovalov, 2010; Shorenko, 2020], it's known from Georgia [Danilov, Mokrousov, 2017]. I. Tymkiv et al. [2015] point to the advancement of this species further north across the territory of Russia, up to 53° N, but at the moment we have not found any publications on the registration of *S. curvatum* in the central part of European Russia.

The purpose of this article is to report the registration of *Sceliphron curvatum* (Smith, 1870) in Belgorod (center of the European part of Russia). This record is currently the northernmost point of distribution of this species on the territory of Russia.

Results and discussion

EXAMINED MATERIAL: Belgorod region, Belgorod, apartment (50.565180 N, 36.561865 E), 27.03.2021, 1♀, T.S. Cherkasova leg, Yu.A. Prisniy det. (Fig. 1).

Fig. 1. General view of a specimen of *Sceliphron curvatum* (Smith, 1870), ♀, collected in Belgorod (Russia)
Рис. 1. Общий вид экземпляра *Sceliphron curvatum* (Smith, 1870), ♀, отмеченного в г. Белгород (Россия)

The species were determined using taxonomic keys [Hensen, 1987; Schmid-Egger, 2005; Bitsch, Barbier, 2006]. Petiolus of female is black, in lateral view distinctly curved and apically not compressed; first abdominal tergite not swollen; mesoscutum dull, irregularly strigose, and with distinct shallow punctation between the striae over its entire surface; hypostomal carina does not reach base of mandibles; interocular distance at vertex distinctly longer than first flagellomere; fore claws untoothed; clypeus of female without lateral incisions (Fig. 2). The collected specimen was identified as *Sceliphron curvatum* (Smith, 1870) (see Fig. 1).

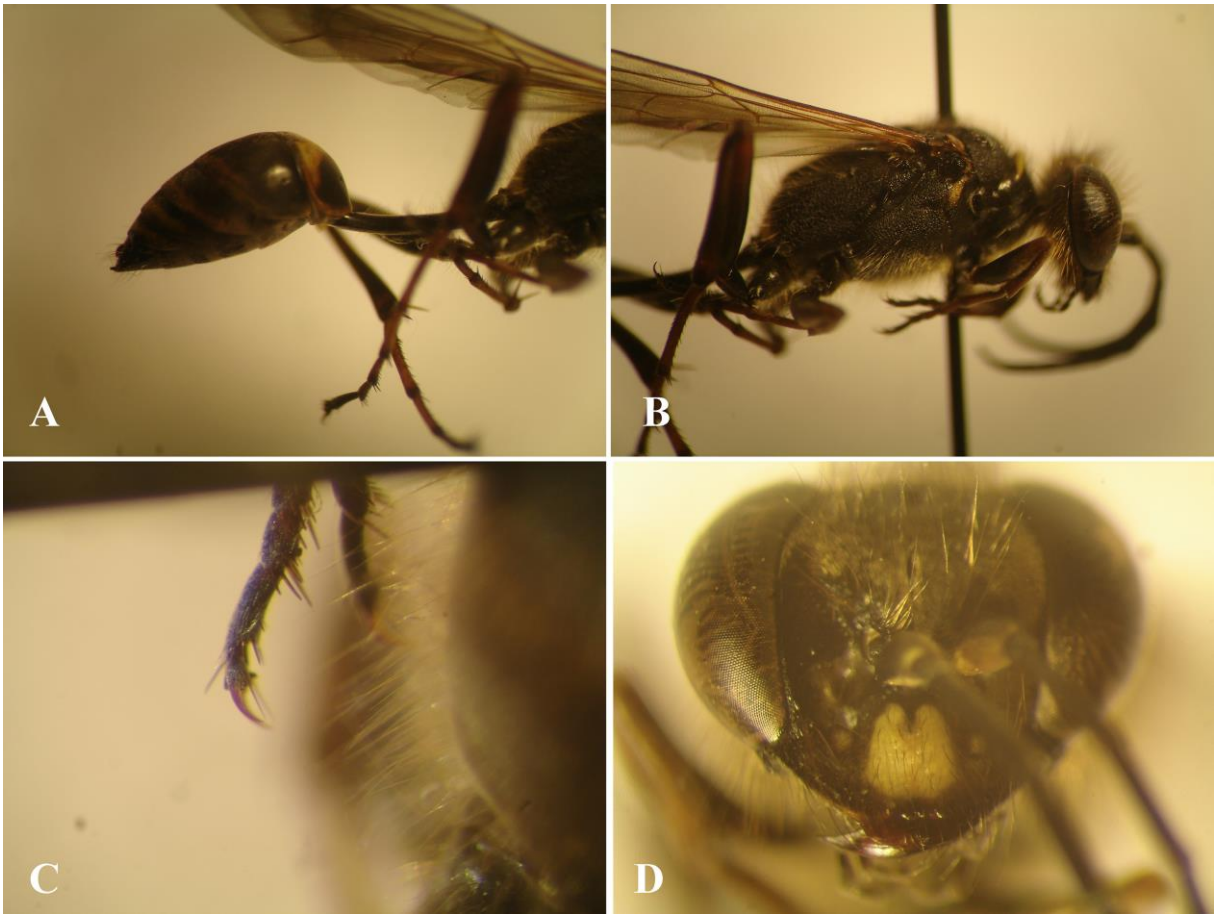

Fig. 2. Details of the structure and diagnostic features of *Sceliphron curvatum* (Smith, 1870), ♀, collected in Belgorod (Russia): A – petiolus and abdomen; B – chest; C – fore claw; D – head (front view)
Рис. 2. Детали строения и диагностические признаки *Sceliphron curvatum* (Smith, 1870), ♀, отмеченного в г. Белгород (Россия): A – стебелек и брюшко; B – грудь; C – коготок передней ноги; D – голова (вид спереди)

Since the female was found in spring in apartment, this indicates the wintering of this species in the climatic conditions of Central European Russia.

Only one species of the genus *Sceliphron*, *S. destillatorium*, in Belgorod region was previously recorded [Prisniy, 2012]. *S. destillatorium* belongs to the group of species that build nests with cells that have common side walls and, as a rule, cover them with a common layer of mud on top. *S. curvatum* builds nests consisting of individual cells, isolated from each other and, as a rule, do not have a common cover [Fateryga, Kovblyuk, 2013]. In 2016, on the territory of Belgorod, in the cavity of a car body nest with 8 single cells of an unidentified *Sceliphron* species were found (message by Yu.A. Prisniy). It can be assumed that these nests belonged to *S. curvatum*, which probably already from 2011–2012 could have met in this territory, as noted by I. Tymkiv et al. [2015].

On May 27, 2021, in cavity of a window frame, in apartment not far from place of finding of adult female, two single cells built of earth were found (Fig. 3). It is safe to say that this nest was built in May of this year by a wintering female *S. curvatum*, since there were no nests in this place at April.

Fig. 3. Single cell of nest of *Sceliphron curvatum* (Smith, 1870),
discovered in May 2021 in cavity of window frame of apartment in Belgorod (Russia)
Рис. 3. Одиночная ячейка гнезда *Sceliphron curvatum* (Smith, 1870),
обнаруженного в мае 2021 года в полости оконной рамы в жилом помещении в г. Белгород (Россия)

The contents of the nests are represented by the following spieces of spiders: family Thomisidae: *Tmarus piger* (Walckenaer, 1802), *Xysticus* sp.; family Cheiracanthiidae: *Cheiracanthium* sp.; family Anyphaenidae: *Anyphaena accentuata* (Walckenaer, 1802); family Araneidae: *Araniella cucurbitina* (Clerck, 1758); family Philodromidae: *Philodromus* sp. (Fig. 4). Mostly (almost 80%) the prey consisted of spiders of family Thomisidae. All specimens were immature, which may be an advantage in competition with the native species *S. destillatorium*, which preys on adult spiders, as noted earlier [Fateryga, Kovblyuk, 2013]. The noted spiders are mainly found on trees and shrubs or on tall grass, which also agrees with the already known data [Fateryga, Kovblyuk, 2013].

On May 29, 2021 in a Petri dish the larva from 1st cell (Fig. 4 A: on spider 1 – *T. piger*; Fig. 5 A) was alive and continued feeding (Fig. 5 B). The larva continued to feed until June 1, 2021. All 17 spiders stored in the cell were eaten with the exception of the cephalothorax with legs *Xysticus* sp. (the larva could not bite through the chitinous cover). The additionally offered spiders from the 2nd cell were not eaten by the larva (Fig. 5 E). On June 2, 2021 the larva was placed back into an earthen cell, where on June 3, 2021, it arranged a cocoon of white silk (Fig. 5 F), which eventually became covered with brown varnish. The emergence of the imago occurred on June 20, 2021 (Fig. 5 G). It took 16 days for the larva to metamorphose into adults (at an indoor temperature of 26–28°C).

There is data that after the appearance of *S. curvatum* in some regions of Austria, the number of nests of *S. destillatorium* significantly decreased [Gepp, 2003]. Also there is data that the abundance of *S. destillatorium* in Crimea has recently been significantly decreasing due to the invasion of *S. curvatum* into this territory, because *S. curvatum* has a wider range of prey and significantly higher reproductive success [Fateryga, Kovblyuk, 2014]. We assume that *S. curvatum*, which in the Belgorod region appeared, may have a negative impact on *S. destillatorium*, which is typical for the region. Therefore, it is necessary to conduct monitoring studies of the

condition of the *S. destillatorium* population, as well as additional studies on the distribution and ecological characteristics of *S. curvatum* in the region.

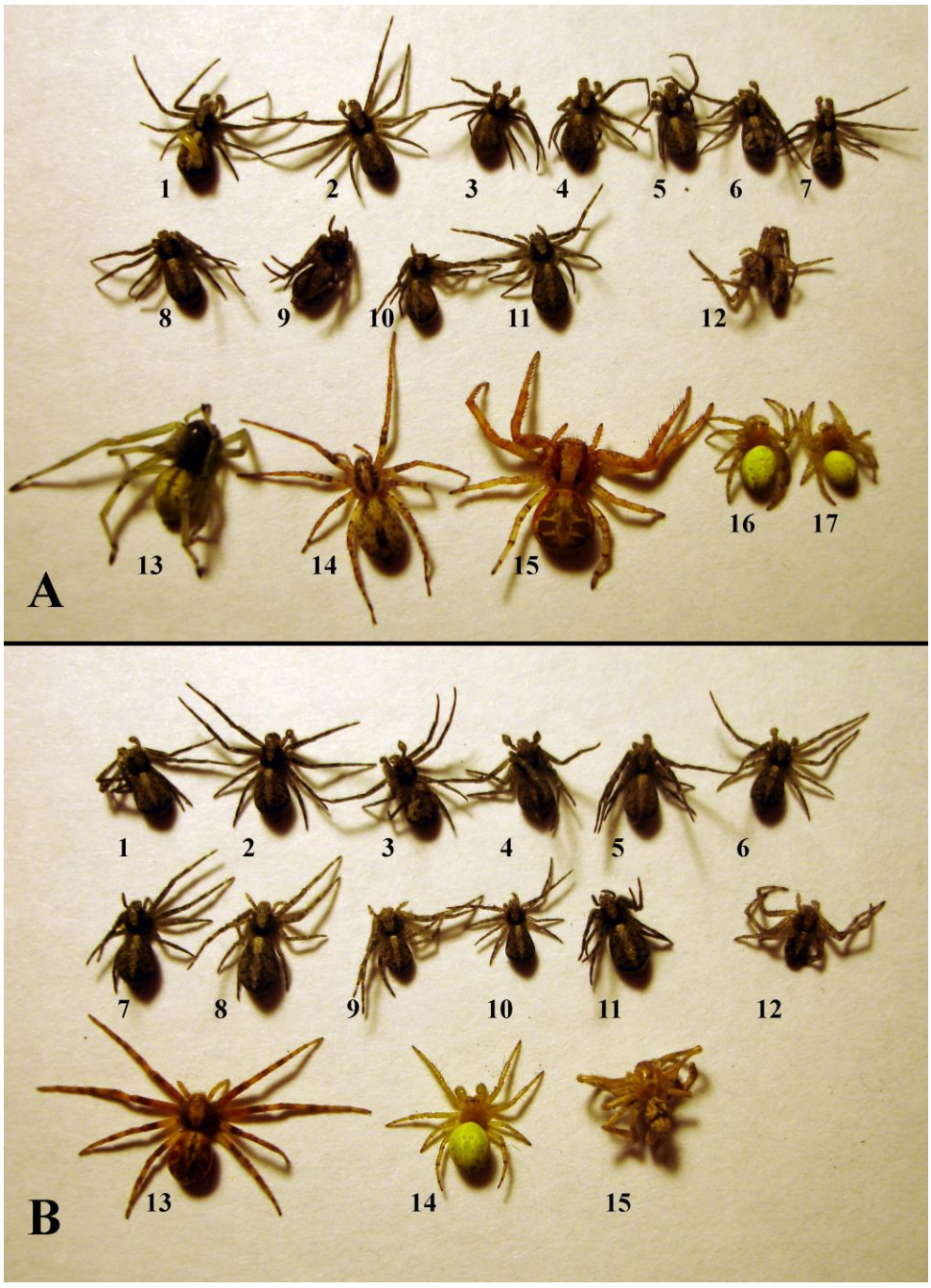

Fig. 4. Composition of the contents (preys) of nest of *Sceliphron curvatum* (Smith, 1870), discovered in May 2021 in Belgorod (Russia): A (cell 1): 1–12 – *Tmarus piger* (Walckenaer, 1802), 13 – *Cheiracanthium* sp., 14 – *Anyphaena accentuata* (Walckenaer, 1802), 15 – *Xysticus* sp., 16–17 – *Araniella cucurbitina* (Clerck, 1758); B (cell 2): 1–12 – *Tmarus piger* (Walckenaer, 1802), 13 – *Philodromus* sp., 14 – *Anyphaena accentuata* (Walckenaer, 1802), 15 – *Cheiracanthium* sp.
Рис. 4. Состав содержимого (добычи) гнезда *Sceliphron curvatum* (Smith, 1870), обнаруженного в мае 2021 года в г. Белгород (Россия):
А (ячейка 1): 1–12 – *Tmarus piger* (Walckenaer, 1802), 13 – *Cheiracanthium* sp., 14 – *Anyphaena accentuata* (Walckenaer, 1802), 15 – *Xysticus* sp., 16–17 – *Araniella cucurbitina* (Clerck, 1758); В (ячейка 2): 1–12 – *Tmarus piger* (Walckenaer, 1802), 13 – *Philodromus* sp., 14 – *Anyphaena accentuata* (Walckenaer, 1802), 15 – *Cheiracanthium* sp.

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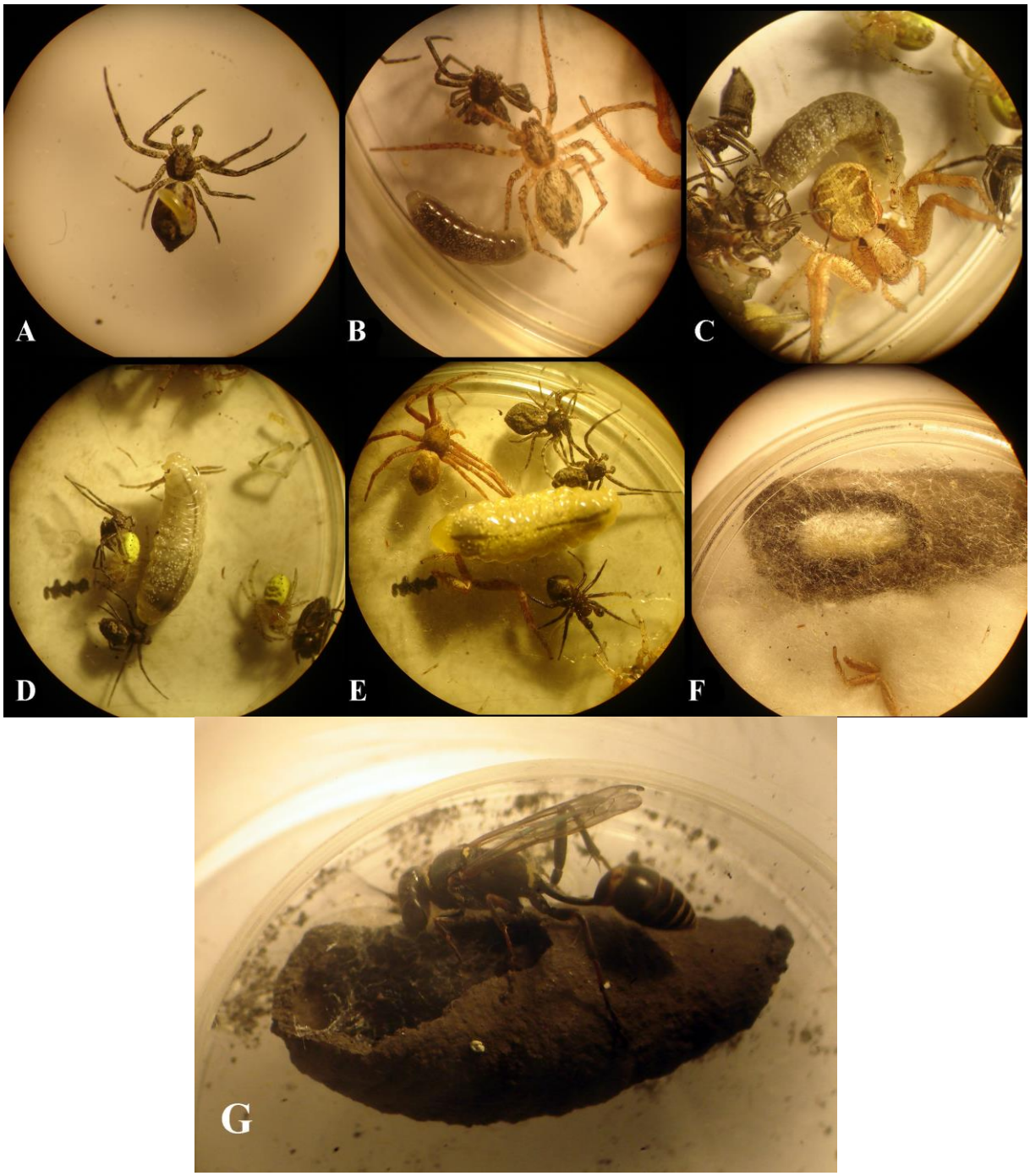

Fig. 5. Development of the larva of *Sceliphron curvatum* (Smith, 1870), discovered in May 2021 in Belgorod (Russia):
A – larva on *T. piger* extracted from 1st cell (May 27, 2021); B – feeding of larva on *A. accentuata* (May 29, 2021); C – feeding of larva on *Xysticus* sp. (May 30, 2021); D – larva ate *T. piger* (May 31, 2021); E – spiders from the 2nd cell offered to larva (June 1, 2021); F – cocoon in the cell (June 2, 2021); G – imago on earthen cell (June 20, 2021)

Рис. 5. Развитие личинки *Sceliphron curvatum* (Smith, 1870), обнаруженной в мае 2021 года в г. Белгород (Россия): A – личинка на *T. piger*, извлеченном из ячейки (27.05.2021); B – питание личинки на *A. accentuata* (29.05.2021); C – питание личинки на *Xysticus* sp. (30.05.2021); D – личинка доедает *T. piger* (31.05.2021); E – пауки из 2-ой ячейки, предложенные личинке (01.06.2021); F – кокон в ячейке (02.05.2021); G – имаго на ячейке (20.06.2021)

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