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## Notes on the genus *Psacadina* (Diptera, Sciomyzidae)

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**Abstract.** A review of the Palaearctic genus *Psacadina* Enderlein, 1939 is given. Diagnostic characters of *Psacadina* species offered in previous publications by Rozkosny (1987), Vala (1989) and Rivoecchi (1992) are discussed. The author came to the conclusion that using the shape of surstylus as the main diagnostic character leads to difficulties, while the form of sternite 5 makes it possible to make an unambiguous diagnosis. The diagnostic value of the wing pattern is confirmed. A new identification key for both sexes of *Psacadina* is proposed. Two new synonyms are proposed: *Psacadina zernyi* Mayer, 1953 = *P. verbekei* Rozkosny, 1975, **syn. nov.** and *P. vittigera* Schiner, 1864 = *P. disjecta* Enderlein, 1939, **syn. nov.** Distribution of *Psacadina* species in the eastern part of Palaearctic is significantly clarified.

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**Keywords:** *Psacadina*, taxonomy, distribution, Sciomyzidae, Diptera

## Заметки роду *Psacadina* (Diptera, Sciomyzidae)

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**Аннотация.** Предложен обзор палеарктического рода *Psacadina* Enderlein, 1939. Дано критическое обсуждение диагностических признаков *Psacadina*, использованных в предыдущих работах: Rozkosny (1987), Vala (1989) и Rivoecchi (1992). Автор пришел к выводу, что использование формы сурстилей как основного диагностического признака приводит к трудностям, тогда как форма стернита 5 позволяет поставить однозначный диагноз. Предложен новый определительный ключ видов *Psacadina*, который позволяет надежно отличать как самцов, так и самок. Предложены новые синонимы: *Psacadina zernyi* Mayer, 1953 = *P. verbekei* Rozkosny, 1975, **syn. nov.** и *P. vittigera* Schiner, 1864 = *P. disjecta* Enderlein, 1939, **syn. nov.** Уточнено распространение видов в восточной части Палеарктики.

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**Ключевые слова:** *Psacadina*, систематика, распространение, Sciomyzidae, Diptera

## Introduction

*Psacadina* Enderlein, 1939 is a genus of Tetanocerini endemic to the Palaearctic, in which five species have been regarded as valid since 1975. It is characterized as follows: two pairs of orbital setae; pedicel short, more wide than long (Fig. 1); arista with long black hairs; anepisternum with one strong seta at posterior margin and covered with several setulae; subalar setae absent; anepimeron with setulae; scutellum with two pairs of setae; wing with dark pattern as in Figs. 2–3; hind coxa with setulae on inner posterior margin; male  $\beta$  ventrally with two rows of spinulose setae.

Previously, *Psacadina* was considered as a subgenus of *Pherbina*. These genera share most characters including the same wing pattern, but *Pherbina* has pedicel longer than wide; subalar setae present and anepimeron apart from setulae with 1–2 strong seta(e).

About 30 years ago the genus *Psacadina* was reviewed in three almost simultaneous publications: Rozkosny (1987), Vala (1989) and Rivosecchi (1992). However, proposals of these authors were in many respects contradictory. This circumstance lead to permanent difficulties in identification of *Psacadina* species which mostly based on the structure of male surstyli (= gonostyli of authors). In the present work I offer two new synonyms: *Psacadina zernyi* Mayer, 1953 = *P. verbekei* Rozkosny, 1975, **syn. nov.** and *P. vittigera* Schiner, 1864 = *P. disjecta* Enderlein, 1939, **syn. nov.** With two synonyms newly proposed, the genus *Psacadina* is no longer problematic; three remaining valid species may be reliably distinguished in both sexes as proposed in the key below. Moreover, reliable identification of the rich material in the Zoological Museum of Moscow University (not indicated in text) and Saint Petersburg Zoological Institute (indicated as ZIN) significantly clarified the distribution of *Psacadina* in the eastern part of Palaearctic.

## Material and methods

Localities are given as follows: country, region/state/province (in italics), and geographi-

cal coordinates in decimal-degree format. Full names of the regions of the Russian administrative subdivisions are an entangled result of political and historical events of no interest for zoology, so they are listed as a name (taken from the English version of Wikipedia) and the word “region” (abbreviated in the text as “Reg.”).

Illustrations are original unless otherwise credited. When referring to figures, I capitalize the first letter (Fig. or Figs.) for those appearing in this paper and use lowercase (fig. or figs.) for those published elsewhere to avoid confusion.

## Material examined

### *Psacadina kaszabi* Elberg, 1978

Figs. 9, 13

RUSSIA: *Amur* Reg.: Zeya env. (53.77°N 127.28°E), 12–14.08.1981, A. Shatalkin, 2♂; Klimoutsy (40 km W of Svobodny (51.46°N 127.59°E), 31.08.1958, A. Zinovjev, 4♀ (ZIN); *Buryatia* Reg.: Tunka env., 51.7°N 102.6°E, 750 m, 7–11.06.2021, N. Vikhrev, 10♂, 5♀; Mondy env., 51.67°N 101.04°E, 1250 m, 17.06.2021, N. Vikhrev, 1♀; *Irkutsk* Reg., Slyudyanka, 51.68°N 103.69°E, 480 m, 12–14.06.2021, N. Vikhrev, 5♂; *Khakas* Reg., Shira Distr., Itkol L., 54.477°N 90.120°E, 11–20.04.2022, M. Esin, 1♂, 1♀; *Primorsky* Reg., Lotos L., 42.46°N 130.64°E, 1–3.07.2014, N. Vikhrev, 1♂; *Tuva* Reg.: Uyuk R., 800 m, 52.072°N 94.047°E, 27.05.2018, N. Vikhrev, 11♂, 7♀; Kyzyl, poplar-birch forest, 51.7°N 94.7°E, 17–25.05.2018, N. Vikhrev, 1♂; *Zabaikalsky* Reg., Ulyatui (51.17°N 116.25°E), 740 m, 25–26.05.2014, A. Medvedev, 1♂, 1♀; 3–6.06.2014, A. Medvedev, 1♂.

DISTRIBUTION. Not rare in Mongolia and south-eastern Siberia, uncommon in the Far East. To the west known till 90°E, to the north till 54°N.

### *Psacadina vittigera* Schiner, 1864

Figs. 3–8, 14

*Psacadina disjecta* Enderlein, 1939, **syn. nov.** (see Discussion)

ESTONIA, Peedu (59.2°N 25.6°E), A. Stackelberg, 22–24.08.1951, 4♂, 5♀ (ZIN).



Fig. 1. *Psacadina zernyi*, male

Рис. 1. *Psacadina zernyi*, самец

KAZAKHSTAN, *Pavlodar* (= N Kazakhstan) Reg., Petropavlovsk, 54.84°N 69.10°E, 28.06.2015, O. Kosterin, 1♂.

RUSSIA: *Kursk* Reg., Oboyan env., Psyol R. (51.191°N 36.313°E), 26.05.2007, N. Vikhrev, A. Ozerov, 6♂, 2♀;

*Moscow* Reg., Ilyinskoe (55.755°N 37.233°E), 31.03.1922, B. Rodendorf, 1♀; *Kashira* Distr., Ozherelye, 54.77°N 38.24°E, 2–4.05.2018, K. Tomkovich, 1♂; *Dmitrov* Distr. (E of Kostino, 56.31°N 37.81°E), 30.08.2007, N. Vikhrev, 1♀;

*Mordovia* Reg.: 20 km W of Saransk, 54.137°N 44.906°E, 21.06.2020, N. Vikhrev, 1♂; *Pushta* env., 54.71°N 43.22°E, 1–5.09.2020, N. Vikhrev, 1♀;

*Saint Petersburg* Reg., *Luga* Distr., *Yaschera* (59.15°N 29.91°E), 28–31.08.1963, A. Stackelberg, 6♂, 2♀ (ZIN).

SPAIN, *Almeria* Prov., *Tijola* (37.35°N 2.43°W), 13.03.1964, L. Knutson, 1♂, genitalia not dissected, identification label by J. Verbeke, 1966: *P. disjecta* Enderlein (ZIN).

TURKEY, *Antalya* Reg., *Side*, sand dune (36.76°N 31.43°E), 28.02.2008, N. Vikhrev, 1♂; 25.02.2008, K. Tomkovich, 1♀.

DISTRIBUTION. European. Also recorded in Turkey and N Kazakhstan, uncommon in the eastern part of its range. To the north recorded till 60°N, to the south till 36°N.

*Psacadina zernyi* Mayer, 1953

Figs. 1, 2, 10–11

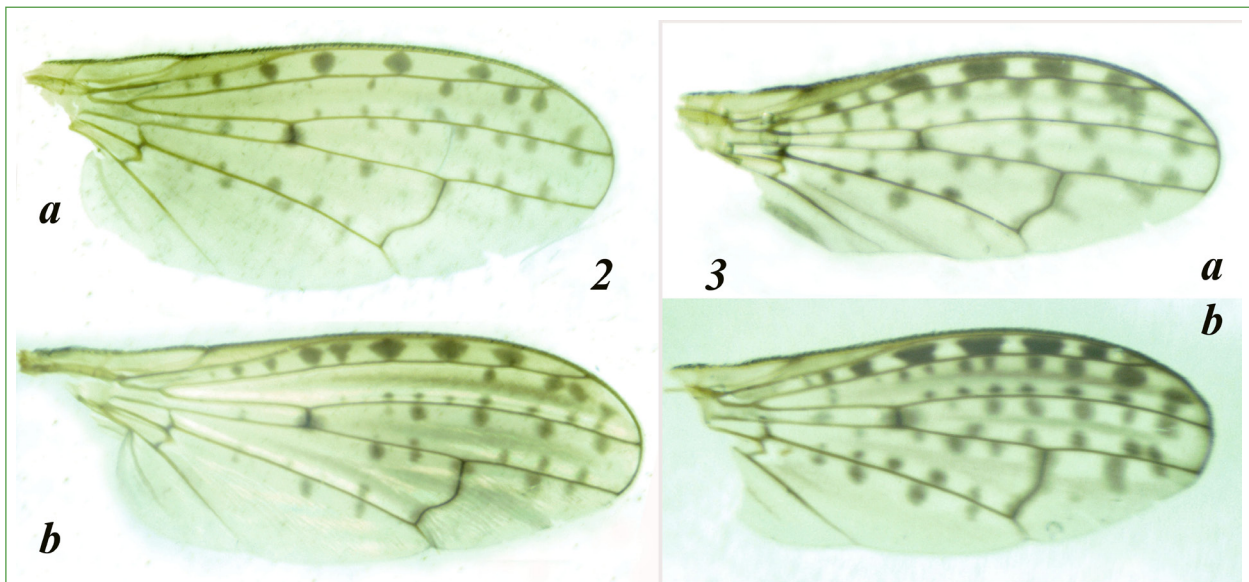
*Psacadina verbekei* Rozkosny, 1975, **syn. nov.** (see Discussion)

AZERBAIJAN, *Nakhchivan* (39.2°N 45.4°E), 28.05.1957, L. Zimina, 1♂.

BELARUS, *Gomel* Reg.: *Mytva* R., 51.854°N 29.223°E, 31.07.2019, N. Vikhrev, 1♂; *Mozyr* env., 52.02°N 29.32°E, 21.05.2019, N. Vikhrev, 1♂; 11–14.06.2019, N. Vikhrev, 1♂, 1♀;

*Vitebsk* Reg., *Ezerische* env., 55.83°N 30.00°E, 16–18.05.2019, N. Vikhrev, 1♂.

ESTONIA, *Peedu* (59.2°N 25.6°E), A. Stackelberg, 1.07.1951, 1♀; 22.08.1951, 1♂ (ZIN).

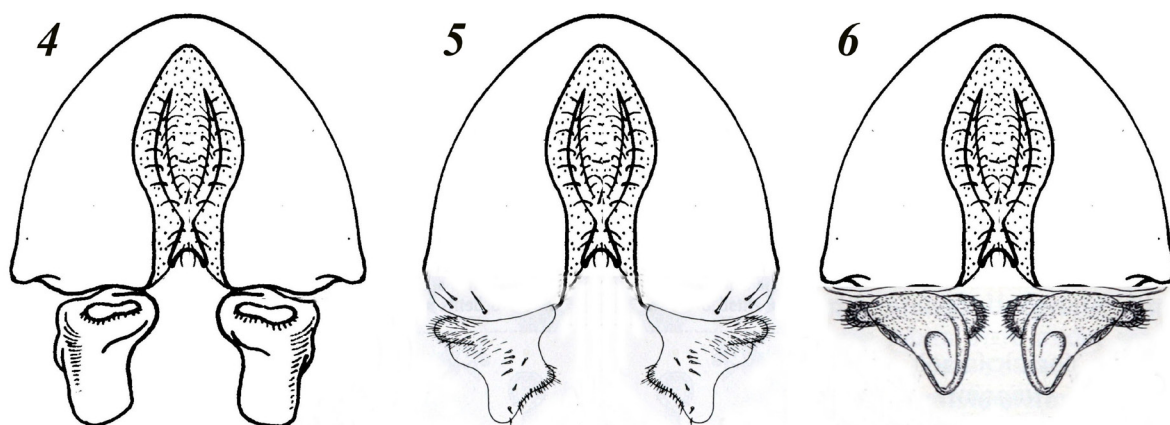


**Figs. 2–3.** Wing pattern of *Psacadina*: 2a, b: *P. zernyi*: a — wing with smaller rounded spots; b — wing with larger diamond-shaped spots; 3a, b: *P. vittigera*: a — wing with rectangular spots; b — wing with trapezoid spots

**Рис. 2–3.** Крыло *Psacadina*: 2a, b: *P. zernyi*: a — крыло с маленькими округлыми пятнами; b — крыло с большими ромбовидными пятнами; 3a, b: *P. vittigera*: a — крыло с прямоугольными пятнами; b — крыло с пятнами трапециевидной формы

KAZAKHSTAN: *Aktobe* Reg., Chesnokovo, 51.66°N 52.17°E, 26.08.2012, Tomkovich, 1♂; *Pavlodar* (= N Kazakhstan) Reg., Ishim R., 53.35°N 67.05°E, 15.08.2015, O. Kosterin, 1♂; KYRGYZSTAN: Choktal (Issyk-Kul L.), 42.58°N 76.75°E, 19–22.09.2013, N. Vikhrev, 2♂; Issyk-Kul L., S of Rybachy (presently Balykchi, 42.4°N 76.2°E), 16.08.1969, E. Nar-chuk, 4♂, 1♀ (ZIN).  
RUSSIA: *Altai Krai* Reg., Zmeinogorsk Distr., Kolyvanskoe L. (51.36°N 82.18°E), 8.09.2007, O. Kosterin, 2♂, 1♀;  
*Amur* Reg., Zeya env. (53.77°N 127.28°E), 12–14.08.1981, A. Shatalkin, 4♂, 2♀;  
*Astrakhan* Reg., Baskunchak L., freshwater pond, 48.193°N 46.813°E, 1–6.05.2010, K. Tomkovich, 1♂, 2♀;  
*Bashkortostan* Reg., Abzakovo env., 53.82°N 58.62°E, 500 m, 15–19.06.2020, N. Vikhrev, 1♀;  
*Buryatia* Reg.: Kyren env., 51.7°N 102.1°E, 750 m, 16–19.06.2021, N. Vikhrev, 1♂, 1♀; Tunka env., 51.7°N 102.6°E, 750 m, 7–11.06.2021, N. Vikhrev, 1♂, 4♀;  
*Irkutsk* Reg., Slyudyanka, 51.68°N 103.69°E, 480 m, 12–14.06.2021, N. Vikhrev, 2♂;  
*Kaliningrad* Reg., Baltiysk, 54.644°N 19.939°E, on *Phragmites*, 23.08.2013, K. Tomkovich, 1♂;

*Karachay-Cherkes* Reg., B. Zelenchuk R., 44.22°N 41.72°E, 580 m, 6.07.2019, O. Kosterin, 1♀;  
*Kemerovo* Reg., 20 km SWW of Kemerovo, 55.25°N 85.77°E, 9.07.2021, D. Efimov, 1♂;  
*Krasnodar* Reg., Adler env., 43.439°N 39.954°E, 23.04.2008, A. Ozerov, D. Gavryushin, 3♂, 1♀;  
*Kursk* Reg., Oboyan env., Psyol R. (51.191°N 36.313°E), 26.05.2007, N. Vikhrev, A. Ozerov, 1♂, 2♀;  
*Mordovia* Reg., Smolny NP, 54.734°N 45.397°E, K. Tomkovich, 2.08.2022, 1♂, 1♀;  
*Moscow* Reg.: Dmitrov Distr. (E of Kostino, 56.31°N 37.81°E), 9–11.05.2007, N. Vikhrev, 3♂, 2♀; 2–9.07.2007, N. Vikhrev, 9♂, 2♀;  
Severovo, YPT, 55.04°N 37.50°E, 6–8.06.2021, K. Tomkovich, 2♂, 1♀; Volokolamsk env., Lama R., 55.97°N 36.03°E, 11.05.2021, N. Vikhrev, 9♂, 3♀;  
*Novosibirsk* Reg. (Academgorodok env.), Irtysh R. oxbows, 54.86°N 83.04°E, 1–2.05.2016, O. Kosterin, 6♂, 1♀;  
*Omsk* Reg., Cherlak env. (54.15°N 74.80°E), 10.05.2009, O. Kosterin, 1♂, 2♀;  
*Orenburg* Reg., Aituarskaya step (51.12°N 57.67°E), 11.05.2005, K. Tomkovich, 1♀;



**Figs. 4–6.** *Psacadina vittigera*: drawings of male postabdomen with surstyli (= gonostyli) in ventral view: 4 — from Rozkosny (1987, fig. 321); 5 — drawing of surstyli from Vala (1989, fig. 96a) attached to Rozkosny’s drawing of postabdomen; 6 — drawing of surstyli from Rivosecchi (1992, fig. 129c) attached to Rozkosny’s drawing of postabdomen

**Рис. 4–6.** *Psacadina vittigera*: рисунок постабдомена и сурстилей (= гоностилей), вид снизу: 4 — из Rozkosny (1987, fig. 321); 5 — рисунок сурстилей из Vala (1989, fig. 96a), прикрепленный к рисунку постабдомена из Rozkosny (1987); 6 — рисунок сурстилей из Rivosecchi (1992, fig. 129c), прикрепленный к рисунку постабдомена из Rozkosny (1987)

*Saint Petersburg Reg.*: Luga (58.7°N 29.9°E), 2–17.08.1952, A. Stackelberg, 9♂, 3♀ (ZIN); Luga Disr., Yaschera (59.15°N 29.91°E), 28–31.08.1963, A. Stackelberg, 6♂, 2♀ (ZIN); *Primorsky Reg.*, 30 km SE of Ussuriysk (Kamenushka, 43.63°N 132.23°E), 31.05.1985, A. Ozerov, 1♂; *Stavropol Reg.*, Kislovodsk env., 43.97°N 42.79°E, 700 m, 14–17.04.2022, N. Vikhrev, 1♂; *Tver Reg.*, Rzhev env., 56.21°N 34.35°E, 18.08.2014, N. Vikhrev, 2♂; *Ulyanovsk Reg.*, Vyazovka env., 52.82°N 48.35°E, 2–8.05.2011, K. Tomkovich, 1♂; *Volgograd Reg.*, Kalach-na-Donu env., 48.65°N 43.60°E, 30.04.2013, N. Vikhrev, 1♂; *Yakutia-Sakha Reg.*, Yakutsk (62.0°N 129.7°E) env., 31.05.1985, A. Barkalov, 1♂; *Zabaikalsky Reg.*, Ulyatui (51.17°N 116.25°E), 740 m, 3–6.06.2014, A. Medvedev, 1♂. **TURKEY**, *Sakarya Reg.*, Karasu (41.1°N 30.7°E) env., 27.08.2009, N. Vikhrev, 1♂. **DISTRIBUTION.** Palaearctic from W Europe to Far East. To the north recorded till 62°N, to the south till 39°N.

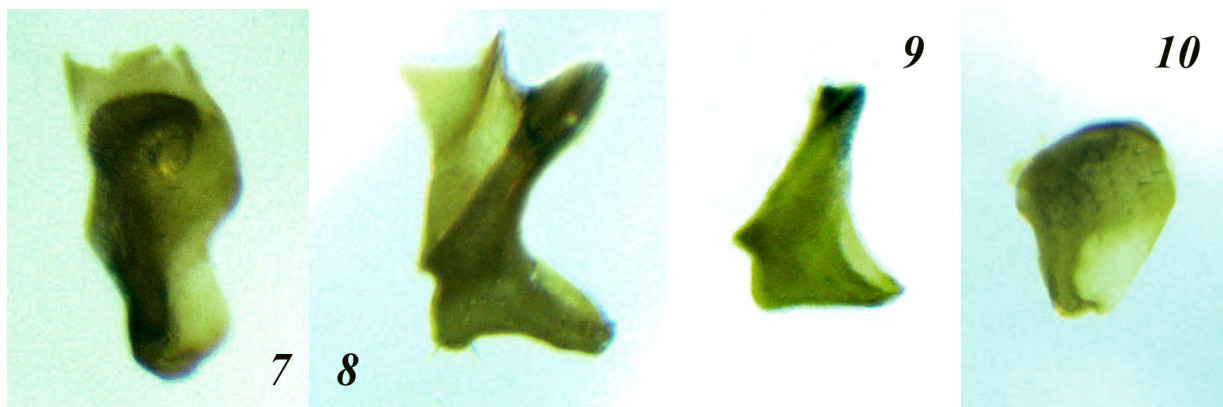
**Identification key for *Psacadina* ♂♀**

1. Wing with rounded (Fig. 2a) or diamond-shaped (Fig. 2b) spots along costal margin; posterior crossvein S-shaped. (Body

length ♂♀: 5.6–6.6 mm; Transpalearctic.) ♂: sternite 5 narrow, elongated, with curved posteriorly apices as in Fig. 11. (Surstyli ear-shaped as in Fig. 10) ..... *zernyi* Mayer  
 — Wing with inverted trapezoid (Fig. 3b) or subquadrate (Fig. 3a) spots along costal margin; posterior crossvein not S-shaped, only with a fold at middle. ♂: sternite 5 not as above, surstyli not ear-shaped ..... 2  
 2. Body length ♂♀: 5.2–6.2 mm. European, also recorded in Turkey and N Kazakhstan, uncommon in the eastern part of its range. ♂: sternite 5 as in Fig. 12 (half moon shaped, with rounded projection on posterior margin and a notch on anterior margin) ..... *vittigera* Schiner  
 — Body length ♂♀: 3.8–4.8 mm. East Palaearctic eastern of 90°E. Common in southeastern Siberia and Mongolia, uncommon in the Far East. ♂: sternite 5 as in Fig. 13 (with notch on posterior margin and long projection on anterior margin) ..... *kaszabi* Elberg

**Discussion**

Most authors (Rozkosny 1987; Rivosecchi 1992) divided species of *Psacadina* into two



**Figs. 7–10.** Surstylus of *Psacadina*: 7, 8 — the same surstylus of *P. vittigera* from a different angle of view; 9 — *P. kaszabi*; 10 — *P. zernyi*

**Рис. 7–10.** Сурстили *Psacadina*: 7, 8 — один и тот же сурстийль *P. vittigera* при съемке с разных углов зрения; 9 — *P. kaszabi*; 10 — *P. zernyi*

groups based on the wing pattern: costal margin of wings with dark spots rounded or subquadrate. I also believe that the species of *Psacadina* form two distinct clades: *P. zernyi* and *P. vittigera* + *P. kaszabi*, the latter two species share the wing pattern and the general structure of genitalia. Unfortunately, the wing pattern is very variable (Figs. 2–3), often even the left and the right wings of the same specimen are significantly different. However, diagnostic use of the wing pattern as recommended in the key above seems reliable, since all specimens I had preliminary diagnosed as “rounded” or “subquadrate” were confirmed as *P. zernyi* or *P. vittigera* + *P. kaszabi* after examination of their genitalia.

Species level identification of *Psacadina* is usually based on examination of male genitalia: surstyli (mentioned as gonostyli in the majority of previous publications) and sternite 5.

The surstylus is a small sclerite of a complicated shape which is very differently visible

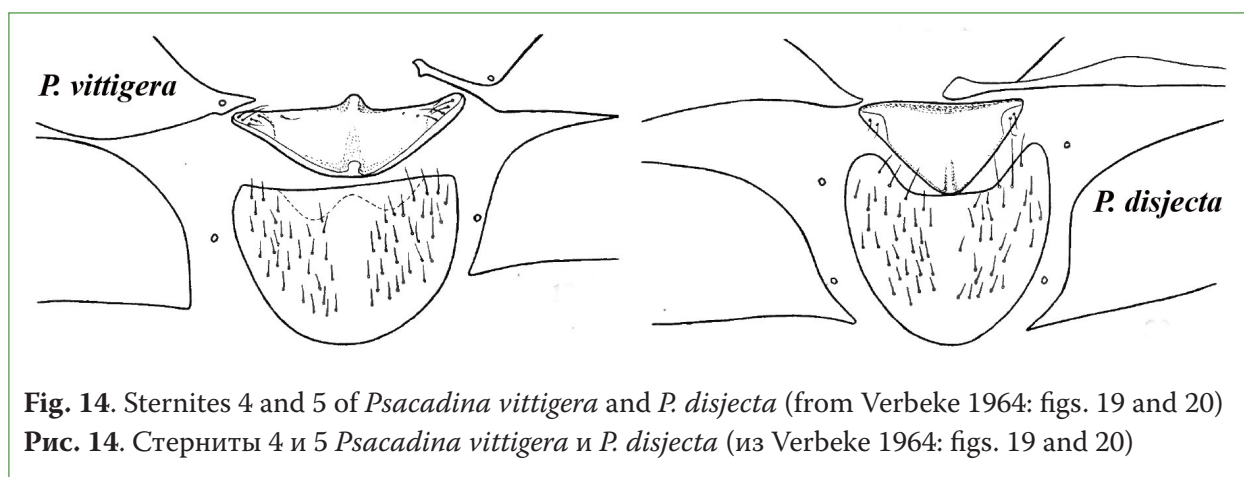
depending on the angle of view. As a result, authors offer very different drawings of it in their works. To illustrate these difficulties, in Figs. 4–6, I took Rozkosny’s (1987, fig. 321) drawing of the male postabdomen of *Psacadina vittigera*, first with the original drawings of the surstyli by Rozkosny and then with the surstyli replaced with their drawings, again of *P. vittigera*, but taken from illustrations by Vala (1989, fig. 96a) and Rivosecchi (1992, fig. 129c).

How does surstyli of *P. vittigera* actually look like? I have separated surstyli of the three above considered species of *Psacadina* and photographed them; the results are shown in Figs. 7–10. I found out that the same surstylus of *P. vittigera* may either look as on Rozkosny’s drawing (compare Figs. 7 and 4) or resemble Vala’s or Rivosecchi’s drawings (compare Figs. 8 with 5 and 6). The surstylus of *P. kaszabi* photographed from the same angle of view is similar to that of *P. vittigera*. The



**Figs. 11–13.** Sternite 5 of *Psacadina*, posterior margin above, anterior below: 11 — *P. zernyi*; 12 — *P. vittigera*; 13 — *P. kaszabi*

**Рис. 11–13.** Стернит 5 *Psacadina*, задний край обращен кверху, передний книзу: 11 — *P. zernyi*; 12 — *P. vittigera*; 13 — *P. kaszabi*



surstylus of *P. zernyi* looks different, it has an ear-like shape, but depending on the angle of view the “ear” looks either short and rounded or more elongated. Thus, the diagnostic value of the shape of surstyli of *Psacadina* seems limited, or at least requires an agreement on unification of the angle of view.

Fortunately, it is possible not to use the shape of surstyli at all to distinguish *Psacadina* species. In contrast with the difficulties discussed above, the shape of sternite 5 makes it easy to make unambiguous conclusions almost regardless of the angle of view. *P. zernyi* has sternite 5 narrow, elongated, with curved posteriorly apices (Fig. 11). The sternite 5 of *P. vittigera* is crescent-shaped with a rounded projection on the posterior margin and a notch on the anterior margin (Fig. 12). The sternite 5 of *P. kaszabi* has a notch on the posterior margin and a long projection on the anterior margin (Fig. 13).

**SYNONYMY.** *P. disjecta* Enderlein, 1939. This species was described from two males from Spain and Estonia. The type series was reexamined by Verbeke (1964) who found that the Estonian specimen belongs to *P. zernyi* and is not conspecific to the Spanish one. According to Verbeke, the Spanish syntype belongs to a different species related to *P. vittigera*. Verbeke (1964) also identified and listed one more specimen from Morocco and several specimens from Spain (Almeria Prov.; Tijola) as *P. disjecta*; one male from the Spanish series is stored in ZIN (see material *P. vittigera* above). The only comprehensible difference between *P. disjecta* and widespread

*P. vittigera* is the shape of sternites 4 and 5 as shown in Fig. 14.

Since 1964 other authors have repeated this recommendation (see, for example, Rivosecchi (1992: 213)), but I found it incorrect.

(1) Sternite 4 of *P. vittigera* does not look as proposed in Fig. 14, but is deeply emarginated at the posterior margin, exactly as proposed by Verbeke for *P. disjecta*.

(2) The notch on the anterior margin of sternite 5 may be visible or not depending on the angle of view.

(3) I examined the male from Spain, Almeria Prov., Tijola in ZIN. Its genitalia were not dissected, but there is an identification label by J. Verbeke, 1966: “*P. disjecta* Enderlein”. However, the postabdomen is slightly bent and the posterior margin of sternite 5 with a rounded projection is visible in the intact specimen.

Thus, at least one specimen identified by Verbeke as *P. disjecta* is *P. vittigera* and the proposed difference in the shape of sternites was not justified, so, *P. vittigera* Schiner, 1864 = *P. disjecta* Enderlein, 1939, **syn. nov.**

*P. verbekei* Rozkosny, 1975 in Knutson et al. 1975. During a long time *Psacadina* with rounded spots along costal margin was known under the name *Psacadina punctata* (Fabricius, 1794) (= *Musca punctata* Fabricius, 1794 = *Pherbina punctata* (Fabricius, 1794)). Rozkosny (Knutson et al. 1975) reexamined the type of *Musca punctata* Fabricius, 1794 and found out that it actually belonged to another species, so what was understood as *Psacadina punctata* was a nameless species. Therefore, he introduced a

new name *Psacadina verbekei* Rozkosny, 1975. Besides, *Musca punctata* Fabricius, 1794 is a junior primary homonym of *Musca punctata* Poda, 1761 (Thompson et Pont 1993); thus, the Fabricius's species is presently known under the valid available name *Pherbellia schoenherri* Fallen, 1826.

Earlier Mayer (1953) described *Psacadina zernyi* which "is closely related to *P. punctata* and differs from the latter only due to slightly different form of surstylus".

However, I find Mayer's description groundless, because the shape of surstylus looks different depending on the angle of view. For example, the most realistic drawings with a comparison of the surstylus and sternite 5 of *P. zernyi* and *P. verbekei* were given by Vala (1989, figs. 96c, d, e, f) and Rivosecchi (1992, figs. 127, 128). I found out that the same surstylus and sternite 5 can be rotated

so that they look like *P. zernyi* or *P. verbekei*. Hence *P. zernyi* and *P. verbekei* are the same species. Therefore, *Psacadina zernyi* Mayer, 1953 becomes the oldest available, not preoccupied and hence valid name of this species: *P. zernyi* Mayer, 1953 = *P. verbekei* Rozkosny, 1975, **syn. nov.**

With the two synonyms newly proposed here, the genus *Psacadina* is no longer problematic, and the three remaining valid species may be reliably distinguished in both sexes as recommended in the key.

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