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Notes on the taxonomy of species of Sciomyzini with a predominantly setulose anepisternum (Diptera, Sciomyzidae)

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Abstract. The present paper was conceived originally as a straightforward, simple description of a new African taxon. It grew substantially as more research was conducted. It now consists of four parts. In Part I, we discuss the taxonomy of five species of Sciomyzini with a predominantly setulose anepisternum: *Atrichomelina pubera*, *Ditaeniella grisescens*, *D. trivittata*, *Pherbellia pilosa*, and *Ph. shatalkini*. In Parts II and III, we consider the three taxa initially included in the genus *Ditaeniella* sensu Rozkošný (1987) (*D. grisescens*, *D. parallela*, and *D. patagonensis*) and the taxon described herein, *D. milleri* **sp. nov.**, analysing this group by use of both the classical morphological approach (Part II) as well as by analysis of molecular data from available DNA barcodes (Part III). In Part IV, we provide a key to the taxa of Sciomyzini worldwide that have a predominantly setulose anepisternum. We also provide a list of specimens examined, the data from which significantly supplement the information previously available regarding the distribution of several Palaearctic species.

Keywords: Diptera, Sciomyzidae, *Ditaeniella*, identification key, review, new species, synonymy

Таксономические заметки по видам Sciomyzini с большей частью покрытым волосками анэпистернумом (Diptera, Sciomyzidae)

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Аннотация. Настоящая статья изначально задумывалась как простое описание нового африканского таксона. Однако по мере продвижения работы объем статьи существенно вырос, и теперь она состоит из четырех частей. В части I мы обсуждаем систематику пяти видов Sciomyzini с анэпистернумом, большей частью покрытым волосками: *Atricomelina pubera*, *Ditaeniella grisescens*, *D. trivittata*, *Pherbellia pilosa* и *Ph. shatalkini*. В частях II и III рассмотрены три таксона, первоначально включенных в род *Ditaeniella* sensu Rozkošný (1987) (*D. grisescens*, *D. parallela* и *D. patagonensis*), и описанный здесь вид *D. milleri* **sp. nov.** Виды *Ditaeniella* проанализированы с использованием как классического морфологического подхода (Часть II), так и путем анализа молекулярных данных по доступным ДНК-баркодам (Часть III). В части IV дан ключ к таксонам Sciomyzini с анэпистернумом, большей частью покрытым волосками. По рассмотренным таксонам приведен список изученных нами экземпляров, эти данные существенно дополняют ранее известную информацию о распространении нескольких палеарктических видов Sciomyzini.

Ключевые слова: Diptera, Sciomyzidae, *Ditaeniella*, ключ, обзор, новые виды, синонимы

Introduction

In 1995, Miller reported finding *Ditaeniella* in several localities in southern Africa (Botswana, Namibia, South Africa). He regarded African specimens as representing an undescribed species of *Ditaeniella* closely related to *D. grisescens* Meigen, 1830, writing, "A taxonomic study is nearing completion to establish the species' identities and relationships to the similar looking *D. grisescens* (in prep.)" (Miller 1995: 196). However, until now no description has been published of any species of *Ditaeniella* from Africa.

In December 2018, N. Vikhrev and M. Yanbulat collected a series of specimens of an undescribed species of *Ditaeniella* near Windhoek, Namibia, in southern Africa. We describe the taxon herein as *Ditaeniella milleri* sp. nov. Our preliminary research included examination of all related taxa to ensure that the African taxon was indeed undescribed. This paper reviews the relevant characters of all taxa related to the new species, i.e., Sciomyzini with a predominantly setulose anepisternum.

Sack (1939: 37) described the genus *Ditaeniella* with *D. grisescens* (described in the genus *Sciomyza*) as the type and sole species. However, for many years thereafter, entomologists failed to acknowledge *Ditaeniella* as a valid taxon, continuing instead to consider *D. grisescens* to be a member of the genus *Pherbellia* Robineau-Desvoidy, 1830 (note: for clarity we herein abbreviate the genera *Pherbellia* as *Ph.* and *Pteromicra* as *Pt.*). Steyskal (1963: 120) established the *Pherbellia grisescens* group on the basis of the unusual structure of the male genitalia. He included in the group *Ph. grisescens* (Palaearctic), *Ph. parallela* Walker, 1853 (as *Ph. humilis* Walker, 1853) (Nearctic), and *Ph. patagonensis* Macquart, 1851 (Neotropical). Rozkošný (1987) resurrected the genus *Ditaeniella* for species included in Steyskal's *Pherbellia grisescens* group and redescribed the genus briefly. Knutson et al. (1990: 484, table 1) provided a more detailed comparison of the characters of *Ditaeniella* and *Pherbellia* and transferred *Pherbellia trivittata* Cresson, 1920 (Nearctic) to *Ditaeniella*. Most recently, Murphy et al. (2018: 54–59) provided a detailed analysis of the history and taxonomy of *Ditaeniella* as well as extensive data regarding *D. parallela* and *D. trivitatta,* the two Nearctic species.

Rozkošný (1987: 18) listed 11 morphological characters of *Ditaeniella*: "Frons mainly matt, mid-frontal stripe elongated and tapered anteriorly, only one orbital seta present. Propleural seta distinct, prosternum haired, also mesopleuron covered with distinct hairs. Inner posterior margin of hind coxa with several hairs. Anal vein on wing reaching posterior wing margin. Male sternum 7 haired, gonostyli partly reduced and postgonites with conspicuous spines." Regarding *Ditaeniella*, he continued, "*grisescens*-group of the large genus *Pherbellia* is considered to be very isolated and regarded as a separate genus…." We cannot fully agree with Rozkošný because the Nearctic *Atrichomelina pubera* Loew, 1862 and the Palaearctic *Ph. pilosa* Hendel, 1902 share with *Ditaeniella* a majority of the morphological characters listed by Rozkošný (1987).

The present paper was conceived originally as a straightforward, simple description of a new African taxon. It grew substantially as more research was conducted. It now consists of four parts. In Part I, we discuss the taxonomy of five taxa of Sciomyzini with a predominantly setulose anepisternum: *A. pubera*, *D. grisescens*, *D. trivittata*, *Ph. pilosa*, and *Ph. shatalkini* Rozkošný, 1991. In Parts II and III, we consider the three taxa initially included in the genus *Ditaeniella* sensu Rozkošný (1987) (*D. grisescens*, *D. parallela*, and *D. patagonensis*) and the taxon described herein, *D. milleri* sp. nov., analysing this group by use of both the classical morphological approach (Part II) as well as by analysis of molecular data from available DNA barcodes (Part III). In Part IV, we provide a key to the taxa of Sciomyzini worldwide that have a predominantly setulose anepisternum. We also provide a list of specimens examined, the data from which significantly supplement the information previously available regarding the distribution of several Palaearctic species.

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Material and methods

Abbreviations of collections in which are deposited specimens that were borrowed for examination during this research are as follows:

USNM—U. S. National Museum of Natural History, Washington, D. C., U. S. A;

ZMUM—Zoological Museum of Moscow University, Russia;

ZIN—Zoological Institute, Saint Petersburg, Russia.

Localities are given as follows: country, region/state/province (in italics), and geographical coordinates in decimal-degree format. The full names of regions of Russian administrative subdivisions are an entangled result of political and historical events of no interest for zoology, so they are listed as name (taken from the English version of Wikipedia) and word "region" (abbreviated in the text as "Reg.").

The following generally accepted abbreviations for morphological structures are used: *f1*, *t1*, *f2*, *t2*, *f3*, *t3* = fore, mid, hind femur or tibia respectively; *ac* — acrostichal setae; *dc* — dorsocentral setae; *a*, *p*, *d*, *v* = anterior, posterior, dorsal, ventral seta(e). The abbreviation for the tarsi as *tar* followed by a pair of digits separated by a hyphen was proposed by Vikhrev (2011): the first digit (1 to 3) gives the leg number and the second digit (1 to 5) the number of the tarsal segment. For example, *tar1-4* = 4th segment of fore tarsus; *tar3-1* = hind basitarsus. Instead of using the term gonostyli (Rozkošný and other authors), we use the term surstyli.

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

COI sequences were taken from the Barcode of Life Data System (BOLD) (http://boldsystems.org). We also ordered from the Syntol Company (Moscow, Russia) *COI* sequences of two specimens of *D. grisescens* and the paratype of *D. milleri* sp. nov. Genetic distances between the sequences were calculated in MEGA (https://www.megasoftware.net/) using the Kimura 2-Parameter (Kimura 1980).

Part I. Species of Sciomyzini with a predominantly setulose anepisternum: Classical morphological approach

Atrichomelina pubera Loew, 1862
Sciomyza pubera Loew, 1862
Atrichomelina pubera Loew, 1862 (Cresson 1920)
Atrichomelina pubera Loew, 1862: redescription in Murphy et al. (2018: 48–52)
Material examined: see specimens listed in Murphy et al. (2018: 50–51).
New specimens examined: USA, *Idaho*, Moscow (46.7°N 117.0°W), 26.08.1912, J. M. Aldrich, 2♂, 2♀ (with Steyskal's det. label *Atrichomelina pubera* Loew) (ZIN); *Minnesota*, Basswood Lake (48.0°N 91.6°W), R. Namba, 16.08.1950, 1♂ (ZMUM).

Ditaeniella trivittata Cresson, 1920
Melina (*Ditaenia*) *trivittata* Cresson, 1920
Ditaeniella trivittata Cresson, 1920: Knutson et al. (1990: table 1)
Ditaeniella trivittata Cresson, 1920: redescription in Murphy et al. (2018: 58–59)
Material examined: see specimens listed in Murphy et al. (2018: 59) and Murphy (2020: 9–10).
Remarks. (Sub)genus *Ditaenia* Hendel, 1902 based on length of midfrontal stripe seems to us quite artificial. (By the way, in *D. grisescens* the shape and colour of the midfrontal stripe are remarkably variable.)

According to Murphy et al. (2018: 58), *D. trivittata* often has two pairs of fronto-orbital setae. When present, the anterior pair is short and weak, often appearing as a socketed setula.
Distribution. USA (14 states in central and southcentral regions).

Pherbellia czernyi Hendel, 1902
Specimen examined:

SERBIA: Crni Vrh env., 43.407°N 22.587°E, 800 m, N. Vikhrev, 1–7.07.2015, 1♂ (ZMUM).
Remarks. Described from the Austrian state of Upper Austria (Pfarrkirchen bei Bad Hall, 48.0°N 14.2°E), the type material is in Naturhistorisches Museum, Vienna. We ini-

tially had doubts about the validity of *Ph. czernyi* as a species separate from *Ph. pilosa*, but our Serbian specimen differs from all specimens of *Ph. pilosa* that we examined (listed below) by its much longer aristal hairs, which are longer than the width of the arista at its base; this character was noted in Hendel's (1902) original description of *Ph. czernyi*. Rozkošný (1991) offered as additional diagnostic characters the chaetotaxy of the fore coxa, the contrasting white *tar1-1*, and the shape of the surstyli. We examined a large series of *Ph. pilosa* Hendel, 1902 and found that the chaetotaxy of the fore coxa and the colour of *tar1-1* may be the same as offered diagnostic for *Ph. czernyi*. We did not examine genitalia of *Ph. czernyi*.

Examination of more European specimens is required to reach a conclusion regarding the status of this taxon as a species.

Distribution. Known only from W Europe.

Pherbellia pilosa Hendel, 1902

Figs. 1, 2

Specimens examined:

BELARUS, *Gomel* Reg., Mozyr env., 52.02°N, 29.32°E: 20.05.2019, N. Vikhrev, 1♂ (ZMUM);

RUSSIA: *Astrakhan* Reg., Baskunchak L., 48.16°N, 46.83°E, 1–6.05.2010, K. Tomkovich, 3♂, 4♀ (ZMUM);

Kursk Reg., Selikhovy Dvory, (51.57°N 36.09°E), 12.05.2008, K. Tomkovich, 1♀ (ZMUM);

Khanty-Mansi Reg., Shapsha, 61.087°N, 69.442°E, 14–16.07.2010, K. Tomkovich, 1♂; 61.09°N, 69.46°E, 15.08.2018, K. Tomkovich, 1♂ (all ZMUM);

Mordovia Reg., Pushta village env., 54.71°N, 43.22°E: 18–22.05.2020, N. Vikhrev, 1♂, 1♀ (ZMUM); 8–12.05.2020, N. Vikhrev, 5♂, 6♀ (ZMUM and USNM); 22–24.05.2020, M. Yanbulat, 10♂, 10♀; 1–5.09.2020, N. Vikhrev, 1♂, 1♀ (all ZMUM);

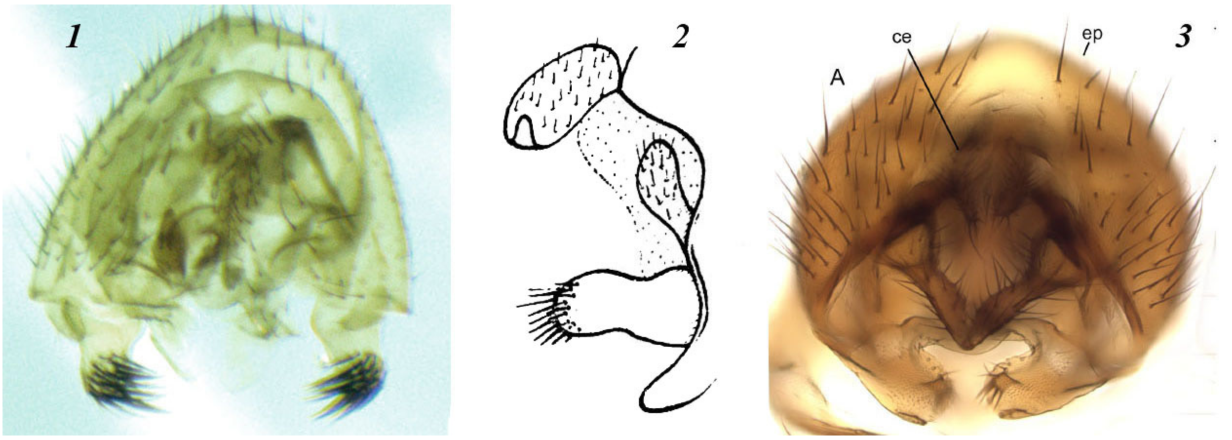
Moscow Reg., Puschino (54.8°N, 37.6°E), 21.07.1984, M. Krivosheina, 1♀ (ZMUM);

Omsk Reg: Omsk, Ptichya Gavan, 54.97°N, 73.35°E, 24.06.2008, O. Kosterin, 1♂; Cherlak env., 54.1°N, 75.0°E, 10.05.2009, O. Kosterin, 1♂, 4♀ (all ZMUM);

Ryazan Reg., Oksky Natural Reserve (54.7°N, 40.8°E), 15.06.1965, V. Kovalev, 1♀ (ZMUM);

Voronezh Reg.: Voronezh, Botanical Garden (51.71°N, 39.23°E), Aksenenko, 7.05.2012, 1♂, 2♀ (ZIN); near Khopyor R., 51.36°N, 42.05°E, 7.06.2012, N. Vikhrev, 4♂, 3♀ (ZMUM).

Remarks. Surprisingly, in the 120 years during which this species has been known, no one has reported that *Ph. pilosa* has hairs on the inner posterodorsal margin of the hind coxa.



Figs. 1–3. *1 — Ph. pilosa*, ventral view, postabdomen showing anterior surstyli (at bottom), each with about 15 spinules; *2 — Ph. pilosa*, male terminalia, lateral view, anterior surstylus with spinules (from Rozkošný 1991: fig. 49); *3 — Ph. shatalkini*, ventral view, postabdomen showing anterior surstyli (at bottom), each with 7–8 spinules stronger than those of *Ph. pilosa* (from Kurina, Knutson 2019)

Рис. 1–3. *1 — Ph. pilosa*, постабдомен снизу, видны передние сурстили, каждый с примерно 15 шипиками; *2 — Ph. pilosa*, терминалии самца, вид сбоку, передние сурстили с шипиками (по Rozkošný 1991: fig. 49); *3 — Ph. shatalkini*, постабдомен снизу, видны передние сурстили, каждый с примерно 7–8 шипиками, которые сильнее, чем таковые у *Ph. pilosa* (по Kurina, Knutson 2019)

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Distribution. Type locality: Danube R. near Vienna, Austria. W Palaearctic species extending to W Siberia to 75°E, north to 61°N, south to 48°N. More southerly records — Kyrgyzstan, Issyk-Kul Lake, and Near East (Rozkošný 1987) — require confirmation. Newly recorded for Belarus, south of European Russia and Western Siberia.

Pherbellia shatalkini Rozkošný, 1991
Figs. 3, 4, 6

Type material: Holotype, ♂: RUSSIA: *Amur* Reg., Zeya env., (53.7°N, 127.3°E), A. Shatalkin, 13.09.1981. Paratypes: the same locality and collector as the holotype: 21.06.1978, 1♂; 10.07.1978, 1♂ (all ZMUM).

Other specimens examined:

MONGOLIA, *Arkhangai* aimak (48°N, 101°E), 28.08.1967, V. Zaitsev, 1♂ (ZIN).

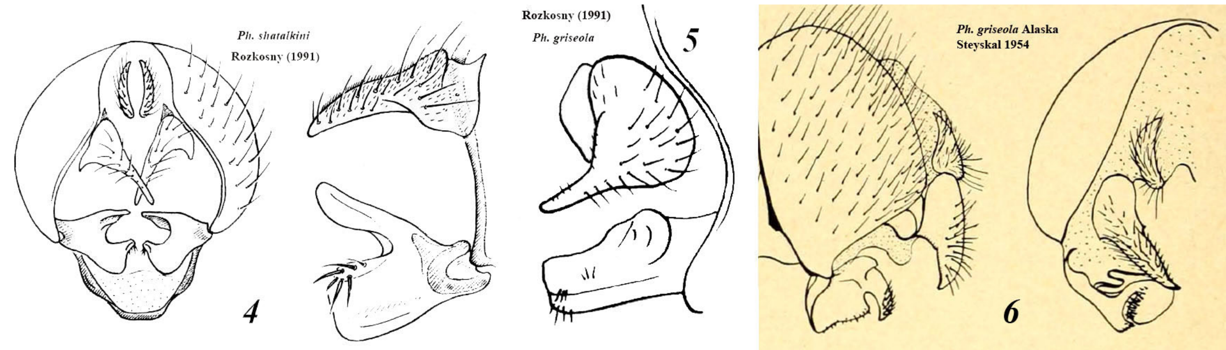
RUSSIA: *Khabarobsk* Reg.: Khabarovsk, 48.6°N, 135.1°E, 2–6.06.2014, N. Vikhrev, 1♂; Sindinskoe L., 48.92°N, 136.24°E, 7.06.2014, N. Vikhrev, 1♂; Komsomolsk-on-Amur, Mylki L., 50.5°N, 136.98°E, 21.06.2022, N. Vikhrev, 1♂ (all ZMUM);

Khakassia Reg., Beltirskoe env., 53.038°N, 90.462°E, 10.05.2018, N. Vikhrev, 2♂ (ZMUM);

Tuva Reg.: Kyzyl env., 51.7°N, 94.7°E, 17–25.05.2018, N. Vikhrev, 3♂, 2♀; Uyuk R., 800 m, 52.07°N, 94.04°E, 27.05.2018, N. Vikhrev, 1♀ (all ZMUM).

USA, *Alaska*, Matanuska (61.4°N, 150.2°W), 8.10.1944, J. C. Chamberlin, 1♂, 1♀ (♀ with G. C. Steyskal's identification label *Ph. griseola*; both ♂ and ♀ with presumably K. Elberg's handwritten label "not *griseola* — hind 1/2 mspl. haired") (all ZIN).

Remarks. Specimens from Alaska show that *Ph. shatalkini* is actually a Holarctic species, while the record of *Ph. griseola* (Steyskal 1954: 55) is misidentification. Steyskal (1954: fig. 1 and here Fig. 6) wrote, "A figure of the male terminalia of one of the Matanuska specimens is presented to facilitate eventual check against Palaearctic material." This case illustrates how difficult it is to use the male genitalia for identification. Steyskal's drawing of the posterior surstylus shows it to be similar to those of both *Ph. shatalkini* and *Ph. griseola*. His drawing of the anterior surstylus shows it to be more similar to that of *Ph. shatalkini* than to the "dog head profile like" shape of that of *Ph. griseola*. Illustrations of the genitalia of *Ph. shatalkini* from the original description by Rozkošný (1991: figs. 13–14) are shown in Fig. 4. Kurina et Knutson (2019) recently redescribed the male genitalia of *Ph. shatalkini*, noting that the anterior surstylus bears 7–8 rather strong spinules (Fig. 3). The anterior surstylus of *Ph. griseola* also has been depicted as spinulose (Rozkošný 1991: fig. 37 and our Fig. 5; Vala 1989: fig. 33c; Rivosecchi 1992: fig. 46b and tab. IXe). In fact, the anterior surstylus of *Ph. griseola* does not bear spinules but bears rather very fine and barely visible hairs on the inner side. To summarise, Steyskal (1954) drew the terminalia of *Ph. shatalkini*, while the presence of *Ph. griseo-*



Figs. 4–6. *4 — Ph. shatalkini*, male postabdomen, ventral view, male terminalia, lateral view (from Rozkošný 1991: figs. 13–14); *5 — Ph. griseola*, male terminalia, lateral view (from Rozkošný 1991: fig. 37); *6 — Ph. shatalkini* (as *Ph. griseola*), male postabdomen, lateral and ventral views (from Steyskal 1954: fig. 1)

Рис. 4–6. *4 — Ph. shatalkini*, постабдомен самца, вид снизу и сбоку (по Rozkošný 1991: figs. 13–14); *5 — Ph. griseola*, терминалии самца сбоку (по Rozkošný 1991: fig. 37); *6 — Ph. shatalkini* (as *Ph. griseola*), постабдомен самца, вид сбоку и снизу (по Steyskal 1954: fig. 1) *la* in the Nearctic requires confirmation. These species may be identified as follows:

— Anepisternum with weak setulae on most of it surface. Arista bare. Postpedicel mostly black. Crossveins only slightly darkened. ♂: anterior surstylus with strong spinules . . . . ***Ph. shatalkini***

— Anepisternum with setulae along posterior margin only, stronger than those on anepisternum of *Ph. shatalkini*. Aristal hairs almost as long as half width of postpedicel. Postpedicel yellow. Crossveins distinctly darkened. ♂: anterior surstylus with fine hardly visible hairs on inner surface . . . . ***Ph. griseola***

Distribution. Holarctic species. In eastern Palaearctic known from 90°E to Far East (136°E), also S Korea (Son, Suh 2019); north to 53°N, south to 48°N. Alaskan specimens have been collected much farther north (61.4°N). Other Nearctic records require reexamination as follows from Remarks, above.

Rozkošný (1987: 18) described the genus *Ditaeniella* as follows: "Frons mainly matt, mid-frontal stripe elongated and tapered anteriorly, only one orbital seta present. Propleural seta distinct, prosternum haired, also mesopleuron covered with distinct hairs. Inner posterior margin of hind coxa with several hairs. Anal vein on wing reaching posterior wing margin. Male sternum 7 haired, gonostyli partly reduced and postgonites with conspicuous spines." He noted, "This combination of characters, the majority of which (especially 1 orbital seta, spines on postgonites, partly reduced gonostyli) belongs obviously to apotypic ones, is not known in any [other] group of the Sciomyzini." As we mentioned in the Introduction, distinguishing between *Ditaeniella* and other taxa of Sciomyzini with a predominantly setulose anepisternum is not as straightforward as it is with most other taxa of Sciomyzini.

We compare the diagnostic morphological characters of these five taxa in Table 1.

Table 1

Comparison of morphological characters of *Ditaeniella* with those of other taxa of Sciomyzini with a predominantly setulose anepisternum*

Таблица 1

Сравнение морфологических признаков *Ditaeniella* с таковыми у других таксонов Sciomyzini с анэпистернумом, преимущественно покрытым волосками*

Characters	*Ditaeniella grisescens*	*Ditaeniella trivittata*	*Atrichomelina pubera*	*Pherbellia pilosa*	*Pherbellia shatalkini*
Rozkosny's generic diagnosis					
midfrontal strip	long, blunted tip	long, blunted tip	short, pointed tip	short, pointed tip	short, pointed tip
orbital setae	one pair	one pair	one (two) pair	two pairs	two pairs
prosternum setulose	setulose	bare	bare	bare	bare
anepisternum	entirelly hairy	partly hairy	entirelly hairy	entirelly hairy	entirelly hairy
inner margin of hind coxa	hairy	hairy	hairy	hairy	bare
♂ genitalia	surstyli reduced, postgonites large and with several spines		surstyli small, cerci with patch of setulae	surstyli well developed, anterior surstylus with spines	
othe characters					
minute hairs on meron	usually present	usually present	usually present	absent	absent
arista	bare	short pubescent	long pubescent	short pubescent	almost bare
strong setae on anepimeron	present	present	absent	present	present
v setae on apex of *f3* ♂	present	present	absent	absent	absent
tar1-1 contarsting whitish	no	no	yes	yes	no
proepisternal seta	strong	strong	hairlike	strong	strong

*Other taxa of *Ditaeniella* (*D. parallela* and *D. milleri* sp. nov.) are not included because they have the same morphology as *D. grisescens*. *Pherbellia mikiana* Hendel, 1900; *Ph. czernyi*, and *Ph. seticoxa* Steyskal, 1961 are not included because the authors have not personally examined specimens of those taxa. Comments to Table 1 appear below.
*Другие таксоны *Ditaeniella* (*D. parallela* and *D. milleri* sp. nov.) не включены, поскольку они имеют ту же морфологию, что и *D. grisescens*. *Pherbellia mikiana* Hendel, 1900; *Ph. czernyi* и *Ph. seticoxa* Steyskal, 1961 не включены, поскольку авторы лично не исследовали экземпляры этих видов. Комментарии к таблице 1 приведены ниже.

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1. The midfrontal stripe of *Ditaeniella* differs slightly in different specimens. It usually appears as a long sharp-angled triangle (Fig. 16). It is not as long and parallel sided as in *Ph. cinerella* but it is noticeably different from the short, pointed triangle found in more typical *Pherbellia* taxa.

2. *Ditaeniella* species have one pair (posterior) of fronto-orbital seta. Similarly, only one pair of fronto-orbital setae is present in *Pteromicra glabricula*, in both species of *Salticella*, and in several taxa of Tetanocerini. In *Atrichomelina*, a weak anterior pair of fronto-orbital setae are sometimes present.

3. Among Sciomyzini with a predominantly setulose anepisternum, a setose prosternum is unique in *Ditaeniella* sensu Rozkošný (bare in *D. trivittata*). A setose prosternum also is found in *Sciomyza* species and several taxa of Tetanocerini.

4. The anepisternal setulae are slightly less extensive in *Ph. shatalkini* and much less extensive in *D. trivittata* than in *D. grisescens*. In the *Ph. dorsata* group, the anepisternum is setulose along the posterior margin only. In the Tetanocerini, the presence of setulae or setae on the anepisternum is a genus-specific character.

5. In the Nearctic *Ph. seticoxa*, the hind coxa bears a few fine hairs on the inner posterior margin (Murphy et al. 2018: 65, 80). In the Tetanocerini, the presence of hairs on the inner posterior margin of the hind coxa is a genus-specific character.

6. Species of *Ditaeniella* have very similar genitalia that differ only in fine details (Figs. 7–9, 13, 15). Likewise, the general genitalic structure of *Ph. pilosa* and *Ph. shatalkini* is similar to that of each other (Figs. 1, 3). In contrast to these similarities, the genitalic ground plans of *Ditaeniella*, *Atrichomelina*, and taxa of *Pherbellia* with a setulose anepisternum differ conspicuously from each other. Thus, the genitalic ground plan may be used as generic character, although applicable to male specimens only.

7. Microsetulae are present on the meron of species of *Ditaeniella* and *Atrichomelina* (Fig. 10). The diagnostic value of these microsetulae is limited because they are not distinct in all specimens and have been overlooked in previous published descriptions of species. The same microsetulae usually are present on meron of *Ph. cinerella*, and stronger setulae are present on the meron of species in the *Ph. dorsata* group.

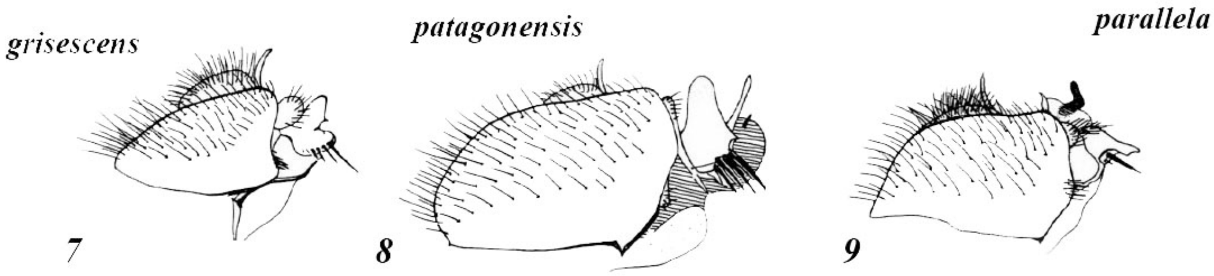
8. As with *Atrichomelina*, some specimens of *Ph. shatalkini* lack strong seta(e) on the anepimeron.

9. Males of *Ditaeniella* have two rows of strong, short setae on the ventral side of the hind femur, one anteroventral and one posteroventral, with no setae between the rows, only setulae (Figs. 11, 12, 17). The rows extend almost the full length of the femur and are denser on the apical half than on the basal half. Neither *Atrichomelina* nor species of *Pherbellia* with a predominantly setulose anepisternum have such rows of spinulose *av* and *pv* setae, although ventral setulae (longer or shorter, dense or sparse) may be present. Females of *Ditaeniella* usually have at least 1–2 *av* seta(e) near the apex of the hind femur, except for *D. milleri* sp. nov., which has 4–5 *av* and 2–4 *pv* setae.

Conclusions. 1) Both sexes of the five species considered in Table 1 may be distinguished reliably from each other on the basis of external morphology, without examination of the genitalia. 2) A generic diagnosis of a group consisting of *Ditaeniella*, *Atrichomelina*, and species of *Pherbellia* with a predominantly setulose anepimeron is difficult to formulate; thus, we think it is most reasonable to retain the currently accepted division by genera until further results of molecular phylogenetic analyses become available.

Part II. Taxa of *Ditaeniella* sensu Rozkošný, a classical morphological approach

Ditaeniella grisescens Meigen, 1830
Figs. 7, 14, 15
Sciomyza grisescens Meigen, 1830
Melina (Ditaenia) grisescens Meigen, 1830 (Cresson, 1920)
Pherbellia grisescens Meigen, 1830 (Malloch, 1933)
Ditaeniella grisescens Meigen, 1830 (Rozkošný, 1987)



Figs. 7–9. Postabdomen of *Ditaeniella* species in lateral view (modified from Steyskal 1963: figs. 8–10): *7 — D. grisescens*; *8 — D. patagonensis*; *9 — D. parallela*

Рис. 7–9. Постабдомен таксонов *Ditaeniella*, вид сбоку (по Steyskal 1963: figs. 8–10): *7 — D. grisescens*; *8 — D. patagonensis*; *9 — D. parallela*

Sciomyza patagonensis Macquart, 1851 = *Pherbellia grisescens* Meigen, 1830 (Malloch, 1933)

Specimens examined:

BELARUS, *Minsk* Reg., Borisov, Berezina R., 54.239°N, 28.494°E, D. Gavryushin, 5.07.2013, 1♂ (ZMUM).

CHINA, *Liaoning* Prov., 50 km north of Mukden (= Shenyang = Fengtian) (42.3°N, 123.4°E), I. Rubtsov, 20.07.1952, 1♀ (ZIN).

HUNGARY, Domsod, Apaj-puszta, (47.1°N, 19.1°E), K. Gorodkov, 25.06.1970, 2♀ (ZIN).

IRAN: *Isfahan* Prov., Ghomrood R., 1920 m, 33.42°N 50.12°E, O. Kosterin, 21.05.2017, 2♀; *Markazi* Prov., Arak env., 1700 m, 34.13°N, 49.71°E, O. Kosterin, 18–30.05.2017, 1♂; Gav Godar env., 1800 m, 34.11°N, 49.36°E, O. Kosterin, 19.05.2017, 1♂; Hendoudar R., 2000 m, 33.76°N, 49.22°E, O. Kosterin, 20.05.2017, 1♂, 1♀; Shazand env., 2000 m, (33.92°N, 49.40°E), I. Grichanov, 20.05.2017, 1♂ (all ZMUM).

KAZAKHSTAN: *Almaty* Reg., Kapchagay Lake env., 43.7°N, 77.2°E, N. Vikhrev, 22–28.05.2016, 2♂; *Kyzylorda* Reg., Bazykara env., 45.757°N, 62.311°E, fresh pond, K. Tomkovich, 15–19.05.2011, 6♂, 1♀; Perovsk (= Kyzylorda) (≈ 44.75°N, 65.71°E), A. Zhelokhovtsev, 14.05.1925, 1♂ (all ZMUM); *Turkistan* Reg., Saryagash Distr. (≈ 41.6°N, 68.7°E), P. Ler, 27.04.1957, 1♂ (ZIN).

KYRGYZSTAN: *Bishkek* Reg., Bishkek Park, 42.90°N 74.62°E, N. Vikhrev, 17.09.2013, 2♂, 1♀ (ZMUM); Issyk-Kul Lake, Rybachiy (= Balykchy) (42.46°N, 76.2°E), 1600 m, E. Nartchuk, K. Gorodkov, 16.08.1969, 4♂, 2♀ (ZIN).

MONGOLIA: *Dornod* aimak, near Choibalsan, 40 km upstream Kerulen R. (48.0°N, 113.9°E) I. Kerzhner, 27.07.1971, 5♂, 1♀; *Omnogovi* aimak, 20 km WSW Bayan-Ovoo (42.9°N, 105.8°E), I. Kerzhner, 8 August 1971, 1♂, 1♀; *Tov* aimak, Urga (= Ulaanbaatar), Tola R. (47.88°N, 106.90°E), P. Kozlov, 29–30.06.1905, 1♂; 5–7.07.1905, 2♀; *Uvs* aimak, 50 km ESE of Ulangom, 49.95°N, 92.65°E, E. Narchuk, 7.08.1975, 1♀ (all ZIN).

RUSSIA: *Altai Krai* Reg., Zmeinogorsk Distr., Kolyvanskoe L. (≈ 51.37°N, 82.17°E), O. Kosterin, 8.09.2007, 1♂, 2♀ (ZMUM);

Amur Reg., Zeya env. (53.7°N, 127.2°E), A. Shatalkin, 6.06.1978, 1♀ (ZMUM);

Astrakhan Reg., Baskunchak Salt Lake, 48.167°N, 46.830°E, near lake, K. Tomkovich, 3–6.05.2010, 1♂; 48.193°N, 48.813°E, fresh pond silt, K. Tomkovich, 1–2.05.2010, 1♀ (all ZMUM);

Buryatia Reg.: Ust-Kiran env., R. Chikoy (50.42°N, 106.83°E), Khomze, 29.07.1908, 1♀ (ZIN); Mondy env., 51.62°N, 100.91°E, 1960 m, 22–24.06.2021, N. Vikhrev, 1♂ (ZMUM).

Crimea Reg., Koktebel env. (44.95°N, 35.25°E), Dyakonov, 27.08.1923, 1♀ (ZIN);

Irkutsk Reg.: Bratsk (≈ 56.29°N, 101.72°E), A. Monchadsky, 29.06.1956, 1♀; (Olkhon L.) Peschanka (≈ 53.285°N, 107.58°E), P. Mikhno, 25.07.1925, 1♀ (all ZIN);

Kaliningrad Reg., Khrabrovo env., 54.88°N, 20.60°E, K. Tomkovich, 23.08.2013, 1♀; 54.90°N, 20.65°E, fresh ponds, K. Tomkovich, 13–15.08.2013, 1♂, 1♀ (ZMUM);

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Karachay-Cherkess Reg., Bol. Zelenchuk R., 44.22°N, 41.72°E, 580 m, O. Kosterin, 6.07.2019, 1♂, 1♀ (ZMUM);

Khanty-Mansi Reg., Khanty-Mansiysk Airport, 61.04°N, 69.11°E, fir forest, K. Gorodkov, 28.08.1976, 4♂, 4♀ (ZIN).

Krasnodar Reg.: Adler env., Imereti Lowlands (43.41°N, 39.95°E), N. Vikhrev, 2.10.2008, 2♀; Gelendzhik Distr., Krinitsa env., Pshada R., 44.396°N, 38.342°E, K. Tomkovich, 6–13.09.2009, 1♂ (all ZMUM);

Krasnoyarsk Reg., Ergaki National Park, 1450 m, 52.84°N, 93.25°E, N. Vikhrev, 27–29.06.2017, 1♂ (ZMUM);

North Ossetia–Alania Reg., Mozdok Distr., Sukhotskoe (≈ 43.67°N, 44.44°E), A. Ozerov, 3.08.1988, 1♀ (ZMUM);

Omsk Reg.: Irtysh R. floodplain, oxbow of Zamarayka R. (54.964°N, 73.353°E), O. Kosterin: 14–18.07.2007, 1♀; Krugloe L., 54.89°N, 73.36°E, O. Kosterin, 24.07.2012, 1♂, 1♀; Ptichya Gavan oxbow, 54.97°N, 73.35°E, O. Kosterin, 23.07.2008, 1♀ (all ZMUM);

Primorsky Reg.: Vladivostok, Sedanka (43.2°N, 132.0°E), A. Stackelberg, 20.06.1927, 1♀ (ZIN); Khanka Lake, 45.06°N, 131.99°E, N. Vikhrev, 15–19.07.2014, 2♂, 1♀ (ZMUM);

Rostov Reg., Tsimlyansk env. (47.65°N, 42.10°E), O. Negrobov, 27.09.1965, 1♂ (ZIN);

Saint Petersburg Reg.: Yukki (60.11°N, 30.28°E), A. Stackelberg, 27.08.1953, 6♂, 9♀; Luga Distr., Yaschera (59.15°N, 29.91°E), A. Stackelberg, 17.07.1963, 1♀ (all ZIN);

Tuva Reg., Dus-Khol Salt Lake, 700 m, 51.36°N, 94.45°E, N. Vikhrev, 2–5.07.2017, 1♂ (ZMUM);

Tver Reg., Volgo L., 56.877°N, 33.244°E, A. Ozerov, 18–19.08.2011, 1♀ (ZMUM);

Ulyanovsk Reg., Radischevo Distr., Vjazovka env., 52.82°N, 48.35°E, K. Tomkovich, 2–5.05.2011, 1♂ (ZMUM);

Yamalo-Nenetsk Reg.: Salekhard env., 66.6°N, 66.8°E, N. Vikhrev, M. Yanbulat, 16–19.07.2019, 4♂, 4♀ (ZMUM); Muzhi vill. (65.4°N, 64.7°E), bank of Ob R., K. Gorodkov, 23.08.1976, 2♂, 2♀ (ZIN).

Yaroslavl Reg., Berditsino (57.45°N 40.11°E), A. Yakovlev, 14.07.1907, 1♂ (ZIN).

TAJIKISTAN: Dushanbe env. (38.5°N, 68.7°E), E. Gurjeva, 2.04.1962, 1♀; *Gorno-Badakhshan* Reg., Shakhdara R. near Roshtqala (≈ 37.2°N, 72.0°E), E. Nartchuk, 15.07.1965, 1♂ (all ZIN).

TURKEY: *Ankara* Prov., Karagol L. env., 1540 m, 40.346°N, 31.929°E, N. Vikhrev, 2.09.2009, 3♂, 2♀; *Antalya* Prov., Titreyen L., 36.757°N, 31.455°E, N. Vikhrev, 1–4.04.2006, 3♂, 2♀; 27–30.03.2007, 4♂, 1♀; 27.09.2007, 2♀; 4.10.2007, 1♂; A. Ozerov, 5.10.2007, 1♀ (all ZMUM); bank of Manavgat R., 36.871°N, 31.527°E, N. Vikhrev, 29 March 2007, 1♀; A. Ozerov, 3.10.2007, 1♂; *Mersin* Prov., near Silifke, 36.31°N, 34.01°E, N. Vikhrev, 22.04.2010, 2♂, 1♀ (all ZMUM).

TURKMENISTAN, *Lebap* Prov., Charjou (= Turkmenabat) env. (≈ 38.76°N, 64.20°E), A. Ozerov, 25.04.1990, 1♀ (ZMUM); *Dasoguz* Prov., Tashauz (= Dasoguz, 41.8°N, 60.0°E), lower Amu-Daria River, Ushinsky, 21–24.04.1931, 3♂, 3♀ (ZIN).

UKRAINE, *Kherson* Reg, Aleshky, lower Dnepr River (46.64°N, 32.72°E), L. Zimin, 26.07.1926, 1♀; 18.08.1926, 1♀ (ZIN).

UZBEKISTAN: *Tashkent* Reg.: Karjantau Ridge (≈ 41.83°N, 69.84°E), K. Obukhova, 22.07.1938, 1♀; 30.07.1938, 1♂ (ZMUM); Chinaz, Syr-Darya R. (40.9°N, 68.7°E), F. Dobrzhansky, 28.04.1925, 1♂ (ZIN); *Xorazm* Reg., Khiva (41.4°N, 60.4°E), L. Zimin, 21–27.04.1927, 2♀ (ZIN).

VIETNAM, *Lao Cai* Prov., Sin Chai, 1400 m, 22.338°N, 103.808°E, A. Ozerov, 15.04.2012, 1♀ (ZMUM).

Distribution. Remarkably widely distributed in the Palaearctic region from west to east, south to the Near East and Egypt, north to the Polar Circle; also recorded from North Vietnam. Has been recorded in the mountains up to 2000 m asl (Buryatia).

Notes on synonymy of *Ditaeniella patagonensis*. Malloch (1933) synonymised *D. patagonensis* Macquart, 1851 with *D. grisescens* Meigen, 1830 after examination of material from Argentina, Chile and Uruguay. Steyskal (1963) refuted this synonymy and proposed *D. patagonensis* as a valid species. Steyskal's (1963: 121, figs. 6–10) drawings of male genitalia of species of *Ditaeniella* (Figs. 7–9) were provided with no explanation as to which differences were diagnostically important. In the figures, the postabdomens of *D. patagonensis* and *D. grisescens* appear quite similar, while that of *D. parallela* differs slightly, for example, in *D. patagonensis* and *D. grisescens* the postgonites bear several spines, rather than a single spine as in *D. parallela*. Thus, Steyskal's drawings did not convince us that the differences between *D. patagonensis* and *D. grisescens* are significant. We agree with Malloch's synonymy that *D. grisescens* = *D. patagonensis*. If this synonymy is confirmed, it will turn out that *D. parallela* occurs in North America, whereas *D. grisescens* occurs in Eurasia and South America. The only reasonable explanation for this disjunct distribution would be that *D. grisescens* was introduced relatively recently from Eurasia to South America.

Ditaeniella milleri sp. nov.

https://zoobank.org/NomenclaturalActs/89FE532F-0687-49FD-B5B5-C5C49A51E5F0

Figs. 10, 11, 12, 13

Type material. Holotype ♂: NAMIBIA, Windhoek env., 22.545°S, 17.255°E, 1870 m, 11.12.2018, N. Vikhrev.

Paratypes, 16♂, 15♀:

NAMIBIA, 15♂, 14♀, the same data as holotype;

ETHIOPIA: *Amhara* Reg., 10.87°N, 39.81°E, 1450 m, 8.08.2012, I. Gomyranov, 1♂; *Oromya* Reg., Bale Mt, 3370 m, 7.088°N, 39.671°E, N. Vikhrev, 17.03.2012, 1♀.

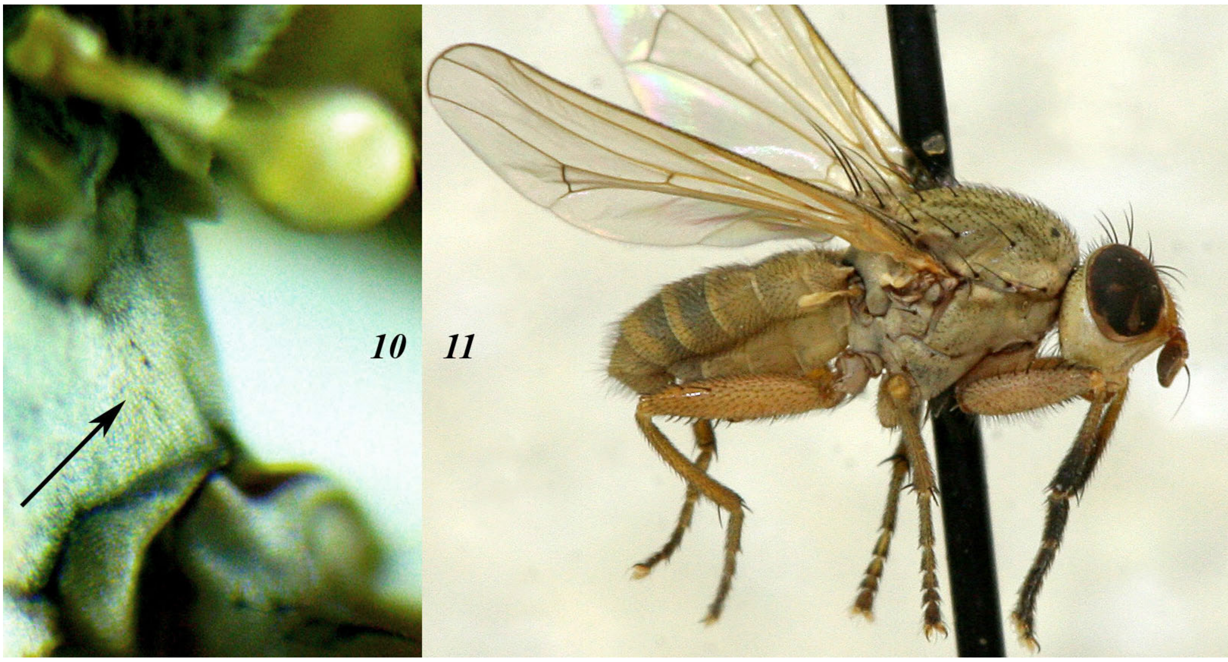
Type material is deposited in ZMUM apart from 1♂, 1♀ paratypes from Namibia in USNM.

Distribution. S Africa, Namibia, Botswana, Ethiopia.

Description. Male, body size: 3.8–5.2 mm.

Head. Frons matt yellow; fronto-orbital plates greyish-white; face and gena white; occiput yellowish white. Midfrontal stripe elongate, usually nearly reaching anterior margin of frons, tapered anteriorly; in dorsolateral view midfrontal stripe appears whitish matt, more pointed at apex, in dorsal view appears whitish brown with a blunted apex. Only one strong fronto-orbital seta (posterior). Gena half as wide as eye width. Antenna yellow basally, postpedicel partly blackish. Arista bare even under high magnification. Palpus yellow.

Thorax. Entirely light-yellowish-grey or scutum dark grey with dirty-yellow pleura, latter colouration probably present in aged specimens. A pair of brownish vittae mesad of dorsocentral present on scutum. Prosternum with a pair of setulae (sometimes bare, rarely with 2 pairs setulae). Anepisternum



Figs. 10–11. *Ditaeniella milleri* **sp. nov.**: *10* — microsetulae on meron; *11* — male holotype

Рис. 10–11. *Ditaeniella milleri* **sp. nov.**: *10* — волоски на мероне; *11* — голотип, самец

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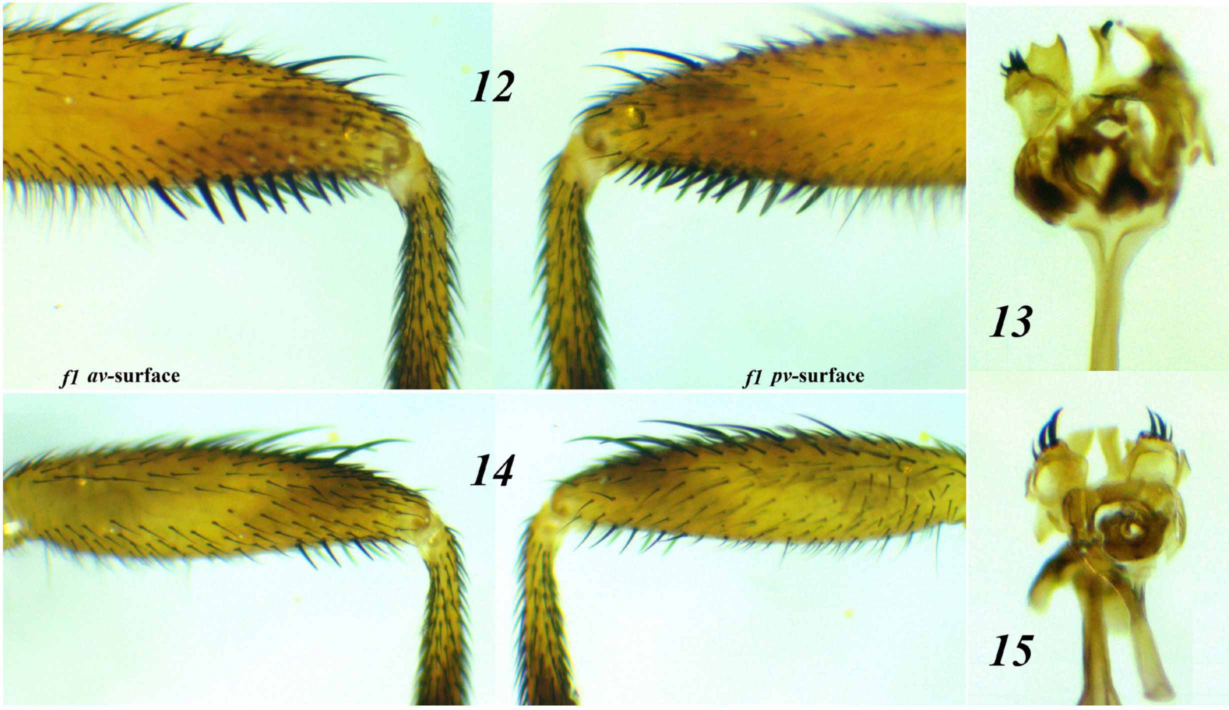


Figs. 12–15. *Ditaeniella milleri* **sp. nov.**, male (*12, 13*): *12* — ventral spines at apex of anterior femora; *13* — postgonites; *Ditaeniella grisescens*, male (*14, 15*): *14* — ventral setae at apex of anterior femora; *15* — postgonites

Рис. 12–15. *Ditaeniella milleri* **sp. nov.**, самец (*12, 13*): *12* — вентральные шипы на переднем бедре; *13* — постгониты; *Ditaeniella grisescens*, самец (*14, 15*): *14* — вентральные шипы на переднем бедре; *15* — постгониты

evenly setulose. Thoracic setae: 1 strong proepisternal, 1 postpronotal, 1 presutural supra-alar, 1 postsutural supra-alar, 2 notopleural, 2 postalar, 2 postsutural dorsocentral, 1 prescutellar acrostichal, and 2 pairs of scutellar setae. Subalar setae absent; anepimeron with 2 strong setae and 4–7 weak setulae; katepisternum setulose, without longer setae on upper margin; meron with 2–4 microsetulae (Fig. 10). Wing hyaline, without pattern.

Legs. Yellow, only apical half of *t1* and fore tarsus dark. Fore coxa with 1 *d* seta at middle. *f1*: in basal 2/3 covered with dense fine ventral setulae; in apical third with dense rows of 7–8 *pv* and 4–6 weaker *av* spines, both *pv* and *av* spines much stronger than ventral spinulose setae present at apex of *f1* in *D. grisescens* (see Figs. 12, 14). *t1* with 1 dorsal preapical seta. *f2* with typical "sciomyzid" *a* seta at middle. *t2* and *t3* without submedian setae. Inner posterior margin of hind coxa with 3 (2–4) setulae. *f3*: 2 *pd* in apical half; apical half with rows of 9–10 *av* and 8–9 *pv* spines similar to those of other species of *Ditaeniella* (these spines in *D. parallela* are shown in Fig. 17); ventral area between rows of spines bare in apical third and covered with dense fine setulae in basal 2/3.

Abdomen. Yellow, with indistinct median vitta. Tergites densely setulose. Surstyli reduced to small protrusions; postgonites large and visible even on intact abdomen. Postgonites (Fig. 13) with external lobe with 2 longer and 2 shorter spines, although these spines are relatively shorter than those in *D. grisescens*; inner spineless lobe tridentate and wider that in *D. grisescens*.

FEMALE differs from male as follows:

— body size 4.1–4.9 mm;

— *f3* at apical third with 4–5 *av* and 4–5 *pv* spines;

— abdominal tergites less setulose than in male but setulae stronger.

Diagnosis. Similar to *D. grisescens*. *f1*: in basal 2/3 covered with dense fine ventral setulae; in apical third with dense rows of 7–8 *pv* and 4–6 weaker *av* spines, both *pv* and *av* spines much stronger than ventral spinulose setulae present at apex of *f1* in *D. grisescens*. ♂: Postgonites (Fig. 13) with external lobe with 2 longer and 2 shorter spines, although these spines are relatively shorter than those in *D. grisescens*; inner spineless lobe tridentate and wider that in *D. grisescens*. ♀: *f3* at apical third with 4–5 *av* and 4–5 *pv* spines.

Etymology. Named in honor of Ray M. Miller, who first found this genus in southern Africa (Miller 1995) and correctly identified his specimens as belonging to an undescribed species of *Ditaeniella* but never published a description of it.

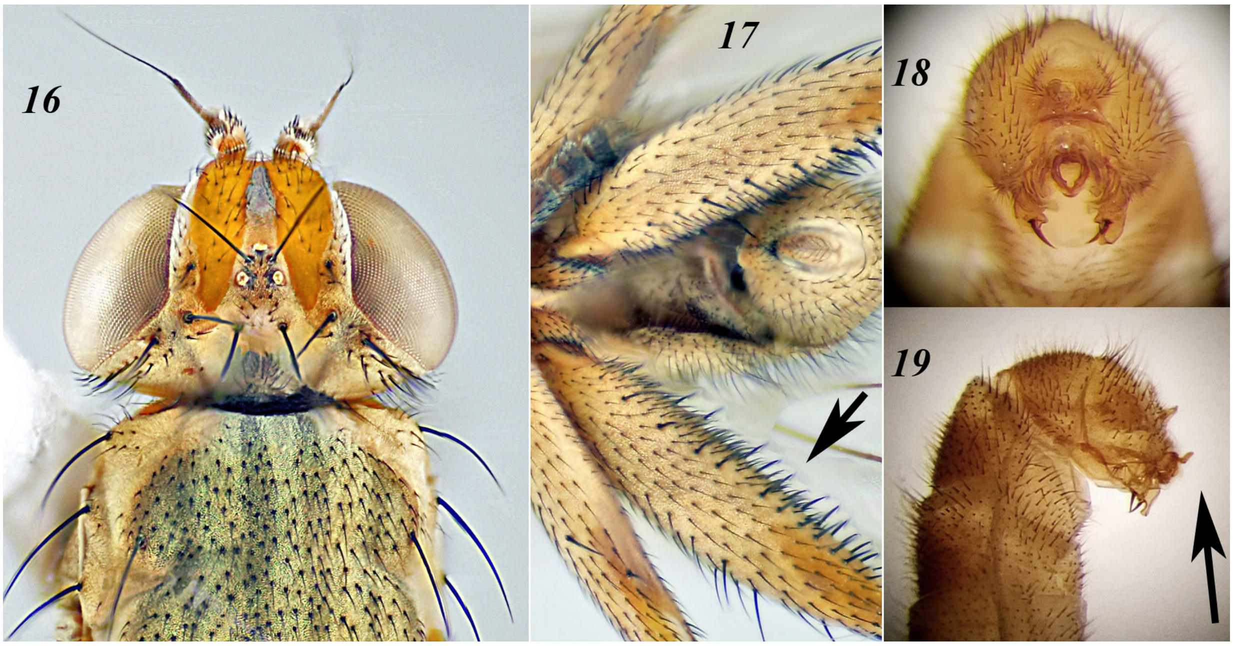
Habitat. The Namibian series was collected near a riverbed that dries up completely during the dry season and overflows during the rainy season. In 2018, on November 26, heavy rain fell on this riverbed. When we visited this place on December 3, we did not find any *Ditaeniella*. We collected our series during our second visit on December 11. In January–February 2021, we returned to this place twice during the height of the rainy season. The riverbed was overflowing, but again we found no *Ditaeniella*.

Ditaeniella parallela Walker, 1853
Figs. 9, 16, 17, 18, 19
Sciomyza parallela Walker 1853
Sciomyza humilis Loew 1876
Sciomyza serena Wulp 1897
Melina (Ditaenia) grisescens Meigen, 1830 (Cresson, 1920: 49–50)
Pherbellia parallela (Johnson 1925: 250)
Ditaeniella parallela (Rozkošný 1987: 18)
Ditaeniella parallela Walker, 1853: redescription in Murphy et al. (2018: 56–58)

Material examined: see specimens listed in Murphy et al. (2018: 57–58) and Murphy (2020: 9).

New specimens examined: USA: *Texas*: Laguna Madre, 25 km SE Harlingen (26.0°N, 97.6°W), D. E. Hardy, 25.01.1945, 2♂ (with L. V. Knutson's determination label "*Ph. humilis* Loew" and G.C. Steyskal's determination label "*Ph. grisescens*") (ZIN); Brazos Co., College Station, 30.60°N, 96.35°W, 10.10.2015, V. Belov, 1♂ (ZMUM).

Distribution. Widespread in USA and Canada, also known from Mexico and Dominican Republic.



Figs. 16–19. *Ditaeniella parallela*, male: *16* — dorsal view; *17* — ventral view with arrow indicating ventral spines on *f3*; *18* — postabdomen, ventral view, postgonites are visible, each bearing only a single spine; *19* — postabdomen, lateral view with arrow pointing to apically curved sclerotised portion of cerci

Рис. 16–19. *Ditaeniella parallela*, самец: *16* — вид сверху; *17* — вид снизу, стрелка указывает на вентральные шипики на *f3*; *18* — постабдомен снизу, видны постгониты, каждый из которых несет по одному шипику; *19* — постабдомен сбоку, стрелка указывает на склеротизированные выросты на церках

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Remarks. Cresson (1920) and Sack (1939) regarded *D. parallela* as a synonym of *D. grisescens* on the basis of non-genitalic characters; we also found no non-genitalic differences. Steyskal (1963) examined the genitalia of *D. grisescens* and *D. parallela* and published drawings of them, having found them to differ (Figs. 7, 9), but he failed to explain which differences in his drawings were diagnostically important. Males of *D. parallela* differ from those of *D. grisescens* by the structure of their genitalia: in *D. parallela*, the sclerotised portion of the cercus forms a flat paired plate, broadened and upcurved apically (Figs. 9, 19); and the postgonites each bear only a single strong spine (Fig. 18). Females of *D. parallela* are undistinguishable from those of *D. grisescens*.

As will be shown in Part III, the distance between *COI* sequences among Palaearctic specimens of *Ditaeniella grisescens* is much greater than that among Nearctic specimens. This suggests an Old-World origin of *Ditaeniella*. If so, *D. parallela* must have colonised North America via the Bering Land Bridge, which existed 30,000–11,000 years BPE.

Ditaeniella patagonensis Macquart, 1851

See: *Ditaeniella grisescens*: Notes on synonymy of *Ditaeniella patagonensis*.

Part III. Taxa of *Ditaeniella* sensu Rozkošný, analysis of molecular data

As follows from the Parts I and II (and the identification key in Part IV, below), the majority of Sciomyzini with a predominantly setulose anepisternum may be distinguished reliably by a set of morphological characters. On the other hand, taxa of *Ditaeniella* sensu Rozkošný differ only slightly from each other. Females of the Nearctic *D. parallela* are indistinguishable from those of *D. grisescens*, while males differ only minutely in the structure of the postabdomen. Historically, authors regarded *D. parallela* as a synonym of *D. grisescens* (Cresson 1920; Sack 1939), whereas present authors regard it as a valid species (Murphy et al. 2018; Steyskal 1963).

Males of the Afrotropical *D. milleri* sp. nov. have very similar genitalia to those of *D. grisescens*; both sexes differ only by stronger ventral setae on fore- and hind femora. As follows from Part II, we see no reason to consider *D. patagonensis* as a valid species, and we have adopted Malloch's synonymy until results of further study elucidates the matter.

All species of *Ditaeniella* are allopatric, so we do not know if small differences (non-genitalic or genitalic) lead to reproductive isolation. We tried to clarify the status of taxa of *Ditaeniella* sensu Rozkošný using *COI* sequences of *D. grisescens* and *D. parallela* available in the Barcode of Life Data System (BOLD) (http://boldsystems.org). We also ordered from the Syntol Company (Russia, Moscow) *COI* sequences of two specimens of *D. grisescens* and the paratype of *D. milleri* sp. nov. To estimate the genetic variability of taxa of *Ditaeniella*, we compared those data with the *COI* variability of several other species of Sciomyzidae with a Holarctic distribution.

These Holarctic species were selected on the basis of two criteria: (1) easily recognisable, so erroneous identification was unlikely; (2) although most of the data in the BOLD database represent the North American fauna, at least one good *COI* sequence was available for the Eurasian specimen. We also included in our study *Atrichomelina pubera* with only a Nearctic distribution, because this taxon was considered in the present work.

The following *COI* sequences were analysed:

Atrichomelina pubera Nearctic (NA): TTDFW043-08, Canada, Saskatchewan; TTMDI1107-10, Canada, Ontario; DI PUR272-10, USA, Arizona; BBDIV183-12, USA, California;

Ditaeniella (as *Pherbellia*) *parallela* NA: BBDIP018-09, Canada, Alberta; DIPUS644-10, USA, Texas;

Ditaeniella grisescens Palaearctic (PA): GBMIN60863-17, France; MAMTJ157-12, Pakistan.

To evaluate the genetic differences between Nearctic and Palaearctic specimens of *Ditaeniella,* we calculated the same pairwise intraspecific distances in *COI* sequences of the following additional Holarctic species of Sciomyzidae:

Pherbellia albocostata NA: BBDEC763-09, Canada, Newfoundland and Labrador;

BBDCN381-10, Canada, British Columbia; AMCAF1462-19, Canada, Yukon; SSEIC6898-13, Canada, Alberta; KNWR008-11, USA, Alaska;

Ph. albocostata PA: GMFIF642-12, Finland; AMTPD2876-15, Germany; GMNWJ1970-14, Norway.

Ph. nana NA: UAMIC3305-15, USA, Alaska; UAMIC3307-15, USA, Alaska;

Ph. nana PA: GBMIN18482-13, Ireland.

Pteromicra angustipennis NA: UAMIC3270-15, USA, Alaska;

Pt. angustipennis PA: AMTPD2668-15, Germany;

Tetanocera robusta NA: JWDCF297-10, Canada, Manitoba; CNNHA178-14, Canada, Northwest Territories;

T. robusta PA: VMDIP001-16, Norway.

Three more *COI* sequences were newly obtained:

Ditaeniella grisescens PA: Russia: Primorsky Reg., Khanka Lake, 45.06°N, 131.99°E and Yamalo-Nenetsk Reg, Salekhard env., 66.6°N, 66.8°E;

D. milleri sp. nov.: Namibia, Windhoek env., 22.545°S, 17.255°E.

The *COI* secuences obtained in the course of this study were submitted to European Nucleotide Archive / Gene Bank and got the following accession numbers:

OW537104 (*D. grisescens*, Salekhard),
OW537105 (*D. grisescens*, Lake Khanka) and
ON331721 (*D. milleri* sp. n., as *Ditaeniella* sp.).

The Neighbour-Joining tree for studied taxa is shown in Fig. 20.

Genetical distances between the sequences were calculated in MEGA by use of the following parameters: Kimura 2-Parameter (K2P) distance model with pairwise deletion of gaps/missing data and inclusion of all substitutions (transitions and transversions).

As a first step, we calculated K2P distances for each species within groups of specimens collected in Nearctic or Palaearctic regions except when such groups consisted of a single specimen. These results are shown in Table 2. As a second step, we calculated K2P distances between five groups of specimens collected in Nearctic or Palaearctic biogeographic realms, the results are shown in Table 3. Of course,

Table 2

K2P distances of *COI* sequences within groups of specimens in the same biogeographic realm

Таблица 2

K2P расстояния последовательностей *COI* внутри особей из одного и того же биогеографического региона

Table 3

K2P distances *COI* between groups of specimens collected in different biogeographic realms: Palaearctic (PA), Nearctic (NA) and Afrotropical (AF)

Таблица 3

K2P расстояния последовательностей *COI* между особями из разных биогеографических регионов: Палеарктика (PA), Неарктика (NA) и Афротропика (AF)

Tabl 2			**Tabl 3**		
Distances within groups	specimen	K2P	**Distances between groups**		
GROUPS	in group	distance	**from different biogeographic realms**		
Ditaeniella grisescens PA	4	1.4%		*D. grisescens* PA	*D. milleri* sp.n. AF
Ditaeniella milleri sp.n. AF	1	n/c	*Ditaeniella grisescens* PA	xxx	xxx
Ditaeniella parallela NA	2	0.3%	*Ditaeniella milleri* sp.n. AF	3.0%	xxx
			Ditaeniella parallela NA	3.5%	3.2%
					medium
Atrichomelina pubera NA	4	1.0%	*T. robusta* NA		0.8%
Pherbellia albocostata NA	5	1.3%	*T. robusta* PA		low
Pherbellia albocostata PA	3	0.5%	*Pt. angustipennis* NA		0.9%
Pherbellia nana NA	2	0.0%	*Pt. angustipennis* PA		low
Pherbellia nana PA	1	n/c	*Ph. nana* NA		1.2%
Pteromicra angustipennis NA	1	n/c	*Ph. nana* PA		low
Pteromicra angustipennis PA	1	n/c			
Tetanocera robusta NA	2	0.3%	*Ph. albocostata* NA		10.5%
Tetanocera robusta PA	1	n/c	*Ph. albocostata* PA		high

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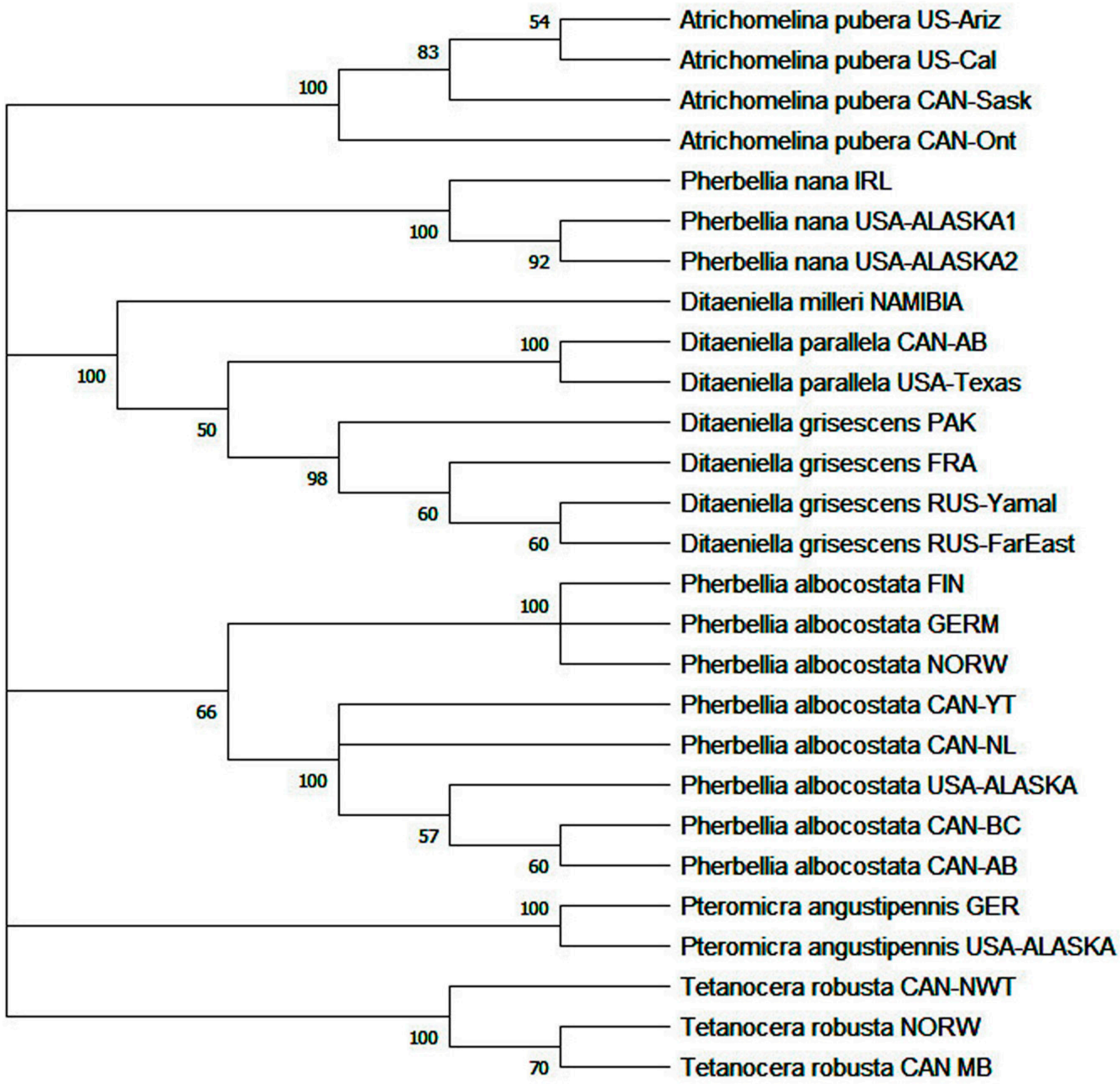

Fig. 20. Evolutionary relationships of taxa. The tree was inferred using the Neighbour-Joining method. The percentage of replicate trees in which the associated taxa clustered together in the bootstrap test (1000 replicates) are shown next to the branches. The evolutionary distances were computed by use of the K2P method. The rate variation among sites was modelled with a gamma distribution. This analysis involved 27 nucleotide sequences. Codon positions included were 1st + 2nd + 3rd + Noncoding. All ambiguous positions were removed for each sequence pair (pairwise deletion option). The final dataset included 657 positions. Evolutionary analyses were conducted in MEGA X14

Рис. 20. Эволюционные взаимоотношения таксонов. Дерево сделано с использованием метода Neighbor-Joining. Процент повторяющихся деревьев, в которых связанные таксоны сгруппированы вместе в тесте bootstrap (1000 повторов), показан рядом с ветвями. Эволюционные расстояния были вычислены с использованием метода K2P. Вариабельность участков была смоделирована с использованием гамма-распределения. Этот анализ включал 27 нуклеотидных последовательностей. Включены все позиции кодонов (1-й + 2-й + 3-й + некодирующий). Все неоднозначные позиции были удалены для каждой пары последовательностей (опция попарного удаления). Окончательный набор данных включал 657 позиций. Эволюционный анализ был проведен в MEGA X14 these results are quite preliminary, as the comparison is made only for the *COI* gene fragment and because only a few sequences were examined. Nevertheless, some suggestions can be made:

1. The distance among four sequences from *D. grisescens* (Palaearctic) is much greater than that between sequences from two specimens of *D. parallela* (Nearctic). This suggests an Old-World origin of *Ditaeniella*.

2. The Nearctic and Palaearctic populations of *Pherbellia nana*, *Pteromicra angustipennis* and *Tetanocera robusta* are very similar.

3. In contrast, the Nearctic and Palaearctic populations of *Pherbellia albocostata* have very divergent *COI* sequences. Therefore, Nearctic and Palaearctic specimens of this species should be re-examined for morphological differences suggesting two species rather than one.

4. The sequences of taxa of *Ditaeniella* from the Nearctic (*D. parallela*), the Palaearctic (*D. grisescens*) and the newly described taxon from the Afrotropical region have a medium distance between them. This variability may correspond to either subspecies or species level. Taking into account that our results are preliminary, with results obtained only for the *COI* gene, we decided on a conservative approach so as to reduce to a minimum any changes in accepted taxonomy. Thus, if *D. parallela* is generally accepted as a valid species, then the new African taxon also should be regarded as a valid species: *D. milleri* sp. nov.

Part IV. Key to species of Sciomyzini with a predominantly setulose anepisternum, ♂♂, ♀♀

1. One (posterior) fronto-orbital seta (rarely very weak second (anterior) seta present). Midfrontal stripe long, with blunt tip; if stripe short with pointed tip, then proepisternal seta very weak. ♂: surstyli reduced or small, not spinulose **2**

— Two strong fronto-orbital setae. Midfrontal stripe short, with pointed tip. ♂: anterior surstylus large, with strong spinules (Figs. 1, 3) . . . . **6** (*Pherbellia*)

2. Proepisternal seta very weak, hardly distinct from adjacent setulae. Aristal hairs longer than basal width of arista. *tar1-1* whitish, contrasting with colour of *t1* and other segments of fore tarsus. Anepimeron densely covered with 20–30 setulae but without strong setae. Midfrontal stripe short, tip pointed. ♂: *f3* ventrally with fine setulae Postgonites without spines . . . . ***Atrichomelina pubera*** Loew

— Proepisternal seta strong. Arista bare or with hairs much shorter than basal width of arista. *tar1-1* not whitish, concolorous with *t1* and other segments of fore tarsus. Anepimeron with 4–7 setulae and 2 strong setae. Midfrontal stripe long, tip blunt. ♂: *f3* ventrally with *av* and *pv* rows of strong, short setae, these rows extended almost the full length of the femur, denser in apical part. Postgonites with strong spines . . . . **3** (*Ditaeniella*)

3. Prosternum bare. Anepisternum sparsely setulose with longer setulae in a row along posterior margin. Arista with distinct although short hairs. Postpedicel entirely yellow. Crossveins clouded. Most abdominal tergites with dark spots (1 median, 2 lateral) appearing as 3 stripes. Body length 4.1–7.6 mm . . . . ***D. trivittata*** Cresson

— Prosternum with several setulae on either side. Anepisternum evenly setulose, without row of longer setulae along posterior margin. Arista bare. Postpedicel mostly blackish, distinctly darker than scape. Crossveins not clouded. Abdominal tergites without stripes or spots but with pale posterior margins. Body length 3.5–5.2 mm . . . . **4** (*Ditaeniella* sensu Rozkošný)

4. *f1* in basal 2/3 covered with fine, dense ventral setulae; apical third with dense rows of 7–8 *pv* and 4–6 weaker *av* spines, both *pv* and *av* spines much stronger than ventral setae, which are present at apex of *f1* in *D. grisescens* (see Fig. 12). ♂: Postgonites (Fig. 13) with external lobe with 2 longer and 2 shorter spines, although these spines are relatively shorter than those in *D. grisescens*; inner spineless lobe tridentate and wider than in *D. grisescens*. ♀: *f3* at apical third with 4–5 *av* and 4–5 *pv* short spinulose setae. Afrotropical . . . . ***D. milleri* sp. nov.**

— Apical third of *f1* with 3–5 *pv* and 2–4 *av* short and weak setae (Fig. 14). ♀: *f3* at apical third with 0–3 *av* and without short spinulose *pv* setae. Not Afrotropical **5**

5. ♂: sclerotised portion of cerci forming a flat, paired plate, broadened and upcurved apically (Figs. 9, 19). Postgonites (Figs. 9, 18) each bearing a single strong spine. Nearctic .... ***D. parallela*** Walker

— ♂: Cerci not matching above description (Fig. 7). Postgonites (Fig. 13) each bearing 2 strong and 1–2 weaker spines. Palaearctic south to border with Indomalayan realm, also South America (probably introduced; currently regarded as full species, *D. patagonensis*) .... ***D. grisescens*** Meigen

6. Inner posterior margin of hind coxa with setulae. Postpedicel yellow. Arista with short but distinct hairs. *tar1-1* whitish to yellowish, lighter than colour of *t1* and other segments of foretarsus. Anepisternum densely setulose. ♂: anterior surstylus with about 15 strong spinules; posterior surstylus small (Figs. 1, 2) .... ***Ph. pilosa*** Hendel

— Inner posterior margin of hind coxa bare. Postpedicel mostly dark. Arista virtually bare. *tar1-1* concolorous with *t1* and other segments of foretarsus. Anepisternum less densely covered with setulae than in *Ph. pilosa*, anterior half mostly bare. ♂: anterior surstylus with 7–8 strong spinules; posterior surstylus large (Fig. 3) .... ***Ph. shatalkini*** Rozkošný

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