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New Record of *Sergentomyia murghabiensis* Perfiliev (1939) from Pakistan (Diptera, Psychodidae, Phlebotominae)

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Abstract: During entomological surveys conducted by the author in the whole of the Balochistan Province during 1996-2001, *Sergentomyia* (*Sergentomyia*) *murghabiensis* Perfiliev (1939) was collected (N= 17) from 6 localities. These localities appear to be the new record of this species in the literature to date. This is to the author's knowledge the first record of this species from Pakistan. Taxonomic characters not described by earlier workers are described and illustrated. Differential diagnosis of this species with its closest allies is also given. Results are compared with the published data of this species available in the existing literature.

Key words: *Sergentomyia* murghabiensis, taxonomic characters, sandfly

INTRODUCTION

In a collection form Arpaklen ravine (Kara Kala District,Turkmenistan), Perfiliev, (1933) found ♀ sandflies and described them briefly as *P. minutus var. arpaklensis*. Perfiliev (1939) explained that a species identical with *P. minutus* as described by Adler and Theodor (1927) does not occur in central Asia. The central Asian sandflies considered to belong to this species were described as *P. minutus var. arpaklensis*. However, Pringle (1953) managed to collect in small numbers of an interesting new species of sandflies from outskirts of Baghdad city and in few other localities in central Iraq and he described them as a new species. Pringle (1953) observed that the arrangement of cibarial teeth in the female of this species resembled the form regarded by Sinton (1932) as *P. minutus* Rondani from Pakistan. The male also resembled that was described as *P. minutus* Rondani by Sinton (1933). Thus, Pringle (1953) concluded that the Iraqi material belonged to the same species as that was previously, wrongly named by Sinton as *minutus* Rondani and in recognition of the important studies on the taxonomy of sandflies carried out by Brigadier Sinton, the species was named after that worker, as *Sergentomyia sintoni* sp. n. Artemiev (1978) treated S. *sintoni* Pringle (1953) as a synonyms of *S. s. murghabiensis* Perfiliev (1939). Theodor and Mesghali (1964) while studying sandflies of Iran, discussed *S. dentata arpaklensis* Perfiliev and considered it as a sub species of *S. dentata* and gave illustrations of cibarial armature. Perfiliev (1968) pointed out that the drawings of the cibarial armture given by Theodor and Mesghali (1964) differs considerably from his drawings of the buccal teeth of *S. arpaklensis* and he concluded that *S. arpaklensis* should be considered as a valid species. Lewis (1967) reported *S. dentata arpaklensis* Perfiliev from a few localities of Pakistan, except Balochistan. Unfortunately, Lewis (1967) did not furnish detail description of *S. dentata arpaklensis* nor gave its illustrations, therefore Balochistan specimens cannot be compared. Artemiev (1978) while describing sandflies from Afghanistan did not mention the distribution of *S. murghabiensis* from Pakistan and considered *P. minutus var. arpaklensis* Perfiliev (1933) as *P. murghabiensis* Perfiliev (1939) which was described from 3 ♀ collected in uninhabited areas near the Murghab River (Turkmenistan) and he treated the species as *S. s. murghabiensis* Perfiliev (1939). The present author follows Artemiev's views. However, characters like number and position of papillae on antennal segments, mouth parts like hypopharynx, mandible, maxillae, measurements of spermathecae, furca, genital atrium, style, paramere, aedeagus and surstyle were not recorded. In view of the insufficient descriptions of Perfiliev and Artemiev (*loc. cit.*), this species is redescribed in detail.

MATERIALS AND METHODS

Flies were collected, processed, preserved, dissected and mounted according to the conventional methods especially those adopted by Johnson *et al.* (1963), Lewis (1973), Killick-Kendrick (1983), Lawyer *et al.* (1991) and Killick-Kendrick *et al.* (1994). For species identification, keys supplied by Perfiliev (1968) and Artemiev (1978) were taken into consideration. All the diagrams are drawn with the help of camera lucida and are to the given scales. Measurements are in millimeter unless otherwise indicated.

Sergentomyia (Sergentomyia) murghabiensis Perfiliev (1939)

(Text-Figs. 1 and 2 and Table 1)

Female: (5 specimens examined) (Fig. 1). Head 0.272-0.288

Table 1: Comparative taxonomic characters (mm) of *Sergentomyia murghabiensis* from Balochistan and the published data of this species form central Asia and its synonyms viz., *S. arpaklensis* Perfiliev,1930 from central Asia and *S. sintoni* Pringle, 1953 from Iraq

♀ Taxonomic Characters		Balochistan, SW Pakistan (Present study)	*S. arpaklensis*, Perfiliev, 1933, synonym (central Asia) (Perfiliev, 1968: 307)	*S. murghabiensis*, Perfiliev,1939. (central Asia) (Perfiliev, 1968: 314)	*S. sintoni*, Pringle 1953, (Iraq)	*S. murghabiensis*, (Artemiev, 1978: 26) (Afghanistan)
Wing	Length	1.28-1.30	1.46-1.59	-	1.5 (1.25-1.6)	-
	Breadth	0.28-0.30	0.27-0.35			
A3	Length	0.084-0.11	0.10-0.12	0.11-0.12	0.103 (0.095-0.114)	-
	A3 / Labrum	0.84-1.1				0.62-0.72
	A3 / A4+5	A3<A4+5	A3<A4+5	A3<A4+5		
Ascoid 4 / A4		0.2-0.24	Less than 1/3 length of segment	Less than 1/3 length of segment	-	-
Labrum Length		0.11-0.12	0.14-0.17	0.21	0.14-0.154 mm	-
Palp formula		1,2,4,3,5	1,2,3,4,5 or 1,2(3-4),5	1,2 (3-4),5	1,2,4,3,5 or 1,2,3-4,5	-
Cibarium		16-20 large teeth of equal size, fused or at some distance from each other on a line, slightly convex anteriorly, large triangular conical pigment patch with anterior process	12-16 large teeth of equal size, fused and standing on a line markedly convex anteriorly. Pigmented area more or less triangular, apex extending anteriorly in the form of a lighter conical process	12-14 large uniform teeth with short spines, in a straight row some, distance from each other, pigmented area large with a light triangular process anteriorly.	12-14 easily define able teeth on a moderate arc with the convexity anteriorly, teeth are evenly spaced, medial teeth maybe some what shorter than the lateral teeth pigment patch roughly triangular.	14-17 uniform teeth arranged on a concave row, large pigment patch with anterior process.
Pharynx		Base of the pharynx 2.02 times as wide as apex, teeth of two types, dense semicircular rows of long spines at anterior part whereas posterior rows of minute tubercles.	Base of the pharynx 3 times as wide as apex, armature is of two types, anterior part composed of relatively long spines arranged in semi circular rows whereas posterior pat consists of dot like armature.	Well marked teeth of 2 types, armature large, with semi-circular rows anteriorly whereas posterior and basal part consists of small dot like tubercles.	About twice as long as broad.	Length/breadth ratio=2.2-3.2, hind border of armature straight or slightly concave
Spermatheca		Tubular, 0.028 mm long, 0.026 mm broad. common ducts also broad.	Tubular, capsule relatively small,broad fused ducts, capsules and ducts of almost the same width	Tubular with short ducts.	Relatively shorter in length in proportion to its breadth.	-

♂*S. murghabiensis* Taxonomic characters		Balochistan, SW Pakistan (Present study)	*S. arpaklensis*, Perfiliev, 1933, synonym (central Asia) (Perfiliev, 1968: 307)	*S. murghabiensis*, (Artemiev, 1978: 26) (Afghanistan) (in µm)
Wing	Length	1.04-1.10	1.30-1.37	-
	Breadth	0.208-0.22	0.23-0.28	
A3	Length	0.11-0.12	0.13-0.16	132-152
	A3 / Labrum	1.0-1.1		1.06-1.3
	A3 / A4+5	A3<A4+5 (=0.740-0.753)	A3<A4+5	
Ascoid 4 / A4		0.25	1/4	0.22-0.26
Labrum Length		0.09-0.12		110-134
Palpal formula		1,2,3-4,5	1,2,3-4,5	-
Cibarium		11-15 uniform small teeth arranged on a slightly concave line.	10-16 small pointed teeth of equal size, standing on a line markedly convex anteriorly, the second row consists of fewer and smaller denticles at the base of main row, pigmented area small, dark brown, rounded or of irregular shape.	12-16 uniform teeth arranged on a concave row,
Pharynx		There is no marked posterior dilation of pharynx. Armature weak transverse lines.	Narrow, little wider posteriorly and then tapers again, the posterior narrow part contain small little developed thin wavy or curved lines.	-
Coxite				
	Coxite / A3	0.20-0.21,	0.24-0.30	220-240
Coxite/Labrum		1.75-1.81,		1.5-1.8
		1.75-2.0		1.72-2.04
Style	length	0.08, 2.5-2.6 times of coxite,2 apical, 2 sub apical spines, spines are longer than the style, seta at 0.80 of the style.	0.08-0.10 mm, about 1/3 the length of coxite, terminal spines as long as style or longer, all apical or two of them slightly sub apical, ventral seta close to apex of style, near terminal spine	Style with 2 spines terminal and 2 sub terminal
Paramere		Broad base with rounded end	Thick of uniform breadth, with rounded apex	With rounded ends
Aedeagus		Straight, thick, digit form with blunt apex	Straight and digit form with blunt rounded apex	Straight
Surstyle length		0.16-0.18, 0.80-0.85x length of coxite.	0.16-0.18, shorter than coxite.	-

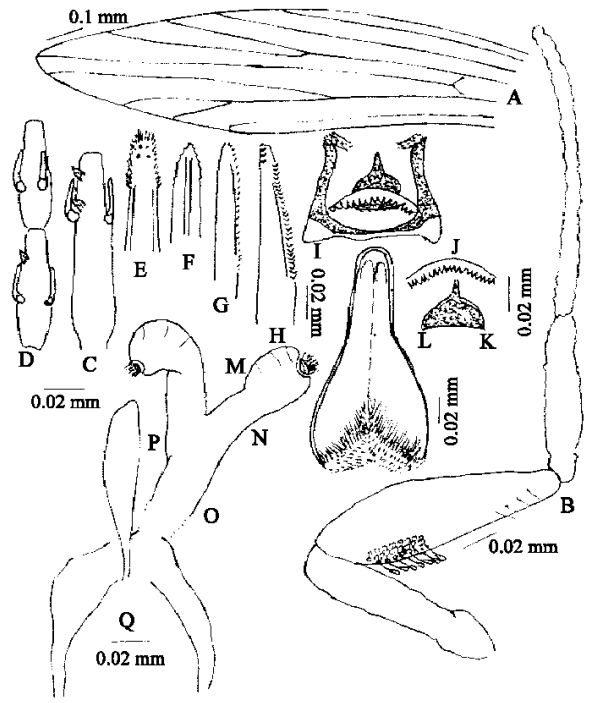

Fig. 1: Camera Lucida drawing of *Sergentomyia murghabiensis* (♀) showing: wing (A), palps (B), the third (C), fourth (D, lower) and fifth (D, upper) antennal segments, labrum (E), hypopharynx (F), mandible (G), maxilla (H), cibarium (I), teeth (J), pigment patch (K), pharynx (L), spermatheca (M), individual duct (N), common duct (O), furca (P), genital atrium (Q).

mm long, 0.256-0.28 mm broad, Eye 0.144-0.16 mm long, 0.088-0.096 mm broad and distance between eyes 0.072-0.08 mm. Wing (Fig. 1A) 1.28-1.30 mm long, 0.28-0.30 mm broad, α=0.096-0.10 mm long, β=0.23-0.24 mm, δ=0.04 mm, but in one specimens from Turbat, δ is measured to be zero, γ=0.24-0.25 mm, π=0.04-0.064 mm, Alar index=0.41. Palp (Fig. 1B) 0.045 mm long, palpal ratio,1:2.25:3.75:3.50:7.5 and formula 1,2,4,3,5, with ten to 25 spatulate Newstead's sensillae in middle third of segment III. Proboscis 0.14-0.16 mm long. A3 (Fig. 1C) 0.084-0.11 mm long, 0.06-0.08x length of head, 0.6-0.69x length of proboscis, 0.84-1.1x length of labrum,0.807-0.93x length of A4+5, ascoid on A3 0.02-0.022 mm long, 0.2-0.24x length of segment. A4 (Fig. 1D,lower) 0.052-0.06 mm long, ascoid on A4 0.02-0.024 mm long, 0.38-0.4x length of segment. A5 (Fig. 1D,upper) 0.052-0.058 mm long, ascoid on A5 0.02-0.024 mm long, 0.384-0.413x length of segment. Antennal segments III an IV have a single prominent papilla but in few specimens A3 has two also, on AIII it is usually near the base and tip of the ascoid whereas on AIV it is always near the tip of the ascoid. AIII is shorter than AIV + AV (about x0.76-0.93). The positions of the papillae on the segments are: AIII, 0.63, AIV, 0.68. The positions of the ascoids on the segments are: AIII, 0.66, AIV, 0.31, AV, 0.33. There are two ascoids on segments III to XV. Labrum (Fig. 1E) 0.10 (0.11-0.12) mm long, 0.017 mm broad, apex with 4-5 closely packed sensillae, a sensilla depth 0.032 mm. Hypopharynx (Fig. 1F) 0.012 mm broad, with pointed fine apex, about 14 lateral undulations, a dental depth of 0.028 mm. Mandible (Fig. 1G) narrow, 0.008 mm broad, with 8 teeth per 0.008 mm, a dental depth of 0.056 mm. Maxilla (Fig. 1H) 0.01 mm broad, with three lateral and 31 ventral teeth, 5 teeth per 0.008 mm, a dental depth of 0.064 mm. Cibarium (Fig. 1I) 0.038-0.044 mm broad with 16-20 almost uniform teeth (about 0.004 mm long) arranged on a slightly curved arc (Fig. 1J) on the back ground of teeth a dark pigmented patch (0.024 mm long and 0.016 mm broad) (Fig. 1K) with a short forward extension. Pharynx (Fig. 1L) 0.125 (0.12-0.133) mm long, much dilated posteriorly, length about 2.02 times greatest breadth which is about 2.82 times the width of narrow anterior armature yellow pigmented occupies the posterior 0.32-0.35 of the pharynx. The anterior edge of armature forms a sharply curved line. Anterior armature is in the form of rather big pigmented teeth (about 0.024 mm long) and posterior part of armature (a patch of about 0.02 mm broad) composed of numerous small punctiform denticles. Basal border of pharynx straight or slightly concave. Spermathecae (Fig. 1M) capsule more rounded, 0.028 mm long, 0.026 mm broad, individual duct (Fig. 1N) 0.048 mm long, 0.018 mm broad, open into a common duct (Fig. 1O) 0.028 mm broad, furca (Fig. 1P) 0.08 mm long and genital atrium (Fig. 1Q) 0.048 mm broad.

Male: (6 specimens examined) (Fig. 2). Head 0.296 mm long, 0.304 mm broad, Eye 0.152 mm long, 0.088 mm broad, distance between eyes 0.128 mm. Wing (Fig. 2A) 1.04 -1.10 mm long, 0.208-0.22 mm broad, α=0.064-0.08 mm, β=0.184-0.20 mm long, δ=0.024-0.04 mm, γ=0.256-0.28 mm, π=0.032-0.040, alar index=0.347-0.4. Palp (Fig. 2B) total length 0.44 mm long, palp formula 1,2,3-4,5 and palp ratio 1:2.96:5:5:10.5. Proboscis 0.14 mm long. A3 (Fig. 2C) 0.11-0.12 long, ascoid=0.018-0.020 mm long, position of ascoid on A3=0.636-0.666, ascoid 3/A3=0.163-0.166, position of a papilla on A3=0.818-0.833. A4 (Fig. 2D,lower) 0.070-0.08 mm long, ascoid 0.018-0.02 mm long, position of ascoid on A4=0.25-0.28, ascoid 4/A4=0.25, position of a papilla on A4=0.65-0.87. A5 (Fig. 2D, upper) 0.076-0.082 mm long, ascoid 0.018-0.02 mm long, position of ascoid on A5=0.24-0.31, ascoid 5/A5=0.23-0.24, position of a papilla on A5=0.58 (N=2). There is a single ascoid on antenna III to XV. A3/labrum=1.0-1.1, A3/A4+5=0.74-0.753. Labrum (Fig. 2E) 0.10-0.12 mm long and a sensilla depth 0.032 mm. Hypopharynx (Fig. 2F) 0.014 mm broad, apex pointed and a dental depth 0.028 mm. Maxilla (Fig. 2G) smooth.

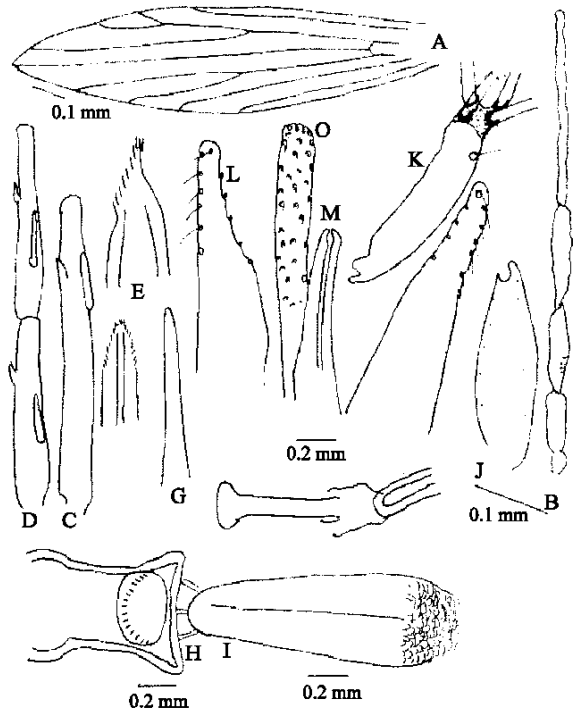

Fig. 2: Camera Lucida drawing of *Sergentomyia murghabiensis* (♂) showing: wing (A), palps (B), the third (C), fourth (D, lower) and fifth (D, upper) antennal segments, labrum (E), hypopharynx (F), maxilla (G), cibarium (H), pharynx (I), coxite (J), style (K), paramere (L), aedeagus (M), genital filament (N), surstyle (O).

Cibarium (Fig. 2H) 0.04-0.046 mm broad, chitinous arch weakly developed, cibarium with about 11-15 uniform small teeth arranged in al slightly concave line. Pharynx (Fig. 2I) 0.12 mm long and is about 3.15 times as long as broad and its widest posterior portion is not quite 1.46 times as wide as the narrowest anterior part. There is no marked posterior dilation of pharynx. The pharyngeal armature occupies 0.23 of the pharynx. The armature is weak and consists of series of transverse lines. The spines at the lateral and posterior part are slender and weak while the more central ones are relatively stout. Male terminalia: Coxite (Fig. 2J) 0.20-0.21 mm long 0.06-0.064 mm broad, coxite/A3=1.75-1.81, coxite/labrum=1.75-2.0, coxite/style=2.25-2.5. Style (Fig. 2K) 0.08 mm long and 0.020-.024 mm broad, with 2 apical spines and two sub apical spines at 0.75 of the style, spines are longer than the style, (about 0.09-0.10 mm long). The tips of spines are usually spatulate. A short seta (0.02 mm long) at 0.80 of the style. Paramere (Fig. 2L) 0.12-0.13 mm long (base 0.03-0.038 mm broad) and extends up to 0.75 of the length of paramere, length of neck is about 0.25 of the paramere and is 0.01 mm broad, paramere with rounded ends. Aedeagus (Fig. 2M) 0.08 mm-0.09 mm long both halves of aedeagus united (0.014 mm broad) with a slight apical notch at 0.95 of the aedeagus, base of the aedeagus not bulbous. Genital filament 0.18-0.26 mm log and filament to pump ratio of 2.25-3.25, filament smooth (Fig. 2N). Surstyle (Fig. 2O) 0.16-0.18 mm long, about 0.80-0.85 of the coxite.

Distribution: Balochistan. New Record Present survey: Bela, Kahan, Khuzdar, Nana saheb ziarat, Tump, Turbat. These localities are important foci of cutaneous leishmaniasis. Flies were collected from indoors using sucking tubes and sticky traps. Afghanistan: Northern and western Afghanistan (Artemiev, 1978). Iran: Northern Iran (called as *S. sintoni*, Theodor and Mesghali, 1964). Turkmenistan (Perfiliev, 1968).

Differential Diagnosis of *S. murghabiensis*: A slightly greater wing length (1.28-1.36 mm) and antenna 3(0.084-0.11 mm long), ascoid 4/A4=0.38-0.40), a slightly shorter cibarium breadth, 16-18 large uniform teeth fused or placed at some distance with short points on a line slightly convex anteriorly, base of the pharynx 3 times as greater as apex, straight base of pharynx and tubular spermathecae are important diagnostic characters in the identification of ♀ *S. murghabiensis*. However, ♂ of this species can be identified on the bases of taxonomic characters like pharyngeal armature occupies 0.23 of the pharynx, coxite/A3=1.75-1.81,aedeagus with an apical notch at 0.95 of the aedeagus and base of aedeagus not bulbous and genital filament /pump=2.25-3.25.

The species differs from the other species of the subgenus *Sergentomyia* recorded during the present study as follows:

S. theodori pashtunica (♀) has a less shorter A3 (0.090-0.096 mm long), a slightly larger labrum (0.12-0.13 mm long), a shorter ratio of ascoids 4/A4 (0.37), different cibarial armature (17-20 teeth arranged on an arch, 7-8 smaller central teeth and 5-6 larger lateral teeth), base of the pharynx 3.14 times as wide as apex, base of the pharynx without median notch, spermathecae tubular, 0.032 mm long, 0.016 mm broad.

DISCUSSION

The morphometric measurements of some taxonomic characters of *S. murghabiensis* from Pakistan show considerable morphological differences and similarities when compared with the published data of this species and its synonyms from other territories (Table 1). Pakistani specimens of *S. murghabiensis* (♀) are observed having a slightly shorter wing as compared with the specimens of *S. arpaklensis* Perfiliev (1933) form

Turkmenistan. Similarly, A3 and labrum are measured slightly shorter as compared with specimens of *S. arpaklensis* Perfiliev, (1933) and *S. murghabiensis* Perfiliev (1939).

Pakistani specimens of *S. murghabiensis* are found in full accord with the published data of the specimens of *S. arpaklensis* and *S. murghabiensis* both from Turkmenistan in diagnostic characters as A3<A4+5, ascoids on A4 is quite less than 1/3 the length of the segment, arrangement and shape of cibarial teeth, base of pharynx about twice as wide as apex and shape of pharyngeal teeth as well as morphology of spermathecal capsule. *S. murghabiensis* (♂) from Pakistan have a relatively shorter wing, A3 and coxite as compared with those Afghanistan and *S. arpaklensis* from Central Asia. However, Pakistani specimens of *S. murghabiensis* resemble with that of *S. arpaklensis* of Central Asia in taxonomic characters like ascoid4/A4, A3<A4+5, shorter surstyle than coxite and in morphology of cibarium, pharynx, style, paramere and aedeagus. It also resembles with *S. murghabiensis* from Afghanistan in characters like labrum, A3/laburm, coxite/A3, coxite/labrum, arrangement of spines on style, ventral seta of style very close to sub apical spine, length of spine of style, shorter style than coxite and in the shape of paramere and aedeagus.

The present study revealed that *Sergentomyia murghabiensis* is a rare species (17/2013, 0.84%) and has a wide but discontinous distribution in Balochistan occurring in a wide variety of climatic regions from warm to semi-cold. Being mainly a Central Asian species it has spread along Afghanistan, Iraq, Iran and south-western Pakistan. Its distribution in Pakistan may represent south-eastern limit of its range.

There are no published reports incriminating *S. murghabiensis,* which is thought to be thermophilic, hydrophilic and a main vector of reptilian leishmaniasis from lizard to lizard (Artemiev,1978) and presumably plays no part in transmitting *Leishmania* to man.

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