

BITING MIDGES OF THE GENUS CULICOIDES

(DIPTERA: CERATOPOGONIDAE) FROM

SOUTHWEST ASIA

by

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ABSTRACT

Title of Dissertation: Biting midges of the genus Culicoides
(Diptera: Ceratopogonidae) from Southwest
Asia

Shahin Navai, Doctor of Philosophy, 1977

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A study was made of the Southwest Asian species of the genus Culicoides Latreille 1809 from six countries: Afghanistan, Iran, Israel, Pakistan, Saudi Arabia and Turkey.

Thirty-eight species of Culicoides belonging to seven subgenera: Trithecoides, Pontoculicoides, Avaritia, Culicoides, Oecacta, Belt-ranmyia and Monoculicoides are described and illustrated. A key is provided to the subgenera and slide mounted species of both sexes. Seven new species are described.

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INTRODUCTION

The members of the genus Culicoides are commonly referred to as biting midges. In different parts of the world they are known by various colloquial names such as, "Punkies" and "No-see-ums" in the forest regions of America; "Jejens" in South America; "Brulots" in French Canada; "Machhri" and "Eutki" in India and "P Ashe-Koor-e" in Iran.

The genus received some attention in Southwest Asia as a result of the horse sickness outbreak in the late 1950's. The females of most species of Culicoides are hematophagous and attack man as well as domestic animals, rodents and birds. They also attack cold blooded animals such as reptiles, amphibians and some insects such as mosquitoes. Some members of the genus are vectors of disease producing organisms such as filarial worms, protozoa and viruses (Du Toit 1944, Kettle 1965, Kremer 1965, Gutsevich 1973). They also play a role as pollinators in the tropics.

The genus Culicoides was proposed by Latreille in 1809. For many years it was treated as one of the genera of the family Chironomidae, subfamily Ceratopogoninae, which was raised to family rank in 1900 by Grassi. For the next 60 years it was known as the family Heleidae. As a result of a ruling by the International Commission of Zoological Nomenclature in 1959, the name Ceratopogonidae has been maintained. The family Ceratopogonidae includes some 78 genera and subgenera (Wirth et al. 1974).

The first taxonomic study on the genus Culicoides in Southwest Asia was by Austen (1921), in which he described 8 species from

Palestine. His collection in the British Museum (Natural History) was studied recently by Boorman (1974). Vimmer (1932) described 46 species from Palestine from Bodenheimer's collection in the National Museum of Czechoslovakia, Prague. Of these 46 species only 9 remain as valid species (Jezek 1974). Macfie (1933) described one species from Palestine. Later, Khalaf described 20 species from Iraq between 1957-1961. In Iran, Mesghali recorded 22 species of Culicoides in 1963. His work was followed by Navai from 1965 to 1973. Tokunaga (1966) reported one species of Culicoides from Afghanistan. Buck et al. (1972) recorded 7 species of Culicoides from Afghanistan. Braverman et al. (1974), in Israel, and Boorman (1974), in Cyprus, have contributed to the knowledge of the genus in Southwest Asia.

All specimens used in this study have been cleared in phenol and mounted in phenol-balsam on slides in the manner of Wirth and Marston (1968). For terminology, see Wirth and Blanton (1959), Campbell and Pelham-Clinton (1960), Shevchenko and Dzhaforov (1968) and Chu-Wang et al. (1975). For convenience terms are illustrated and explained on Plate 1.

The following technical terms are used in the text and tables.

Frontal vitta - is the part of vertex lying between the eyes and separated from the rest of the vertex by a transverse upper suture (Plate 1H). When the fronto-median bristle is located under the upper suture, the eyes are separated, although they may be very close together under the bristle (Plate 1G, H). Eyes are contiguous if the fronto-median bristle is located at the top of the upper suture and the eyes are in contact (Plate 1E); eyes may be separate if the

fronto-median bristle is located at the top of the upper suture (Plate 1F). These characters are rather variable in some species as illustrated by some of the plates.

Sensilla chaetica (antennal setae) (Table 1) bristle like or spine line, dark, the base of the seta set into an alveolar cavity "seta socket" (Plate 1B); in the female antennae located at the proximal end of each segment (Plate 1B). In the male are located on the lower median portion of each segment and in the present drawings only the sockets of which are illustrated. There is one sensillum chaeticum (terminal antennal seta) at the tip of last segment in both sexes (Plate 1B).

Sensilla trichodea - hair shaped, transparent, socket may be elevated on a tubercle, or set into an alveolar cavity.

- a. Sharp-tipped sensilla trichoidea - hair shaped, easy to distinguish from seta, more abundant on distal segments of both sexes (Plate 1B, J).
- b. Tube-like sensilla trichodea - thick and somewhat curved, in this study was found only in C. montanus (Plate 1L and 8A).

Sensilla basiconica - transparent, short and stouter horn-like pegs, with no dividing line between these and sensilla trichodea (Plate 1B).

Sensilla coeloconica - short pegs in shallow depressions, each pit contains a sensillum coeloconium encircled by microtrichia (Plate 1B, I). The position of the sensillum is a good character for species groups, but rather variable in some species (Table 2).

Antennal proportions - are the values of the length of each individual flagellomere (for convenience the term "segment" has been used, although their lack of true segmentation is recognized). Each unit, one division of the ocular micrometer = 0.002 mm.

Antennal ratio (AR) - in female is the ratio obtained by dividing the combined length of the distal 5 segments (= a) by the combined length of the preceeding 8 segments (= b), $AR = \frac{a}{b}$ (Table 3).

Palpal segments - length of each segment was measured as shown on Plate 1K, the first segment was not measured.

Palpal ratio (PR) - obtained by dividing the length of the third segment (= c) by its greatest breadth (= d), $PR = \frac{c}{d}$.

Wing length - measured from the basal arculus to the tip of the wing (Plate 1A and Table 4).

Costal ratio (CR) - obtained by dividing the costa length (= e) (basal arculus to the end of costal vein), by the wing length (= f), $CR = \frac{e}{f}$.

The measurements were made with an ocular micrometer, and the values have been converted into millimeters. Measurements are presented as mean (minimum - maximum, n), n - number of measurements.

Tables 3 and 4 show the measurements of antennal ratio and wing length of each species with the confidence limit of mean.

The wings and legs have been illustrated with the aid of a microprojector; all other drawings were done with the aid of a camera - lucida using various magnifications. An attempt was made to draw each figure in all plates more or less to the same size regardless of their natural size. The scutellum of C. humeralis was

illustrated from slide mounted specimen, therefore, it is semidiagrammatic. In some cases parameres or the aedeagus have been illustrated separately in order to show characters better.

Types of the new species and all other specimens studied are in the collection of the U.S. National Museum of Natural History (USNM) in Washington, D.C. and paratypes are in the collections of National Museum (Natural History), Paris, France; Zoological Institute, Leningrad, USSR and British Museum (Natural History), England.

This work was done under the direction of Prof. D. H. Messersmith of the University of Maryland, Department of Entomology and Dr. W. W. Wirth of the Systematic Entomology Laboratory, Agricultural Research Service, USDA. I am greatly indebted to both of them for their guidance and assistance. Dr. Wirth conceived this problem and made available all the resources of the U.S. National Museum of Natural History. Special thanks are due for his valuable suggestions and help with problems. Thanks to my fellow graduate students, Paul Bystrak, William Grogan, Gaye Williams, and William Waugh, who have made the hardships associated with preparing this dissertation bearable with their friendship. Thanks to my friends William Waugh and Gaye Williams for editing the text. Thanks are also extended to Prof. A. V. Gutsevich of the Zoological Institute, Leningrad, USSR; Dr. M. Kremer of the Parasitology Institute of Strasbourg, France, and Dr. H. Remm of the Tartu State University, Tartu, Estonia, USSR for sending valuable specimens.

PLATE 1

Morphological structures of genus Culicoides

- A - wing
- B - female antennal segment 15
- C - female palpus, sensilla dispersed
- D - spermathecae
- E - female fronto-vitta, eyes contiguous
- F - female fronto-vitta, eyes separate
- G - female fronto-vitta, eyes separate
- H - female fronto-vitta, eyes separate
- I - female antennal segment 9 - 12
- J - male genitalia
- K - female palpus, sensilla compact
- L - female antennal segments 1 - 6

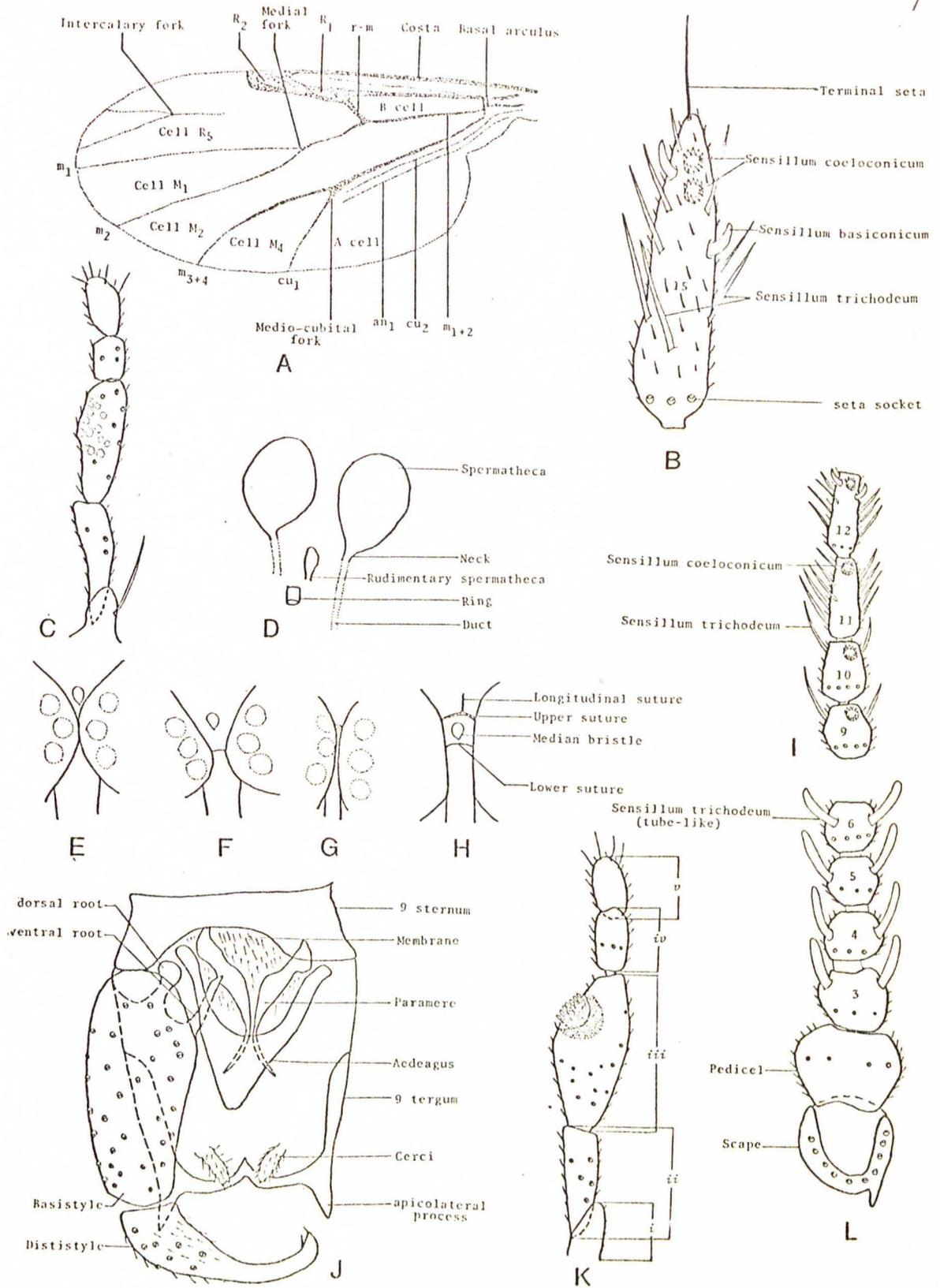


Table 1 continued

Subgenera, group, species		3	4	5	6	7	8	9	10	11	12	13	14	15
<u>circumscriptus</u>	♀									-	-	-	-	-
	♂													-
<u>C. (Monoculicoides)</u>														
Sp. 13 n.sp.***	♀													
	♂													
<u>puncticollis</u>	♀													
	♂													-
<u>nubeculosus</u>	♀													
	♂													-

* - Male or female unknown

** - Male or female not collected

*** - Antenna missing

Table 2

Antennal segments of female and male Culicoides
with sensilla coeloconica

Subgenera, group, species		3	4	5	6	7	8	9	10	11	12	13	14	15
<u>C. (Trithecoides)</u>														
<u>humeralis</u> **	♀	+								+	+	+	+	+
	♂													
<u>C. (Pontoculicoides)</u>														
<u>ibericus</u> **	♀	+	±			+	+	+	+					
	♂													
<u>saevus</u>	♀	+				+	+	+	+	±				
	♂	+					+	+	+					
<u>sejfadinei</u> **	♀	+		+	+	+	+	+	+					
	♂													
<u>C. (Avaritia)</u>														
<u>obsoletus</u>	♀	+								±	+	+	±	±
	♂	+										+	+	+
<u>dewulfi</u>	♀	+									+	+	+	+
	♂	+										+	+	+
<u>montanus</u> **	♀									±	+	+	+	+
	♂													
<u>C. (Culicoides)</u>														
<u>peregrinus</u>	♀	+		±		±		±	+	+	+	+	+	+
	♂	+										+	+	+
<u>pulicaris</u>	♀	+				±		±		+	+	+	+	+
	♂	+										+	+	+
<u>C. (Oecacta)</u>														
a. The <u>schultzei</u> gp.														
<u>schultzei</u>	♀	+				+	+	+	+					
	♂	+							+	+				
b. The <u>mesghalii</u> gp.														
<u>mesghalii</u>	♀	+			±	+	+	+	±	+	+	+	+	+
	♂	+									+	+	+	
c. The <u>similis</u> gp.														
Sp. 22 n.sp.*	♀	+			±	+	+	+	+					
	♂													
Sp. 15 n.sp.	♀	+	±	+	+	+	+	+	+					
	♂	+					+		+	+	+			
<u>similis</u>	♀	+		+		+	+	+	+					
	♂	+					+		+	+	+			
<u>longipennis</u>	♀	+		+	±	+	+	+	+	±				
	♂	+					+		+	+	+			
d. The <u>fascipennis</u> gp.														
<u>subfascipennis</u>	♀	+								+	+	+	+	+
	♂	+										+	+	+

Table 2 continued

Subgenera, group, species		3	4	5	6	7	8	9	10	11	12	13	14	15
<u>circumscriptus</u>	♀	+	+	+	+	+	+	+	±	+	+	+	+	
	♂	+	+									+	+	
<u>C. (Monoculicoides)</u>														
Sp. 13 n.sp.***	♀													
	♂													
<u>puncticollis</u>	♀	+				±	+	+	+					
	♂	+			±		+	+	+					
<u>nubeculosus</u>	♀	+					+	+	+					
	♂	+					+	+	+					

* - Male or female unknown

** - Male or female not collected

*** - Antenna missing

Table 3

Antennal ratios of females of s. w. Asian species of Culicoides.

Subgenera, group, species	sample size	observed range		mean	S.D.	95% confidence limit to the mean	
		min.	max.			lower limit	upper limit
<u>C. (Trithecoides)</u> <u>humeralis</u>	4	1.15	1.25	1.19	0.043	1.12	1.26
<u>C. (Pontoculicoides)</u> <u>ibericus</u>	1			0.87			
<u>saevus</u>	5	1.01	1.15	1.07	0.058	1.00	1.14
<u>sejfadinei</u>	1			0.97			
<u>C. (Arvaritia)</u> <u>obsoletus</u>	3	1.02	1.15	1.06	0.075	0.98	1.15
<u>dewulfi</u>	5	1.00	1.16	1.07	0.067	0.99	1.15
<u>montanus</u>	3	1.00	1.08	1.04	0.040	0.94	1.14
<u>C. (Culicoides)</u> <u>peregrinus</u>	10	1.07	1.27	1.13	0.062	1.08	1.17
<u>pulicaris</u>	5	0.92	1.01	0.96	0.036	0.91	1.00
<u>C. (Oecacta)</u> a. The <u>schultzei</u> gp. <u>schultzei</u>	5	0.97	1.05	1.02	0.033	0.99	1.06
b. The <u>mesghalii</u> gp. <u>mesghalii</u>	5	0.97	1.09	1.04	0.047	0.98	1.10
c. The <u>similis</u> gp. Sp. 22 n.sp.	1			1.03			
Sp. 15 n.sp.	10	1.16	1.30	1.22	0.047	1.18	1.25
<u>similis</u>	6	1.15	1.36	1.24	0.074	1.16	1.32
<u>longipennis</u>	5	0.79	0.90	0.84	0.035	0.79	0.88
d. The <u>fascipennis</u> gp. <u>subfascipennis</u>	5	1.10	1.17	1.12	0.029	1.08	1.15

Table 3 continued

Subgenera, group, species	sample size	observed range		mean	S.D.	95% confidence limit to the mean	
		min.	max.			lower limit	upper limit
e. The <u>pictipennis</u> gp.							
<u>kurensis</u>	5	1.01	1.07	1.05	0.026	1.02	1.08
<u>maritimus</u>	5	1.32	1.70	1.46	0.150	1.27	1.64
<u>stepicola</u>	5	1.16	1.29	1.24	0.053	1.17	1.30
<u>odibilis</u>	5	1.25	1.66	1.36	0.171	1.15	1.57
<u>pictipennis</u>	5	1.18	1.32	1.25	0.051	1.18	1.31
f. The <u>bulbostylus</u> gp.							
<u>turanicus</u>	5	1.23	1.34	1.29	0.043	1.24	1.34
<u>odiatus</u>	5	1.03	1.13	1.08	0.039	1.03	1.13
<u>bulbostylus</u>	6	1.01	1.27	1.15	0.094	1.05	1.25
Sp. 4 n.sp.	5	1.08	1.18	1.12	0.040	1.07	1.17
<u>dzhafarovi</u>	5	1.16	1.29	1.22	0.053	1.15	1.28
g. The <u>pallidus</u> gp.							
<u>tugaicus</u>	2	1.14	1.18	1.16	0.028	0.90	1.41
<u>pallidus</u>	5	1.00	1.16	1.08	0.061	1.00	1.15
<u>azerbajdzhanicus</u>	5	1.15	1.23	1.19	0.029	1.15	1.23
C. (<u>Beltranmyia</u>)							
<u>desertorum</u>	5	1.17	1.27	1.22	0.037	1.17	1.26
Sp. 5 n.sp.	10	1.13	1.32	1.22	0.057	1.18	1.26
<u>circumscriptus</u>	5	1.15	1.21	1.17	0.022	1.14	1.20
C. (<u>Monoculicoides</u>)							
<u>puncticollis</u>	10	0.74	0.84	0.79	0.034	0.76	0.81
<u>nubeculosus</u>	1			0.79			

Table 4

Wing length of females of S. W. Asian species of Culicoides.

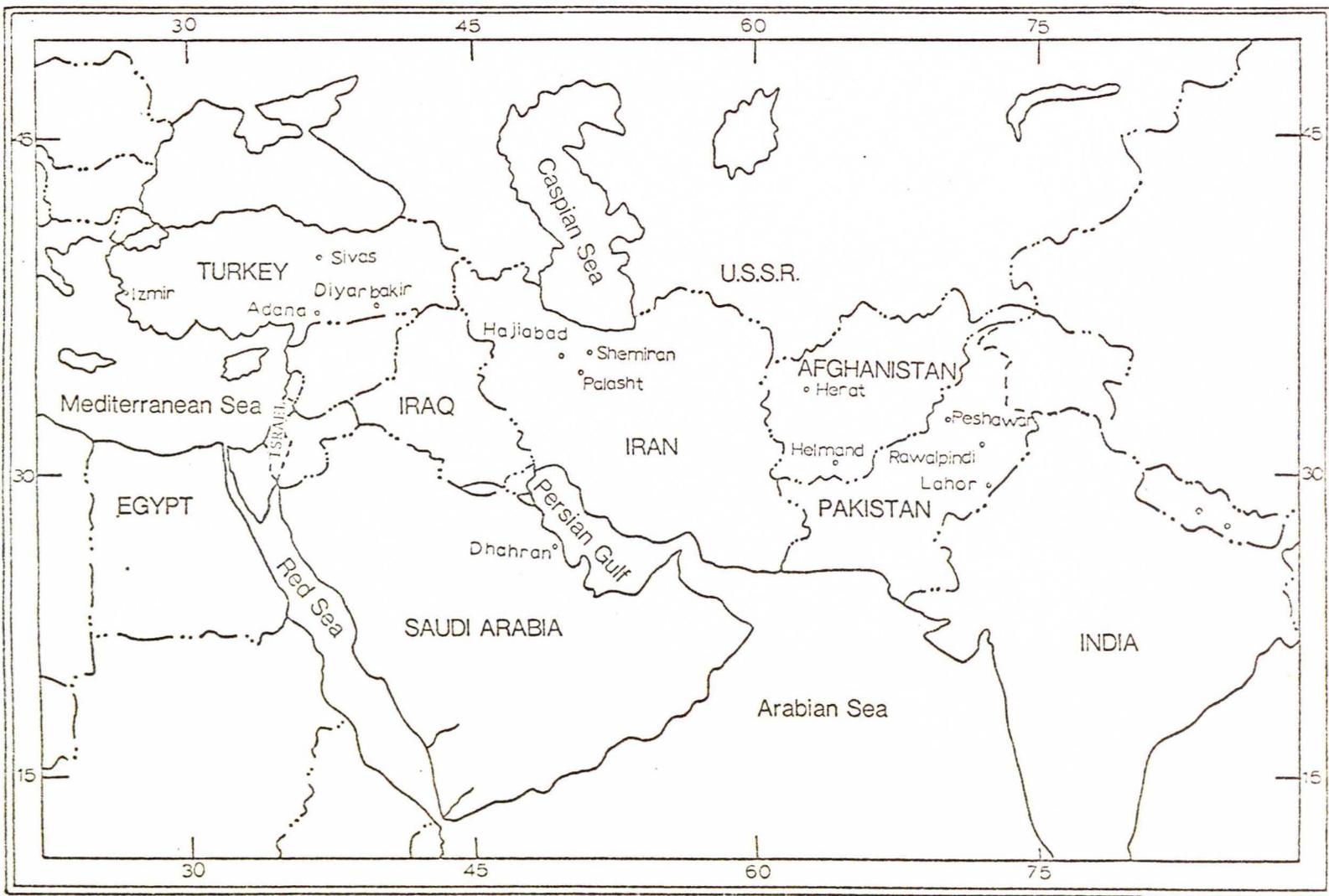
Subgenera, group, species	sample size	observed range		mean	S.D.	95% confidence limit to the mean	
		min.	max.			lower limit	upper limit
<u>C. (Trithecoides)</u> <u>humeralis</u>	4	0.81	0.97	0.91	0.071	0.79	1.02
<u>C. (Pontoculicoides)</u> <u>ibericus</u>	1			1.02			
<u>saevus</u>	10	0.80	0.99	0.91	0.053	0.87	0.95
<u>sejfadinei</u>	1			1.09			
<u>C. (Arvaritia)</u> <u>obsoletus</u>	3	0.88	1.49	1.08	0.35	0.82	1.33
<u>dewulfi</u>	10	0.70	0.83	0.76	0.042	0.73	0.79
<u>montanus</u>	3	0.83	0.98	0.88	0.086	0.83	1.09
<u>C. (Culicoides)</u> <u>peregrinus</u>	10	0.92	1.22	1.10	0.078	1.04	1.15
<u>pulicaris</u>	10	1.45	1.77	1.54	0.097	1.47	1.61
<u>C. (Oecacta)</u> a. The <u>schultzei</u> gp. <u>schultzei</u>	10	0.80	1.02	0.89	0.073	0.83	0.94
b. The <u>mesghalii</u> gp. <u>mesghalii</u>	10	0.95	1.09	1.04	0.045	1.01	1.07
c. The <u>similis</u> gp. Sp. 22 n.sp.	1			0.76			
Sp. 15 n.sp.	10	0.73	0.90	0.79	0.65	0.74	0.83
<u>similis</u>	6	0.81	0.85	0.83	0.016	0.81	0.85
<u>longipennis</u>	10	1.22	1.49	1.35	0.107	1.27	1.43
d. The <u>fascipennis</u> gp. <u>subfascipennis</u>	10	1.18	1.55	1.33	0.102	1.26	1.40

Table 4 continued

Subgenera, group, species	sample size	observed range		mean	S.D.	95% confidence limit to the mean	
		min.	max.			lower limit	upper limit
e. The <u>pictipennis</u> gp.							
<u>kurensis</u>	10	0.97	1.36	1.15	0.154	1.04	1.26
<u>maritimus</u>	10	1.42	1.97	1.75	0.179	1.62	1.88
<u>stepicola</u>	10	1.09	1.35	1.24	0.080	1.18	1.30
<u>odibilis</u>	10	1.10	1.84	1.33	0.199	0.71	1.94
<u>pictipennis</u>	10	0.91	1.06	0.99	0.046	0.96	1.02
f. The <u>bulbostylus</u> gp.							
<u>turanicus</u>	10	1.10	1.20	1.16	0.034	1.13	1.18
<u>odiatus</u>	10	0.97	1.14	1.05	0.063	1.00	1.09
<u>bulbostylus</u>	6	1.05	1.22	1.11	0.065	1.04	1.18
Sp. 4 n.sp.	5	0.99	1.17	1.05	0.072	0.96	1.14
<u>dzhafarovi</u>	5	0.78	0.88	0.83	0.037	0.78	0.87
g. The <u>pallidus</u> gp.							
<u>tugaicus</u>	2	0.86	0.93	0.89	0.049	0.45	1.33
<u>pallidus</u>	5	0.85	0.98	0.91	0.060	0.83	0.98
<u>azerbajdzhanicus</u>	10	0.65	0.85	0.71	0.057	0.67	0.75
C. (<u>Beltranmyia</u>)							
<u>desertorum</u>	10	0.98	1.12	1.05	0.048	1.01	1.08
Sp. 5 n.sp.	10	0.80	1.00	0.88	0.073	0.83	0.93
<u>circumscriptus</u>	10	0.95	1.22	1.04	0.077	0.98	1.09
C. (<u>Monoculicoides</u>)							
<u>puncticollis</u>	10	1.26	1.55	1.44	0.099	1.37	1.51
<u>nubeculosus</u>	1			1.64			

SITES OF COLLECTIONS

Most of the s. w. Asian species of Culicoides are yet to be described, and a comprehensive study of this area is necessary. The present study is based on collections made between 1957 to 1968, mainly by light trap from Afghanistan, Iran, Israel, Pakistan, Saudi Arabia and Turkey. Map 1 and Table 5 show the locality and data of collections. Table 6 shows the distribution of each species in this study. Little is known about the biology and ecology of these flies in S. W. Asia.



MAP 1. Showing sites of collection.

Table 5

Data of collections in each country

Collecting sites	Date	Method of collection	No. of <u>Culicoides</u> collected
Afghanistan:			
Bamian Prov., Seyydabad, 2439 m.	8-18 August, 1968	Black light trap	5
Helmand Prov., Gawargin, 20 km. S. Lashkargah, 670 m.	1 October, 1968	Black light trap	293
Herat Prov., Karokh, 43 km. E. Herat, 1280 m.	10 Setpember, 1968	Black light trap	20
Herat Prov., Karokh, 43 km. E. Herat, 1280 m.	1, 15-21 October, 1968	Black light trap	193
Kunduz Prov., Bulla Quchi	10 September, 1968	Black light trap	1349
Kunduz Prov., Bulla Quchi	12, 16 September, 1968	Black light trap	178
Kunduz Prov.	10 September, 1968	Black light trap	136
Iran:			
Shemiran	August, 1959	Light trap	23
Hajiabad	6 August, 1959	Resting on horse	14
Tehran	3 August, 1959	Light trap	9
Karimabad	7 August, 1959	Resting on horse	13
Israel:			
Deganya A, Jordan R.	9-10 December, 1968	Light	2
Pakistan:			
Lahore	July-August, 1957	Light trap	110
Lahore	May-June, 1958	Light trap	8
Lahore	August, 1958	Light trap	15
Lahore, Punjab	June, 1959	Light trap	166
Peshawar	20 June, 1958	Light trap	58
Peshawar, N. W. Frontier Prov.	June, 1959	Light trap	229
Rawalpindi, Ayub Nat. Park	June, 1959	Light trap	237
Rawalpindi, Dhamyal	June, 1959	Light trap	328

Table 5 continued

Collecting sites	Date	Method of collection	No. of <u>Culicoides</u> collected
Saudi Arabia:			
Dhahran	September, 1964	Light trap	73
Turkey:			
Adana	24 December, 1963	-	13
Adana	13 October, 1960	Light trap	19
Bespinar	12, 14 July, 1961	Horse trap	22
Bespinar	30 April - 3 May, 1961	Horse trap	19
Bornova, Izmir Prov.	18 July, 1961	Light	112
Bornova, Izmir Prov.	October, 1961	Light	215
Bornova, Izmir Prov.	March, 1962	Light	26
Bornova, Izmir Prov.	May, 1962	Light	75
Bornova, Izmir Prov.	June, 1962	Light	55
Cigli, Izmir Prov.	29 March, 1961	Light	27
Diyarbakir	24 September, 1960	Light	33
Pirinclik	19 May, 1961	Light trap	67
Pirinclik	16 July, 1961	Light trap	12
Pirinclik	10, 12, 16 July, 1961	Horse trap	5
Pirinclik	30 April, 1961	Horse trap	9
Sivas	26 May, 1961	-	3
Tire, Izmir Prov.	-	-	25

Table 6 continued

Subgenera, group, species	Afghanistan	Iran	Israel	Pakistan	Saudi Arabia	Turkey
18 - <u>maritimus</u>						+
19 - <u>stepicola</u>	+					
20 - <u>odibilis</u>						+
21 - <u>pictipennis</u>						+
22 - Sp. 18 n.sp.			+			
23 - Sp. 30 n.sp.				+		
f. The <u>bulbostylus</u> gp.						
24 - <u>turanicus</u>	+					
25 - <u>odiatus</u>	+			+		+
26 - <u>bulbostylus</u>						+
27 - <u>furcillatus</u>						+
28 - Sp. 4 n.sp.					+	
29 - <u>dzhafarovi</u>	+					
g. The <u>pallidus</u> gp.						
30 - <u>tugaicus</u>						+
31 - <u>pallidus</u>	+			+		
32 - <u>azerbajdzhanicus</u>	+			+	+	
<u>C. (Beltranmyia)</u>						
33 - <u>desertorum</u>	+			+		
34 - Sp. 5 n.sp.					+	
35 - <u>circumscriptus</u>	+	+		+		+
<u>C. (Monoculicoides)</u>						
36 - Sp. 13 n.sp.					+	
37 - <u>puncticollis</u>	+			+		+
38 - <u>nubeculocus</u>						+

SYSTEMATIC ARRANGEMENT

The Palaearctic species of the genus Culicoides have been arranged into species groups and subgenera by Campbell and Pelham-Clinton (1960), Gutsevich (1960, 1970, 1973), Dzhafarov (1964), Kremer (1965), and Remm and Zhogolev (1968). Of 19 subgenera recorded for Culicoides (Wirth et al., 1974), 7 were reported in the Palearctic region by the above authors.

The following 7 subgenera were found to occur in the present study area: Trithecoides, Pontoculicoides, Avaritia, Culicoides, Oecacta, Beltranmyia and Monoculicoides. Based on wing pattern, palpi, female and male antennae and male genitalia, the subgenus Oecacta is further divided into 7 species groups, the schultzei, mesghalii, similis, fascipennis, pictipennis, bulbostylus and pallidus groups. The following 3 groups are new: mesghalii, bulbostylus, and pallidus groups.

In Table 7 the 38 described species are arranged phylogenetically with numerical characters given for females.

Table 7

Systematic arrangement of some female Culicoides from S. W. Asia
with mean values of certain numerical characters

Subgenera, group, species	Wing length (mm)	Wing breadth (mm)	Costal ratio	Antennal ratio	No. mandibular teeth	No. spines on tibial comb
<u>C.</u> (<u>Trithecoides</u>)						
1 - <u>humeralis</u>	0.91	0.43	0.67	1.19	7-8	4
<u>C.</u> (<u>Pontoculicoides</u>)						
2 - <u>ibericus</u>	1.02	0.48	0.57	0.87	13-14	4-5
3 - <u>saevus</u>	0.92	0.44	0.57	1.07	10-13	5
4 - <u>sejfadinei</u>	1.09	0.54	0.63	0.97	12	5
<u>C.</u> (<u>Avaritia</u>)						
5 - <u>obsoletus</u>	1.08	0.50	0.59	1.06	13-15	5
6 - <u>dewulfi</u>	0.76	0.35	0.55	1.07	13-15	5
7 - <u>montanus</u>	0.88	0.42	0.61	1.04	13-15	5
<u>C.</u> (<u>Culicoides</u>)						
8 - <u>peregrinus</u>	1.10	0.52	0.63	1.13	12-16	6
9 - <u>pulicaris</u>	1.54	0.69	0.57	0.96	14-16	6
<u>C.</u> (<u>Oecacta</u>)						
a. The <u>schultzei</u> gp.						
10 - <u>schultzei</u>	0.89	0.41	0.51	1.02	11-14	4
b. The <u>mesghalii</u> gp.						
11 - <u>mesghalii</u>	1.04	0.52	0.57	1.04	11-14	6
c. The <u>similis</u> gp.						
12 - Sp. 22 n.sp.	0.76	0.37	0.56	1.03	11	4
13 - Sp. 15 n.sp.	0.79	0.38	0.54	1.22	7-8	4
14 - <u>similis</u>	0.83	0.40	0.55	1.24	9-11	4
15 - <u>longipennis</u>	0.84	0.39	0.53	1.35	9-11	4
d. The <u>fascipennis</u> gp.						
16 - <u>subfascipennis</u>	1.33	0.62	0.56	1.12	12-16	4-5

Table 7 continued

Subgenera, group species	Wing length (mm)	Wing breadth (mm)	Costal ratio	Antennal ratio	No. mandibular teeth	No. spines on tibial comb
e. The <u>pictipennis</u> gp.						
17 - <u>kurensis</u>	1.15	0.53	0.54	1.05	14-17	4
18 - <u>maritimus</u>	1.75	0.75	0.61	1.45	13-18	4
19 - <u>stepicola</u>	1.24	0.55	0.56	1.24	12-15	4-5
20 - <u>odibilis</u>	1.33	0.61	0.58	1.36	11-14	4-5
21 - <u>pictipennis</u>	0.99	0.47	0.55	1.25	12-14	4
22 - Sp. 18 n.sp.*						
23 - Sp. 30 n.sp.*						
f. The <u>bulbostylus</u> gp.						
24 - <u>turanicus</u>	1.16	0.54	0.58	1.29	12-13	4
25 - <u>odiatus</u>	1.05	0.49	0.59	1.08	10-13	4
26 - <u>bulbostylus</u>	1.15	0.53	0.57	1.15	10-15	4
27 - <u>furcillatus</u> **						
28 - Sp. 4 n.sp.	1.05	0.48	0.59	1.12	11-13	4
29 - <u>dzhafarovi</u>	0.83	0.40	0.55	1.22	11-14	4
g. The <u>pallidus</u> gp.						
30 - <u>tugaicus</u>	0.90	0.43	0.53	1.17	12-15	5
31 - <u>pallidus</u>	0.91	0.43	0.55	1.08	11-15	4
32 - <u>azerbajdzhanicus</u>	0.71	0.35	0.51	1.19	8-9	4
<u>C. (Beltranmyia)</u>						
33 - <u>desertorum</u>	1.05	0.49	0.53	1.22	14-15	5
34 - Sp. 5 n.sp.	0.89	0.44	0.55	1.23	11-12	4-5
35 - <u>circumscriptus</u>	1.04	0.48	0.57	1.17	14-18	4
<u>C. (Monoculicoides)</u>						
36 - Sp. 13 n.sp.*						
37 - <u>puncticollis</u>	1.44	0.61	0.53	0.79	10-13	5
38 - <u>nubeculosus</u>	1.64	0.71	0.54	0.79	11	6

* - Female unknown

** - Female not collected

KEY TO SUBGENERA, GROUP AND SPECIES OF THE GENUS
CULICOIDES LATREILLE OF SOUTHWEST ASIA

- 1 (2) Females 2
 Males 35
- 2 (1) More than one spermatheca 3
 One spermatheca 7
- 3 (4) Three well developed spermathecae 4
 Two well developed spermathecae, disregarding rudimentary
 spermatheca 5
- 4 (3) Eyes contiguous, wing spotted (subgenus Trithecoides) .
 humeralis
 Eyes separate, wing clear (subgenus Pontoculicoides) . . 8
- 5 (6) Eyes contiguous 6
 Eyes separate (subgenus Oecacta) 13
- 6 (5) Third palpal segment with compact sensilla, Plate 1K
 (subgenus Avaritia) 10
 Third palpal segment with dispersed sensilla, Plate 1C
 (subgenus Culicoides) 12
- 7 (2) Antennal segments 10-15 with sensilla coeloconica
 (subgenus Beltranmyia) 31
 Antennal segments 10-15 without sensilla coeloconica
 (subgenus Monoculicoides) 33

Subgenus PONTOCULICOIDES

- 8 (4) Spermathecae long and recurved ibericus
 Spermathecae not recurved 9

- 9 (8) Spermathecae semispheroidal saevus
 Spermathecae mushroom shaped sejfadinei

Subgenus AVARITIA

- 10 (6) Antennal segments 3-10 with tube-like sensilla trichodea .
 montanus
 Antennal segments 3-10 without tube-like sensilla trichodea
 11
- 11 (10) Spermathecae unequal dewulfi
 Spermathecae equal obsoletus

Subgenus CULICOIDES

- 12 (6) Palps covered with dark spiny setae arranged in rows . . .
 peregrinus
 Palps without dark spiny seta pulicaris

Subgenus OECACTA

- 13 (5) Antennal segments 11-15 with sensilla coeloconica 14
 Antennal segments 11-15 without sensilla coeloconica . . 17
- 14 (13) Third palpal segment with dispersed sensilla, wing spotted
 (mesghalii group) mesghalii
 Third palpal segment with compact sensilla, wing clear
 or spotted 15
- 15 (14) Wing spotted 16
 Wing clear or with very pale marks over the costal margin
 (bulbostylus group) 19

- 16 (15) Antennal segments 4-10 with sensilla coeloconica (pictipennis group) 22
- Antennal segments 4-10 without sensilla coeloconica
(fascipennis group) subfascipennis
- 17 (13) Wing spotted 18
- Wing clear or with very pale marks over the costal margin
(pallidus group) 26
- 18 (17) Cell R₅ with 4 or more pale spots, antennal segments 4-6
without sensilla coeloconica (schultzei group)
. schultzei
- Cell R₅ with 3 or less pale spots, antennal segments 4-6
with sensilla coeloconica (similis group) 28
- bulbostylus group
- 19 (15) Spermathecae equal 20
- Spermathecae unequal odiatus
- 20 (19) Third palpal segment with shallow sensory pit 21
- Third palpal segment with deep sensory pit . . Sp. 4 n. sp.
- 21 (20) Wing longer than 1 mm turanicus
- Wing shorter than 1 mm dzhafarovi
- pictipennis group
- 22 (16) Basal cell without macrotrichia 23
- Basal cell with macrotrichia maritimus
- 23 (22) Pale spot present on the apical third of the wing 24
- Pale spot not present on the apical third of the wing . . .
. kurensis

- 24 (23) Spermathecae equal 25
 Spermathecae unequal odibilis
- 25 (24) Legs light brown without pattern stepicola
 Legs with dark knees and pale bands on femur and tibia . . .
 pictipennis

pallidus group

- 26 (17) Spermathecae with long sclerotized neck . . azerbajdzhanicus
 Spermathecae neck not long 27
- 27 (26) Fronto-vertex broad, about 2 times the width of the facet;
 tibial comb with 5 spines tugaicus
 Fronto-vertex narrow, less than the width of a facet;
 tibial comb with 4 spines pallidus

similis group

- 28 (18) Third palpal segment with shallow sensory pit 29
 Third palpal segment with deep sensory pit . . . Sp. 22 n. sp.
- 29 (28) Pale spot at the apex of cell R_5 heart shaped
 Sp. 15 n. sp.
 Pale spot at the apex of cell R_5 rounded 30
- 30 (29) Cell R_5 with 2 pale spots past the end of costa . . . similis
 Cell R_5 with only 1 pale spot past the end of costa
 longipennis

Subgenus BELTRANMYIA

- 31 (7) Wing spotted, basal cell with macrotrichia 32
 Wing clear, basal cell without macrotrichia . . . Sp. 5 n. sp.

- 32 (31) Dark spot over r-m cross vein circumscriptus
 Dark spot over r-m cross vein not present desertorum

Subgenus MONOCULICOIDES

- 33 (7) Wing spotted 34
 Wing clear Sp. 13 n. sp.
- 34 (33) Spermatheca spherical nubeculosus
 Spermatheca saccate, often curved puncticollis
- 35 (1) Parameres separate 36
 Parameres fused (subgenus Monoculicoides) 67
- 36 (35) Ninth tergum rounded apically, apicolateral processes
 small or absent 37
 Ninth tergum not rounded, apicolateral processes well
 developed 38
- 37 (36) Apicolateral processes absent, inner side of basistyle
 without setae (subgenus Avaritia) 43
 Apicolateral processes small, inner side of basistyle with
 setae (subgenus Culicoides) 45
- 38 (36) Radial cells equal 39
 Radial cells unequal (subgenus Trithecoides) humeralis
- 39 (38) Female with 2 or 3 spermathecae 40
 Female with only 1 spermatheca (subgenus Beltranmyia) 66
- 40 (39) Female with 3 spermathecae (subgenus Pontoculicoides) 41
 Female with 2 spermathecae (subgenus Oecacta) 46

Subgenus PONTOCULICOIDES

- 41 (40) Veins surrounding cell R₂ slightly darker than the rest of

- the wing ibericus
- Veins surrounding cell R_2 not dark 42
- 42 (41) Parameres pointed basally and at apices sejfadinei
- Parameres pointed only at apices saevus

Subgenus AVARITIA

- 43 (37) Ninth sternum with slit-like notch 44
- Ninth sternum without slit-like notch; aedeagus arch less
than its width dewulfi
- 44 (43) Third palpal segment with very deep tube-like sensory pit .
. montanus
- Third palpal segment without deep sensory pit obsoletus

Subgenus CULICOIDES

- 45 (37) Palps covered with dark spiny setae peregrinus
- Palps without dark spiny setae pulicaris

Subgenus OECACTA

- 46 (40) Antenna with sensilla coeloconica on segments 13-15 . . . 47
- Antennal segments 13-15 without sensilla coeloconica . . 50
- 47 (46) Third palpal segments with dispersed sensilla; wing spot-
ted (mesghalii group) mesghalii
- Third palpal segment with compact sensilla in form of
sensory pit, wing clear or spotted 48
- 48 (47) Wing spotted 49
- Wing unspotted or with very pale marks over the costal
margin (bulbostylus group) 52

- 49 (48) Antennal segments 4-12 with sensilla coeloconica (pictipennis group) 56
- Antennal segments 4-12 without sensilla coeloconica (fascipennis group) subfascipennis
- 50 (46) Wing spotted 51
- Wing clear or with very pale marks over the costal margin
(pallidus group) 62
- 51 (50) Cell R₅ with 4 or more pale spots; antennal segments 4-8
without sensilla coeloconica (schultzei group)
. schultzei
- Cell R₅ with 3 or less pale spots; antennal segments 4-8
with sensilla coeloconica (similis group) 64
- bulbostylus group
- 52 (48) Third palpal segment with deep sensory pit 53
- Third palpal segment with shallow sensory pit 54
- 53 (52) Dististyle divided sharply into 2 parts, thickened basal
part spheroidal and covered with long bristles
. bulbostylus
- Dististyle not divided into 2 parts odiatus
- 54 (52) The tip of parameres divided into 3-4 prongs
. furcillatus
- The tip of parameres pointed 55
- 55 (54) Aedeagus arch low, its height less than half of its
width dzhafarovi
- Aedeagus arch high, its height equal or more than its
width turanicus

pictipennis group

- 56 (49) Basal cell without macrotrichia 57
 Basal cell with macrotrichia maritimus
- 57 (56) Pale spot present on apical third of wing 58
 Apical third of wing without pale spot kurensis
- 58 (57) Legs with light bands 59
 Legs without pattern stepicola
- 59 (58) Apical half of dististyle light yellow, color different
 from basal half Sp. 30 n. sp.
 Dististyle light brown 60
- 60 (59) Dististyle hook shaped, bent at right angle at
 middle Sp. 18 n. sp.
 Dististyle not hook shaped 61
- 61 (60) Aedeagus arch V-shaped, median portion truncated . . odibilis
 Aedeagus arch U-shaped, median portion not truncated . .
 pictipennis

pallidus group

- 62 (50) Paramere basal knob foot shaped 63
 Paramere basal knob simple pallidus
- 63 (62) Paramere serrate apically tugaicus
 Paramere dentate apically azerbajdzhanicus

similis group

- 64 (51) Pale spot at the apex of cell R₅ rounded 65

- Pale spot at the apex of cell R_5 heart shaped
- Sp. 15 n. sp.
- 65 (64) Aedeagus filiform at the tip similis
- Aedeagus serrated at the tip longipennis

Subgenus BELTRANMYIA

- 66 (39) Dark spot over r-m cross vein; ventral root of basistyle
not developed circumscriptus
- No dark spot over r-m cross vein; ventral root of basistyle
well developed desertorum

Subgenus MONOCULICOIDES

- 67 (35) Wing spotted 68
- Wing clear Sp. 13 n. sp.
- 68 (67) Ventral root of basistyle large nubeculosus
- Ventral root of basistyle small puncticollis

54 (a) Subgenus Subgenus
 54 (b) Subgenus Subgenus at the tip
 54 (c) Subgenus Subgenus at the tip

Subgenus Subgenus

55 (i) Subgenus Subgenus over the cross
 55 (ii) Subgenus Subgenus
 55 (iii) Subgenus Subgenus

Subgenus Subgenus

56 (i) Subgenus Subgenus
 56 (ii) Subgenus Subgenus
 56 (iii) Subgenus Subgenus



Culicoides (Trithecoides) humeralis Okada, 1941

Plate 2

Culicoides humeralis Okada, 1941, J. Coll. Agric., Hokaido Imp. Univ.

Size small ;wing spotted, radial cells unequal; eyes contiguous.

Female. - Eyes contiguous (Plate 2F) and bare. Antennal segments 3 - 15 (Plate 2A) lengths in mean proportion of 18 - 13.5 - 14 - 15 - 16 - 16.5 - 17 - 16.5 - 25.5 - 24 - 27.5 - 30 - 43 (n = 4); AR 1.19 (1.15 - 1.25, n = 4); sensilla coeloconica on segments 3, 11 - 15, total number of sensilla coeloconica 10 - 11; sensilla chaetica on segment 1 - 10, terminal seta present. Third palpal segment (Plate 2P) slightly swollen with scattered sensory organ; palpal segments 2 - 5 lengths 42 - 46 - 24 - 25 (n = 4) microns; PR 1.80 (1.54 - 2.00, n = 4). Mandible with 7 - 8 very strong teeth (Plate 2B).

Thorax: Mesonotum (Plate 2M) yellowish with dark brown stripe on anterior margin and somewhat lighter brown spot on posterior margin, based on slide mounted specimens; scutellum and postscutellum dark brown. Wing pattern as illustrated (Plate 2W), 3 very dark areas on the costal margin of the wing, dark spots on apical half slightly variable in size, dark area located at the tip of vein M_1 , M_2 , M_{3+4} and Cu, apical part of first radial cell and distal part of second radial cell dark, radial cells unequal, second radial cell larger than the first; macrotrichia few, only at the apical part of wing, no macrotrichia on basal cell; wing length 0.91 (0.81 - 0.99, n = 1) mm, breadth 0.43 (0.39 - 0.46, n = 4) mm, CR 0.67 (0.65 - 0.68, n = 4). Halter pale. Legs (Plate 2L) dark brown with pale bands as illustrated; tibial comb (Plate 2T) with 4 spines, the second from spur longest.

Abdomen: Brown, with 3 spermatheca (Plate 2S), middle spermatheca

Culcioides (Trithecooides) humeralis

(only female)

A - antenna

B - mandible

F - fronto-vitta

L₁ - female 1st legL₂ - female 2nd legL₃ - female 3rd leg

M - mesonotum and scutellum

P - palpus

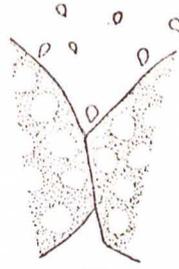
S - spermathecae

T - tibial comb

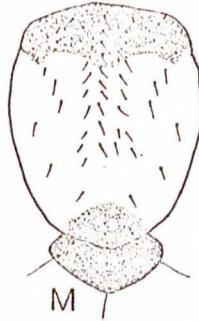
W - wing



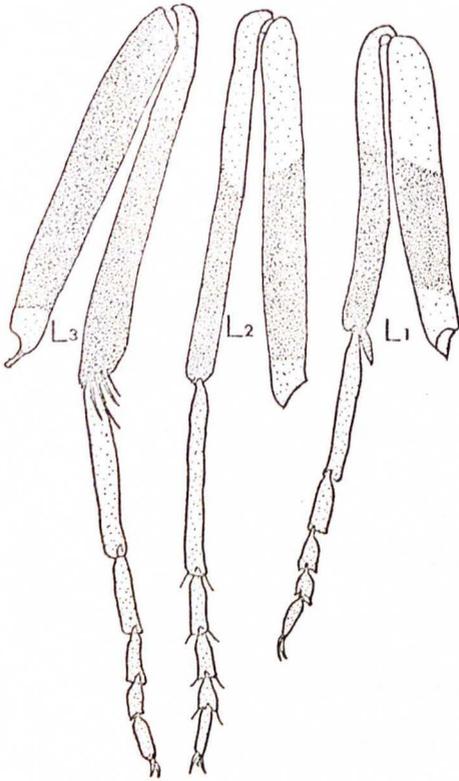
W



F



M



L3

L2

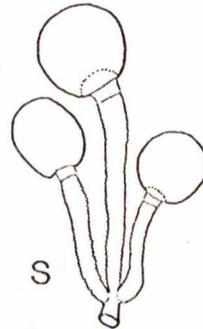
L1



P



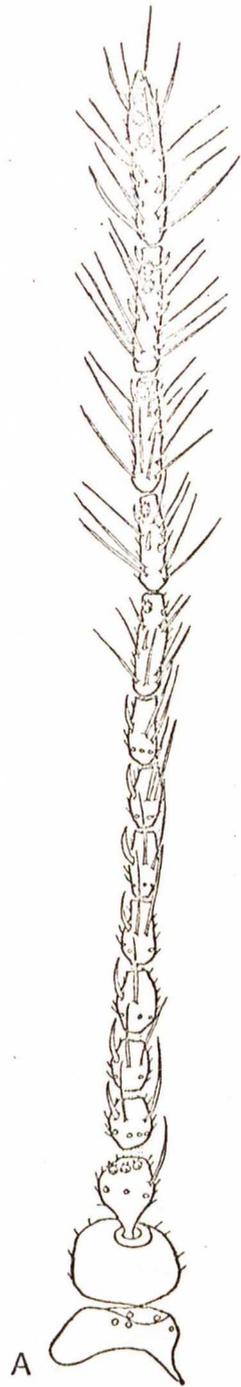
T



S



B



A

slightly larger than others; measuring 32 by 32 (n = 4) microns and 23 by 23 (n = 7) microns, the duct of the larger spermatheca 78 microns and the duct of the small spermatheca 45 microns.

Male. - Not collected.

Distribution - Japan, Malaya, Taiwan, Thailand, E. Siberia, Pakistan.

Slide mounted material studied - Pakistan: Lahore, Punjab, June 1959, H. Barnett, light trap, 4 females.

The drawings of Plate 1 and measurements were done from the mentioned specimens from Pakistan.

Culicoides (Pontoculicoides) ibericus Dzhafarov, 1964

Plate 3

Culicoides ibericus Dzhafarov, 1964, Biting Midges (Diptera, Heleidae) Transcaucasus: 355.

Size medium; wing clear; separate eyes.

Female. - Eyes separate (Plate 3F) and bare. Antennal segments 3 - 15 (Plate 3A) lengths in proportion of 17 - 12 - 12 - 12 - 13 - 13 - 13 - 14 - 17 - 17 - 18 - 17 - 23 (n = 1), AR 0.87 (n = 1); sensilla coeloconica on segments 3, 4, 7 - 10, it may be absent on segment 4 (present on right side only), total number of sensilla coeloconica 7 - 8; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 3P) swollen with single shallow sensory pit; palp segments 2 - 5 lengths 54 - 60 - 25 - 29 (n = 1) microns; PR 2 (n = 1). Mandible with 13 - 14 teeth.

Thorax: Mesonotum dark brown, based on slide mounted specimen, without distinct pattern; scutellum same color as mesonotum. Wing

Culicoides (Pontoculicoides) ibericus

(only female)

A - antenna

F - fronto-vitta

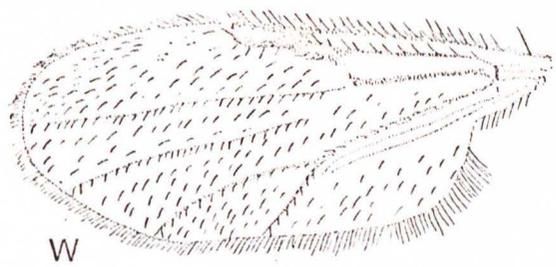
L₁ - 1st legL₂ - 2nd legL₃ - 3rd leg

P - palpus

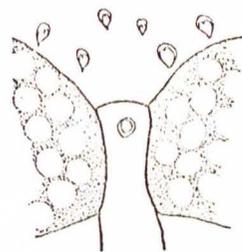
S - spermathecae

T - tibial comb

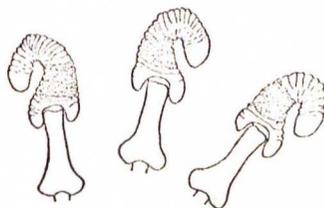
W - wing



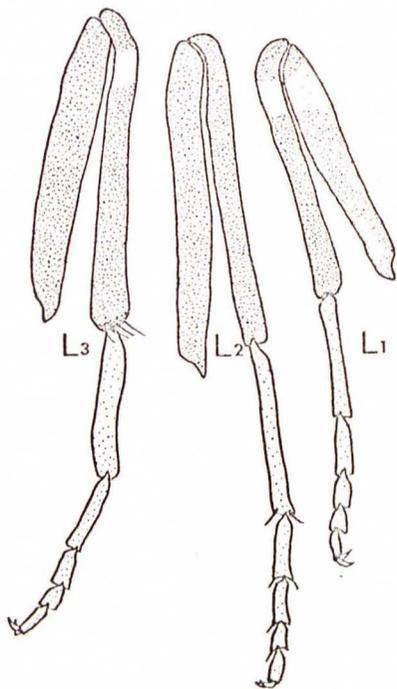
W



F



S



L3

L2

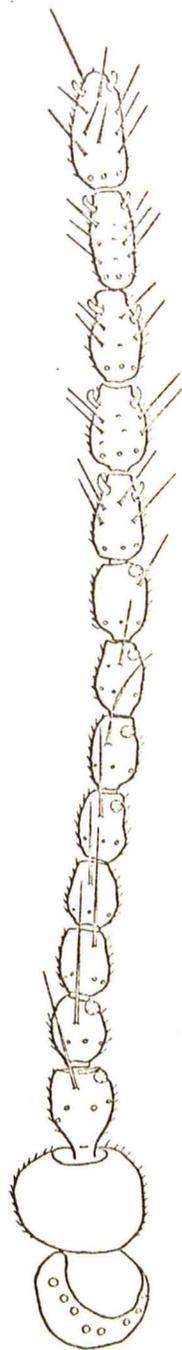
L1



T



P



A

(Plate 3W) clear without spots, radial veins around the second radial cell slightly darker than the rest of the wing, radial cells equal; macrotrichia not dense, present all over the wing except the basal cell; wing length 1.02 mm, breadth 0.48 mm, CR 0.57. Halter pale. Legs (Plate 3L) pattern as illustrated, femur and tibia light brown and darker than the other parts, first and second thoracic legs with pale bands at the base and tip of the femur and the base of tibia, hind legs with 1 pale band at the base of tibia; tibial comb (Plate 3T) with 4 - 5 spines (different in left and right leg), the first and second from spur subequal and longest.

Abdomen: Dark brown with 3 peculiar recurved spermathecae (Plate 3S), roughly measured 38 by 25 microns, neck 36 microns.

Male. - Not collected.

Distribution - Italy; Turkey; USSR.

Slide mounted material studied - Turkey: Bornova, Izmir Prov., May 1962, T. Curtin, light, 1 female.

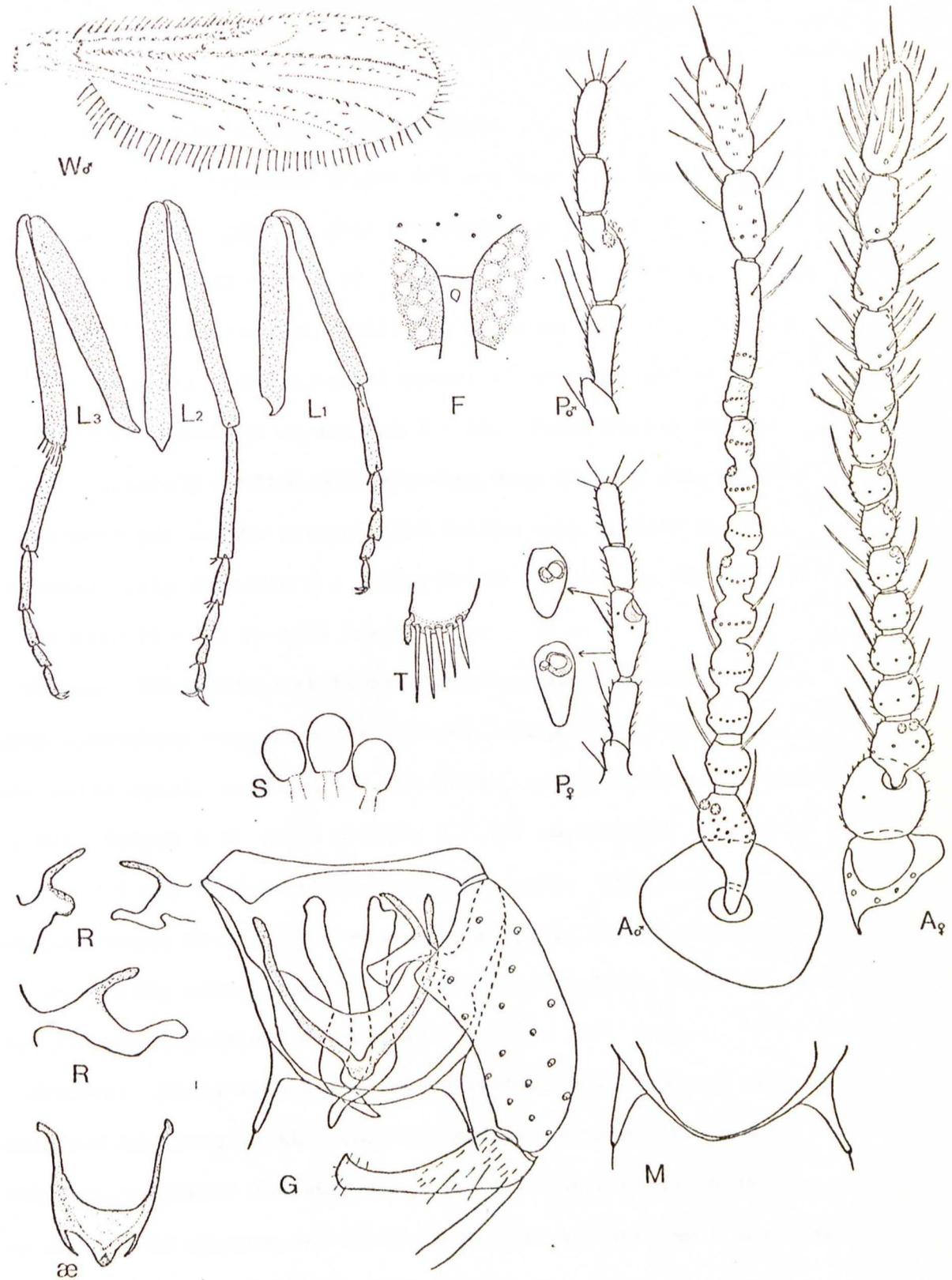
The drawings of Plate 2 and measurements were done from the only female collected from Turkey.

Discussion - One female of Culicoides ibericus was studied from USSR. It showed a greatly different antennal ratio (1.60), than a specimen from Turkey (0.87). The wing length of a specimen from USSR is 1.11 mm., and the specimen from Turkey is 1.02 mm. In other aspects they are identical.

Culicoides (Pontoculicoides) saevus Kieffer, 1923

Culicoides (Pontoculicoides) saevus

- A - antennae, male and female
ae - aedeagus
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
R - dorsal and ventral roots of basistyle
S - spermathecae
T - female tibial comb
W - male wing



Culicoides saevus Kieffer, 1923. Arch. Inst. Pasteur d'Algerie,
1: 675.

Size small; wing clear; separate eyes.

Female. - Eyes separate (Plate 4F) and bare. Antennal segments 3 - 15 (Plate 4A) lengths in mean proportion of 16 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 14 - 15 - 17 - 17 - 29 (n = 5), AR 1.07 (1.01 - 1.15, n = 5); sensilla coeloconica usually on segments 3, 7 - 10, may be present on segments 5 and 6, total number of sensilla coeloconica 6 - 8; sensilla chaetica on segment 1 - 15. Third palpal segment (Plate 4P) slightly swollen with somewhat deep sensory pit, another small sensory pit may be present next to the main sensory pit as illustrated; palp segments 2 - 5 lengths 43 - 48 - 23 - 32 (n = 5). Mandible with 10 - 13 (n = 8) teeth.

Thorax: Mesonotum dark brown without pattern based on slide mounted specimens; scutellum light brown. Wing clear without spot, radial cells equal; macrotrichia not dense, no macrotrichia on basal cell; wing length 0.91 (0.80 - 0.99, n = 10) mm, breadth 0.47 (0.38 - 0.54, n = 10) mm, CR 0.57 (0.54 - 0.59, n = 10). Halter pale. Legs (Plate 4L) light brown, femur and tibia slightly darker without distinct pale band; tibial comb (Plate 4T) with 5 spines, the first and second from spur subequal and longest.

Abdomen: Brown with 3 sac-shaped spermathecae, usually well sclerotized but occasionally they are not sclerotized (Plate 4S), 1 of the 3 spermathecae somewhat larger, the other 2 equal; measuring 33 by 26 (n = 5) microns and 26 by 23 (n = 5) microns, neck sometimes visible but not sclerotized as illustrated.

Male. - Same as female with usual differences. Wing (Plate 4W) length 0.79 (0.72 - 0.87, n = 10) mm, breadth 0.31 (n = 10) mm, CR 0.51 (n = 10). Antenna with sensilla coeloconica on segments 3, 8 - 10; may be absent on segment 9 or 10 (Plate 4A); sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 4P) slightly swollen with small but somewhat deep sensory pit.

Genitalia: (Plate 4G, ae, M, R) 9th tergum short and slightly wider at base, lateral processes well developed and divergent, posterior margin without notch and usually convex (Plate 4G, M); basistyle not broad, with well developed ventral and dorsal roots, ventral root variable in shape as illustrated (Plate 4G, R), dististyle narrowed toward the apex, not curved; 9th sternum with shallow excavation, membrane not spiculate. Aedeagus with high U-shaped arch, arms slender and sclerotized, median portion very short the form of a projection. Paramere peculiar, shaped like a straight rod, apex narrowed and curved.

Distribution - Algeria, Afghanistan, Iran, Pakistan, USSR.

Slide mounted material studied - Afghanistan: Helmand Prov., Gawargin, 670 m, 20 km S. Lashkaegah, 1 October 1968, D. P. Wojcik, black light trap, 60 females; Kunduz Prov., Bulla Quchi, 305 m, 10 September 1968, D. P. Wojcik, black light trap, 62 females, 1 male; Kunduz Prov., Bulla Quchi, 10 September 1968, D. P. Wojcik, 543 females, 1 male; Kunduz Prov., Bulla Quchi, 12 September 1968, D. P. Wojcik, black light, 76 females, 1 male and 1 gynandromorph.

Iran: Shemiran, August 1959, H. Barnett, light trap, 1 female; Tehran, 3 August, 1959, H. Barnett, light trap, 1 male.

Pakistan: Dharmyal, Rawalpindi, June 1959, H. Barnett, light trap, 75 females, 32 males; Lahore, July - August 1957, J. Maldonado, 3 females, 7 males; Lahore, Punjab, June 1959, H. Barnett, light trap, 3 females, 4 males; Ayub Natl. Park, Rawalpindi, June 1959, H. Barnett, light trap, 14 females, 7 males; Peshawar, 20 June 1958, J. Maldonado, light trap, 20 females, 6 males and 1 gynandromorph; Peshawar, 20 June 1958, J. Maldonado, light trap, 20 females, 14 males; Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 26 females, 12 males; Peshawar, 20 September 1960, J. Scanlon, light trap, 1 female.

Turkey: Bospinar, 1 - 3 May 1961, T. J. Curtin, horse trap, 9 females; Bospinar, 12 July 1961, T. J. Curtin, horse trap, 1 female; Diyarbakir, 24 September 1960, T. J. Curtin, light, 4 females; Izmir Prov., Bornova, October 1961, T. J. Curtin, light, 13 females, 1 male; Izmir Prov., Bornova, March 1962, T. J. Curtin, light, 1 female, 1 male; Izmir Prov., Bornova, May 1962, T. J. Curtin, light 1 female, 1 male; Izmir Prov., Bornova, June 1962, T. J. Curtin, light, 1 female; Izmir Prov., Cigil, 29 March 1961, T. J. Curtin, light, 12 females, 3 males; Izmir Prov., Pirincilik, 30 April - 19 May 1961, T. Curtin, light trap, 3 females, 1 male; Pirincilik, 16 July 1961, T. J. Curtin, 1 female, 1 male; Izmir Prov., Tir, T. J. Curtin, light, 7 females (no date recorded).

The drawings of Plate 4 and all measurements were done from the specimens from Pakistan, Dharmyal, Rawalpindi, June 1959, H. Barnett, light trap.

Culicoides (Pontoculicoides) sejfadinei Dzhafarov, 1958

Plate 5

Culicoides sejfadinei Dzhafarov, 1958. New species of biting flies
Diptera, Heleidae from Nakhichevanskai USSR: 247.

Size medium; wing clear; eyes separate.

Female. - Eyes separate (Plate 5F) and bare. Antennal segments
3 - 15 (Plate 5A) lengths in proportion of 14 - 13 - 14 - 13 - 14 -
14 - 15 - 15 - 17 - 19 - 22 - 21 - 30 (n = 1), AR 0.97 (n = 1); sen-
silla coeloconica on segments 3, 5 - 10; sensilla chaetica on segments
1 - 15. Third palpal segment (Plate 5P) swollen with single shallow
sensory pit; palp segments 2 - 5 lengths 54 - 65 - 29 - 29 (n = 1)
microns; PR 2.23 (n = 1). Mandible with 12 teeth.

Thorax: Mesonotum dark brown without pattern based on slide
mounted specimen; scutellum slightly lighter than mesonotum. Wing
(Plate 5W) clear without spot; radial cells equal; macrotrichia not
dense and mainly at the apical half, basal cell without macrotrichia;
wing length 1.09 (n = 1) mm, breadth 0.54 (n = 1) mm, CR 0.63 (n = 1).
Halter very light brown. Legs (Plate 5L) brown without pattern;
tibial comb (Plate 5T) with 5 spines, first from spur longest.

Abdomen: Light brown with 3 equal mushroom-shaped spermathecae
(Plate 5S); measuring 59 by 49 (n = 2) microns, spermatheca duct 34
(n = 2) microns.

Male. - Not collected.

Distribution - Iran, Pakistan, USSR.

Slide mounted material studied - Pakistan: Dharmyal, Rawalpindi,
June 1959, H. Barnett, light trap, 1 female.

PLATE 5

Culicoides (Pontoculicoides) sejfadinei

(only female)

A - antenna

F - fronto-vitta

L₁ - 1st leg

L₂ - 2nd leg

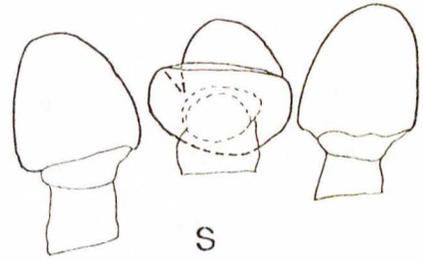
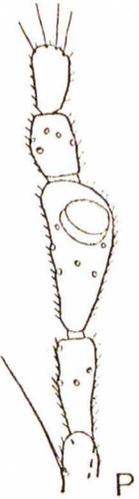
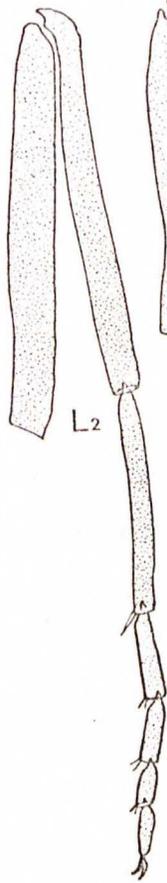
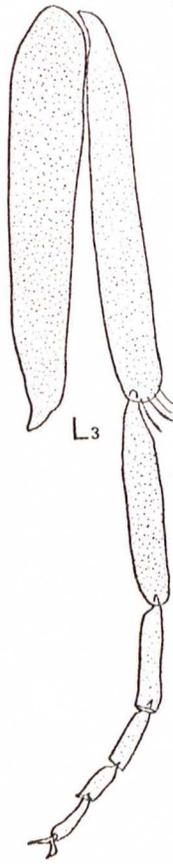
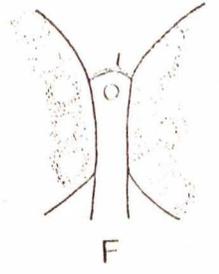
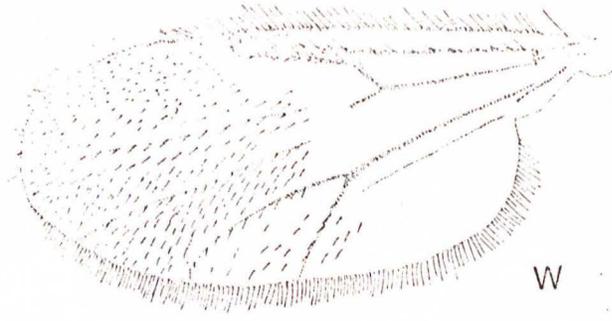
L₃ - 3rd leg

P - palpus

S - spermathecae

T - tibial comb

W - wing



Culicoides (Avaritia) obsoletus Meigen, 1818

Plate 6

Ceratopogon obsoletus Meigen, 1818. Syst. Beschreibung der Bekannten europäischen Zweiflügelige Insekten: 76.

Size small; wing spotted; eyes contiguous.

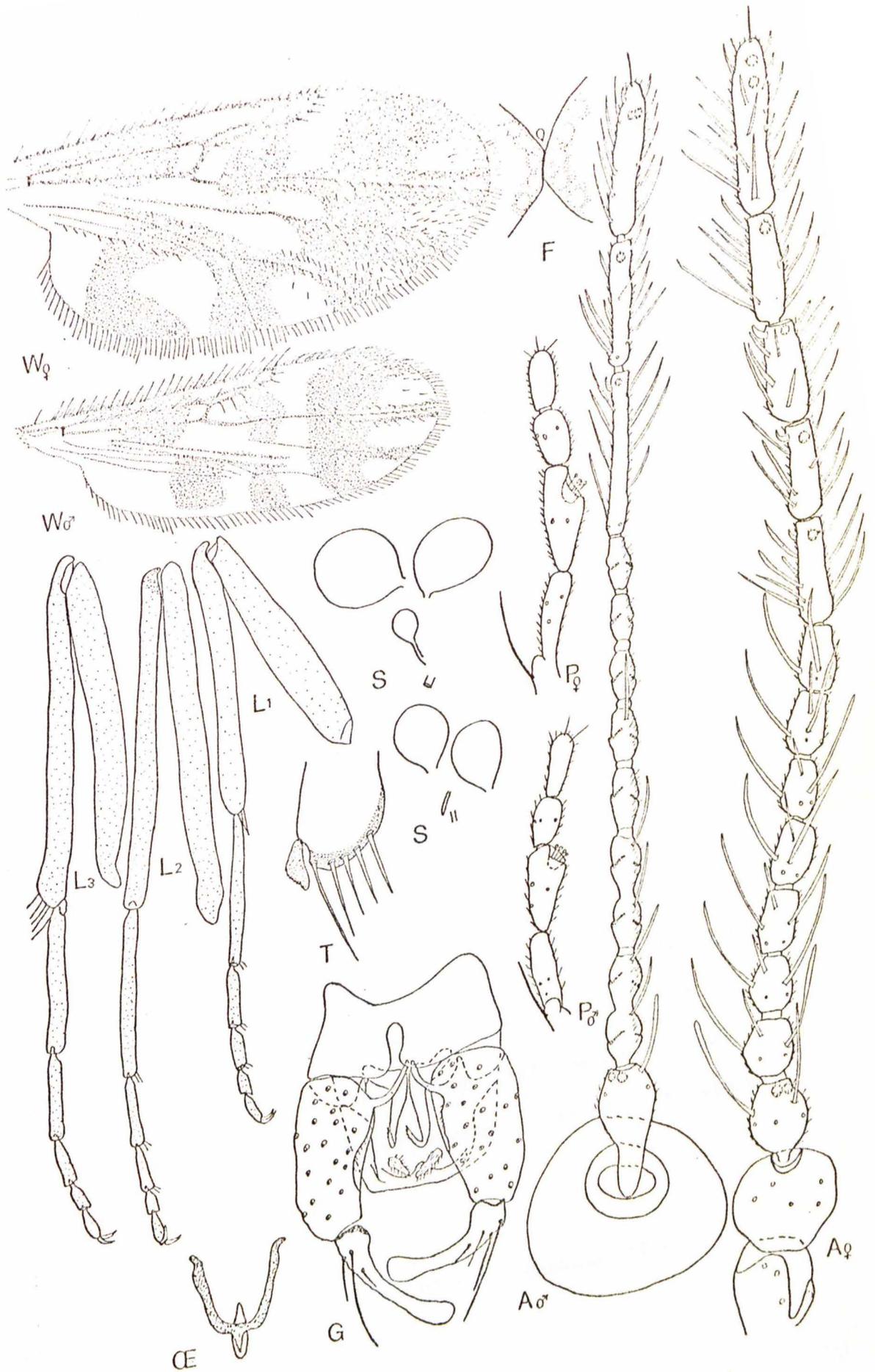
Female. - Eyes contiguous (Plate 6F) and bare. Antennal segments 3 - 15 (Plate 6A) lengths in mean proportion of 18 - 12 - 12 - 12 - 13 - 13 - 13 - 14 - 20 - 21 - 19 - 20 - 36 (n = 3), AR 1.06 (1.02 - 1.15, n = 3); sensilla coeloconica on segments 3, 11 - 15, total number of sensilla coeloconica 6 - 7; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 6P) with a single sensory pit, not deep; palpal segments 2 - 5 lengths 50 - 56 - 27 - 22 (n = 3); PR 2.67 (2.33 - 2.90, n = 3). Mandible with 13 - 15 teeth.

Thorax: Mesonotum dark brown based on slide mounted specimens, no distinct pattern; scutellum same color as mesonotum. Wing (Plate 6W) with pale spots as illustrated, radial cells equal, basal half of first radial cell and apical half of second radial cell in pale spot; pale spots on apical part of cells R_5 , M_1 , M_2 and M_4 ; wing length 1.08 (0.88 - 1.49, n = 3) mm, breadth 0.50 (0.41 - 0.68, n = 3) mm, CR 0.59 (0.58 - 0.60, n = 3); macrotrichia distributed on apical half of wing. Halter pale. Legs (Plate 6L) light brown as illustrated; tibial comb (Plate 6T) with 5 spines, the first one from spur longest.

Abdomen: Brown, lighter than thorax, with 2 subequal spermathecae, measuring 46 by 22 (n = 3) microns and 42 by 34 (n = 3) microns; rudimentary spermatheca and sclerotized ring (Plate 6S) present; rudimentary spermatheca length 15 microns, the rudimentary spermatheca may

Culicoides (Avaritia) obsoletus

- A - antennae, male and female
ae - aedeagus
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
S - spermathecae
T - female tibial comb
W - wings, male and female



develop as third small spermatheca (Plate 6S) as illustrated.

Male. - Same as female with usual differences. Wing (Plate 6W) length 1.15 (n = 1) mm, breadth 0.42 (n = 1) mm, CR 0.57 (n = 1); Antenna (Plate 6A) with sensilla coeloconica on segments 3, 13 - 15; sensilla chaetica on segments 1 - 12, terminal seta present. Third palpal segment (Plate 6P) with single sensory pit.

Genitalia: (Plate 6G, ae) 9th tergum truncate without apicolateral process; sternum with deep narrow notch; membrane bare. Basistyle with few setae on inner margin as illustrated, ventral root very long and slender, dorsal root short; dististyle with round apex. Aedeagus (Plate 6ae) with high U-shaped arch and small median process. Parameres bent at right angle and swollen at base then gradually narrowed and pointed at the tip, the apex bent sharply.

Distribution - North Africa; North America; Asia; Europe.

Slide mounted material studies - Turkey, Izmir Prov., Bornova, October 1961, T. Curtin, light, 2 females, 1 male; Izmir Prov., Bornova, March 1962, T. Curtin, light, 1 female.

Discussion - There is a significant difference in size of specimens collected in March and October. The wing of the female measured 1.49 mm by 0.68 mm in March and 0.88 mm by 0.41 mm in October.

Drawings of Plate 6 were done from specimens collected from Bornova, October 1961; all collected specimens were used for measurements.

Culicoides (Avaritia) dewulfi Goetghebuer, 1936

Plate 7

Culicoides dewulfi Goetghebuer, 1936. Bull. Annl. Soc. Ent. Belgique
76: 320.

Size small; wing spotted; eyes contiguous.

Female. - Eyes contiguous (Plate 7F) and bare. Antennal segments 3 - 15 (Plate 7A) lengths in mean proportion of 14 - 9 - 9 - 10 - 10 - 10 - 10 - 11 - 16 - 17 - 17 - 17 - 24 (n = 5), AR 1.07 (1 - 1.16, n = 5); basiconica sensoria on segments 3, 12 - 15, may be present on segment 11, total number of sensilla coeloconica 6 - 7; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 7P) with a single shallow sensory pit; palpal segments 2 - 5 lengths 46 - 37 - 22 - 24 (n = 5) microns; PR 2.23 (1.87 - 2.71, n = 5). Mandible with 13 - 15 (n = 8) teeth.

Thorax: Mesonotum dark brown based on slide mounted specimen; scutellum same color as mesonotum. Wing (Plate 7W) with pale spots, radial cells equal, basal half of first radial cell and apical half of second radial cell in light spots, light spots on apical part of cells R_5 , M_1 , M_2 and M_4 ; macrotrichia few distributed on apical part and anal cell; wing length 0.76 (0.70 - 0.83, n = 10) mm, breadth 0.35 (0.30 - 0.39, n = 10) mm, CR 0.55 (0.54 - 0.57, n = 10). Halter pale. Legs (Plate 7L) brown with pale bands as illustrated, femur and tibia darker; tibial comb (Plate 7T) with 5 spines, the first from spur longest.

Abdomen: Brown with 2 unequal spermathecae (Plate 7S), measuring 44 by 39 (n = 5) microns and 34 by 29 (n = 5) microns; rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca length 19 (n = 4) microns, neck short.

Male. - Same color as female with usual differences. Wing (Plate 7W) length 0.83 (0.73 - 0.90, n = 5) mm, breadth 0.32 (0.28 - 0.39, n = 5), CR 0.53 (n = 5). Antenna with sensilla coeloconica (Plate 7A) on segments 3, 13 - 15; sensilla chaetica on segments 1 - 13, may be present on segment 14, terminal seta present. Third palpal segment (Plate 7P) with single sensory pit, not deep.

Genitalia: (Plate 7G, ae) 9th tergum nearly rectangular without apicolateral processes, posterior margin without notch; basistyle with long curved ventral root, dorsal root short; dististyle elongated and narrowed at the apex; 9th sternum with wide deep emargination, membrane bare. Aedeagus (Plate 7ae) arms joined by a transverse cross-piece, the crosspiece may be weakly sclerotized as illustrated.

Distribution - Central Africa; Asia: Afghanistan, Iran, Pakistan, USSR; Europe: Belgium, England, Scotland.

Slide mounted material studied - Afghanistan: Helmand Prov., Gawargin, 670 m, 20 km S. Lashkargah, 1 - X - 1968, D. P. Wojcik, black light trap, 6 females.

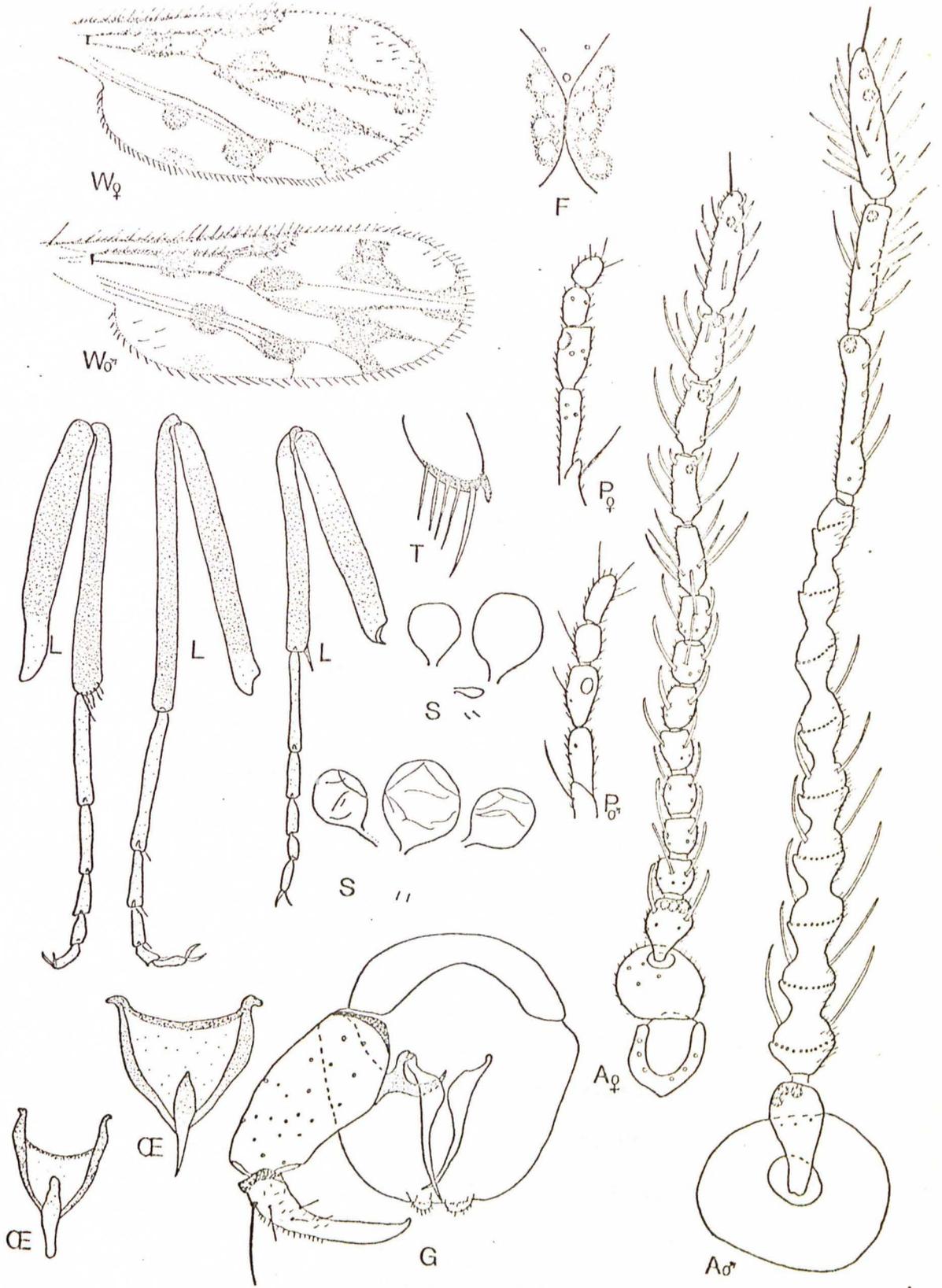
Pakistan: Lahore, July - August 1957, J. Maldonado, 6 females, 4 males; Lahore, Punjab, June 1959, H. Barnett, light trap, 18 females, 13 males; Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 4 females, 2 males; Rawalpindi, Ayub Natl. Park, June 1959, H. Barnett, light trap, 4 females, 2 males; Rawalpindi, June 1959, H. Barnett, light trap, 6 females, 1 male.

Turkey: Adana, 13 October 1960, T. Curtin, light, 1 male.

The drawings of Plate 7 and all measurements were done from specimens from Pakistan, Lahore, Punjab, June 1959.

Culicoides (Avaritia) dewulfi

- A - antennae, male and female
ae - aedeagus
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
S - spermathecae
T - female tibial comb
W - wings, male and female



Culicoides (Avaritia) montanus Schakirzjanova, 1962

Plate 8

Culicoides montanus Schakirzjanova, 1962. Zool. Akad. Nauk, Kazakh. SSR, Alma Ata, 18: 258.

Size small; wing spotted; eyes contiguous.

Female. - Eyes contiguous (Plate 8F) and bare. Antennal segments 3 - 15 (Plate 8A) length in mean proportions of 15 - 11 - 11 - 12 - 12 - 12 - 13 - 14 - 17 - 18 - 19 - 18 - 31.5 (n = 3), AR 1.04 (1.00 - 1.08, n = 3); sensilla coeloconica on segments 11 - 14, but may be absent on segment 11 or may be present on segment 15, total number of sensilla coeloconica 3 - 5, sensilla trichodea tube-like on segments 3 - 10; sensilla chaetica on segments 1 - 10, may be present on segments 13 and 14; terminal seta present. Third palpal segment (Plate 8P) swollen with sclerotized tube-like sensory pit, very deep; palpal segments 2 - 5 lengths 41 - 50 - 23 - 28 (n = 3) microns; PR 1.94 (1.70 - 2.2, n = 3). Mandible with 13 - 15 (n = 5) teeth.

Thorax: Mesonotum brown based on slide mounted specimens; scutellum same color as mesonotum. Wing (Plate 8W) with pale spots, radial cells subequal, basal half of first radial cell and apical half of second radial cell in light spots, light spots on apical part of cells R_5 , M_1 , M_2 and M_4 reach the margin of wing; macrotrichia few, distributed on apical part of wing; wing length 0.88 (0.83 - 0.98, n = 3) mm, breadth 0.42 (0.37 - 0.47, n = 3) mm, CR 0.61 (0.59 - 0.62, n = 3). Halter pale. Legs (Plate 8L) light brown without pale bands; tibial comb with 5 spines, the first from spur longest.

Abdomen: Light brown with 2 subequal spermathecae (Plate 8S),

PLATE 8

Culicoides (Avaritia) montanus

(only female)

A - antenna

F - fronto-vitta

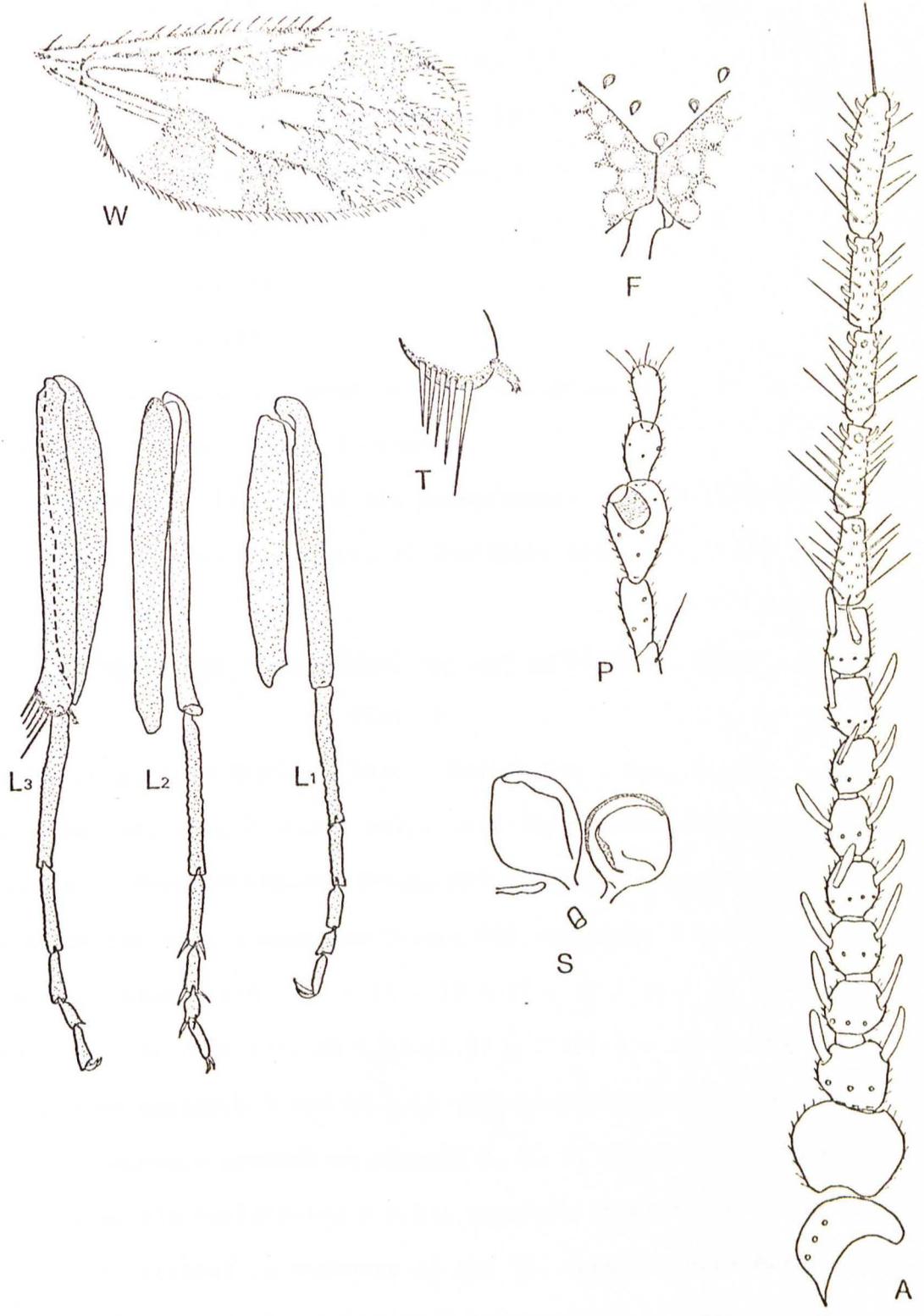
L₁ - 1st legL₂ - 2nd legL₃ - 3rd leg

P - palpus

S - spermathecae

T - tibial comb

W - wing



measuring 44 by 33 (n = 3) microns and 37 by 34 (n = 3) microns; rudimentary spermatheca and sclerotized ring present; rudimentary spermatheca length 17 (n = 2) microns, neck 5 (n = 6) microns.

Male. - Not collected. According to the illustration of L. R. Babadzhanova (Gutsevich 1966: 666) and Gutsevich 1973: 108, the male genitalia are very similar to those of C. obsoletus, the species differing in the palpal sensory pit.

Distribution - Turkey, USSR.

Slide mounted material studies - Turkey: Diyarbakir, 24 September 1960, T. Curtin, light, 3 females.

The drawing of Plate 8 and all measurements were done from the specimens from Turkey, Diyarbakir, 24 September 1960.

Culicoides (Culicoides) peregrinus Kieffer, 1910

Plate 9

Culicoides peregrinus Kieffer, 1910. Indian Mus., Mem. 2: 191.

Size medium; wing spotted; palps very dark; eyes contiguous.

Female. - Eyes contiguous (Plate 9F) and bare. Antennae dark particularly the last 5 segments (Plate 9A), segments 3 - 15 lengths in mean proportion of 20 - 15 - 15 - 17 - 17 - 17 - 15 - 18.5 - 25 - 25 - 28 - 32 - 44 (n = 10), AR 1.13 (1.07 - 1.27, n = 10); sensilla coeloconica on segments 3 and 11 - 15 (in one specimen from Lahore, sensilla coeloconica present on segment 3, 5, 7, 9, 10 - 15), total number of sensilla coeloconica 9 - 12; sensilla chaetica on segments 1 - 10, may be present on segments 13 and 14, terminal seta present. Palp (Plate 9P) very dark, the apex of segments 1 - 4 lighter, with

strong and dense blackish setae arranged in numerous rows in each segment, third segment not swollen, sensory organ in form of several depressions close together or in the form of one very shallow pit; palpal segments 2 - 5 lengths 63 - 74 - 29 - 37 (n = 10) microns; PR 2.8 (2.57 - 3.18). Mandible with 12 - 16 (n = 18) teeth.

Thorax: Mesonotum dark brown based on slide mounted specimen, no significant pattern; scutellum same color as mesonotum. Wing (Plate 9W) pattern as illustrated, general color dark with pale spots, costal margin darker than the rest of the wing, basal half of the first radial cell and apical half of the second radial cell in light area, the base of wing lighter than the other part, pale spot over r-m cross vein meeting the costal margin, a double light spot at the apex of cell R_5 not meeting the anterior wing margin, apices of veins M_1 , M_2 and M_{3+4} with a small light spot at wing margin; 2 light spots in cells M_1 and M_2 , 2 light spots in cell M_4 , one very close to the wing margin (may meet the wing margin) and another at the medio-cubital fork, small round light spot behind medial fork, anal cell pale at the base with 2 light spots at distal and median portion; macrotrichia sparse at the apex of the wing; wing length 1.10 (0.92 - 1.22, n = 10) mm, breadth 0.52 (0.50 - 0.57, n = 10) mm, CR 0.63 (0.59 - 0.65, n = 10). Halter dark with pebbly appearance (Plate 9H). Legs (Plate 9L) brown with light bands as illustrated; tibial comb with 6 spines, the second from spur longest (Plate 9T).

Abdomen: Dark brown, 2 subequal spermathecae with short neck, rudimentary spermatheca and sclerotized ring present (Plate 9S); measuring 57 by 44 (n = 8) microns and 55 by 42 (n = 8) microns,

Culicoides (Culicoides) peregrinus

A - antennae, male and female

ae - aedeagus

C - cerci

F - female fronto-vitta

G - male genitalia

H - halter

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

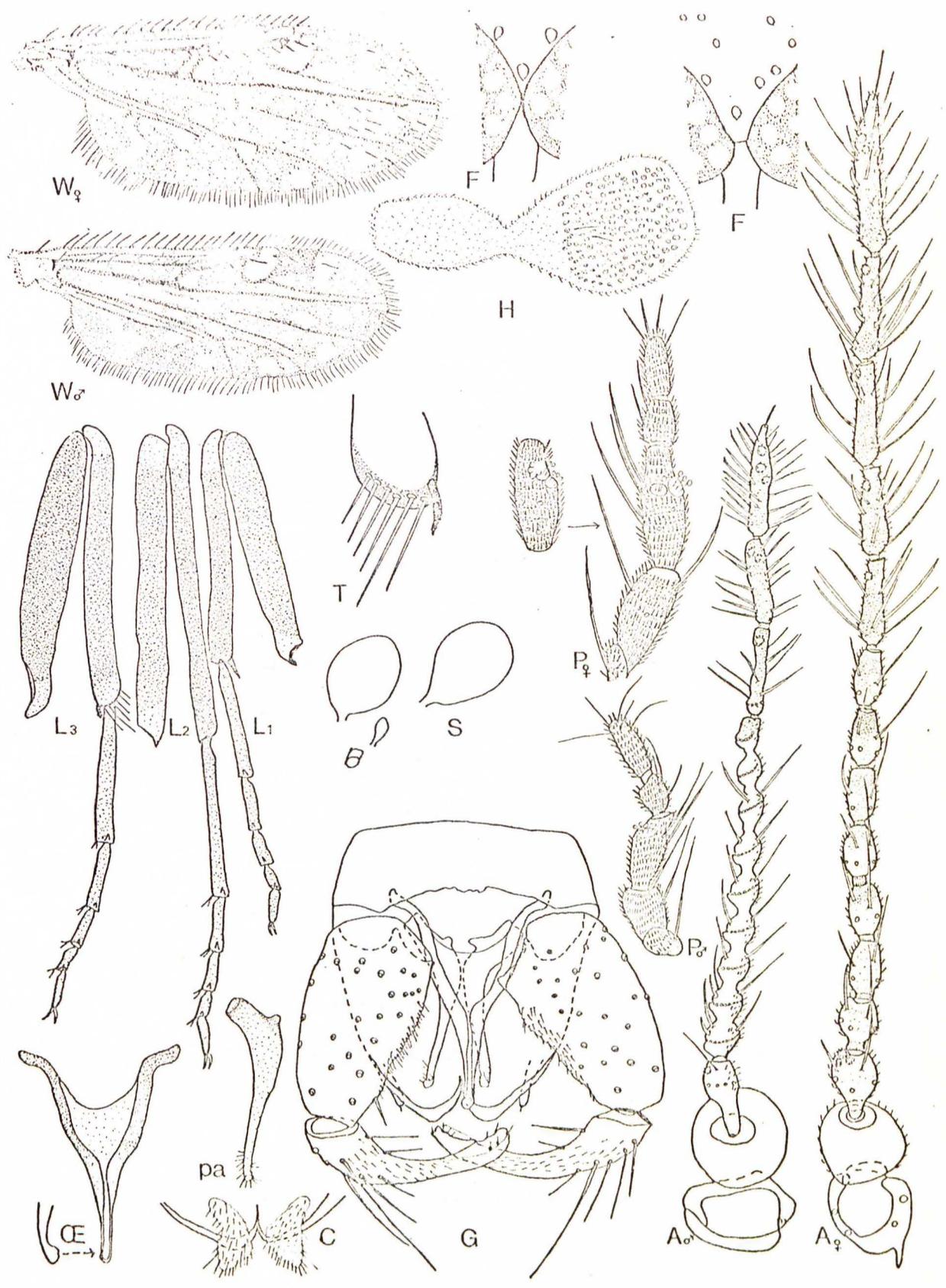
P - palpi, male and female

pa - parameres

S - spermathecae

T - female tibial comb

W - wings, male and female



rudimentary spermatheca length 15 microns, spermathecae neck 4 (n = 16) microns.

Male. - Same as female with usual differences. Wing veins generally darker than female (Plate 9W), otherwise same as female; wing length 0.99 (0.93 - 1.02, n = 10) mm, breadth 0.39 (0.36 - 0.43, n = 10) mm, CR 0.62 (n = 10). Antennal segments 12 - 15 dark (Plate 9A), sensilla coeloconica on segments 3, 13 - 15; sensilla chaetica on segments 1 - 14, terminal seta present.

Genitalia: (Plate 9G, ae, C, pa), 9th tergum almost round, lateral processes like a very small projection, the posterior margin with deep V-shaped notch, cerci (Plate 9C) long; basistyle stout, inner margin with spinules, dorsal and ventral roots not well developed but visible, dististyle elongated and slightly curved few hairs at tip; 9th sternum with shallow emargination, membrane bare. Aedeagus with sclerotized arm and long slender body which is slightly curved at the tip (Plate 9ae). Paramere thickened at the base with small projection (Plate 9pa), narrowed distally with terminal fringing hairs.

Distribution - India; Indonesia; Java; Malaya; New Guinea; Pakistan; Philippines; Taiwan; Thailand.

Slide mounted material studied - Pakistan: Lahore, Punjab, June 1959, H. Barnett, light trap, 21 females, 17 males; Lahore, August 1958, light trap, J. Maldonado, 1 female; Lahore, July - August 1957, J. Maldonado, 1 female.

The drawings of Plate 9 and measurements were done from specimens from Pakistan, Punjab, June 1959.

Culicoides (Culicoides) pulicaris (Linnaeus), 1758

Plate 10

(Culex) pulicaris Linnaeus, 1758. Systema Naturae, Tomas I: 603.

Size medium, eyes contiguous, wing spotted.

Female. - Eyes contiguous (Plate 10F) and bare. Antennal segments 3 - 15 (Plate 10A) lengths in mean proportion of 26 - 18 - 19 - 19 - 21 - 19 - 20 - 19 - 25 - 27 - 29 - 30 - 43 (n = 5), AR 0.96 (0.92 - 1.01, n = 5); sensilla coeloconica on segments 3, 11 - 15, sometimes present on segments 7 and 9, total number of sensilla coeloconica 10 - 11; sensilla chaetica on segments 1 - 10, may be present on segments 11 - 14, terminal seta present. Third palpal segment (Plate 10P) with dispersed sensory organ, may be present as a single pit as illustrated; palpal segments 2 - 5 lengths 85 - 101 - 36 - 47 (n = 5) microns; PR 2.80 (2.62 - 3.12, n = 5). Mandible with 14 - 16 teeth.

Thorax: Mesonotum dark brown with pattern based on slide mounted specimens; scutellum same color as mesonotum. Wings (Plate 10W) with spots as illustrated, the size of dark area variable; macrotrichia numerous and not present on basal cell; wing length 1.54 (1.45 - 1.77), n = 10) mm, breadth 0.69 (0.64 - 0.80, n = 10) mm, CR 0.57 (0.54 - 0.60, n = 10). Halter pale. Legs (Plate 10L), femur and tibia dark with pale bands at the base, tarsus pale; tibial comb with 5 or 6 spines (Plate 10T), the second from spur longest.

Abdomen: Dark brown with 2 unequal spermatheca (Plate 10S), measuring 70 by 52 (n = 4) microns and 59 by 48 (n = 4) microns; neck long, rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca may develop to a small spermatheca as illustrated,

Culicoides (Culicoides) pulicaris

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

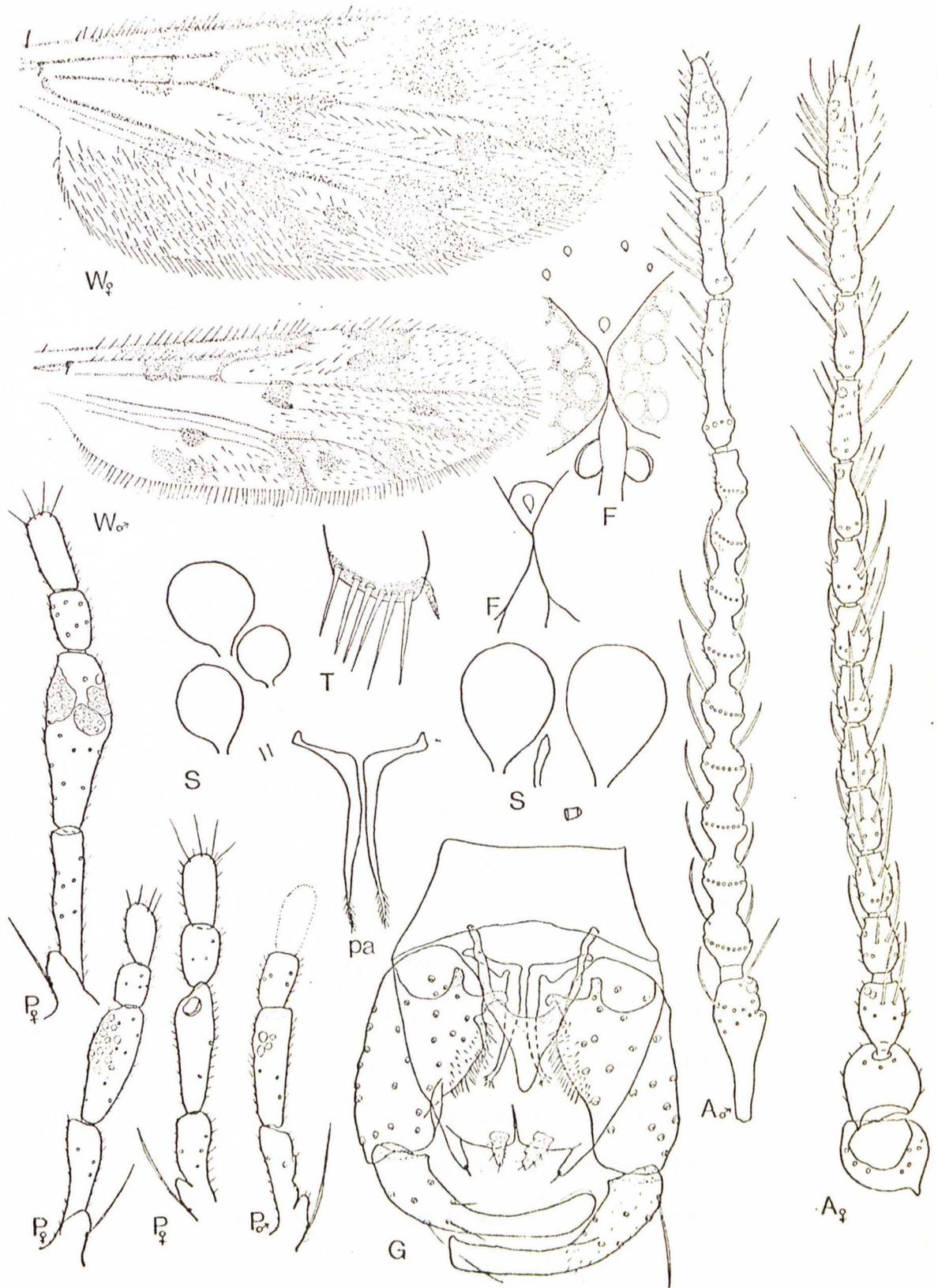
P - palpi, male and female

pa - parameres

S - spermathecae

T - female tibial comb

W - wings, male and female



rudimentary spermatheca length 24 (n = 4) microns, neck 6 (n = 8) microns.

Male. - Same as female with usual differences. Wing spots (Plate 10W) same as female but generally lighter than female wing, wing length 1.46 (1.39 - 1.55, n = 5) mm, breadth 0.53 (n = 5) mm, CR 1.19 (1.09 - 1.27, n = 5). Antenna with sensilla coeloconica on segments 3, 13 - 15 (Plate 10A); sensilla chaetica on segments 1 - 13, may be present on segment 14, terminal seta present. Third palpal segment (Plate 10P) with dispersed sensory organ.

Genitalia: (Plate 10G, pa) 9th tergum with notch on posterior margin, lateral processes convergent; basistyle with strong setae on inner margin, roots short and well sclerotized, dististyle curved; sternite with a wide emargination, membrane bare. Aedeagus with high U-shaped arch, arms dark, median portion well developed. Paramere curved at right angle at the base and hairy at the tip (Plate 10pa).

Distribution - North Africa; North America; Europe; Asia: Afghanistan, China, Iraq, Iran, Israel, Japan, Pakistan, Turkey, USSR.

Slide mounted material studied - Afghanistan: Bamian Prov., Seydabat, 2439 m, 4 km N. Bamian, 20 August 1968, D. P. Wojcik, black light trap, 1 female; Helmand Prov., Gawargin, 671 m, 20 km S. Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 1 female; Herat Prov., Karokh, 1280 m, 43 km E. Herat, 15 October 1968, D. P. Wojcik, black light trap, 1 female; same data as the previous one, date as follows: 16 October 1968, 2 females; 18 October 1968, 10 females; 19 October 1968, 1 female; 20 October 1968, 7 females, 5 males; 21 October 1968, 2 females.

Turkey: Izmir Prov., Cigli, 29 March 1961, T. Curtin, light, 7 females, 3 males; Pirincilik, 19 May 1961, T. Curtin, light, 5 females, 4 males; Izmir Prov., Bornova, 18 July 1961, T. Curtin, light, 1 female; same data as the previous one, date as follows: October 1961, 6 females, 1 male; March 1962, 5 females, 3 males; May 1961, 4 females, 6 males.

Culicoides (Oecacta) schultzei (Enderlein), 1908

Plate 11

(Ceratopogon) schultzei Enderlein, 1908. Denk. Med. Ver. Jean 13: 459.

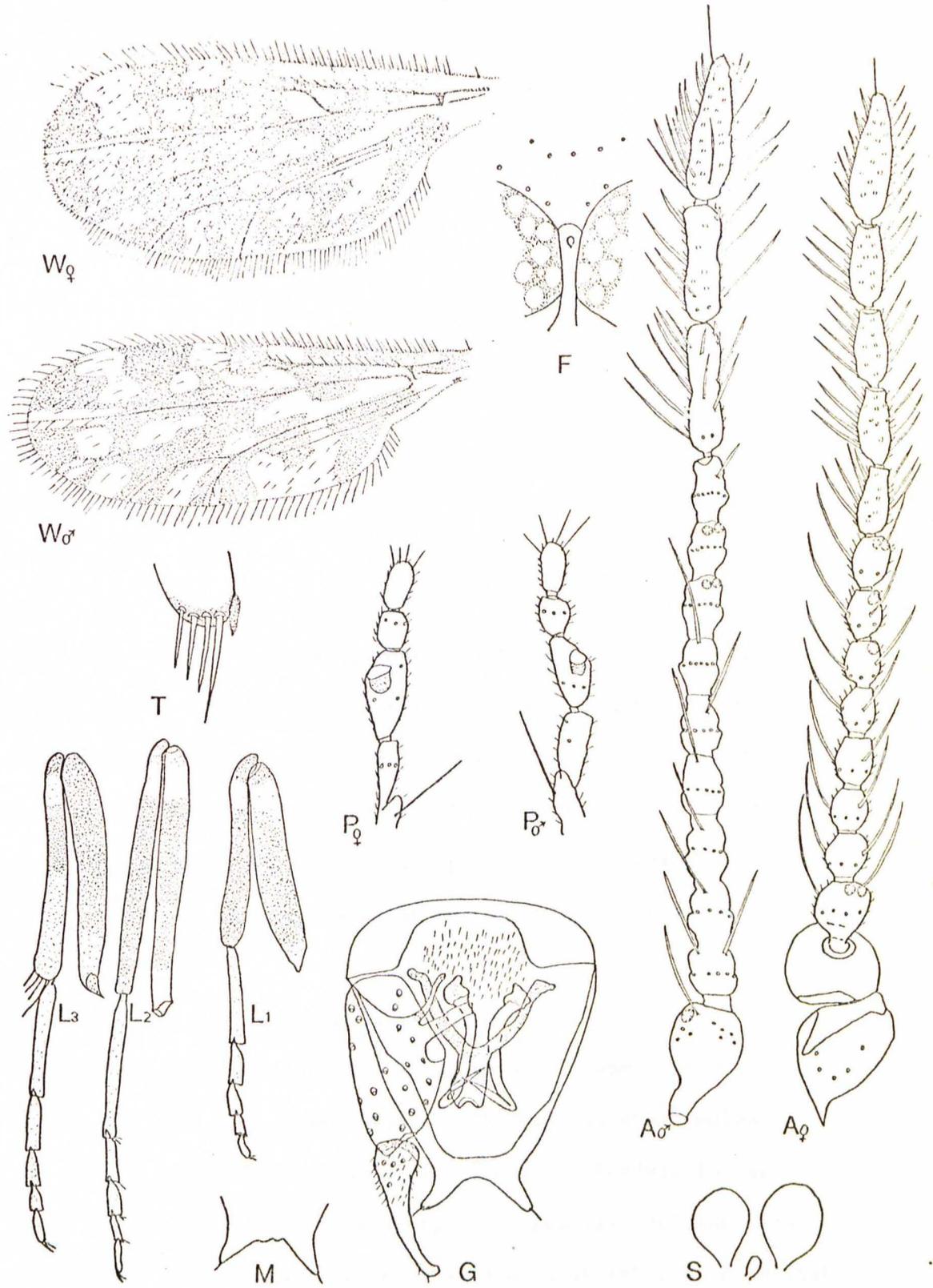
Size small; wing spotted; eyes separate;

Female. - Eyes not contiguous (Plate 11F) and bare. Antennal segments 3 - 15 (Plate 11A) lengths in mean proportion of 17 - 11 - 11 - 11 - 11 - 11 - 11 - 12 - 17 - 17 - 18 - 19 - 29 (n = 5), AR 1.02 (0.97 - 1.05, n = 5); sensilla coeloconica present on segments 3, 8 - 10 (may be present on segment 7 also), total number of sensilla coeloconica 6 - 8; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 11P) with single sensory pit, not shallow; palpal segments 2 - 5 lengths 46 - 49 - 21 - 27 (n = 5) microns; PR 2.01 (1.66 - 2.20, n = 5). Mandible with 12 - 14 teeth.

Thorax: Mesonotum brown with some indistinct light area based on slide mounted specimens; scutellum light brown. Wing (Plate 11W) with characteristic spots as illustrated; macrotrichia numerous all over the wing, basal cell without macrotrichia; wing length 0.89 (0.80 - 1.02, n = 10) mm, breadth 0.41 (0.37 - 0.46, n = 10) mm, CR 0.51 (0.47 - 0.53). Halter very light brown. Legs (Plate 11L) brown, femur and

Culicoides (Oecacta) schultzei

- A - antennae, male and female
- F - female fronto-vitta
- G - male genitalia
- L₁ - female 1st leg
- L₂ - female 2nd leg
- L₃ - female 3rd leg
- M - dorsal margin of 9th tergum
- P - palpi, male and female
- S - spermathecae
- T - female tibial comb
- W - wings, male and female



tibia darker with pale bands as illustrated, tarsus light; tibial comb with 4 spines (Plate 11T), first from spur longest.

Abdomen: Brown with 2 subequal spermathecae (Plate 11S), neck very short, measuring 42 by 26 ($n = 5$) microns and 40 by 26 ($n = 5$) microns; rudimentary spermatheca present; rudimentary spermatheca length 16 ($n = 3$) microns.

Male. - Same as female with usual differences. Wing length 0.75 (0.67 - 0.79, $n = 10$), breadth 0.32 (0.28 - 0.36, $n = 10$) mm, CR 0.47 (0.45 - 0.49, $n = 10$). Antenna (Plate 11A) with sensilla coeloconica on segments 3, 10 - 11; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 11P) with single sensory pit, not shallow.

Genitalia: (Plate 11G, M) 9th tergum elongated and tapered with long divergent lateral processes, posterior margin with or without small notch (Plate 10M); basistyle thick with well developed dorsal and ventral roots; dististyle slightly curved; sternite with wide and deep emargination, membrane spiculate. Aedeagus with high V-shaped arch and well developed truncate median portion. Paramere with sclerotized basal knob, slender and bent at the apical part, pointed at the tip.

Distribution - Africa and Asia.

Slide mounted material studied - Afghanistan: Kunduz Prov., Bulla Quchi, 10, 12, 16 September 1968, D. P. Wojcik, 456 females, 56 males; Kunduz, Bulla Quchi, 333 m, 10.5 km W. E. Kunduz, 10 September 1968, D. P. Wojcik, black light trap, 35 females; Helmand Prov., Gawargin, 670 m, 20 km S. Lashkargah, 1 - 15 October 1968, D. P. Wojcik, black light trap, 311 females.

Iran: Shemiran, August 1959, H. Barnett, light, 1 female;
Karimabad, 7 August 1959, H. Barnett, resting on horse, 1 female,
1 male.

Pakistan: Lahore, July - August 1957, light trap, J. Maldonado,
25 females, 16 males; Lahore, August 1958, 2 females, 1 male; Lahore,
Punjab, June 1959, H. Barnett, light trap, 27 females, 19 males; Pes-
hawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 11
females, 8 males; Rawalpindi, Ayuh Natl. Park, June 1959, H. Barnett,
light trap, 36 females, 5 males.

Turkey: Adana, 13 October 1960, T. Curtin, light, 4 females.

The female drawings of Plate 11 and measurements were done from
specimens from Pakistan, Rawalpindi, Ayuh Natl. Park, June 1959,
H. Barnett. The male drawings were done from specimens from Pakistan,
Peshawar, N. W. Frontier Prov., June 1959, H. Barnett. Measurements
of males were done mostly from Pakistan, Lahore, Punjab, June 1959,
H. Barnett.

Culicoides (Oecacta) mesghalii Navai, 1973

Plate 12

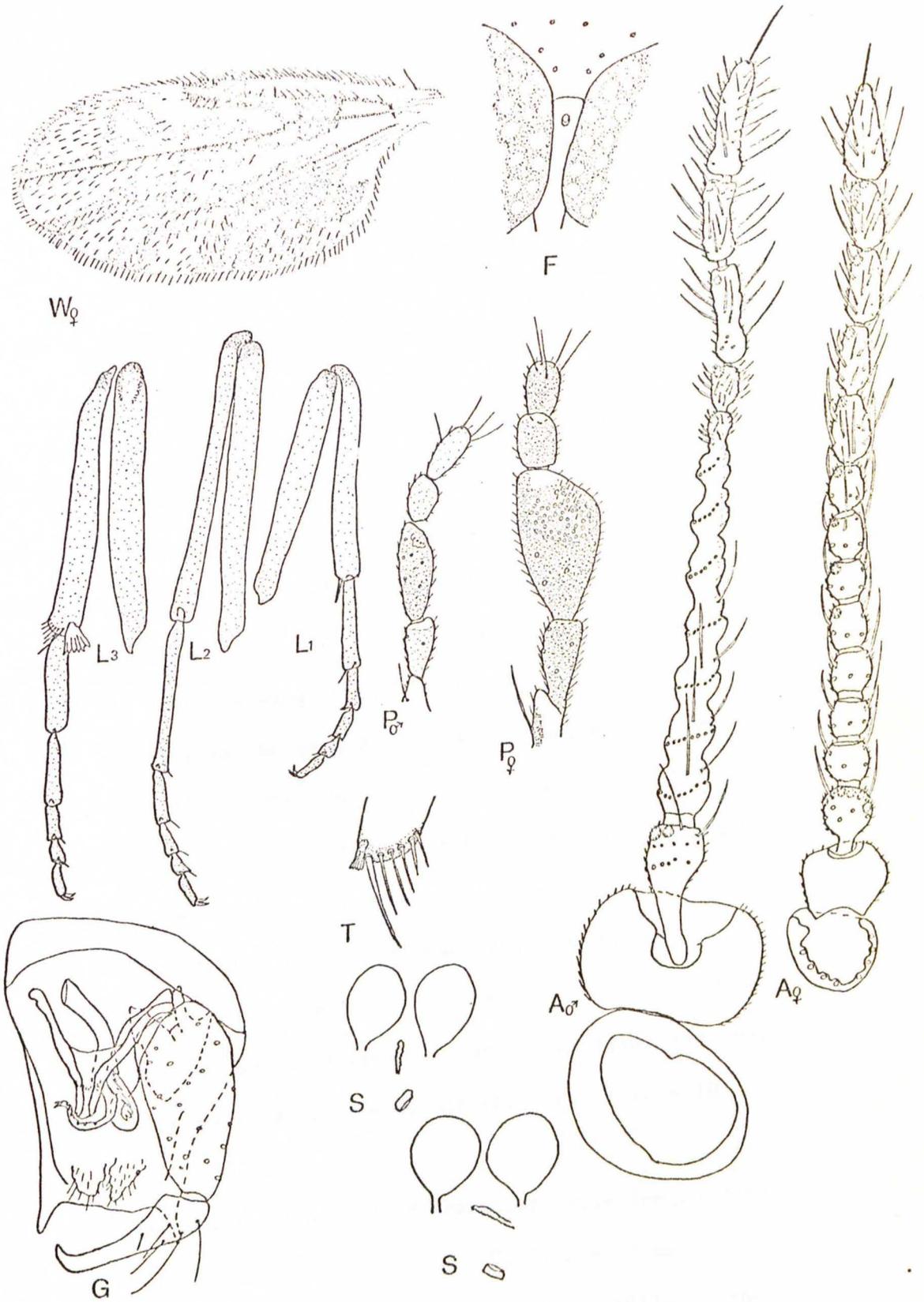
Culicoides mesghalii Navai, 1973. Bull. Soc. Path. Exat. 66: 196.

Moderate size; wing spotted; third segment of palp with dispersed
sensory organ.

Female. - Eyes separate (Plate 12F) and bare. Antennal segments
3 - 15 (Plate 12A) lengths in mean proportion of 19 - 12 - 12 - 12 -
13 - 12 - 13 - 13 - 19 - 20 - 21 - 29 (n = 5), AR 1.04 (0.97 - 1.09,
n = 5); sensilla coeloconica present on segments 3, 7 - 14, may be

Culicoides (Oecacta) mesghalii

- A - antennae, male and female
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
S - spermathecae
T - female tibial comb
W - female wing



present on segment 6 or absent from segment 10, total number of sensilla coeloconica 12 - 15; sensilla chaetica on segments 1 - 10, terminal seta present. Palp dark (Plate 12P), third palpal segment swollen, sensilla sparse in a large area as illustrated, no sensory pit; palpal segments 2 - 5 lengths 56 - 90 - 28 - 34 (n = 5) microns; PR 1.91 (1.69 - 2.23, n = 5). Mandible with 11 - 14 teeth.

Thorax: Mesonotum dark brown without distinct pattern based on slide mounted specimens; scutellum lighter than mesonotum. Wing (Plate 12W) radial cells equal, first radial cell dark at the apex and the second radial cell entirely dark, basal cell with dark spot in the middle extending over the M_1 vein, the light spot at the apex of cell R_5 does not reach the wing margin, cell M_1 , M_2 and M_4 each one with a light spot at the apex, base of the wing in light area; macrotrichia all over the wing except the basal cell; wing length 1.04 (0.95 - 1.09, n = 10) mm, breadth 0.52 (0.49 - 0.56, n = 10) mm, CR 0.57 (0.54 - 0.59, n = 10). Halter pale. Legs (Plate 12L) light brown without light band as illustrated; tibial comb with 6 spines (Plate 12T), the first from spur longest.

Abdomen: Brown with 2 oval-shaped spermathecae (Plate 12S), neck relatively short; measuring 47 by 35 (n = 5) microns and 43 by 34 (n = 5) microns; rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca 21 (n = 5) microns, neck 6 (n = 10) microns.

Male. - Same as female with usual differences, wing length 0.83 (0.76 - 0.87, n = 2) mm, breadth 0.34 (0.32 - 0.36, n = 2) mm, CR 0.52 (0.51 - 0.53, n = 2). Antenna (Plate 12A) with sensilla coelo-

conica on segments 3, 12 - 14; sensilla chaetica on segments 1 - 10 and 13, terminal seta present. Third palpal segment (Plate 12P) slender with few sensilla placed in small area as illustrated, no sensory pit.

Genitalia: (Plate 12G) 9th tergum narrowed proximally, apico-lateral processes slender and pointed, distal margin without notch; basistyle with well developed dorsal and ventral roots, ventral root thick and foot shaped; dististyle gradually narrowed and hooked at the tip; 9th sternum with a broad incision, membrane not spiculated. Aedeagus with high U-shaped arch, arms sclerotized, median portion well developed. Paramere without basal knob or very small, stem slightly curved and fairly stout, gradually narrowed and sharply bent at the apical third and wearing 7 - 9 fine spines.

Distribution - Iran; Saudi Arabia.

Slide mounted material studied - Saudi Arabia, Dhahran, September 1964, R. L. Peffley, light trap, 30 females, 2 males. Drawing of Plate 12 and measurements were done from specimens from Saudi Arabia.

Discussion - C. mesghalii is distinct from other members of the subgenus Oecacta, in Palearctic region, by the arrangement of sensilla coeloconica of the antenna, the dispersed palpal sensoria and the male genitalia. This species does not readily fit into any of the established group in subgenus Oecacta. C. mesghalii is distinctive enough to place it under a separate group.

Culicoides (Oecacta) Sp. 22 n. sp.

Plate 13

Small sized dark species, wing spotted, eyes separate with hairs between the facets.

Female. - Eyes not contiguous (Plate 13F), hairs between facets (Plate 13H). Antennal segments 3 - 15 (Plate 13A) lengths in mean proportion of 40 - 25 - 25 - 25 - 27 - 25 - 27 - 29 - 40 - 43 - 47 - 45 - 54 (n = 1), AR 1.03; sensilla coeloconica on segments 3 and 6 - 10 (only on one side present on segment 6), total number of sensilla coeloconica 11 - 12; sensilla chaetica on segments 1 - 10. Third palpal segment (Plate 13P) swollen with a very deep sensory organ as illustrated, palpal segments 2 - 5 length 31 - 54 - 18 - 25 (n = 1) microns, PR 1.03. Mandible with 11 teeth.

Thorax: Mesonotum dark brown based on slide mounted specimen, without distinct pattern; scutellum same color as mesonotum. Wing (Plate 13W) dark with light spots, radial cells equal and both in dark area, light spot over r-m cross vein not reaching costal margin; a round light spot over the basal arculus and the base of basal cell; cell R₅ with 2 light spots, 1 double spot next to the second radial cell which reaches the tip of radial veins, the second spot at the apex not reaching the wing margin; cell M₁ with a light spot at the apex not reaching the wing margin; cell M₂ with 2 light spots, 1 ahead of medio-cubital fork and 1 at the apex not reaching the wing margin, the light spot over the base of vein M₂ almost connects to a light strip under the basal cell that reaches the light spot at the base of the basal cell; cell M₄ with a light spot not reaching the wing margin; anal cell with 2 light spots, 1 at the base and 1 at the

PLATE 13

Culicoides (Oecacta) Sp. 22 n. sp.

(only female)

A - antenna

F - fronto-vitta

H - facets of compound eyes, hairs between the facets

L₁ - 1st leg

L₂ - 2nd leg

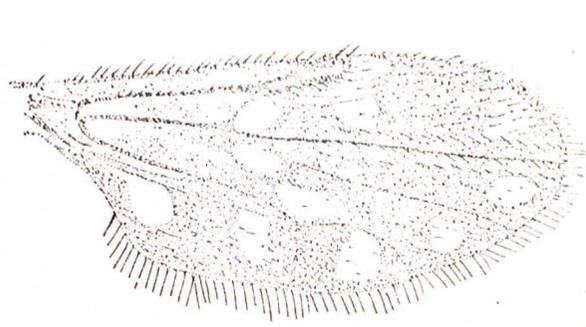
L₃ - 3rd leg

P - palpus

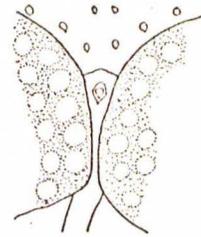
S - spermathecae

T - tibial comb

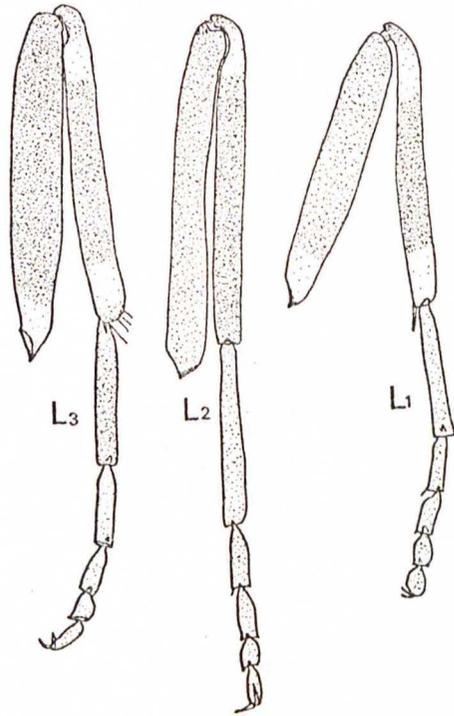
W - wing



W



F



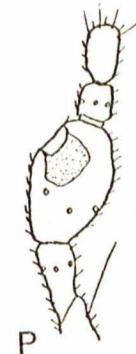
L3

L2

L1



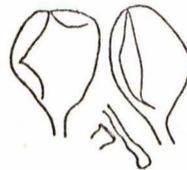
H



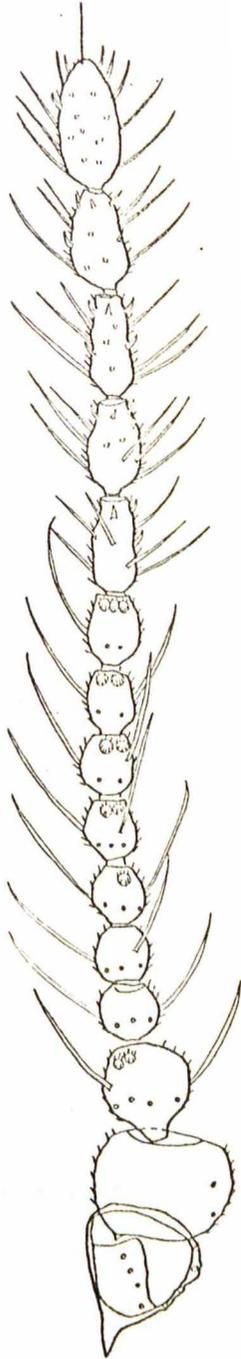
P



T



S



A

apex not reaching the wing margin; macrotrichia mostly at the apical half of the wing, not present on the basal cell; wing length 0.76 mm, breadth 0.37 mm, CR 0.56. Halter light brown. Legs (Plate 13L) brown with light bands, front leg (Plate 13L₁) with dark femur, tibia darker than femur with light bands at the base and tip, tarsus lighter; second leg (Plate 13L₂) with dark femur, no light band, tibia dark with light band at the base, tarsus lighter; hind leg (Plate 13L₃) femur dark with light band at the base, tibia dark with light bands at the base and tip; tibial comb (Plate 13T) with 4 spines, the first from spur longest.

Abdomen: Dark brown with 2 spermathecae (Plate 13S), both oval shaped with long neck, measuring 51 by 36 ($n = 2$) microns; rudimentary spermatheca and sclerotized ring present; rudimentary spermatheca length 29 microns, neck 8 ($n = 2$) microns.

Male. - Unknown.

Distribution - Pakistan.

Types - Holotype female, Pakistan, Lahore, July - August 1957,

J. Maldonado. Type #75302.

The drawings of Plate 13 and measurements were done from the holotype.

Discussion - This species has been described from the only slide mounted specimen; the color could be different in the fresh specimens. This species, with hairy eyes and deep palpal sensory pit, is different from the other species in the similis group, therefore, it can be placed in a separate group in the future.

Culicoides (Oecacta) Sp. 15 n. sp.

Plate 14

Size small; wing spotted; eyes separate;

Female. - Eyes not contiguous (Plate 14F) and bare. Antennal segments 3 - 15 (Plate 14A) lengths in mean proportion of 16 - 12 - 10 - 10 - 10 - 10 - 10 - 11 - 18 - 19 - 19 - 20 - 31 (n = 10), AR 1.22 (1.16 - 1.30, n = 10); sensilla coeloconica on segments 3 - 10, may be absent on segment 4, total number of sensilla coeloconica 9 - 13; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 14P) swollen with single sensory pit as illustrated, not deep; palpal segments 2 - 5 lengths 34 - 48 - 18 - 24 (n = 10) microns; PR 1.89 (1.66 - 2.08, n = 10). Mandible with 7 - 8 (n = 14) teeth.

Thorax: Mesonotum dark brown with pale spots, pattern cannot be described from slide material; scutellum light brown. Wing (Plate 14W) dark with pale spots, radial cells equal, first radial cell in light area, second radial cell entirely dark; costal margin with 1 light spot which extends over median and joins the pale area above medio-cubital fork; r-m cross vein dark; cell R_5 with a large light spot in front of second radial cell extending broadly over vein M_1 and M_2 , distal light spot of cell R_5 heart shaped and very distinct; light spots at the tip of cells M_1 and M_2 reaching the wing margin; cell M_4 with a large light spot; anal cell with 2 large light spots, 1 long and extending to the anal margin of the wing, the other one in the apex of the anal cell may reach the anal margin and be shaped like an hourglass; macrotrichia sparse at the distal portion, basal cell

Culicoides (Oecacta) Sp. 15 n. sp.

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

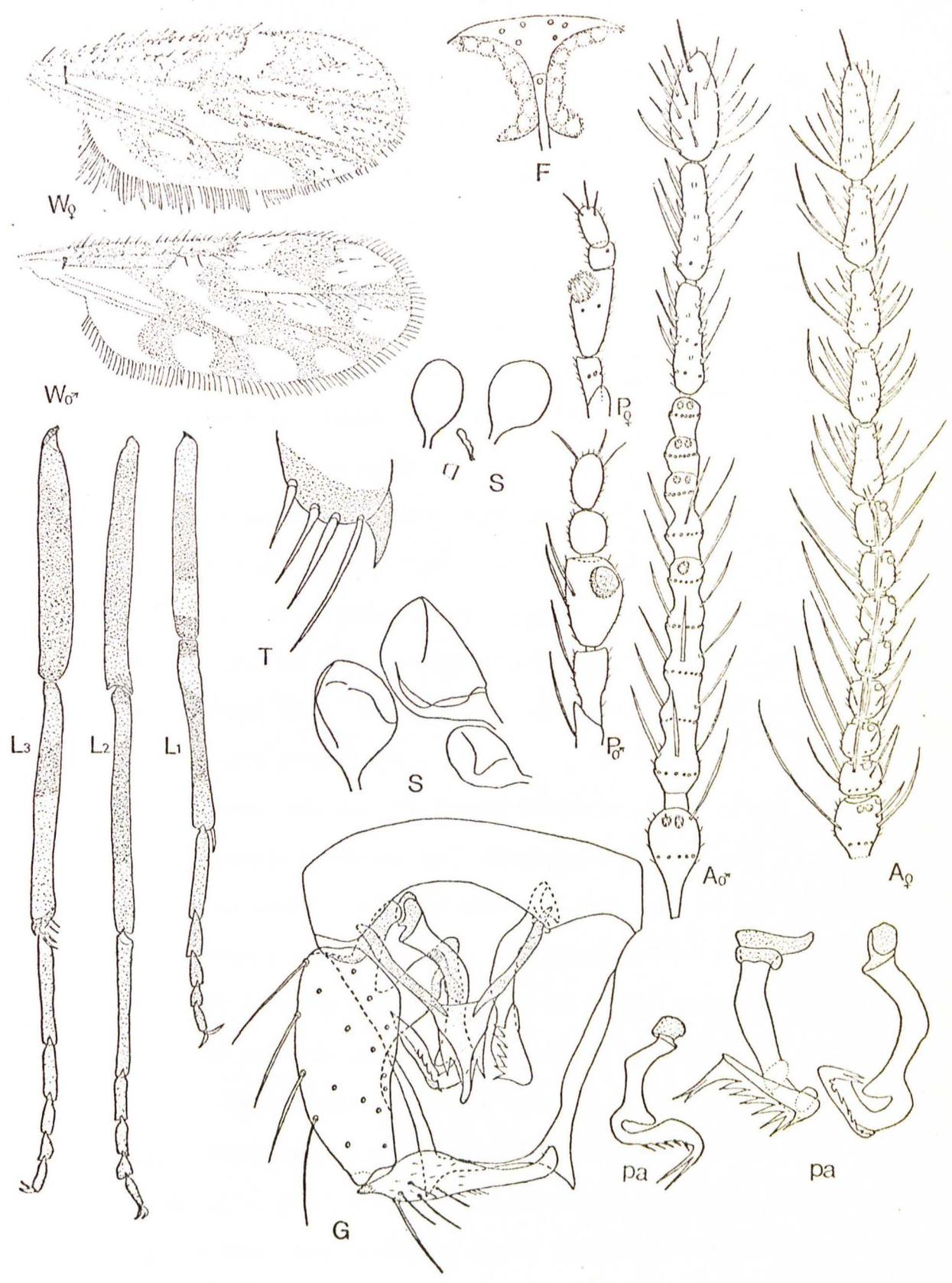
P - palpi, male and female

pa - parameres

S - spermathecae

T - female tibial comb

W - wings, female and male



without macrotrichia; wing length 0.79 (0.73 - 0.90, n = 10) mm, breadth 0.38 (0.34 - 0.43, n = 10) mm, CR 0.54 (0.53 - 0.55, n = 10). Halter pale. Legs (Plate 14L) light brown with pale bands as illustrated, tarsus lighter than tibia; tibial comb with 6 spines, the first spur longest (Plate 14T).

Abdomen: Light brown, 2 subequal spermathecae with narrow and relatively long neck (Plate 14S), measuring 48 by 37 (n = 9) microns and 43 by 32 (n = 9) microns; rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca length 22 (n = 9) microns, spermatheca neck 6 (n = 17) microns.

Male. - Same as female with usual differences. Wing length 0.66 (0.63 - 0.68, n = 10) mm, breadth 0.27 (0.25 - 0.29, n = 10) mm, CR 0.50 (0.45 - 0.51, n = 10). Antenna with sensilla coeloconica on segments 3, 8, 10 - 12, no seta on segments 15, only sensilla trichodea present (Plate 14A). Third palpal segment slightly swollen (Plate 14P) with single sensory pit.

Genitalia: (Plate 14G, pa) 9th tergum elongated and narrowed proximally, apico-lateral processes well developed and divergent, distal margin without notch; basistyle with well developed processes, ventral root boat shaped and sclerotized; dorsal root stout and long, dististyle gradually narrowed and slightly curved at the apex; 9th sternum with a broad and deep incision, membrane not spiculate. Aedeagus with high semicircular arch, arms strongly sclerotized, median portion same length as arms with 2 pointed lateral processes, the middle part tapering to slender tip. Paramere (Plate 14pa) with sclerotized foot-shaped basal knob which may appear different from different

positions as illustrated, stem moderately stout and slightly curved with processes in the middle, distal portion curved at a right angle and bearing a lateral fringe of 5 - 7 spines, forked tip.

Distribution - Pakistan.

Types - Holotype male, Pakistan, Rawalpindi, Ayub Natl. Park, June 1959, H. Barnett, light trap. Type #75303.
Pakistan, Rawalpindi, Dharmyal, June 1959, H. Barnett, light trap.
Paratypes: 39 females, 31 males as follows: 7 females, 12 males same data as holotype; 16 females, 22 males same data as allotype; 7 females, 1 male from Pakistan, Lahore, July - August 1957, J. Maldonado.

All drawings of Plate 14 were done from holotype and paratypes same data as holotype.

Discussion - Culicoides Sp. 15 is distinct from other members of the similis group and closely related species C. similis by having a distinct heart-shaped apical spot in cell R₅ (round in C. similis) and the lateral processes at the base of aedeagus stem.

Culicoides (Oecacta) similis C. I. M., 1920

Plate 15

Culicoides similis Carter, Ingram, and Macfie, 1920. An. Trop. Med. Parasit. 14: 255.

Size small; wing spotted; eyes separate.

Female. - Eyes not contiguous (Plate 15F) and bare. Antennal segments 3 - 15 (Plate 15A) with lengths in mean proportion of 15 - 10 - 9.5 - 10 - 10 - 10 - 10 - 12 - 18 - 18 - 20 - 21 - 31.5 (n = 6),

PLATE 15

Culicoides (Oecacta) similis

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

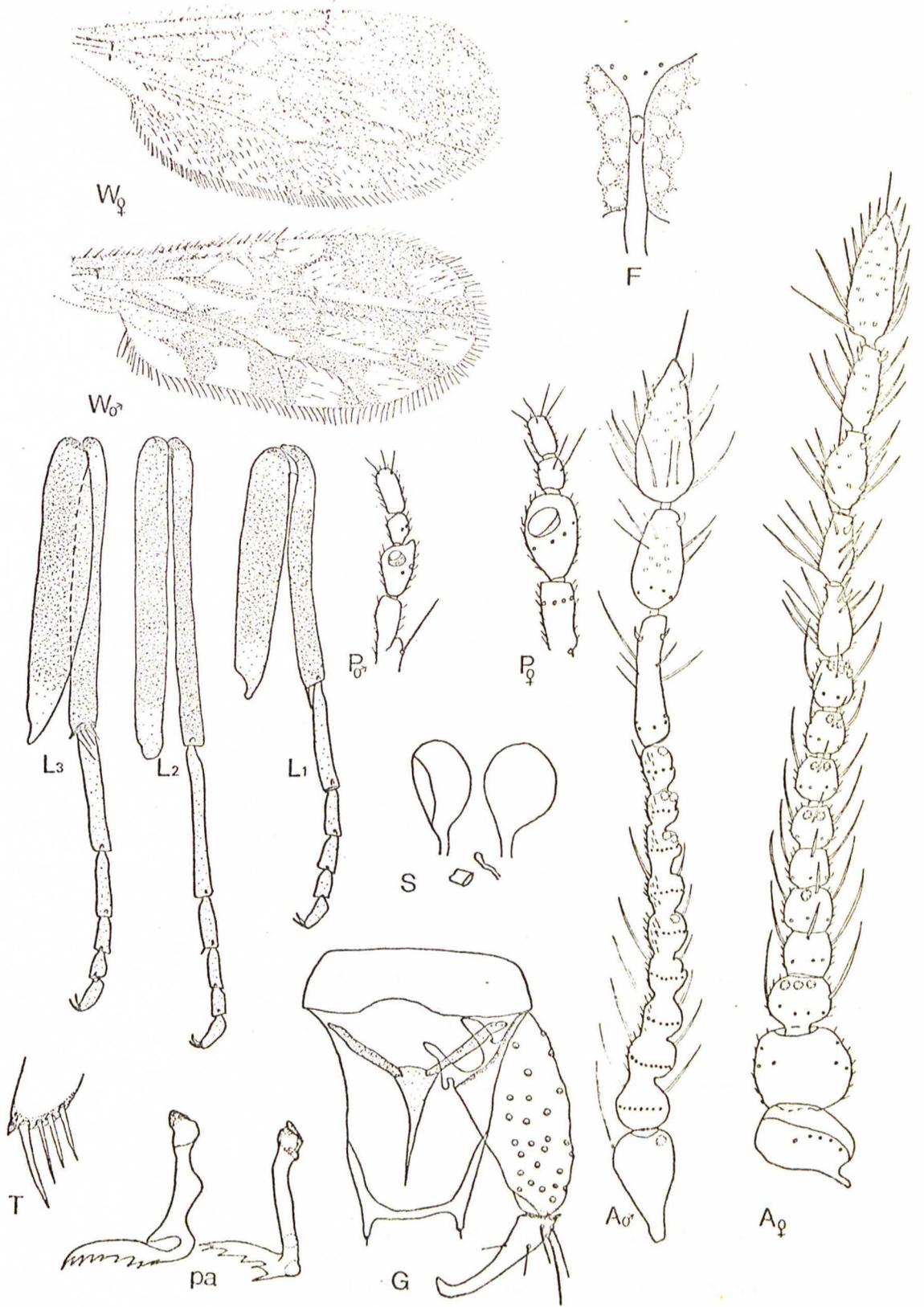
P - palpi, male and female

pa - parameres

S - spermathecae

T - female tibial comb

W - wings, male and female



AR 1.24 (1.15 - 1.36, n = 6); sensilla coeloconica on segments 3, 5, 7 - 10, total number of sensilla coeloconica 12 - 15; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 15P) swollen with single shallow sensory pit as illustrated; palpal segments 2 - 5 lengths 34 - 49 - 16 - 27 (n = 5) microns; PR 1.74 (1.61 - 1.92, n = 6). Mandible with 9 - 11 (n = 7) teeth.

Thorax: Mesonotum dark brown with light spots based on slide mounted specimens, the pattern cannot be described from slide specimens; scutellum brown. Wing (Plate 15W) dark with pale spots as illustrated, radial cells equal, more than half of the basal part of the first radial cell pale, second radial cell entirely dark r-m cross vein in pale area; cell R_5 with 2 very significant pale spots past the end of costa, 1 pale spot at the apex of cell R_5 not reaching the wing margin, other pale spots as illustrated; macrotrichia not dense but spread all over the wing, basal cell without macrotrichia; wing length 0.83 (0.81 - 0.85, n = 6) mm, breadth 0.40 (0.38 - 0.41, n = 6) mm, CR 0.55 (n = 6). Halter light brown sometimes with pebbly appearance. Legs (Plate 15L) light brown, femur and tibia darker than tarsus, light bands on femur and tibia as illustrated; tibial comb (Plate 15T) with 4 spines, the first from spur longest.

Abdomen: Brown with 2 equal spermathecae (Plate 15S), long neck, rudimentary spermatheca and sclerotized ring present; measuring 47 by 37 (n = 11) microns, neck 12 (n = 11) microns, rudimentary spermatheca length 25 (n = 4) microns.

Male. - Same as female with usual differences. Wing (Plate 15W) length 0.67 (n = 1) mm, breadth 0.28 (n = 1) mm, CR 0.48. Antenna

(Plate 15A) with sensilla coeloconica on segments 3, 8, 10 - 12; sensilla chaetica on segments 1 - 14, terminal seta present.

Genitalia: (Plate 15G, pa) 9th tergum elongated and narrowed, apico-lateral processes subparallel, distal margin without notch; basistyle with foot-shaped ventral root, dorsal root stout and long; dististyle gradually narrowed and slightly curved; 9th sternum with a broad incision, membrane not spiculate. Aedeagus arch low and broad, arms well sclerotized as illustrated, median portion triangular, long and filiform at the tip. Paramere with sclerotized knob, stem slightly curved with lateral processes in the middle, distal portion curved at right angle and bearing lateral fringed spines (Plate 15pa).

Distribution - Africa; Asia.

Slide mounted specimens studied - Iran: Hajiabad, 6 August 1959, H. Barnett, resting on horse, 1 male; Shemiran, August 1959, H. Barnett, light trap.

Pakistan: Lahore, Punjab, June 1959, H. Barnett, light trap, 1 female; Rawalpindi, Ayub Natl. Park, June 1959, H. Barnett, light trap, 1 female; Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 4 females, 1 male. The drawings of Plate 15, both male and female, were done from specimens collected from Peshawar, N. W. Frontier Prov., June 1959, H. Barnett. All specimens mentioned were used for measurements.

Discussion - The original description of C. similis by C. I. M. 1920 and further details in the literature show this species can be separated from C. longipennis Khalaf, 1957, by wing marks and male genitalia. The pale spots of cell R_5 and the aedeagus of C. similis

are very distinctive and easily separate C. similis from C. longipennis. The specimens of C. similis present in the USNM collection were studied. In all specimens from Africa (Gambia, Nigeria) and Asia (Bangkok, Siam, India, Thailand), the male genitalia and wing pattern, especially the 2 pale spots at the end of costal vein in cell R_5 , are the same as the present description, therefore, I am not in agreement with Gutsevich (1973) who put C. longipennis and C. similis in different subspecies.

Culicoides (Oecacta) longipennis Khalaf, 1957

Plate 16

Culicoides longipennis Khalaf, 1957. Bull. Soc. Ent. Egypt, 14: 346.

Size small; wing spotted; eyes separate.

Female. - Eyes not contiguous (Plate 16F) and bare. Antennal segments 3 - 15 (Plate 16A) with lengths in mean proportion of 14 - 10 - 10 - 10 - 11 - 11 - 11 - 13 - 19 - 20 - 22 - 23 - 36 (n = 5), AR 1.35 (1.22 - 1.49, n = 5); sensilla coeloconica on segments 3, 5 and 7 - 10, total number of sensilla coeloconica 12 - 14; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment swollen (Plate 16P), sensory pit not deep; palpal segments 2 - 5 lengths 31 - 51 - 19 - 26 (n = 5) microns; PR 1.94 (1.80 - 2.1, n = 5). Mandible with 9 - 11 (n = 6) teeth.

Thorax: Mesonotum dark brown with light spots based on slide mounted specimens, not possible to describe the pattern from slide specimens; scutellum brown. Wing (Plate 16W) dark with light spots; radial cells equal, the basal half of first radial cell pale, the

Culicoides (Oecacta) longipennis

A - antennae, female and male

E - aedeagus and parameres

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

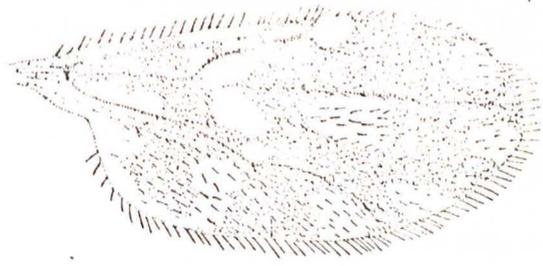
L₃ - female 3rd leg

P - palpi, male and female

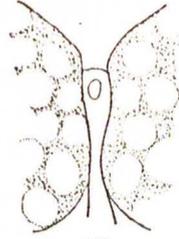
S - spermathecae

T - female tibial comb

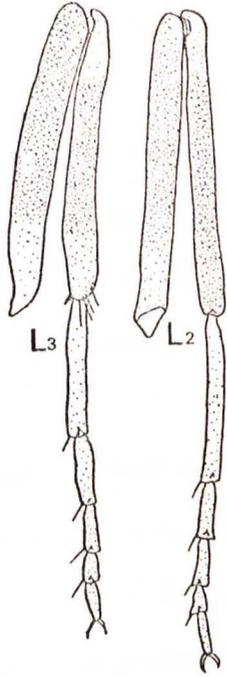
W - female wing



W♀



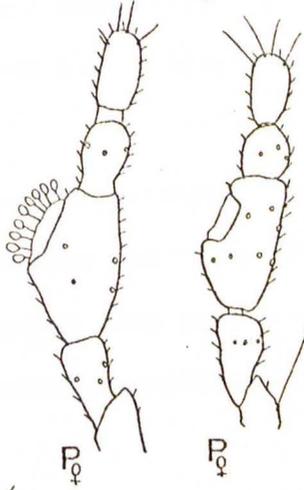
F



L3

L2

L1

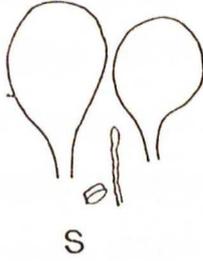


P♀

P♀



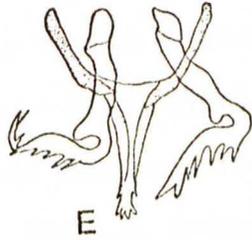
P♀



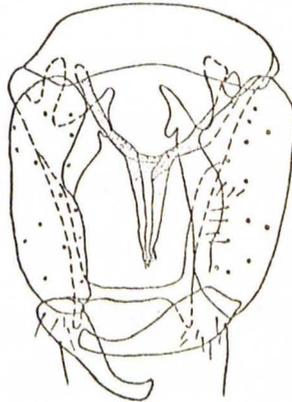
S



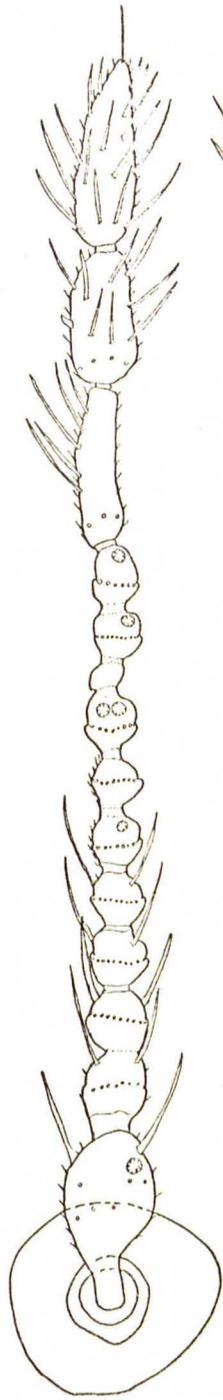
T



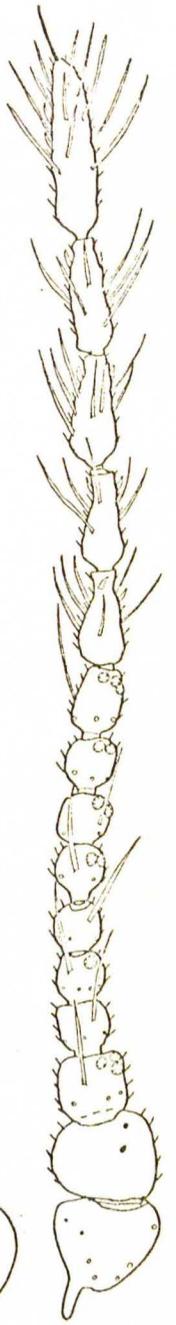
E



G



A♂



A♀

second radial cell dark, r-m cross vein in the pale area, only 1 pale spot immediately following cell R_2 ; other pale spots on wing as illustrated and same as C. similis; macrotrichia numerous all over the wing, not present on basal cell; wing length 0.84 (0.79 - 0.90, n = 10) mm, breadth 0.39 (0.37 - 0.42, n = 10) mm, CR 0.53 (0.51 - 0.57, n = 10). Halter light brown. Legs (Plate 15L) brown with light bands on femur and tibia as illustrated; tibial comb with 4 spines (Plate 15T), the one next to spur longest.

Abdomen: Brown with 2 subequal spermathecae (Plate 16S), long neck, measuring 59 by 41 (n = 5) microns and 49 by 36 (n = 4) microns; rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca length 25 (n = 6) microns, spermatheca neck 11 (n = 11) microns.

Male. - Same as female with usual differences. Wing length 0.69 (0.65 - 0.71, n = 10) mm, breadth 0.30 (0.28 - 0.32, n = 10) mm, CR 0.48 (0.46 - 0.49, n = 10). Antenna (Plate 16A) with sensilla coeloconica on segments 3, 8, 10 - 12; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment slightly swollen (Plate 16P) with single sensory pit.

Genitalia: (Plate 16G, E) quite similar to its closely related species, C. similis, but differing in the aedeagus; the terminal portion of aedeagus in C. longipennis is serrulated and the aedeagus arch is higher in this species (Plate 16G, E).

Distribution - Iraq, USSR, Iran, Afghanistan, Pakistan, Turkey.

Slide mounted specimens studied - Afghanistan: Helmand Prov., Gawargin, 670 m, 20 km S. Lashkargah, 1 October 1968, D. P. Wojcik,

black light trap, 6 females; Kunduz Prov., Bulla Quchi, 10 September 1968, D. P. Wojcik, black light, 24 females, 9 males; Kunduz Prov., Bulla Quchi, 12 September 1968, D. P. Wojcik, black light, 1 female, 1 male; Kunduz Prov., Bulla Quchi, 305 m, 11 km S. E. Kunduz, 10 September 1968, D. P. Wojcik, black light trap, 5 females, 1 male.

Pakistan: Lahore, July - August 1957, J. Maldonado, 9 females, 1 male; Lahore, May - June 1958, J. Maldonado, light trap, 3 females; Rawalpindi, Ayub Natl. Park, June 1957, H. Barnett, light trap, 50 females, 18 males; Rawalpindi, Dharmyal, June 1959, H. Barnett, light trap, 39 females, 15 males; Peshawar, 20 June 1958, J. Maldonado, light trap, 4 females, 4 males; Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 15 females, 15 males; Peshawar, 20 September 1960, J. Scanlon, light trap, 1 male. The female drawings of Plate 16 were from specimens from Pakistan, Peshawar, 20 June 1958, J. Maldonado, light trap. The male drawings of Plate 16 were done from specimens from Pakistan, Dharmyal, Rawalpindi, June 1959, H. Barnett. All measurements were done from specimens from Rawalpindi, Dharmyal, June 1959, H. Barnett, light trap.

Turkey: Adana, 13 October 1960, T. Curtin, light, 2 females; Izmir Prov., Bornova, October 1961, T. Curtin, light, 1 female; May 1962, T. Curtin, light, 2 females; June 1962, T. Curtin, light, 2 females.

Culicoides (Oecacta) subfascipennis Kieffer, 1919

Plate 17

Culicoides subfascipennis Kieffer, 1919. Ann. Hist. Nat. Mus. Hung. 17, 44.

Culicoides (Oecacta) subfascipennis

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

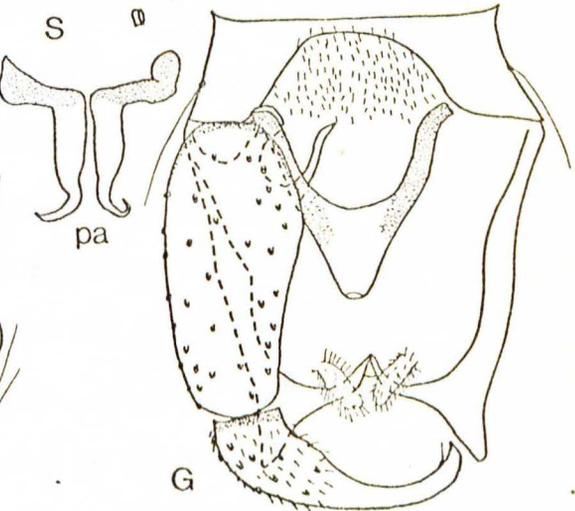
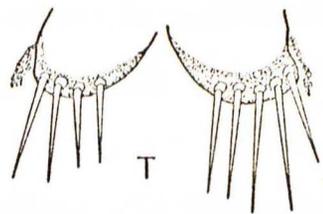
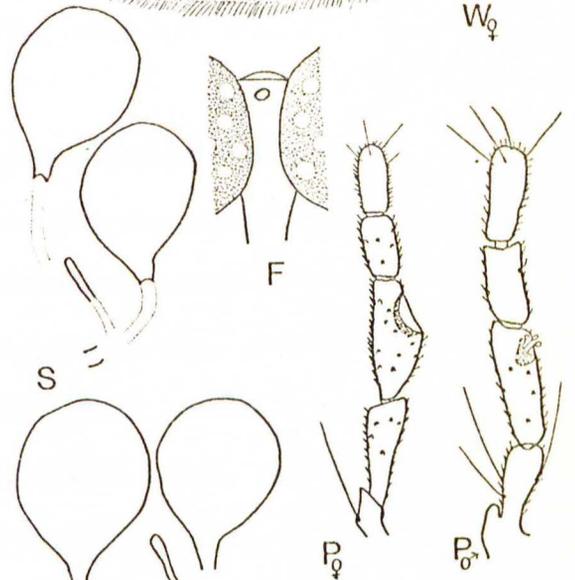
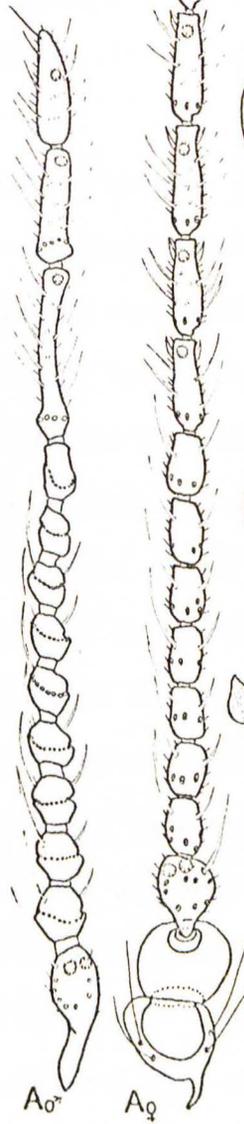
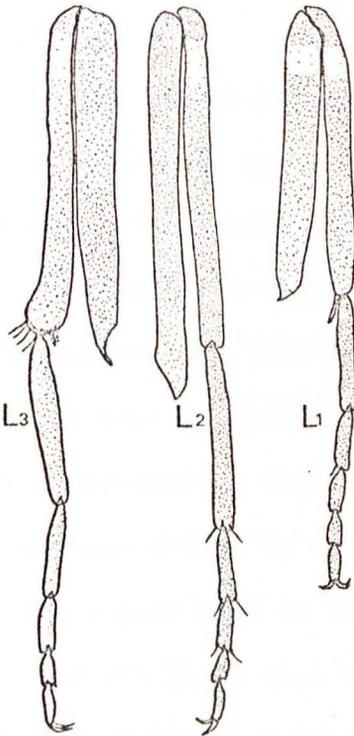
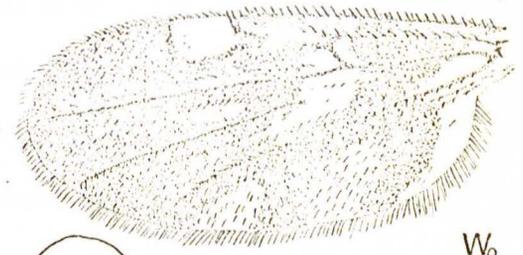
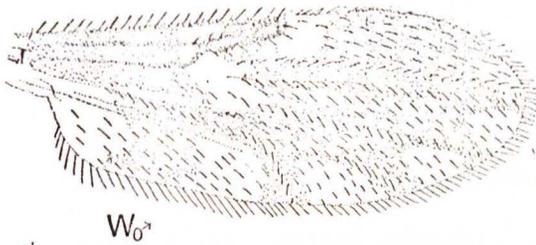
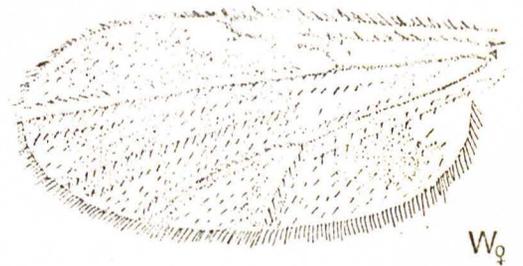
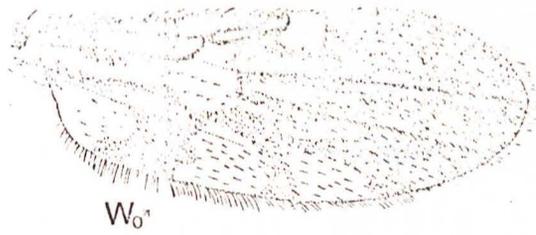
P - palpi, male and female

pa - parameres

S - spermathecae

T - female tibial comb

W - wings, male and female



Moderately large species; faintly spotted wing; eyes separate.

Female. - Eyes not contiguous (Plate 17F) and bare. Antennal segments 3 - 15 (Plate 17A) with lengths in mean proportion of 21 - 15 - 15 - 15 - 16 - 16 - 17 - 17 - 25 - 25 - 30 - 29 - 38 (n = 5), AR 1.12 (1.10 - 1.17, n = 5); sensilla coeloconica on segments 3, 11 - 15, total number of sensilla coeloconica 7; sensilla chaetica on segments 1 - 15. Third palpal segment slightly swollen (Plate 17P) with single shallow sensory pit; palpal segments 2 - 5 lengths 75 - 78 - 34 - 36 (n = 5) microns; PR 2.39 (2.20 - 2.77, n = 5). Mandible with 12 - 16 (n = 10) teeth.

Thorax: Mesonotum dark brown without pattern based on slide mounted specimens; scutellum slightly lighter than mesonotum. Wing (Plate 17W) faint with pale spots, wing pattern more visible in dark phase, the size and number of pale spots variable as illustrated, radial cells equal, the apex of cell R_1 dark, cell R_2 entirely dark, pale spot over r-m cross vein extends to the costal margin and may reach medio-cubital fork; pale spots at the tip of cells R_5 , M_1 and M_2 sometimes absent as illustrated (Plate 17W); a pale spot beyond cell R_2 ; a pale spot at the base of cell M_1 present; base of the wing light and the light area extends to the anal cell and may reach the pale spot at the apex of anal cell; pale spot at cell M_4 reaching the wing margin; macrotrichia numerous all over the wing, not present on basal cell; wing length 1.33 (1.18 - 1.55, n = 10) mm, breadth 0.62 (0.55 - 0.74, n = 10) mm, CR 0.56 (0.54 - 0.58, n = 10). Halter pale. Legs (Plate 17L) brown with subbasal pale ring as illustrated; tibial comb with 4 - 5 spines, if 4 spines present the first 2 next to spur

equal and longest but if 5 spines present, the first next to spur shortest (Plate 17T).

Abdomen: Dark brown with 2 subspherical spermathecae (Plate 17S), measuring 65 by 54 (n = 8) microns and 58 by 50 (n = 4) microns; rudimentary spermatheca and sclerotized ring present; rudimentary spermatheca length 23 (n = 8) microns, spermatheca neck 9 (n = 12) microns, the duct may be visible as illustrated.

Male. - Same as female with usual differences. Wing (Plate 17W) pattern same as female as illustrated, wing length 1.28 (1.19 - 1.35, n = 10) mm, breadth 0.47 (0.45 - 0.48, n = 10) mm, CR 0.52 (0.50 - 0.54, n = 10). Antenna (Plate 17A) with sensilla coeloconica on segments 3, 13 - 15; sensilla chaetica on segments 1 - 14, terminal seta present.

Third palpal segment not swollen and with a single sensory pit.

Genitalia: (Plate 17G, pa) 9th tergum elongated with wide and subparallel apicolateral processes, posterior margin with a deep V-shaped notch; basistyle with long and pointed ventral root, dorsal root well developed as illustrated, dististyle gradually narrowed toward the middle and remain narrowed to the tip and curved; 9th sternum with a deep incision; membrane spiculated with numerous short hairs. Aedeagus with U-shaped high arch, arms sclerotized and dark, median portion long and truncate. Paramere short with sclerotized basal knob (Plate 17pa), bent at right angle at the base and slightly narrowed toward the apex then sharply narrowed and bent at the apical third, pointed at the tip.

Distribution - Europe; Asia.

Slide mounted material studied - Afghanistan, Bamian Prov., Sey-ydabad, 2439 m, 4 km N. Bamian, 18 - 21 August 1968, D. P. Wojcik,

black light trap, 31 females, 16 males.

The drawings of Plate 17 and measurements were done from the specimens from Afghanistan, Bamian, 18 - 21 August 1968.

Culicoides (Oecacta) kurensis Dzhafarov, 1962

Plate 18

Culicoides kurensis Dzhafarov, 1962. Ent. Oboz. 41 (1): 206.

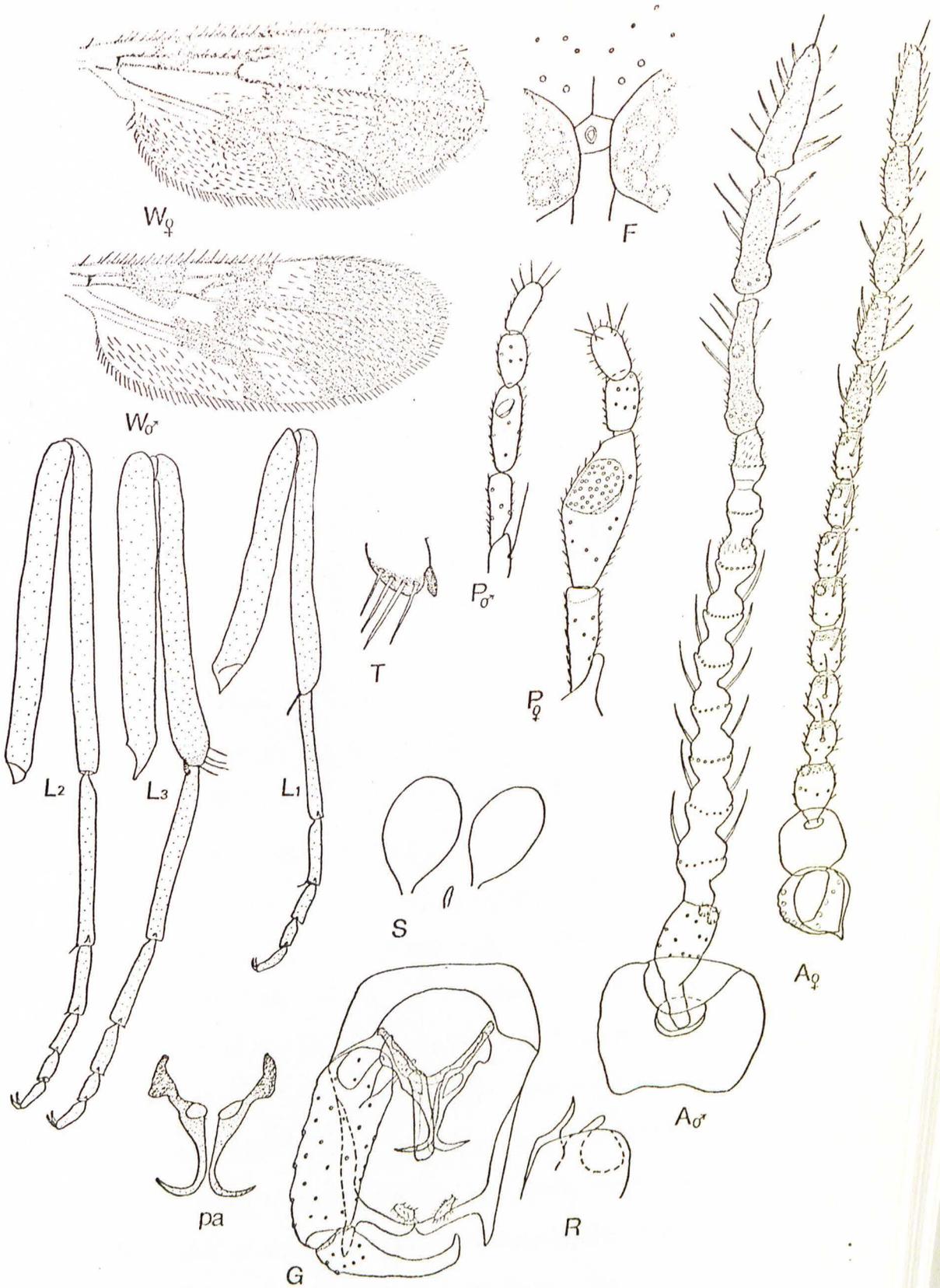
Size medium, faint spotted wing, eyes separate.

Female. - Eyes not contiguous (Plate 18F) and bare, upper, lower and longitudinal suture present. Antennal segments 3 - 15 (Plate 18A) with lengths in mean proportion of 19 - 13 - 13 - 14 - 14 - 14 - 15 - 15 - 21 - 22 - 23 - 24 - 33 (n = 5), AR 1.05 (1.01 - 1.07, n = 5); sensilla coeloconica on segments 3 and 6 - 14, may not be present on segments 6, 7, 9 and rarely segment 10, total number of sensilla coeloconica 9 - 12; sensilla chaetica on segments 1 - 15. Third palpal segment well swollen with 1 single shallow pit with wide opening as illustrated (Plate 18P); palpal segments 2 - 5 lengths 57 - 82 - 31 - 32 (n = 5) microns; palpal ratio 2.25 (2.1 - 2.5, n = 5). Mandible with 14 - 17 teeth.

Thorax: Mesonotum brown without pattern based on slide mounted specimens; scutellum lighter than mesonotum. Wing (Plate 18W) faint with pale spots; radial cells equal in size, the tip of the first radial cell dark, second radial cell entirely dark; the base of the wing in a pale area which extends to the anal cell and also joins the light area over the r-m cross vein; a dark spot on the middle of basal cell reaching the costal margin and may extend over vein M_{1+2} ; in the middle of the wing a dark band starts from the costal margin and

Culicoides (Oecacta) kurensis

- A - antennae, male and female
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - parameres
R - dorsal and ventral roots of basistyle
S - spermathecae
T - female tibial comb
W - wings, male and female



continues to the anal margin of the wing; the apical third of the wing dark, the pale area may be poorly defined and difficult to see under bright field but visible under dark phase field microscopy; macrotrichia numerous at the apical half and few at the base of the wing, basal cell without macrotrichia; wing length 1.15 (0.97 - 1.36, n = 10) mm, breadth 0.53 (0.44 - 0.65, n = 10) mm, CR 0.54 (0.53 - 0.56, n = 10). Halter pale. Legs (Plate 18L) light brown without pattern; tibial comb with 4 spines (Plate 18T), the second from spur longest.

Abdomen: Brown with 2 equal oval-shaped spermathecae (Plate 18S), measuring 59 by 44 (n = 7) microns; rudimentary spermatheca present, rudimentary spermatheca length 13 (n = 4) microns, spermatheca neck length 5 (n = 6) microns.

Male. - Same as female with usual differences. Wing (Plate 18W) pattern same as female, wing length 1.07 (0.85 - 1.23, n = 5) mm, breadth 0.42 (0.36 - 0.47, n = 5), CR 0.49 (0.47 - 0.51, n = 5). Antenna with sensilla coeloconica on segments 3, 10, 13, 14 (Plate 18A); sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment not swollen (Plate 18P) with 1 single sensory pit.

Genitalia: (Plate 18G, pa, C) 9th tergum with well developed lateral processes, posterior margin with notch; basistyle with ventral and dorsal roots (Plate 18C), dististyle narrowed toward the apex and slightly curved; 9th sternum with a deep incision, membrane without spicule. Aedeagus arch broad, arms sclerotized and dark, median portion long and parallel sided with blunt tip. Paramere basal knob foot shaped (Plate 18pa), swollen in the lower middle portion, distal

portion tapering to pointed tip and bent at right angle at the apex as illustrated.

Distribution - USSR, Iran, Turkey.

Slide mounted material studied - Turkey: Bospinar, 30 April - 3 May 1961, T. J. Curtin, horse trap, 3 females; Bospinar, 12 July 1961, T. J. Curtin, horse trap, 9 females; Pirincilik, 30 April - 3 May 1961, T. J. Curtin, light trap, 3 males; Pirincilik, 10 July 1961, T. J. Curtin, 1 male; Pirincilik, 16 July 1961, T. Curtin, 1 male.

The drawings of female of Plate 18 and measurements of female were done from specimens from Turkey, Bospinar, 12 July 1961; the male drawings and measurements were done from specimens from Turkey, Pirincilik, April - July 1961.

Culicoides (Oecacta) maritimus Kieffer, 1924

Plate 19

Culicoides maritimus Kieffer, 1924. Bull. Soc. Hist. Nat. Moselle. 30: 16.

Relatively large species; wing spotted; eyes separate.

Female. - Eyes separate and bare (Plate 19F), longitudinal and upper suture present, in 1 specimen no suture present as illustrated. Antennal segments 3 and 11 - 15 darker (Plate 19A), segments 3 - 15 with lengths in mean proportion of 25.5 - 17 - 17 - 17.5 - 18 - 18 - 18 - 20 - 37 - 35 - 40 - 40 - 53 (n = 5), AR 1.45 (1.32 - 1.70, n = 5); sensilla coeloconica on segments 1 - 15; total number of sensilla coeloconica 20 - 25; sensilla chaetica on segments 1 - 10, may be present on segments 11 - 15. Third palpal segment swollen with single sensory

Culicoides (Oecacta) maritimus

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

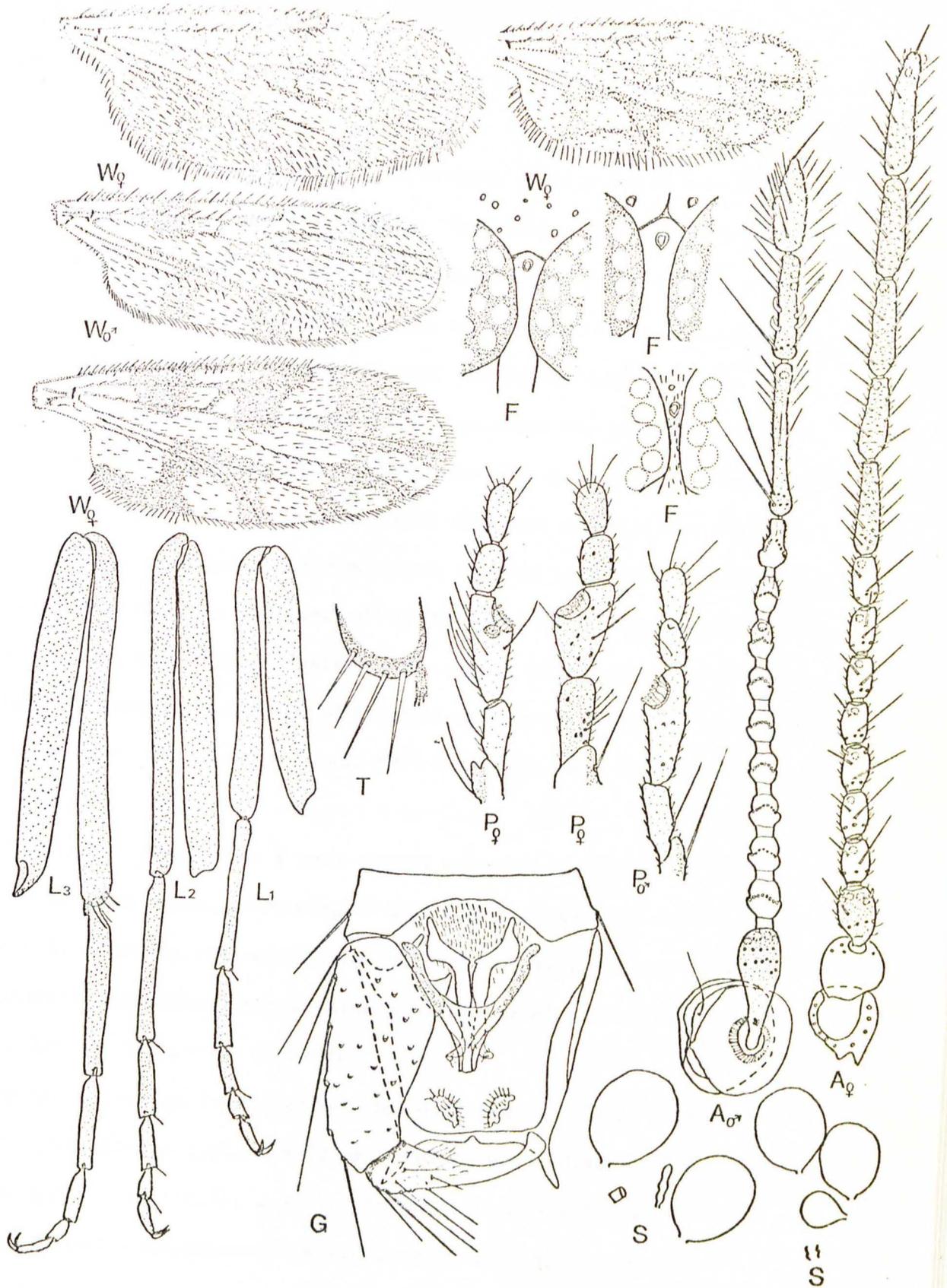
L₃ - female 3rd leg

P - palpi, male and female

S - spermathecae

T - female tibial comb

W - wings, male and female



pit (Plate 19P), not deep; palpal segments 2 - 5 lengths 76 - 95 - 33 - 40 (n = 5) microns; PR 2.3 (2 - 2.5, n = 5). Mandible with 13 - 18 teeth.

Thorax: Mesonotum dark brown without pattern based on slide mounted specimens; scutellum lighter than mesonotum. Wing (Plate 19W) dark with light spots; radial cells equal in size, the apical half of first radial cell dark, second radial cell completely dark; the size of pale spots variable as illustrated, the apical spot of cells R_5 , M_1 and M_2 may reach the wing margin; in 1 specimen the pale spot of anal cell hourglass shaped as illustrated; the pale spot beyond the second radial cell may join the pale spots at the base of cells M_1 , M_2 and M_4 and make a pale band as illustrated; base of wing pale; macrotrichia numerous all over the wing including the basal cell; wing length 1.75 (1.42 - 1.97, n = 10) mm. Halter pale. Legs (Plate 19L) light brown, in dark specimens the pale band present at base of tibia but not very distinct; tibial comb (Plate 19T) with 4 spines, the first from spur longest.

Abdomen: Brown with 2 oval-shaped subequal spermathecae (Plate 19S), neck very short, measuring 59 by 45 (n = 4) microns and 52 by 42 (n = 4) microns; rudimentary spermatheca and ring present, the rudimentary spermatheca may develop as illustrated, rudimentary spermatheca length 27 (n = 4) microns.

Male. - Same as female with usual differences. Wing (Plate 19W) length 1.43 (1.13 - 1.61, n = 9) mm, breadth 0.51 (0.42 - 0.58, n = 9) mm, CR 0.53 (0.51 - 0.56, n = 9). Antennal segments 3 and 13 - 15 darker, sensilla coeloconica on segments 3, 10, 13, 14; sensilla

chaetica on segments 1 - 14, terminal seta present (Plate 19A).
Third palpal segment slightly swollen with single sensory pit, in 1 specimen an extra small sensory pit present as illustrated (Plate 19P).

Genitalia: (Plate 19G) 9th tergum with long tapering divergent lateral processes, posterior margin with notch; basistyle with ventral and dorsal root, roots not very long; dististyle narrowed toward the apex and slightly curved; 9th sternum with a deep incision, membrane spiculated. Aedeagus arch U-shaped and relatively high, arms sclerotized dark, median portion well developed with blunt tip. Paramere with foot-shaped basal knob, slightly swollen at base then gradually narrowed toward the end, bent at the apex, pointed tip bearing 3 - 4 distinct terminal fringing hairs.

Distribution - W. Europe; USSR, Turkey.

Slide mounted material studied - Turkey: Pirincilik, 19 May 1961, T. J. Curtin, light, 2 females, 4 males; Izmir Prov., Bornova, 18 July 1961, T. Curtin, light, 1 male; Izmir Prov., Bornova, March 1962, T. Curtin, light, 8 females, 1 male; Izmir Prov., Bornova, May 1962, T. Curtin, light, 2 females, 2 males.

The female drawings of Plate 19 and measurements were done from specimens from Turkey, Izmir, March 1962; the male drawings and measurements were done from specimens from Pirincilik and Izmir Prov.

Culicoides (Oecacta) stepicola Remm, 1968

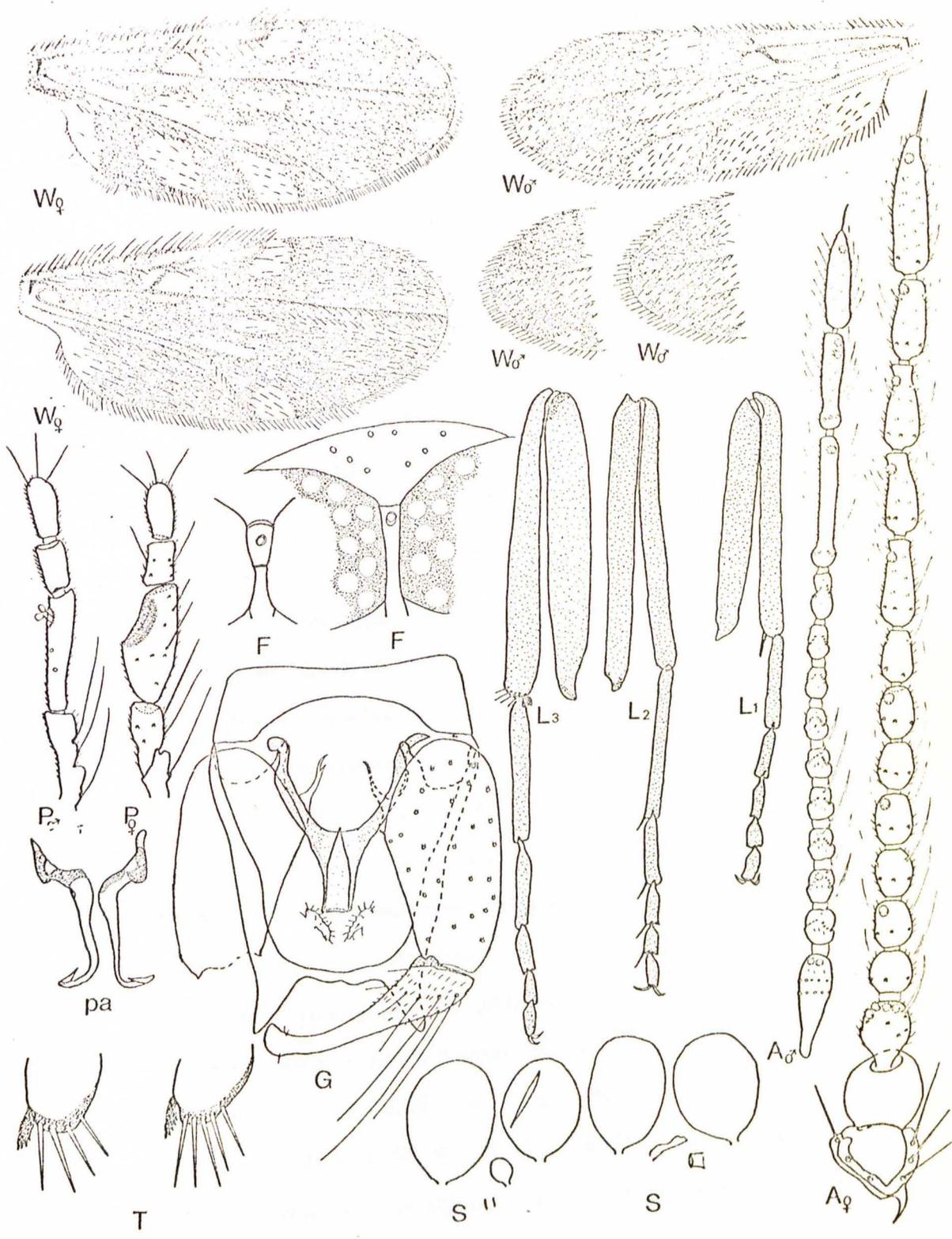
Plate 20

Culicoides (Oecacta) stepicola Remm, 1968. Entom. Oboz. 47: 838.

Size medium; faint spotted wing; eyes separate.

Culcioides (Oecacta) stepicola

- A - antennae, male and female
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - parameres
S - spermathecae
T - female tibial comb
W - wings, male and female



Female. - Eyes not contiguous and bare (Plate 20F), lower suture may be present. Antennal segments 3 - 15 (Plate 20A) with lengths in mean proportion of 18 - 12 - 12 - 13 - 14 - 13 - 14 - 14 - 24 - 25 - 25 - 26 - 38 (n = 5), AR 1.24 (1.16 - 1.29, n = 5); sensilla coeloconica on segments 3, 5, 7, 9 and 11 - 15, may be present on segment 5 or absent on segments 5, 7 and 9, the sensilla coeloconica arrangement on left side and right side may be different, total number of sensilla coeloconica 9 - 13; sensilla chaetica on segments 1 - 15. Third palpal segment slightly swollen with single sensory pit, not deep (Plate 20P); palpal segments 2 - 5 lengths 48 - 76 - 27 - 32 (n = 5) microns; PR 2.11 (1.80 - 2.25, n = 5). Mandible with 12 - 15 teeth.

Thorax: Mesonotum dark brown without pattern based on slide mounted specimens; scutellum lighter than mesonotum. Wing (Plate 20W) faint with pale spots and dark radial veins, wing pattern extremely variable and the degree of pale spots development different as illustrated, and pale spots more visible in dark phase field microscope; radial cells equal, the base of first radial cell pale, apical half of first radial cell and second radial cell entirely dark, pale spot over r-m cross vein, pale spot beyond second radial cell, pale spots at base of cells M_1 and M_2 ; the pale spots at the tip of cells R_5 , M_1 , M_2 may be absent as illustrated, the pale spot at the apex of anal cell may be absent; macrotrichia spread all over the wing, absent on basal cell; wing length 1.24 (1.08 - 1.35, n = 10) mm, breadth 0.55 (0.48 - 0.62, n = 10) mm, CR 0.56 (0.54 - 0.59, n = 10). Halter pale. Legs (Plate 20L) light brown without pattern; tibial comb with 4 - 5 spines (Plate 20T).

Abdomen: Brown with 2 equal oval-shaped spermathecae (Plate 20S), measuring 53 by 36 microns ($n = 10$); rudimentary spermatheca and ring present, rudimentary spermatheca length 16 microns.

Male. - Same as female with usual differences. Wing length 1.21 (1.17 - 1.29, $n = 5$) mm, breadth 0.45 (0.43 - 0.48, $n = 5$) mm, CR 0.52 (0.51 - 0.54, $n = 5$), wing pattern (Plate 20W) same as female and variable. Antenna (Plate 20A) with sensilla coeloconica on segments 3 and 13 - 15, may also be present on segment 5; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 20P) not swollen, single sensory pit present.

Genitalia: (Plate 20G, pa, C) 9th tergum with well developed divergent lateral processes, posterior margin with notch; basistyle with dorsal and ventral root, ventral root very long and slender (Plate 20C); dististyle narrowed toward the apex and slightly curved; 9th sternum with deep and wide incision, membrane bare. Aedeagus with deep U-shaped arch, arms sclerotized and dark, median portion long and parallel sided, truncate at the tip, in a few specimens the median portion is much longer and pointed at the tip with the apical half turned over the distal half as illustrated. Paramere (Plate 20pa) basal knob foot-shaped and slightly swollen at the base, gradually narrowed toward the apex, filiform at the apex and sharply bent.

Distribution - USSR (Crimea); Afghanistan.

Slide mounted material studied - Afghanistan: Bamian Prov., Seyydabad, 2439 m, 4 km N. Bamian, 18 - 20 August 1968, D. P. Wojcik, black light trap, 3 females, 4 males; Herat Prov., Karokh, 1280 m, 43 km E. Herat, 15, 18, 20 October 1968, D. P. Wojcik, black light

7 females, 1 male.

The female drawings of Plate 20 were done from specimens from Afghanistan, Bamian Prov. and Herat Prov.; the male drawings of Plate 20 were done from specimens from Afghanistan, Bamian Prov. All specimens collected from Afghanistan were used for measurements.

Discussion - The male genitalia of C. stepicola is very similar to C. cubitalis as was pointed out by Remm 1968 in the original description, but the genitalia drawing by Remm shows differences in the shape of the 9th tergum and ventral processes of the dististyle. The male specimens from Afghanistan show a long and slender ventral root; this is in agreement with the single male I have examined from Crimea determined by Dr. Remm. The female described by Remm does not show sensilla coeloconica on segment 15 of the antenna, but it is present in specimens from Afghanistan. I examined a female from Crimea determined by Remm, but because it is a very poorly mounted specimen, I was not able to determine if the sensoria are present or absent on segment 15. Gutsevich (1973) recorded the sensilla coeloconica on the last segment of the antenna.

Culicoides (Oecacta) odibilis Austen, 1921

Plate 21

Culicoides odibilis Austen, 1921. Bull. Ent. Res. 12: 114.

Size medium; wing spots distinct; eyes separate.

Female. - Eyes not contiguous, bare (Plate 21F). Antennal segments 3 - 15 (Plate 21A) lengths in mean proportion of 20 - 14 - 14 - 15 - 15 - 15 - 15 - 15 - 24 - 28 - 29 - 32 - 44 (n = 5), AR 1.36 (1.25 - 1.66, n = 5); sensilla coeloconica on segments 3 - 15,

total number of sensilla coeloconica 25 - 28; sensilla chaetica on segments 1 - 10, may be present on segments 11 - 14, terminal seta present. Third palpal segment swollen with single wide opening sensory pit (Plate 21P), palpal segments 2 - 5 lengths 81 - 86 - 32 - 33 (n = 5) microns; PR 1.97 (1.94 - 2.50, n = 5). Mandible with 11 - 14 teeth.

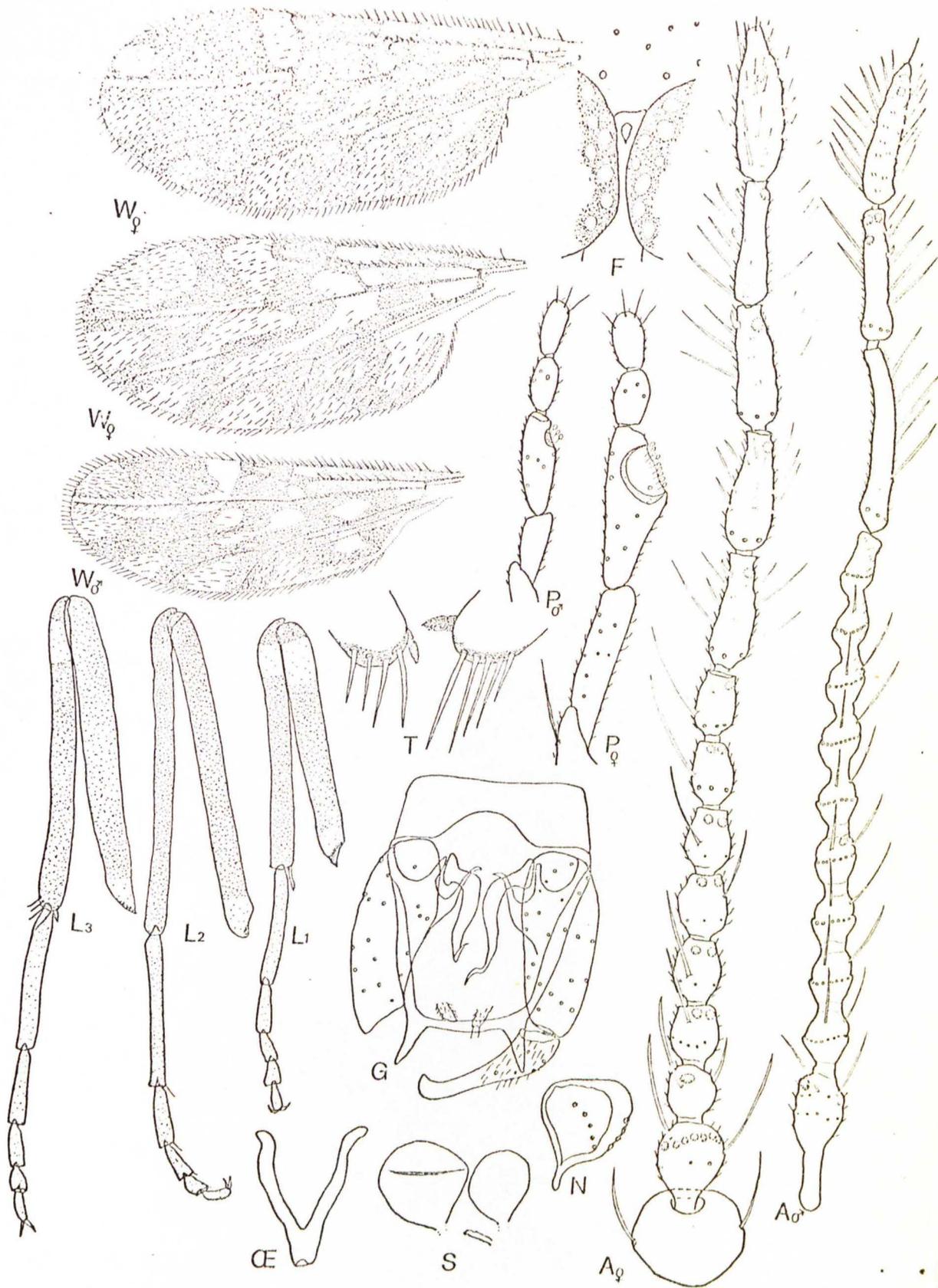
Thorax: Mesonotum dark brown based on slide mounted specimens, pattern not distinct; scutellum lighter than mesonotum. Wing (Plate 21W) dark with light spots, radial cells equal, the basal half of first radial cell light; light spot over the r-m cross vein and humeral cross vein, the light spot over the r-m cross vein may exceed the median vein and join the pale spot at the base of M_1 cell; pale spots at the tip of cells R_5 , M_1 , M_2 and M_4 ; the base of anal cell light, the light spot at the apex of anal cell hourglass shaped or separated as 2 light spots; in general the size of light spots variable as illustrated; macrotrichia spread over the wing, not present on basal cell; wing length 1.33 (1.10 - 1.84, n = 10), breadth 0.61 (0.55 - 0.77, n = 10), CR 0.58 (0.54 - 0.63, n = 10). Halter pale. Legs (Plate 20L) brown with light band at the base of tibia; tibial comb with 4 - 5 spines (Plate 21T).

Abdomen: Brown with 2 unequal spermathecae (Plate 20S), measuring 48 by 41 (n = 5) microns and 37 by 34 (n = 5) microns; rudimentary spermatheca present, rudimentary spermatheca length 18 (n = 6) microns, spermatheca neck 3 (n = 8) microns.

Male. - Same as female with usual differences. Wing (Plate 21W) length 1.16 (0.87 - 1.39, n = 8) mm, breadth 0.45 (0.39 - 0.52, n = 8) mm, CR 0.54 (0.51 - 0.55, n = 8). Antenna (Plate 21A) with sensilla

Culicoides (Oecacta) odibilis

- A - antennae, male and female
- ae - aedeagus
- F - female fronto-vitta
- G - male genitalia
- L₁ - female 1st leg
- L₂ - female 2nd leg
- L₃ - female 3rd leg
- N - scape of female antenna
- P - palpi, male and female
- S - spermathecae
- T - female tibial comb
- W - wings, male and female



coeloconia on segments 3, 7 and 14 - 15, may be absent from segment 7; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 21P) not swollen, single sensory pit present.

Genitalia: (Plate 21G, ae) 9th tergum elongate with long divergent lateral processes; basistyle with well developed ventral and dorsal roots, ventral root long and slender, dististyle narrowed toward the apex and slightly curved; 9th sternum with a deep incision, membrane not spiculate. Aedeagus (Plate 21ae) arch high and V-shaped, median portion not long, truncated. Paramere basal knob foot shaped, slightly widened at the base then gradually narrowed, filiform and bent at the apex.

Distribution - Europe; Asia: Japan, Palestine, Turkey, USSR.

Slide mounted material studied - Turkey: Diyarbakir, 24 September 1960, T. Curtin, light, 1 female; Pirincilik, 19 May 1961, T. Curtin, light, 2 females; Bornova, Izmir Prov., 18 July 1961, T. Curtin, light, 2 females, 1 male; Bornova, Izmir Prov., October 1961, T. Curtin, light, 5 females, 4 males; Bornova, Izmir Prov., June 1961, T. Curtin, light, 1 female, 2 males; Tire, Izmir Prov., T. Curtin, light, 1 female.

The male and female drawings of Plate 21 were done from specimens from Turkey, Izmir Prov., Bornova, 18 July 1961 and Diyarbakir 24 September 1960; all specimens were used for measurements.

Culicodites (Oecacta) pictipennis (Staeger), 1839

Plate 22

Ceratopogon pictipennis Staeger, 1839. Kröyer Naturhistorisk Tidss-

krift 2: 594.

Size moderate; distinct wing spots; eyes not contiguous.

Female. - Eyes separate and bare (Plate 22F), the lower suture may be present. Antennal segments 3 - 15 (Plate 22A) lengths in mean proportion of 18 - 11 - 11 - 12 - 11 - 12 - 12 - 13 - 21 - 22 - 23 - 23 - 36 (n = 5), AR 1.25 (1.18 - 1.32, n = 5); sensilla coeloconica on segments 3 - 14, total number of sensilla coeloconica 15 - 18; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 22P) swollen with a single shallow sensory pit; palpal segments 2 - 5 lengths 45 - 72 - 24 - 27 (n = 5) microns; PR 2.04 (1.9 - 2.2, n = 5). Mandible with 12 - 14 (n = 8) teeth.

Thorax: Mesonotum dark brown with 2 pale stripes in the middle and numerous hair sockets based on slide mounted specimens; scutellum dark brown. Wings (Plate 22W) dark with pale spots, radial cells equal, the basal half of first radial cell light, second radial cell dark but the tip of radial veins light; pale spot over r-m cross vein reaching the costal margin and extending to the cells M_1 and M_2 ; light spot at the tip of cells R_5 , M_1 , M_2 , M_4 and anal cell; light spot near the base of cell M_1 may join the light spot at the base of cell M_2 and the one over r-m cross vein; macrotrichia dense and distributed over wing, no macrotrichia on basal cell; wing length 0.99 (0.91 - 1.06, n = 10) mm, breadth 0.47 (0.40 - 0.53, n = 10) mm, CR 0.55 (0.53 - 0.56, n = 10). Halter yellowish. Legs (Plate 22L) brown with dark knees and pale band at the base of tibia and the apex of front femur as illustrated; tibial comb (Plate 22T) with 4 spines, first spine from spur longest.

Abdomen: Brown with 2 equal spermathecae (Plate 22S), measuring 45 by 34 (n = 5) microns; rudimentary spermatheca and sclerotized ring

present, rudimentary spermatheca length 17 ($n = 5$) microns, no sclerotized neck but may be visible as illustrated.

Male. - Same as female with usual differences. Wing (Plate 22W) pattern same as female, the light spots more expanded, wing length 0.96 (0.86 - 1.03, $n = 10$) mm, breadth 0.37 (0.32 - 0.39, $n = 10$) mm, CR 0.49 (0.46 - 0.52, $n = 10$). Antenna (Plate 22A) with sensilla coeloconica on segments 3, 4, 13 - 15, may be absent on segment 4; the last 3 segments (13 - 15) slightly darker than the other segments; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal (Plate 22P) segment not swollen, single sensory pit.

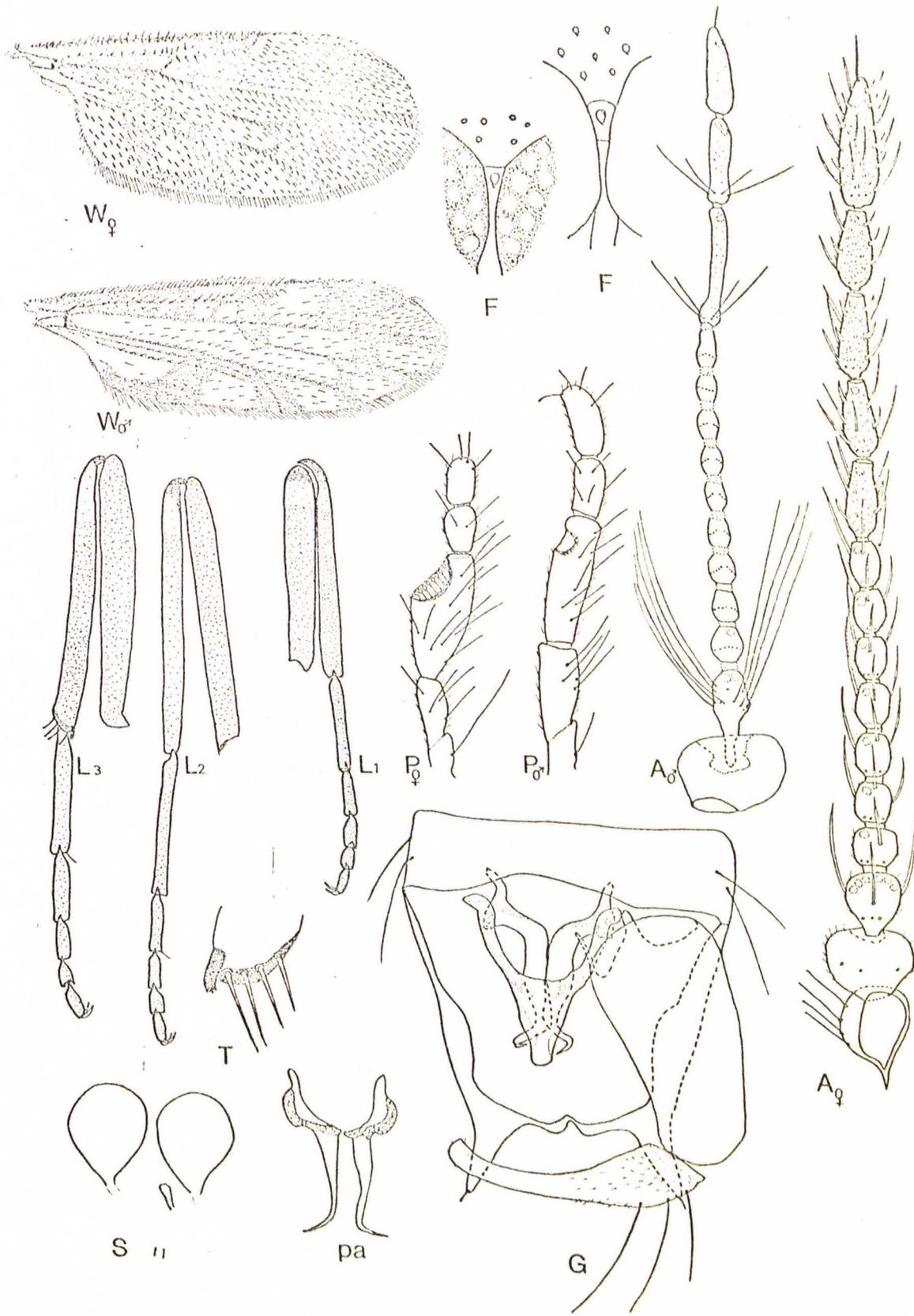
Genitalia: (Plate 22G, pa) 9th tergum gradually narrowed toward the apex, apicolateral processes well developed and divergent, posterior margin with deep notch; basistyle with ventral and dorsal roots well developed, ventral root long and slender, dististyle slightly curved; 9th sternum widely emarginate, membrane not spinose. Aedeagus arch high and U-shaped, median portion widened at the base and abruptly narrowed at the end. Paramere (Plate 22pa) with foot-shaped basal knob, stem slightly swollen at the base then gradually narrowed and pointed, sharply bent at the apex.

Distribution - Europe; Asia.

Slide mounted specimens studied - Turkey: Izmir Prov., Tir, T. Curtin, light, 1 female, 2 males Izmir Prov., Cigli, 29 March 1961, T. Curtin, light, 2 females; Pirincilik, 19 May 1961, T. Curtin, light, 2 females, 18 males; Izmir Prov., Bornova, 18 July 1961, T. Curtin, light, 5 females, 14 males; Izmir Prov., Bornova, October 1961, T. Curtin, light, 1 female, 5 males; Izmir Prov., Bornova, March 1962, T.

Culicoides (Oecacta) pictipennis

- A - antennae, male and female
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - parameres
S - spermathecae
T - female tibial comb
W - wings, male and female



Curtin, light, 2 females, 25 males; Izmir Prov., Bornova, May 1962, T.
 Curtin, light, 3 females, 2 males; Izmir Prov., Bornova, June 1962, T.
 Curtin, light, 17 females.

The female drawings of Plate 22 and female measurements were done from specimens from Izmir Prov., Bornova, June 1962; the male drawings of Plate 22 were done from specimens from Pirincilik, 19 May 1961; the male measurements were done from specimens from Izmir Prov., Bornova, 18 July 1961.

Culicoides (Oecacta) Sp. 18 n. sp.

Plate 23

Wing spotted; medium sized species.

Female. - Unknown.

Male. - Eyes bare. Antenna with sensilla coeloconica on segments 3 and 13 - 14, may be absent on segment 13 (Plate 23A); sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 23P) not swollen, single sensory pit.

Thorax: Mesonotum brown without pattern, based on slide mounted specimen, scutellum slightly lighter than mesonotum. Wing (Plate 23W) pattern as illustrated, spots more visible in dark phase field microscope; radial cells equal in size, the first radial cell in light area and the second radial cell entirely dark; the base of the wing pale which extends to the cell M_2 and also joins the pale area over the r-m cross vein and first radial cell; pale spot beyond second radial cell reaching the wing margin; pale spot at the tip of cells R_5 , M_1 , M_2 , M_4 and anal cell; elongated oval shaped pale spot at the base of cell M_2 ;

Culicoides (Oecacta) Sp. 18 n. sp.

(only male)

A - antenna

ae - aedeagus

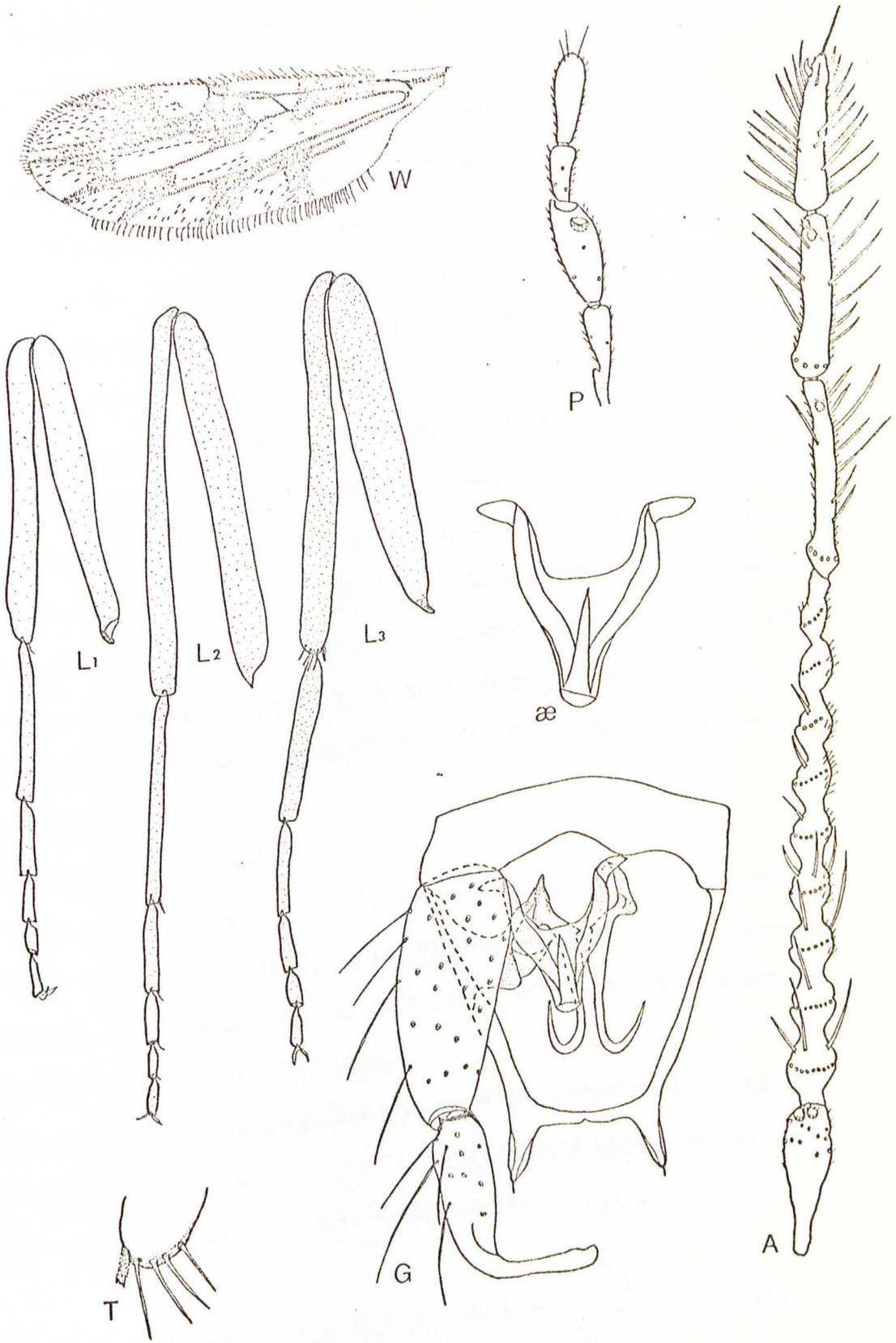
G - genitalia

L₁ - 1st legL₂ - 2nd legL₃ - 3rd leg

P - palpus

T - tibial comb

W - wing



the macrotrichia numerous at the apical half, basal cell without macrotrichia; wing length 1.25 (1.22 - 1.29, n = 2) mm, breadth 0.45 (n = 5) mm, CR 0.51 (n = 2). Halter pale. Legs (Plate 23L) light brown without any distinct pattern, tibial comb (Plate 23T) with 4 spines, the first 2 from spur subequal and longest.

Genitalia: (Plate 23G, ae) 9th tergum widest at base and gradually narrowed toward the apex, apicolateral processes well developed and divergent, posterior margin with notch but not deep; basistyle slender, the dorsal and ventral roots well developed, dorsal root foot shaped, ventral root slender; dististyle very significant, long and hook shaped, bent at right angle in the middle; 9th sternum with excavation, not very deep, membrane not spiculate. Aedeagus (Plate 23ae) with U-shaped arch and well developed median portion, arms sclerotized and slightly dark. Basal knob of parameres foot shaped, stem slightly swollen at the lower portion, distal portion tapering to pointed tip, sharply curved at the apex as illustrated,

Distribution - Israel.

Types - Holotype male, Israel, Deganya A, Jordan R., 10 December 1968, R. Y. Palmoni, at light. Type #75304. Paratype 1 male, Deganya A, Jordan R., 9 December 1968, R. Y. Palmoni, at light. Most drawings of Plate 23 were done from holotype.

Discussion - The wing pattern and sensilla coeloconica of the antenna in this species is similar to the pictipennis group, but is readily separated by the hook-shaped dististyle.

Culicoides (Oecacta) Sp. 30 n. sp.

Plate 24

Wing spotted with intercalary fork; small sized dark species.

Female. - Unknown.

Male. - Eyes bare. Antenna with sensilla coeloconica on segments 3, 13 - 15 (Plate 24A); sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 24P) slightly swollen, with single sensory pit.

Thorax: Mesonotum dark brown with pattern, the pattern cannot be described from slide mounted specimen, scutellum dark brown. Wing dark with light spots, pattern as illustrated (Plate 24W), a conspicuous intercalary fork in cell R_5 as illustrated; radial cells equal in size, the first and second radial cells dark, the veins at the base of cell R_1 and at the tip of cell R_2 light; the base of the wing dark; an elongated spot beyond basal arculus; a light spot over r-m cross vein; the light spot beyond second radial cell reaching the wing margin; light spots at the tip of cells R_5 , M_1 , M_2 , M_4 and anal cell; elongated light spot at the middle of anal cell, 2 light spots at the base of cell M_1 ; 2 light spots at the base of cell M_2 , round light spot over the basal half of vein m_1 ; an elongated light spot over the distal half of vein m_2 ; not many macrotrichia present at the distal half of wing, basal cell without macrotrichia; wing length 0.78 mm, breadth 0.31 mm, CR 0.51. Halter dark. Legs (Plate 24L) dark brown with distinct light bands; light band at the base of femur and tibia of first and third thoracic leg; light band at the base of tibia of second thoracic leg; tibial comb (Plate 24T) with 5 spines, the first 2 from spur equal and longest.

Genitalia: (Plate 24G, pa) 9th tergum square shaped, posterior end slightly tapered, apicolateral processes well developed and

PLATE 24

Culicoides (Oecacta) Sp. 30 n. sp.

(only male)

A - antenna

G - genitalia

L₁ - 1st leg

L₂ - 2nd leg

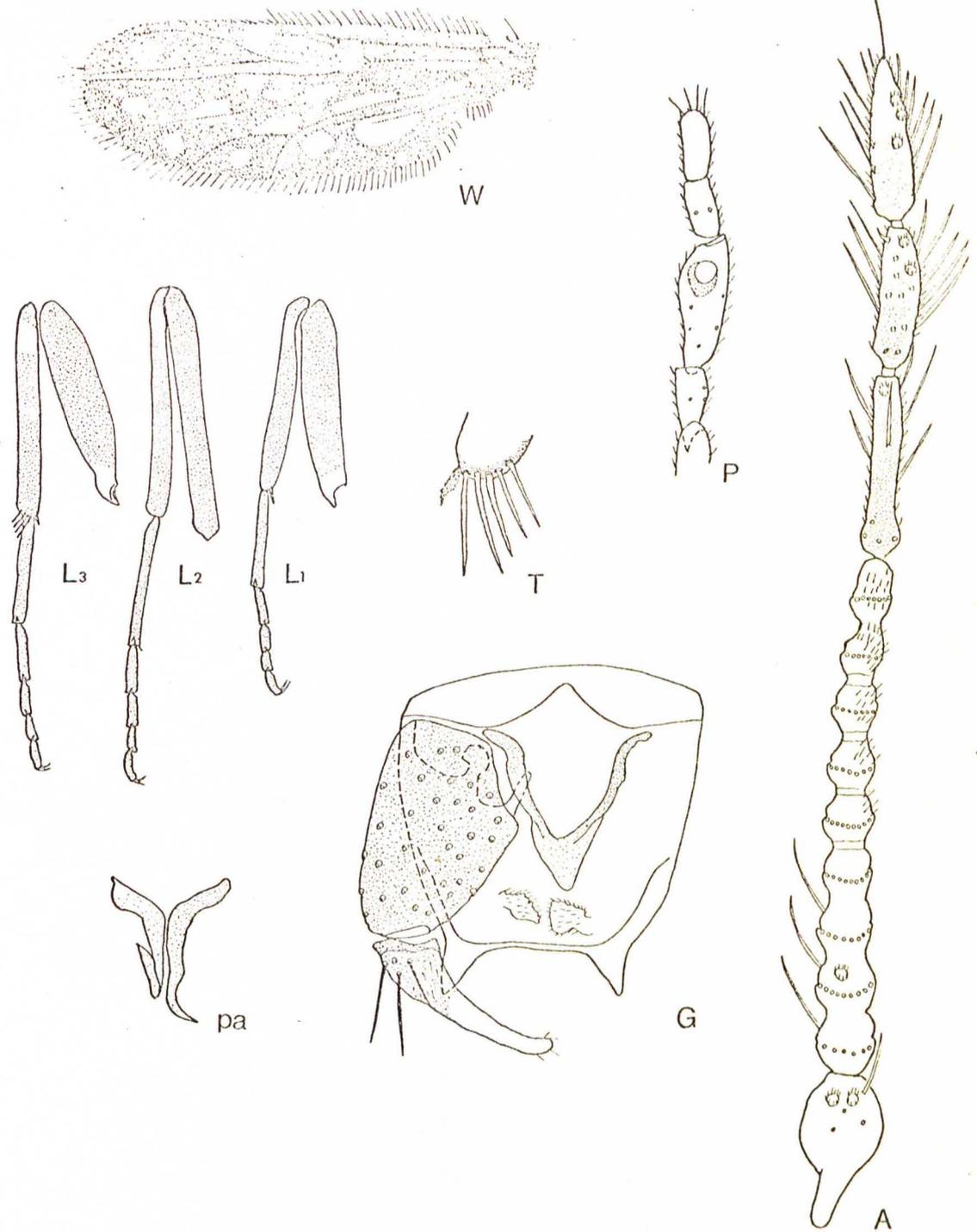
L₃ - 3rd leg

P - palpus

pa - parameres

T - tibial comb

W - wing



divergent, posterior margin without notch; basistyle dark and stout, the dorsal and ventral roots well developed; dististyle diagnostic, dark and thick at the base and gradually narrowed toward the apex, the apical half very significant with light yellowish color; 9th sternum with V-shaped excavation, membrane not spiculated. Aedeagus with high V-shaped arch, arms dark sclerotized, median portion triangular and light brown. Parameres (Plate 24pa) brown with small basal knob, basal part bent at right angle, stem gradually narrowed toward the apex and pointed, curved at the apex as illustrated.

Distribution - Pakistan.

Type - Holotype male, Pakistan, Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap. Type #75305.

Discussion - Since the female is not known, the relative position of this species within the group is not certain. The wing pattern, square-shaped tergite, and the color of the dististyle are very characteristic and separates this species from the closely related species C. odibilis.

Culicoides (Oecacta) turanicus Gutsevich and Smatov, 1966

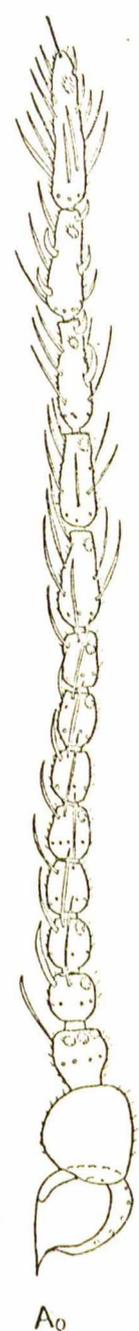
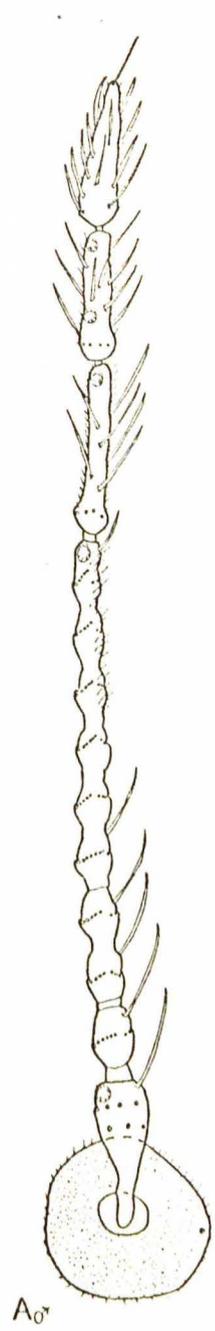
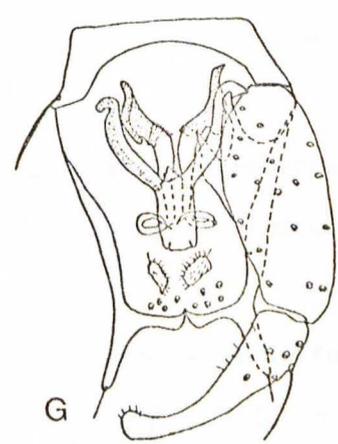
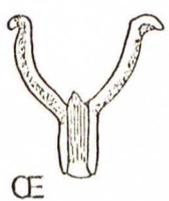
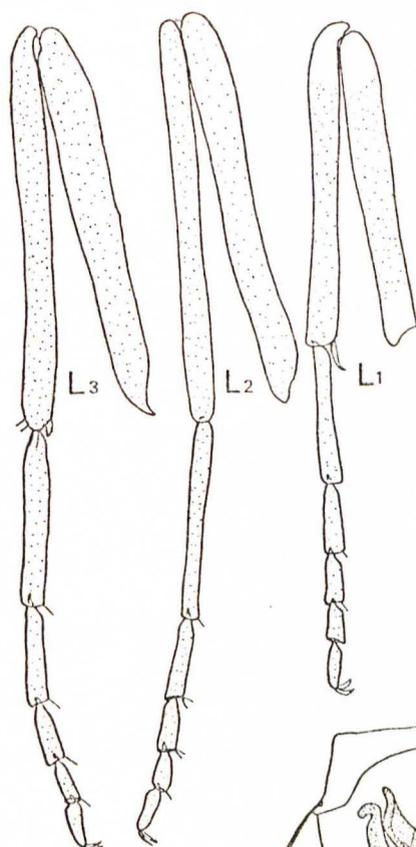
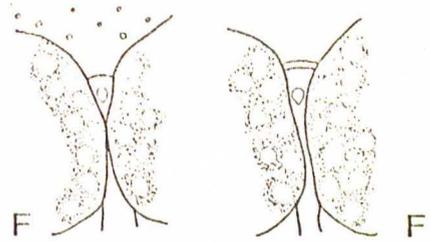
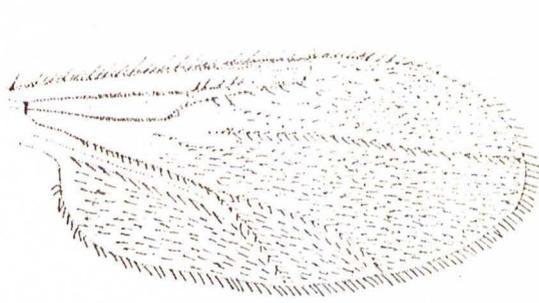
Plate 25

Gutsevich and Smatov 1966. Akad. Sci. Kasa. 27: 70 (C. kasachstanicus sp. n., nom. preoccupatum: C. pulicaris kasachstanicus Schakirzjanova, 1963. Biting midges from Kazakhstan (USSR) Diptera (Heleidae). Akad. Sci. Kasa. SSR. 121 pp: 60.

Size medium; clear wing with 2 pale marks in costal margin; eyes separate.

Culicoides (Oecacta) turanicus

- A - antennae, male and female
ae - aedeagus
C - dorsal and ventral roots of basistyle
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
S - spermathecae
T - female tibial comb
W - female wing



Female. - Eyes not contiguous (Plate 25F) but may get very close as illustrated, eyes bare. Antennal segments 3 - 15 (Plate 25A) lengths in mean proportion of 18 - 12 - 12 - 12 - 13 - 12 - 13 - 14 - 23 - 25 - 26 - 26 - 37 (n = 5), AR 1.29 (1.23 - 1.34, n = 5), sensilla coeloconica on segments 3 - 15, may be absent on segments 4, 6, 8 and 10 simultaneously, total number of sensilla coeloconica 11 - 16; sensilla chaetica on segments 1 - 15. Third palpal segments swollen (Plate 25P) with single shallow sensory pit, PR 2.31 (2.12 - 2.50, n = 5). Mandible with 12 - 13 teeth.

Thorax: Mesonotum brown to dark brown, based on slide mounted specimens, no pattern, scutellum lighter than mesonotum. Wing (Plate 25W) clear with 2 very pale marks, 1 over r-m cross vein and 1 beyond second radial cell, radial veins thick and slightly darker than the other part of the wing, radial cells equal; macrotrichia abundant and not present on basal cell; wing length 1.16 (1.10 - 1.20, n = 10) mm, breadth 0.54 (0.50 - 0.56, n = 10) mm, CR 0.58 (0.56 - 0.60, n = 10). Halter pale. Legs (Plate 25L) light brown, front leg with pale band at the base of femur and around knee (may not be visible if leg is very light); tibial comb (Plate 25T) with 4 spines, the first and second from spur subequal and longest.

Abdomen: Light brown with 2 egg-shaped spermathecae, measuring 61 by 35 (n = 5) microns, neck short; rudimentary spermatheca present, length 20 (n = 5) microns.

Male. - Same as female with usual differences. Wing length 1.06 (0.98 - 1.10, n = 3) mm, breadth 0.39 (0.38 - 0.40, n = 3) mm, CR 0.52 (0.50 - 0.53, n = 3). Antenna with sensilla coeloconica on segments

3 and 13 - 14, may be present on segment 10 (Plate 25A); sensilla chaetica on segments 1 - 14, terminal seta present.

Genitalia: (Plate 25G, ae, C) 9th tergum elongated and wider at base, apicolateral processes well developed and divergent, posterior margin with notch; basistyle not thick, ventral and dorsal roots developed (Plate 25C), dististyle slightly curved; 9th sternum with deep excavation, membrane not spiculate. Aedeagus (Plate 25ae) with high arch, arms slender and terminal portion elongate and almost rectangular. Paramere basal knob foot shaped and sclerotized, stem gradually narrowed and pointed, sharply bent at the apex.

Distribution - Afghanistan; USSR.

Slide mounted material studied - Afghanistan: Bamian Prov., Seyydabad, 2439 m, 4 km N. Bamian, 20 August 1968, D. P. Wojcik, black light trap, 2 females; Helmand Prov., Gawargin, 670 m, 20 km. S. Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 1 female; Herat Prov., Karokh, 1280 m, 43 km E. Herat, 15 - 20 October 1968, D. P. Wojcik, black light trap, 18 females, 3 males.

The drawings of Plate 25 and all measurements were done from specimens from Afghanistan, Herat Prov., Karokh, 15 - 20 October 1968.

Culicoides (Oecacta) odiatus Austen, 1921

Plate 26

Culicoides odiatus Austen, 1921. Bull. Ent. Res. vol. 12: 112.

Synonym: Culicoides lailae Khalaf, 1961. Beiträge Zur Entomologie,

vol. 2 (3-4): 458.

Culicoides kurekstaicus Dzhafarov, 1962. Entom. Oboz. 41 (1):

Culicoides conicus Remm and Zhagolev, 1968. Entom. Oboz.
47 (4): 839.

Culicoides indistinctus Khalaf, 1961. Beiträge Zur Entom-
ologie vol. 2 (3-4): 461. New synonym.

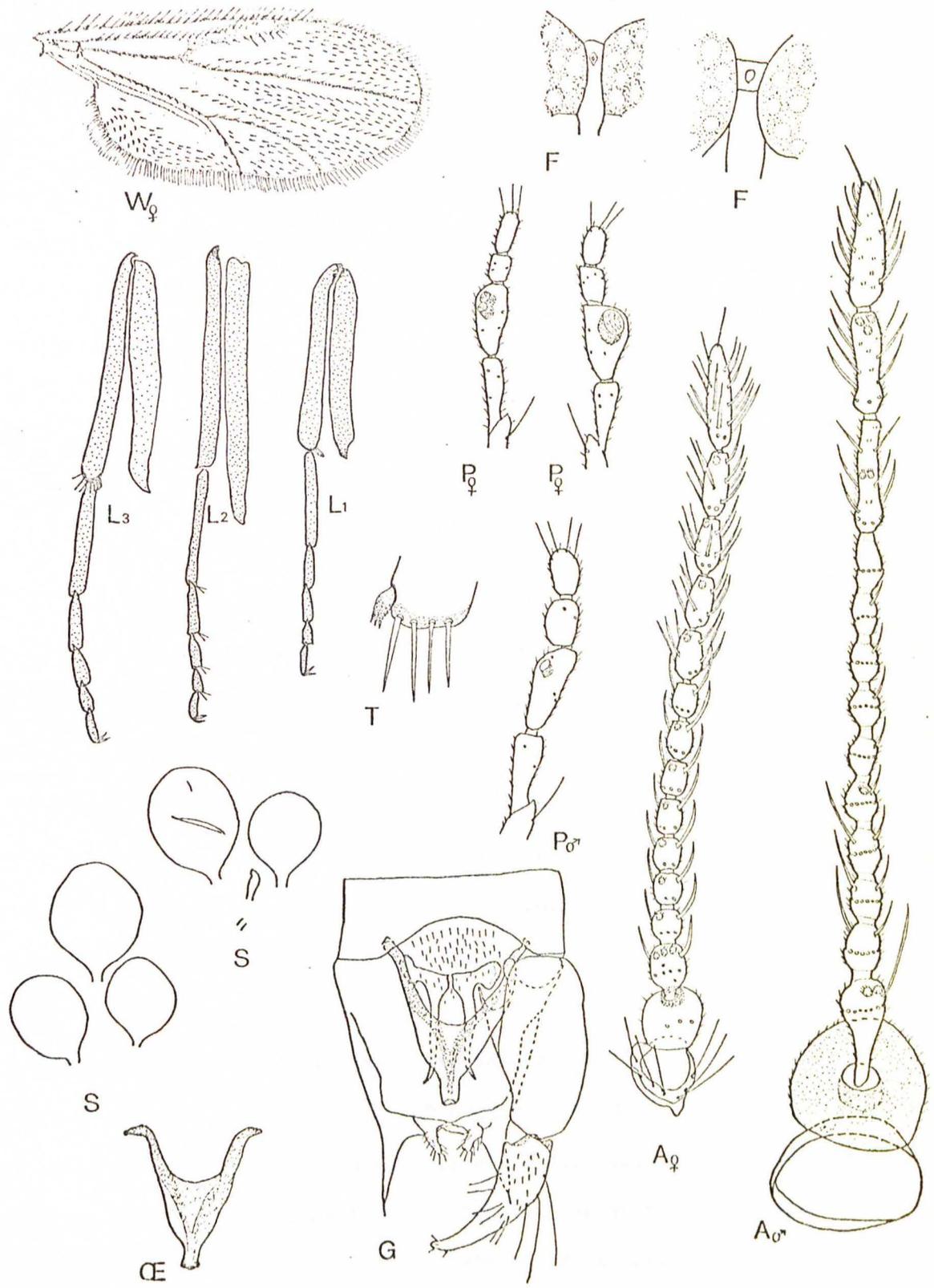
Size medium; wing clear with 2 costal margin pale spots; eyes
separate.

Female. - Eyes not contiguous (Plate 26F) and bare, the lower
suture may be present as illustrated. Antennal segments 3 - 15 (Plate
26A) lengths in mean proportion of 19 - 11 - 12 - 12 - 13 - 13 - 13 -
13 - 19 - 19 - 20 - 23 - 33 (n = 5), AR 1.08 (1.03 - 1.13, n = 5),
sensilla coeloconica on segments 3 - 14, may be absent on segments 4,
6, 8 and 10, and may be variable in right and left antenna of the same
specimen, total number of sensilla coeloconica 9 - 15; sensilla chae-
tica on segments 1 - 15. Third palpal segment (Plate 26P) with a rel-
atively deep sensory pit, it may appear as 2 small and deep pits con-
nected together as illustrated, PR 2.18 (1.86 - 2.36, n = 5). Man-
dible with 10 - 13 teeth.

Thorax: Mesonotum brown to dark brown without pattern based on
slide mounted specimens; scutellum somewhat lighter than mesonotum.
Wing (Plate 26W) clear with 2 pale marks on costal margin, 1 over r-m
cross vein and 1 beyond second radial cell, radial cells equal; macro-
trichia more numerous on the apical half and anal cell, no macrotrichia
on basal cell, wing length 1.05 (0.97 - 1.14, n = 10) mm, breadth 0.49
(0.45 - 0.54, n = 10) mm, CR 0.59 (0.57 - 0.61, n = 10). Halter pale.
Legs (Plate 26L) light brown without pattern; tibial comb (Plate 26T)
with 4 spines, the first and second from spur subequal and longer.

Culicoides (Oecacta) odiatus

- A - antennae, male and female
ae - aedeagus
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
S - spermathecae
W - female wing



Abdomen: Light brown with 2 unequal spermathecae (Plate 26S), measuring 64 by 51 ($n = 4$) microns and 48 by 43 ($n = 4$) microns; rudimentary spermatheca and ring present, rudimentary spermatheca may develop as illustrated; rudimentary spermatheca length 20 ($n = 4$) microns, spermatheca neck 7 ($n = 8$) microns.

Male. - Same as female with usual differences. Wing length 1.17 (1.10 - 1.21, $n = 10$) mm, breadth 0.46 (0.45 - 0.48, $n = 10$) mm, CR 0.54 (0.53 - 0.55, $n = 10$). Antenna (Plate 26A) with sensilla coeloconica on segments 3 and 13 - 14, may be present on segments 5 and 7; sensilla chaetica on segments 1 - 14, terminal seta present; second antennal segment very dark.

Genitalia: (Plate 26G, ae) 9th tergum narrowed posteriorly, apicolateral processes well developed and divergent, posterior margin with small notch; basistyle moderately stout with well developed dorsal and ventral roots, dististyle stout and slightly curved; 9th sternum with deep excavation, membrane spiculate. Aedeagus (Plate 26ae) with U-shaped arch, arms well sclerotized and dark, terminal portion short and truncate. Paramere with foot-shaped basal knob, stem slightly swollen at base and gradually narrowed and pointed at the tip.

Distribution - Afghanistan; Iran; Iraq; Pakistan; Palestine; Turkey; USSR.

Slide mounted material studied - Afghanistan: Bamian Prov., Seydabat, 2439 m, 4 km N. Bamian, 18 - 20 August 1968, D. P. Wojcik, black light trap, 3 females, 3 males; Helmand Prov., Gawargin, 670 m, 20 km, S. Lashkargah, 1 October 1968, 27 females; Herat Prov., Karokh, 1280 m, 43 km E. Herat, 15 - 20 October 1968, D. P. Wojcik, black light trap, 6 females, 18 males; Kunduz Prov., Bulla Quchi, 10 - 12 Septem-

ber 1968, D. P. Wojcik, black light, 74 females, 1 male.

Pakistan: Dharmyal, Rawalpindi, June 1959, H. Barnett, light trap, 3 females Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 7 females, 1 male.

Turkey: Bospinar, 30 April 1961, T. J. Curtin, horse trap, 1 female; Diyarbakir, 24 September 1960, T. Curtin, light trap, 1 male; Izmir Prov., Cigli, 29 March 1961, T. Curtin, light, 1 female; Bornova, 18 July 1961, T. Curtin, 2 females, October 1961, 18 females; March 1962, light, 1 male; May 1962, light, 1 female; June 1962, 1 female; Pirincilik, 19 May 1961, T. Curtin, light, 3 females; Tire, T. Curtin, light, 8 females, 1 male (no date recorded).

The female drawings of Plate 26 and measurements were done from specimens from Afghanistan, Kunduz Prov., Bulla Quchi, 10 September 1968; the male drawings of Plate 26 and measurements were done from specimens from Afghanistan, Herat Prov., Karukh, 20 October 1968.

Discussion - Five male paratypes in addition to 1 female and 2 males from Badoosh, all slide specimens, determined by K. Khalaf as C. indistinctus in the collection of the USNM were examined. All males are identical in all respects of C. odiatus, the only female slide specimen is a very poor mount and could not be determined to species. The AR and sensilla coeloconica arrangement of female given by J. Boorman (1974) from the specimen in British Museum are identical with C. odiatus. It is suggested that C. indistinctus Khalaf is synonymous with C. odiatus Austen; this bears out Boorman's thoughts at the Strasbourg meeting (1973), Symposium on Palearctic Ceratopogonidae, Strasbourg, France, September, 1973, that C. indistinctus and C. lailae are synonymous.

Culicoides (Oecacta) bulbostylus Khalaf, 1961

Plate 27

Culicoides bulbostylus Khalaf, 1961. Beitr. Entomol. 11 (3-4): 463.

Size medium; wing clear with 2 pale spots; eyes separate.

Female. - Eyes not contiguous (Plate 27F) and bare. Antennal segments 3 - 15 (Plate 27A) lengths in mean proportion of 19 - 14 - 15 - 15 - 14.5 - 14.5 - 15 - 15 - 22 - 23 - 24 - 26 - 37 (n = 6), AR 1.15 (1.05 - 1.22, n = 6), sensilla coeloconica on segments 3 - 14, may not be present on segments 4, 6, 8 and 10 simultaneously, total number of sensilla coeloconica 10 - 17; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 27P) swollen with moderately deep sensory pit; palpal segments 2 - 5 lengths 60 - 89 - 36 - 41 (n = 6) microns; PR 1.92 (1.65 - 2.10, n = 6). Mandible with 10 - 15 teeth.

Thorax: Mesonotum brown without pattern based on slide mounted specimens; scutellum same as mesonotum. Wing (Plate 27W) clear with 2 very pale spots, 1 over r-m cross vein and 1 beyond second radial cell, radial cells equal, macrotrichia not abundant at the base of the wing, basal cell without macrotrichia; wing length 1.15 (1.01 - 1.27, n = 6) mm, breadth 0.53 (0.47 - 0.58, n = 6) mm, CR 0.57 (0.55 - 0.58, n = 6). Halter pale. Legs (Plate 27L) light brown without pattern, knees not dark as Khalaf (1961) described but appeared slightly darker than the remainder of the leg, tibial comb with 4 spines (Plate 27T), the first and second from spur subequal and longest.

Abdomen: Light brown with 2 equal spermathecae (Plate 27S),

Culicoides (Oecacta) bulbostylus

A - antennae, male and female

ae - aedeagus

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

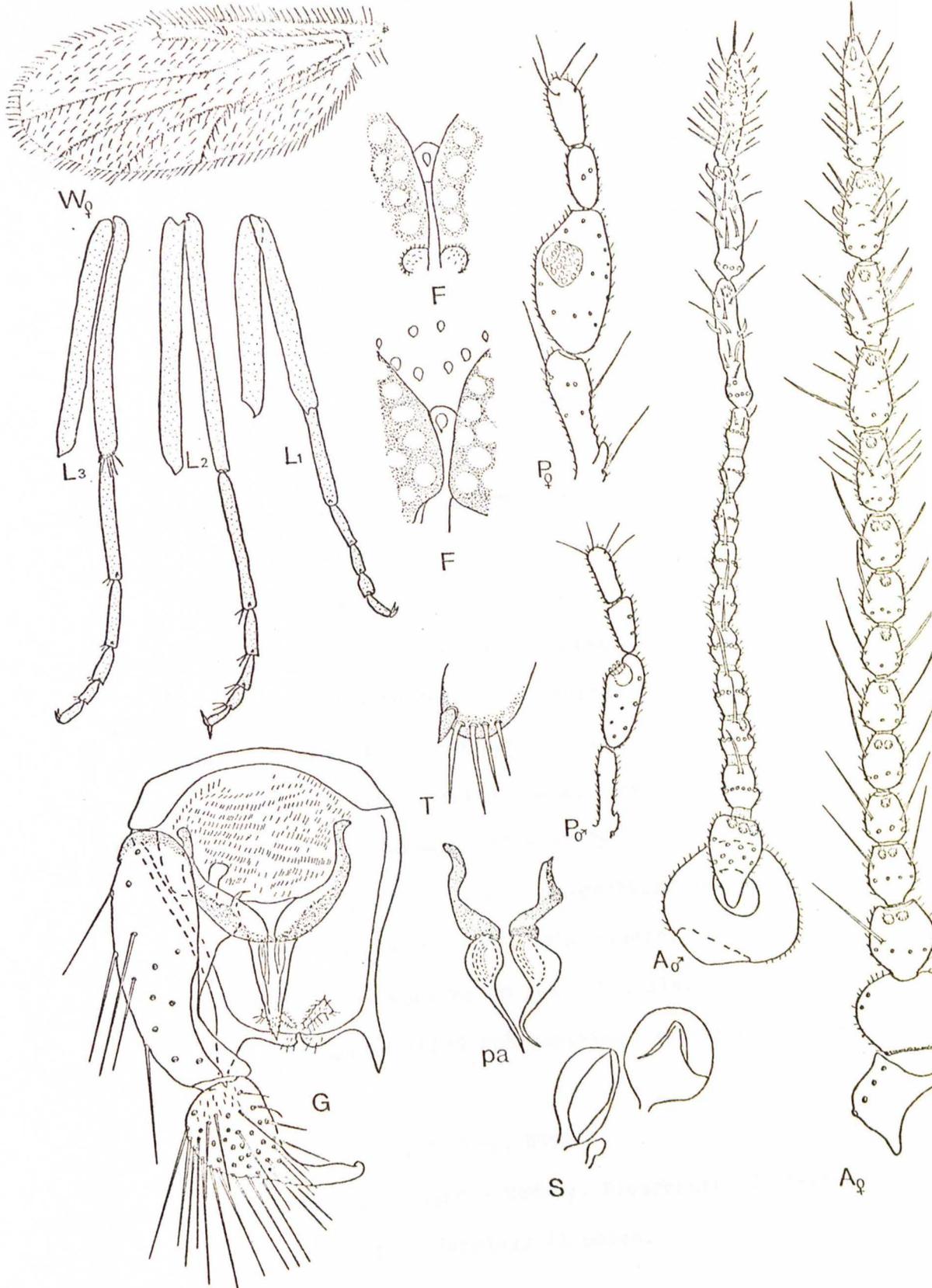
L₃ - female 3rd leg

P - palpi, male and female

S - spermathecae

T - female tibial comb

W - female wing



neck short, measuring 58 by 46 ($n = 4$) microns, neck 4 ($n = 2$) microns; rudimentary spermatheca present, no sclerotized ring; rudimentary spermatheca length 19 ($n = 4$) microns.

Male. - Same as female with the usual differences. Wing length 0.96 (0.94 - 1.00, $n = 4$) mm, breadth 0.36 (0.35 - 0.37, $n = 4$) mm, CR 0.49 (0.48 - 0.50, $n = 4$). Antenna (Plate 27A) with sensilla ceciloconica on segments 3, 5, 7 and 13 - 15, may not be present on segment 5 or 7; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 27P) slightly swollen with relatively deep sensory organ.

Genitalia: (Plate 27G, pa) 9th tergum slightly narrowed toward the apex, posterior margin with notch, apicolateral processes well developed and subparallel; basistyle long and relatively slender with well developed dorsal and ventral roots, dististyle globular at the base, basal half covered with dense long hairs, the apical half narrowed sharply and curved; 9th sternum with broad and deep incision, membrane spinose. Aedeagus with broad U-shaped arch, median portion long and gradually tapering. Paramere (Plate 27pa) basal knob foot shaped and well sclerotized, the stem well sclerotized at the basal third of its length and sharply swollen in the middle, forming hollow heel at one side with its opening on the other side, paramere sharply narrowed at the apical third and tapering, apical third may be bent.

Distribution - Iraq; Iran; Turkey; USSR.

Slide mounted material studied - Turkey: Diyarbakir, 24 September 1960, T. Curtin, light, 6 females, 11 males.

All drawings of Plate 27 and measurements were done from specimens from Turkey, Diyarbakir, 24 September 1960.

Culicoides (Oecacta) furcillatus Callot, Kremer and Paradis, 1962

Plate 28

Culicoides furcillatus Callot, Kremer and Paradis, 1962. Bull. Soc.

Path. Exot. 40: 771.

Culicoides tbilisicus Dzhafarov, 1964. Biting Midges of Transcau-

casus, 414 pp.: 309.

Moderately large species; wing clear; eyes bare.

Female. - Not collected.

Male. - Antenna with sensilla coeloconica on segments 3 and 13 - 15 (Plate 28A); sensilla chaetica on segments 1 - 14, terminal seta present.

Third palpal segment (Plate 28P) not swollen with single sensory pit.

Thorax: Mesonotum brown without pattern based on slide mounted specimen, scutellum slightly lighter than mesonotum. Wing (Plate 28W) clear with a pale spot beyond the second radial cell, macrotrichia predominantly at the apical half of the wing, no macrotrichia on basal cell; wing length 1.20 mm, breadth 0.50 mm, CR 0.53. Halter pale. Legs light brown without distinct pattern, tibial comb (Plate 28T) with 4 spines, the second from spur the longest.

Genitalia: (Plate 28G) 9th tergum slightly wider at the base, apicolateral processes well developed and divergent, posterior margin with notch but not deep; basistyle slender, the ventral and dorsal

Culicoides (Oecacta) furcillatus

(only male)

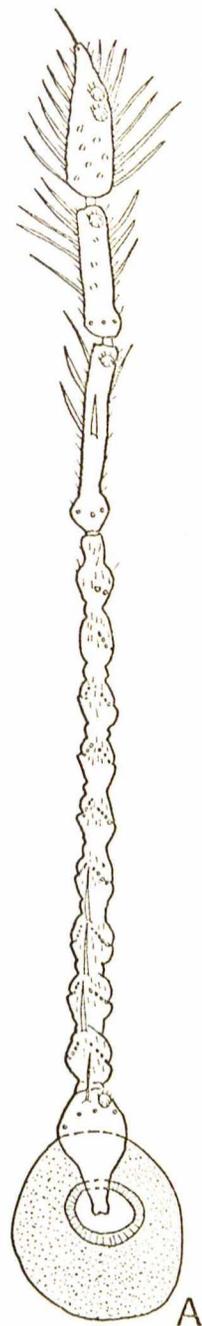
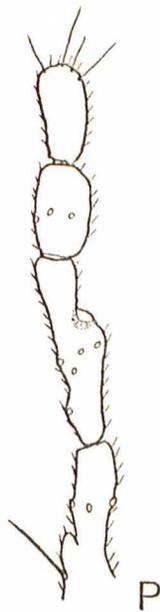
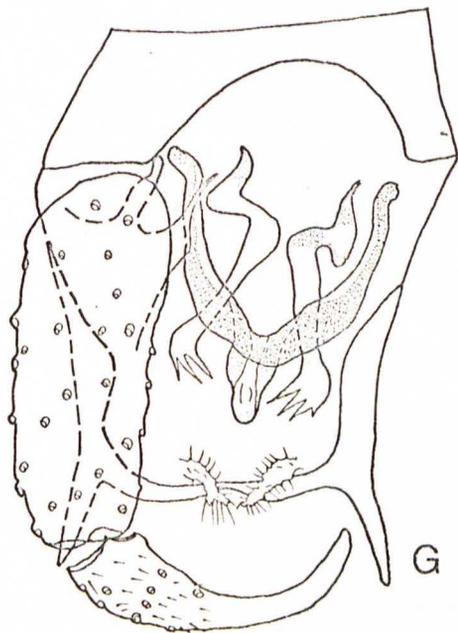
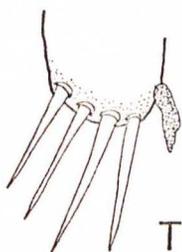
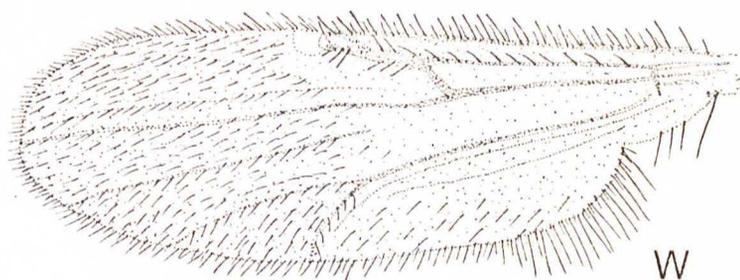
A - antenna

G - genitalia

P - palpus

T - tibial comb

W - wing



roots well developed and slender, dististyle long and curved; 9th sternum with deep excavation, membrane not spiculate. Aedeagus with high U-shaped arch and well developed median portion, arms darkly sclerotized. Paramere basal knob foot shaped, stem slightly swollen with very remarkable apex, the tip divided into 3 - 4 prongs.

Distribution - France; Turkey; USSR.

Slide mounted material studied - Turkey: Izmir Prov., Bornova, May 1962, T. Curtin, light, 1 male.

The drawings of Plate 28 and measurements were done from the male specimen from Turkey.

Culicoides (Oecacta) Sp. 4 n. sp.

Plate 29

Size moderate; wing clear; eyes separate.

Female. - Eyes not contiguous (Plate 29F) and bare. Antennal segments 3 - 15 (Plate 29A) lengths in mean proportion of 19 - 11 - 13 - 13 - 13 - 13 - 13 - 14 - 21 - 22 - 22 - 24 - 34 (n = 5), AR 1.12 (1.08 - 1.18, n = 5); sensilla coeloconica on segments 3, 5, 7, 8, 9 and 11 - 14, in 1 specimen present on segment 6, in holotype sensilla coeloconica present on segment 10 in 1 side only and in the other specimens present on segment 8 in 1 side and absent from the other side, total number of sensilla coeloconica 13 - 15; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 29P) swollen with single deep sensory pit; palpal segments 2 - 5 lengths 62 - 75 - 32 - 40 (n = 5) microns; PR 2.02 (0 - 2.12, n = 5). Mandible with 11 - 13 (n = 8) teeth.

PLATE 29

Culicoides (Oecacta) Sp. 4 n. sp.

(only female)

A - antenna

F - fronto-vitta

L₁ - 1st leg

L₂ - 2nd leg

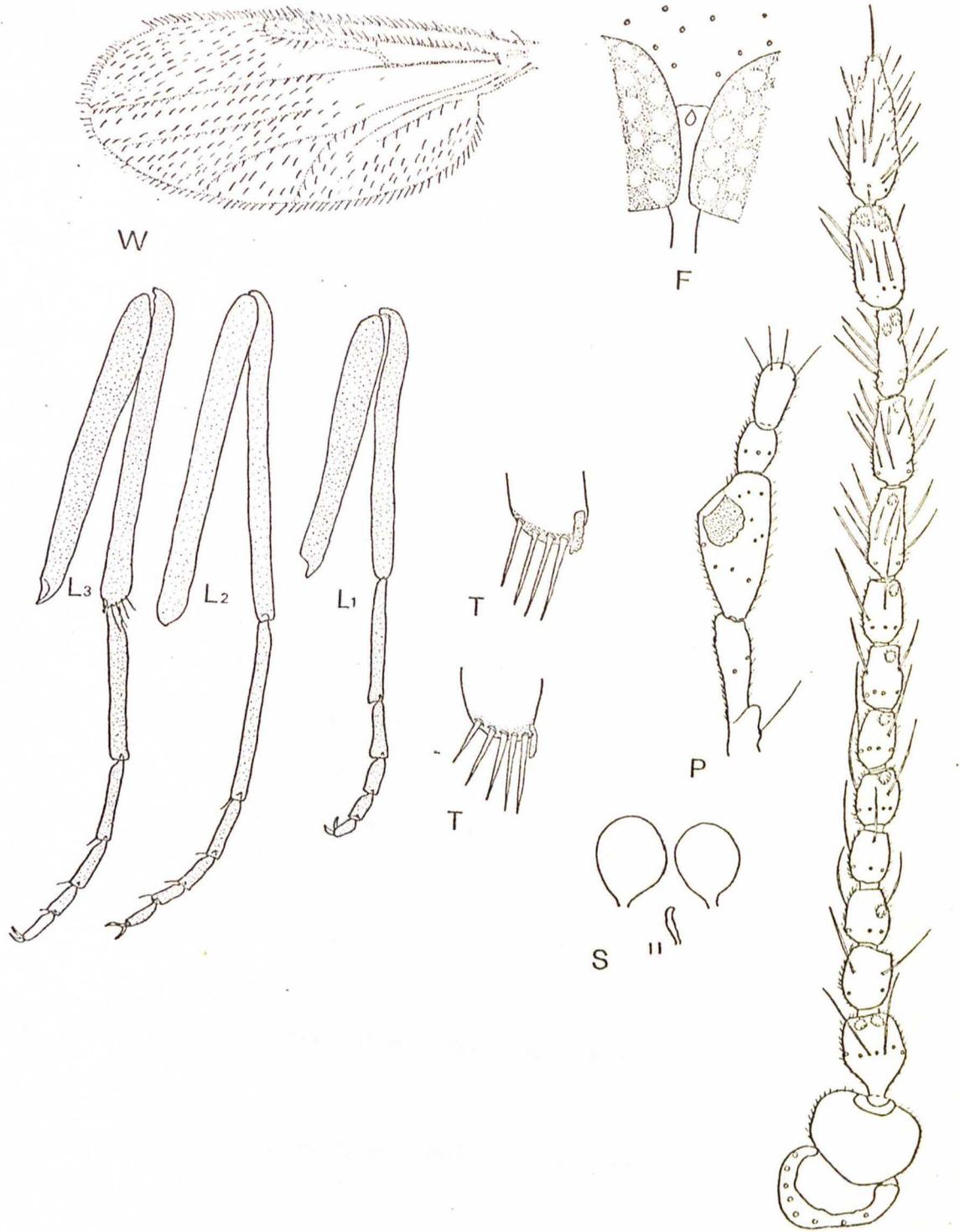
L₃ - 3rd leg

P - palpus

S - spermathecae

T - tibial comb

W - wing



Thorax: Mesonotum light brown without pattern based on slide mounted specimens; scutellum same color as mesonotum. Wings (Plate 29W) clear, radial cells equal; macrotrichia numerous but not present on basal cell; wing length 1.05 (0.99 - 1.17, n = 5) mm, breadth 0.48 (0.47 - 0.52, n = 5) mm, CR 0.59 (0.57 - 0.62, n = 5). Halter pale. Legs (Plate 29L) light brown without pattern; tibial comb (Plate 29T) with 4 - 5 spines, the first 2 from spur equal and longest.

Abdomen: Light brown with 2 equal spermathecae (Plate 29S), measuring 40 by 34 (n = 8) microns; rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca length 18 (n = 5) microns, spermatheca neck 4 (n = 8) microns.

Male. - Unknown.

Distribution - Saudi Arabia.

Type - Holotype female, Saudi Arabia, Dhahran, September 1964, R. L. Peffley, light trap. Paratype, 4 females same data as holotype.

The drawings of Plate 29 were done mainly from holotype and all specimens were used for measurements. Type #75306.

Culicoides (Oecacta) dzhafarovi Remm, 1967

Plate 30

Culicoides aff. heliophilus Dzhafarov, 1964. Biting midges of Transcaucasus, 414 pp.: 331.

Culicoides (Oecacta) dzhafarovi Remm, 1967. Tartu Riikliku Ulikooli Toimet. 194: 25.

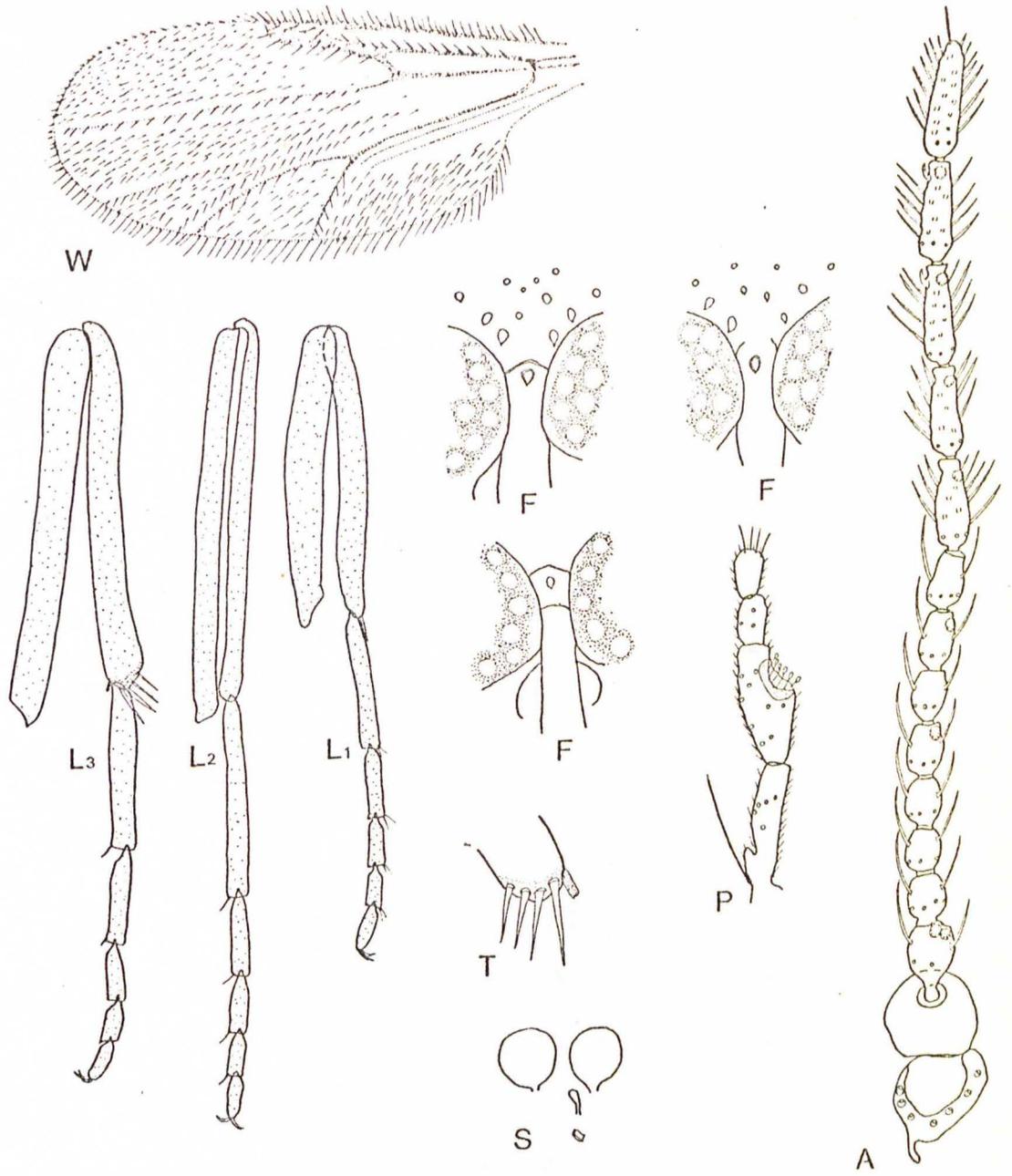
Culicoides dzhafarovi Callot, Kremer, Molet and Bach, 1968: 95.

PLATE 30

Culicoides (Oecacta) dzhafarovi

(only female)

- A - antenna
F - fronto-vitta
L₁ - 1st leg
L₂ - 2nd leg
L₃ - 3rd leg
P - palpus
S - spermathecae
T - tibial comb
W - wing
-



Size small; wing clear; small spermathecae; eyes separate.

Female. - Eyes not contiguous (Plate 30F) and bare, lower suture may be present. Antennal segments 3 - 15 (Plate 30A) lengths in mean proportion of 14 - 9 - 9 - 10 - 11 - 10 - 12 - 12 - 19 - 19 - 21 - 21 - 25 (n = 5), AR 1.22 (1.16 - 1.29, n = 5); sensilla coeloconica on segments 3, 7, 9 and 11 - 14, may be absent on segment 7, in 2 specimens present on segment 7 of one side and absent from the other side, total number of sensilla coeloconica 7 - 9; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 30P) swollen with single shallow sensory pit; palpal segments 2 - 5 lengths 47 - 61 - 23 - 23 (n = 5) microns; PR 2.08 (1.84 - 2.30, n = 5). Mandible with 11 - 14 (n = 9) teeth.

Thorax: Mesonotum light brown without pattern based on slide mounted specimens; scutellum yellowish and lighter than mesonotum. Wings (Plate 30W) clear, radial cells equal; macrotrichia numerous, not present on basal cell; wing length 0.83 (0.78 - 0.88, n = 5) mm, breadth 0.40 (0.37 - 0.42, n = 5) mm, CR 0.55 (0.53 - 0.57, n = 5). Halter very light brown. Legs (Plate 30L) light brown without pattern; tibial comb (Plate 30T) with 4 spines, first from spur longest.

Abdomen: Light brown with 2 small spheroid spermathecae (Plate 30S), measuring 28 by 27 (n = 5) microns; rudimentary spermatheca and sclerotized ring present; rudimentary spermatheca length 13 (n = 5) microns.

Male. - Not collected.

Distribution - Afghanistan; USSR.

Slide mounted material studied - Afghanistan: Helmand Prov.,

Gawargin, 670 m, 20 km S. Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 2 females; Kunduz Prov., Bulla Quchi, 10 September 1968, D. P. Wojcik, black light, 3 females.

The drawings of Plate 30 were done from specimen from Kunduz Prov., Bulla Quchi. All above specimens were used for measurements.

Culicoides (Oecacta) tugaicus Dzhafarov, 1960

Plate 31

Culicoides tugaicus Dzhafarov, 1960. Zool. Zhurnal. 39 (8): 1183.

Size moderate; wing clear; eyes separate.

Female. - Eyes not contiguous (Plate 31F) and bare. Antennal segments 3 - 15 (Plate 31A) lengths in mean proportion of 12.5 - 9.5 - 10.5 - 10.5 - 10.5 - 10.5 - 11 - 11.5 - 18.5 - 18 - 20 - 19.5 - 25 (n = 2), AR 1.17 (1.15 - 1.19, n = 2); sensilla coeloconica on segments 3 - 10, total number of sensilla coeloconica 9 - 10; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 31P) swollen with a deep, sclerotized sensory pit; palpal segments 2 - 5 lengths 41 - 65 - 25 - 25 (n = 2) microns; PR 2 (1.93 - 2.06, n = 2). Mandible with 12 - 15 (n = 3) teeth.

Thorax: Mesonotum brown without pattern, based on slide mounted specimens; scutellum same color as mesonotum. Wing (Plate 31W) clear, radial cells equal, radial veins thick and slightly darker than the rest of the wing; macrotrichia spread over the wing except basal cell; wing length 0.90 (0.86 - 0.93, n = 2) mm, breadth 0.43 (0.42 - 0.44, n = 2), CR 0.53 (n = 2). Halter pale. Legs (Plate 31L) light brown without pattern; tibial comb (Plate 31T) with 5 spines,

Culicoides (Oecacta) tugaicus

A - antennae, male and female

B - basistyle and dististyle

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

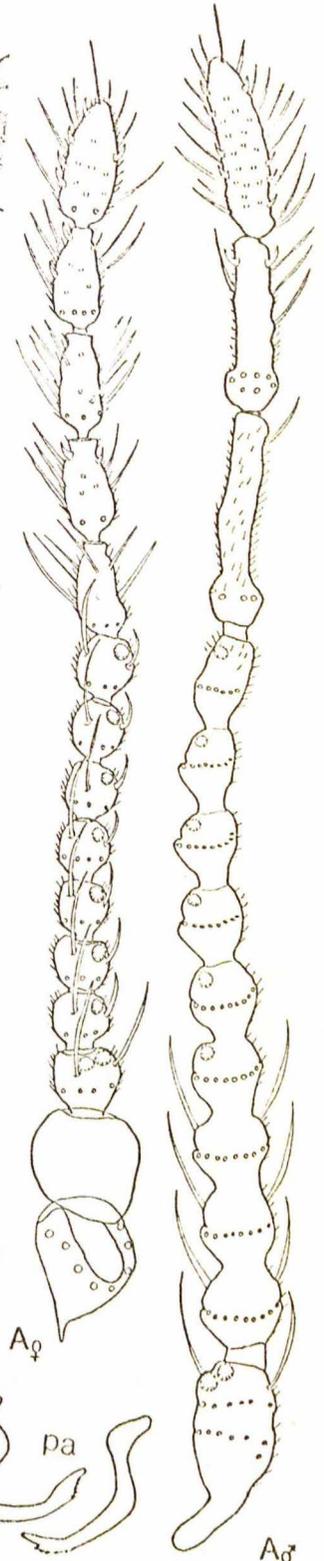
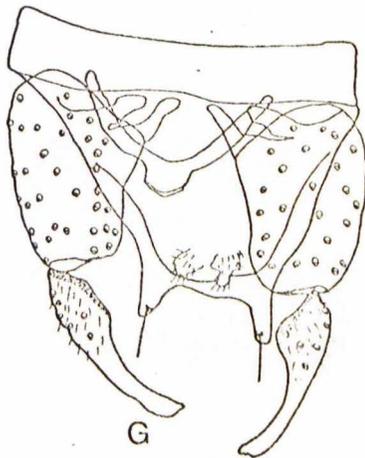
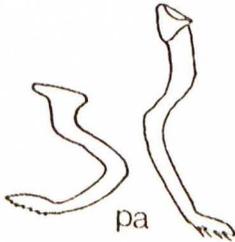
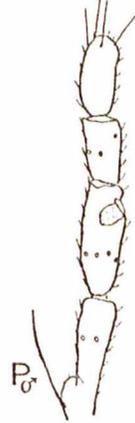
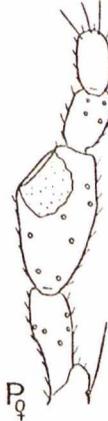
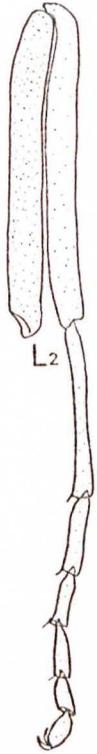
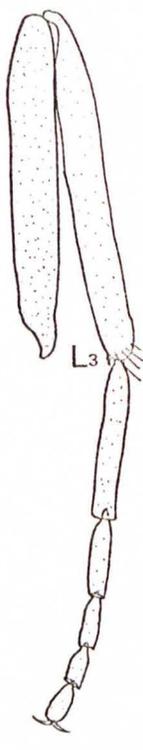
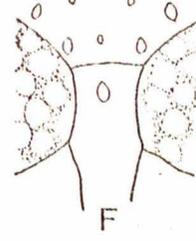
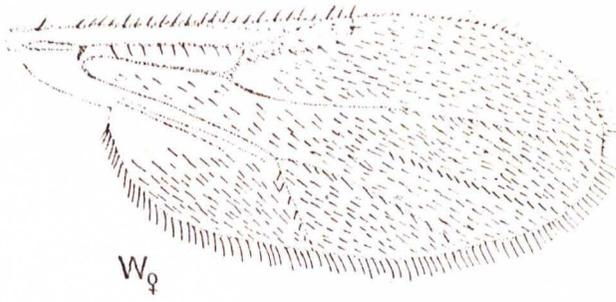
P - palpi, male and female

pa - parameres

S - spermathecae

T - tibial comb

W - female wing



the first and second from spur subequal and longest.

Abdomen: Brown with 2 equal spermathecae (Plate 31S), measuring 39 by 31 (n = 4) microns, rudimentary spermatheca present, length 16 (n = 2) microns, spermatheca neck 4 (n = 4) microns.

Male. - Same as female with usual differences. Wing length 0.85 (0.75 - 0.89, n = 8) mm, breadth 0.30 (0.24 - 0.33, n = 8) mm, CR 0.47 (0.46 - 0.49, n = 8). Antenna (Plate 31A) with sensilla coelconica on segments 3 and 7 - 12; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 31P) not swollen but with small, deep sensory pit.

Genitalia: (Plate 31G, pa, B) 9th tergum wide at the base and tapering at the apex, posterior margin slightly convex, apicolateral processes well developed; basistyle thick and short (Plate 31B), dorsal and ventral roots well developed, dististyle broad at the base and narrowed toward the apex, not curved; 9th sternum with a very shallow incision, membrane not spiculate. Aedeagus small with wide U-shaped arch, median portion short and angular. Paramere (Plate 31pa) long, slender and curved, basal knob foot-shaped, serrated apically.

Distribution - Turkey; USSR.

Slide mounted material studied - Turkey: Izmir Prov., Bornova, October 1961, T. Curtin, light, 3 males; Izmir Prov., Bornova, May 1962, T. Curtin, light, 2 females, 6 males.

The drawings of Plate 31 were done from specimens from Izmir, Bornova, May 1962. All above materials were used for measurements.

Culicoides (Oecacta) pallidus Khalaf, 1957

Plate 32

Culicoides pallidus Khalaf, 1957. Bull. Soc. Entom. Egypte 41: 338.

Size moderate; wing clear.

Female. - Eyes not contiguous (Plate 32F) and bare. Antennal segments 3 - 15 (Plate 32A) lengths in mean proportion of 16 - 12 - 12 - 12 - 12 - 13 - 12 - 13 - 18 - 19 - 20 - 21 - 33 (n = 5), AR 1.08 (1.00 - 1.16, n = 5); sensilla coeloconica on segments 3 - 10, may be absent on segment 6 or present on segment 11 (Plate 32A), total number of sensilla coeloconica 11 - 20; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 32P) swollen with single deep sensory pit; palpal segments 2 - 5 lengths 42 - 66 - 25 - 33 (n = 5) microns; PR 1.72 (1.41 - 1.84, n = 4). Mandible with 11 - 15 teeth.

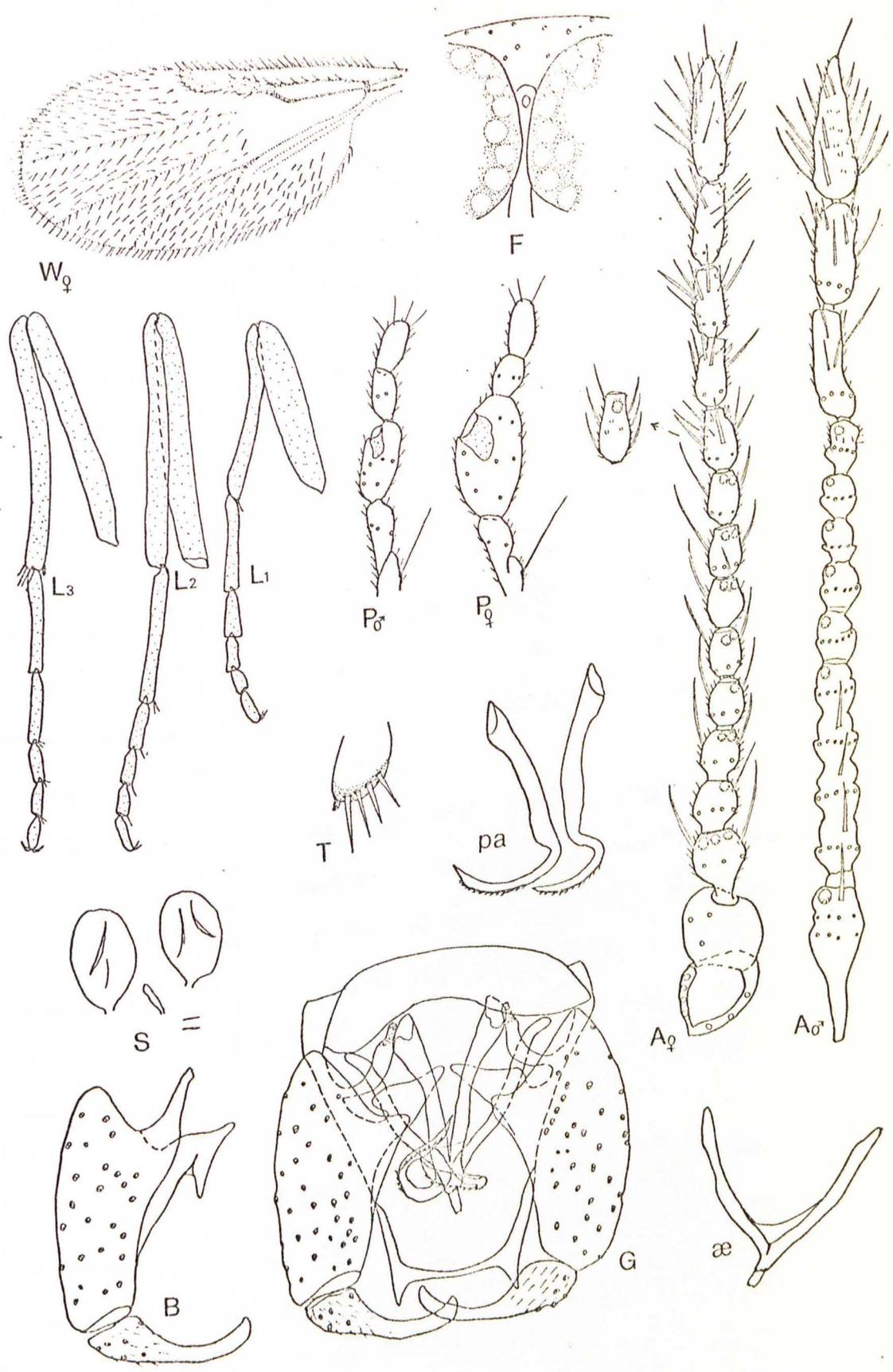
Thorax: Mesonotum light brown without pattern based on slide mounted specimens; scutellum same color as mesonotum. Wings (Plate 32W) clear, radial cells equal in size; macrotrichia distributed over the wing, few at the base of the wing, no macrotrichia at the basal cell; wing length 0.91 (0.85 - 0.98, n = 5) mm, breadth 0.44 (0.40 - 0.48, n = 5) mm, CR 0.55 (0.53 - 0.55, n = 5). Halter pale. Legs (Plate 32L) yellowish-light brown without pattern; tibial comb with 4 spines (Plate 32T), first from spur longest.

Abdomen: Light brown with 2 equal spermathecae (Plate 32S), measuring 51 by 34 (n = 4) microns, rudimentary spermatheca and sclerotized ring present; rudimentary spermatheca length 17 (n = 3) microns, spermatheca neck 3 (n = 4) microns.

Male. - Same as female with usual differences. Wing length

Culicoides (Oecacta) pallidus

- A - antennae, male and female
ae - aedeagus
B - basistyle and dististyle
F - female fronto-vitta
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - parameres
S - spermathecae
T - female tibial comb
W - female wing



0.74 (0.69 - 0.76, n = 6) mm, breadth 0.32 (0.29 - 0.34, n = 6) mm, CR 0.47 (0.45 - 0.48, n = 6). Antenna (Plate 32A) with sensilla coeloconica on segments 3 and 7 - 12; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 32P) slightly swollen with single deep sensory pit.

Genitalia: (Plate 32G, B, ae, pa) 9th tergum wide at the base and narrowed gradually toward the apex, apicolateral processes parallel, posterior margin without notch; basistyle with well developed ventral and dorsal roots (Plate 32B), ventral root foot shaped, dististyle narrowed toward the apex and curved; sternite with wide, shallow incision, membrane not spiculate. Aedeagus with long, slender arms, arch high and V-shaped, median portion very short (Plate 32ae). Paramere (Plate 32pa) slightly swollen at the base, stem narrow, long and tapering at the end, apex with numerous fine spines on one side and sharply bent at the apical third.

Distribution - Afghanistan; Iran; Iraq; Pakistan; USSR.

Slide mounted material studied - Afghanistan: Kunduz Prov., Bulla Quchi, 10 September 1968, D. P. Wojcik, black light trap, 19 females.

Pakistan: Lahore, July - August 1957, J. Maldonado, 3 females, 5 males; Lahore, May - June 1958, J. Maldonado, light trap, 2 females; Rawalpindi, Dharmyal, June 1959, H. Barnett, light trap, 1 female, 1 male.

The female drawings of Plate 32 were done from specimens from Pakistan, Lahore, May - June 1958; the male drawings were done from specimens from Pakistan, Lahore, July - August 1957. All above specimens from Pakistan were used for measurements.

Culicoides (Oecacta) azerbaijdzhanicus Dzhafarov, 1962

Plate 33

Culicoides azerbaijdzhanicus Dzhafarov, 1962. Ent. Oboz. 41 (1): 211.

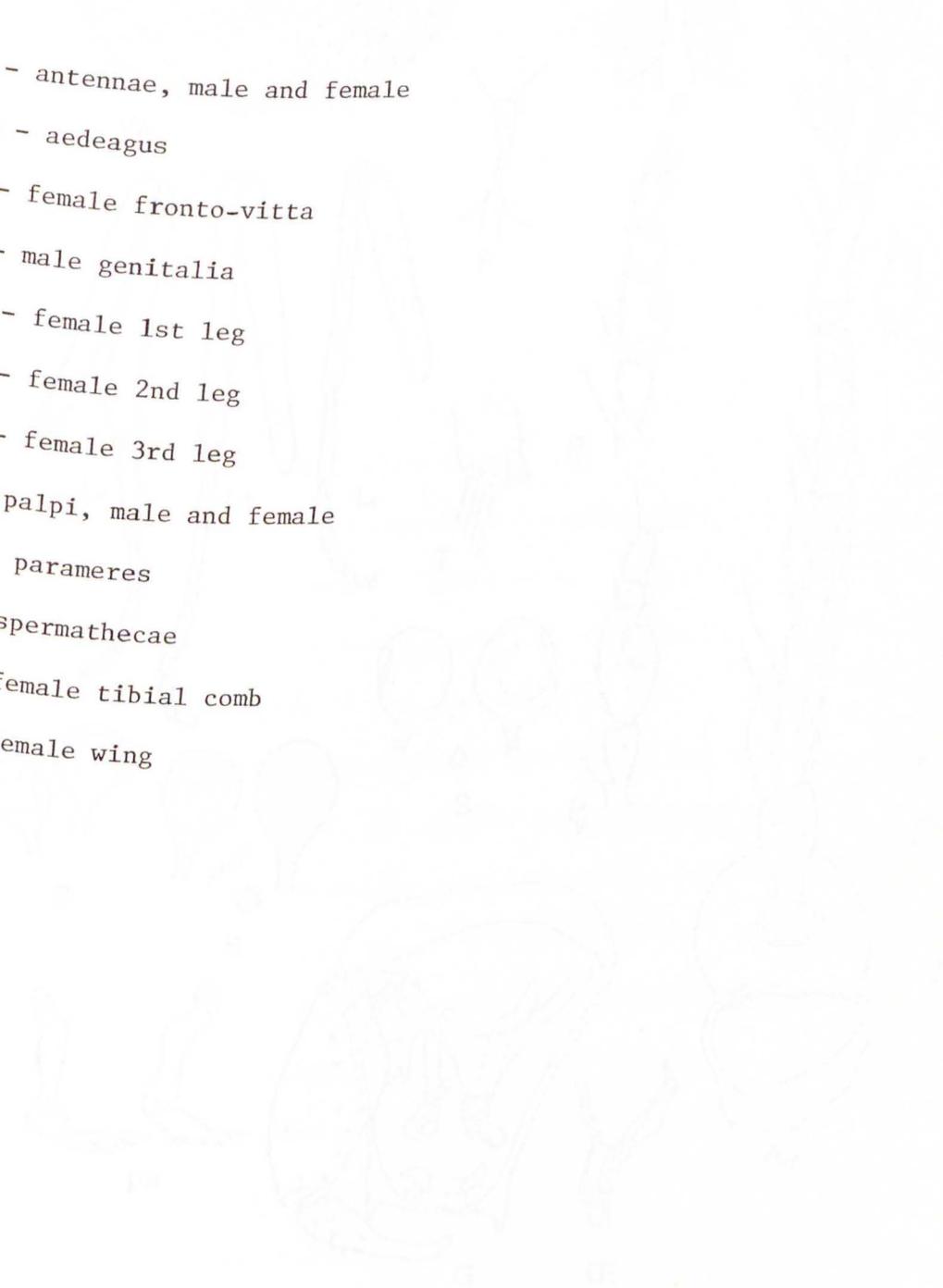
Size small; wing clear; eyes separate.

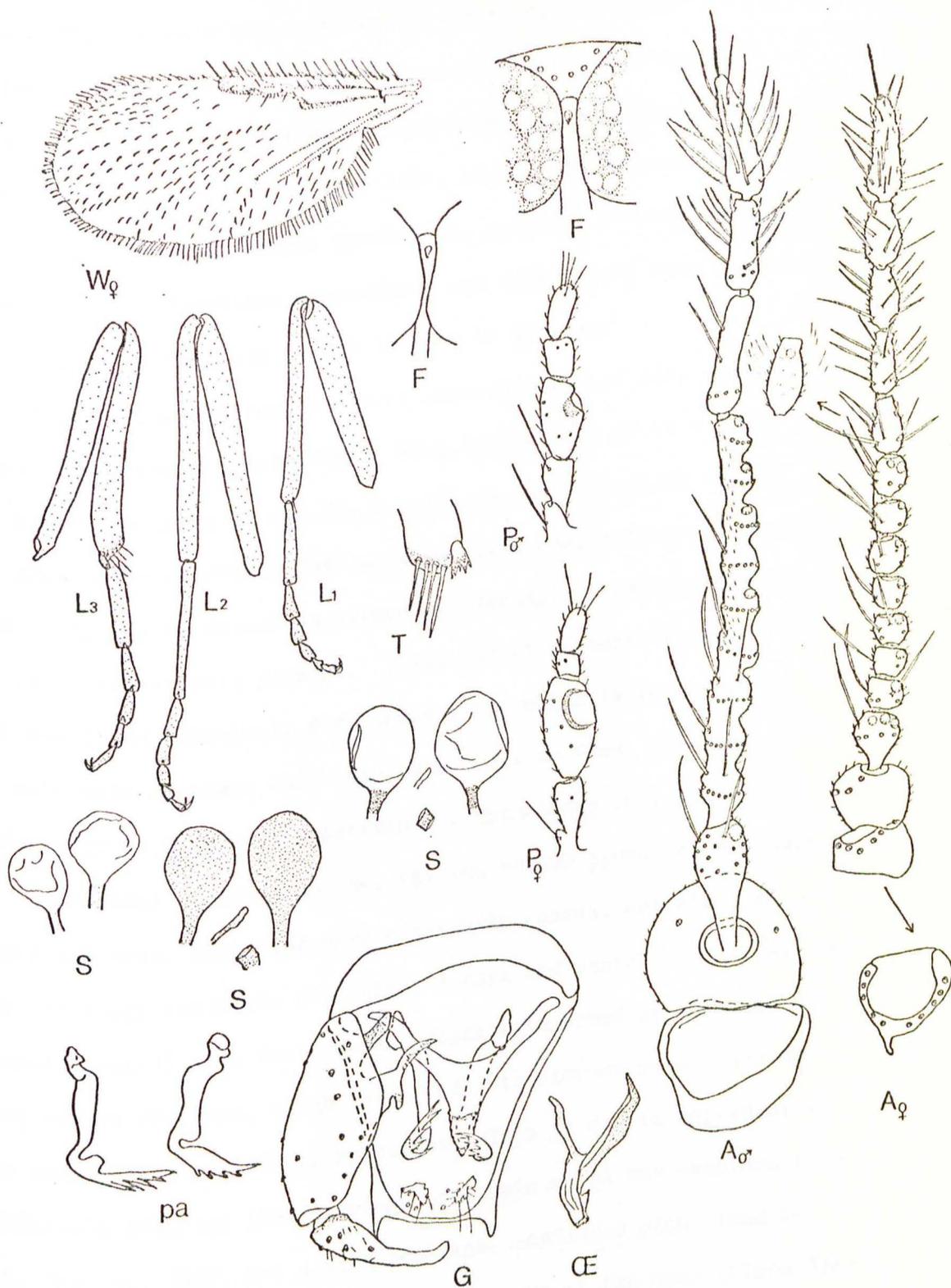
Female. - Eyes not contiguous (Plate 33F) and bare. Antennal segments 3 - 15 (Plate 33A) lengths in mean proportion of 13 - 8 - 8 - 8 - 8 - 9 - 9 - 11 - 15 - 15 - 15 - 17 - 26 (n = 5), AR 1.19 (1.15 - 1.23, n = 5); sensilla coeloconica on segments 3 - 10, in 1 specimen from Pakistan sensilla coelonica present on segment 11 (Plate 33A) as illustrated, total number of sensilla coeloconica 10 - 12; sensilla chaetica on segments 1 - 10, terminal seta present. Third palpal segment (Plate 33P) with single shallow sensory pit; palpal segments 2 - 5 lengths 30 - 46 - 14 - 21 (n = 5) microns; PR 1.70 (1.64 - 1.75, n = 5). Mandible with 8 - 9 (n = 4) teeth.

Thorax: Mesonotum light brown without pattern based on slide mounted specimens; scutellum slightly lighter than mesonotum. Wing (Plate 33W) clear, with 1 small pale spot beyond second radial cell, radial veins sometimes slightly darker than the other part of the wing, radial cells equal; macrotrichia present over the whole wing except the basal cell; wing length 0.71 (0.65 - 0.85, n = 10) mm, breadth 0.35 (0.31 - 0.43, n = 10) mm, CR 0.51 (0.50 - 0.53, n = 10). Halter pale. Legs (Plate 33L) light brown without pattern; tibial comb with 4 spines (Plate 33T), first from spur longest.

Abdomen: Light brown with 2 equal oval-shaped spermathecae (Plate 33), neck fairly long, measuring 39 by 32 (n = 4) microns; spermatheca neck 16 (n = 4) microns; spermathecae may not be heavily

Culicoides (Oecacta) azerbaijdzhanicus

- A - antennae, male and female
ae - aedeagus
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - parameres
S - spermathecae
T - female tibial comb
W - female wing
- 



sclerotized or only the neck heavily sclerotized, among 64 females collected from Pakistan 60% with heavily sclerotized spermathecae, 39.5% with light sclerotized spermathecae, and the other 0.5% only neck heavily sclerotized (Plate 33S), if the spermathecae are lightly sclerotized the rudimentary spermatheca and ring are not visible (Plate 33S); rudimentary spermatheca and sclerotized ring present, rudimentary spermatheca length 18 ($n = 4$) microns.

Male. - Same as female except sensory organ of palp slightly deeper than female (Plate 33P). Wing length 0.59 (0.51 - 0.69, $n = 10$) mm, breadth 0.25 (0.21 - 0.30, $n = 10$) mm, CR 0.44 (0.37 - 0.47, $n = 10$). Antenna (Plate 33A) with sensilla coeloconica on segments 3, 8 - 12, may be absent on segment 9; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 33P) with small and relatively deep sensory pit which is in agreement with the only male specimen which was examined from USSR, Sarakhs, 1959 (University of Maryland, Department of Entomology collection).

Genitalia: (Plate 33G, ae, pa) 9th tergum elongated and narrowed toward the apex, posterior margin slightly convex, apicolateral process not long; basistyle not thick, dorsal and ventral roots well developed, ventral root foot shaped, dististyle broad at base and narrowed toward the apex, slightly curved; 9th sternum with broad and deep incision, membrane not spiculate. This is not in agreement with Dzhafarov's 1962 and 1964 drawings; one male which was examined from USSR, Sarakhs, 1959, has a bare membrane. Aedeagus with broad U-shaped arch, median portion short and dentate at the apex (Plate 33ae). Paramere (Plate 33pa) with slender stem, basal knob somewhat sclero-

tized, the median processes visible in certain positions, bent sharply at the apical half, 5 - 6 teeth on the apical third.

Distribution - Afghanistan; Iran; Pakistan; Saudi Arabia; USSR.

Slide mounted material studied - Afghanistan: Helmand Prov., Gawargin, 670 m, 20 km Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 2 females.

Pakistan: Ayub, Natl. Park, Rawalpindi, June 1959, H. Barnett, light trap, 37 females, 16 males; Dharmyal, Rawalpindi, June 1959, H. Barnett, light trap, 18 females, 4 males; Lahore, July - August 1957, J. Maldonado, 9 females, Lahore, May - June 1958, J. Maldonado, light trap, 1 female; Peshawar, 20 June 1958, J. Maldonado, light trap, 1 male.

Saudi Arabia: Dhahran, September 1964, R. L. Peffley, light trap, 3 females, 3 males.

The drawings of Plate 33 were done predominately from specimens from Saudi Arabia, Dhahran, September 1964. Measurements were done from specimens from Saudi Arabia and Pakistan.

Culicoides (Beltranmyia) desertorum Gutsevich, 1959

Plate 34

Culicoides desertorum Gutsevich, 1959. Ent. Oboz. 38 (3): 675.

Size medium; wing spotted; eyes separate.

Female. - Eyes separate (Plate 34F) and bare. Antennal segments 3 - 15 (Plate 34A) lengths in mean proportion of 20-12-12-12-13 - 12 - 13 - 13 - 22 - 22 - 25 - 26 - 37 (n = 5), AR 1.22 (1.17 -

Culicoides (Beltranmyia) desertorum

A - antennae, male and female

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

L₃ - female 3rd leg

P - palpi, male and female

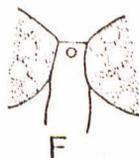
S - spermatheca

T - female tibial comb

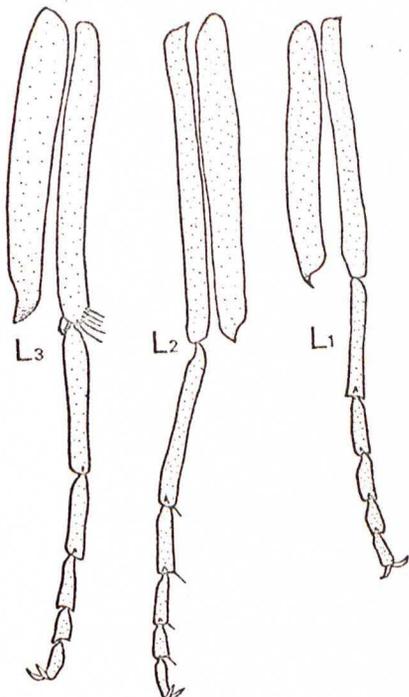
W - female wing



W♀



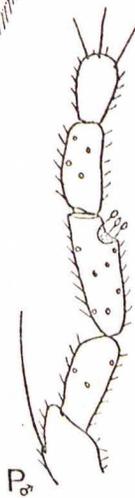
F



L3

L2

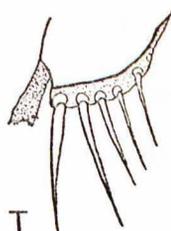
L1



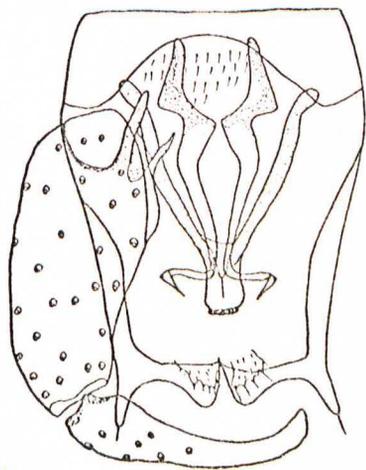
P♂



P♀



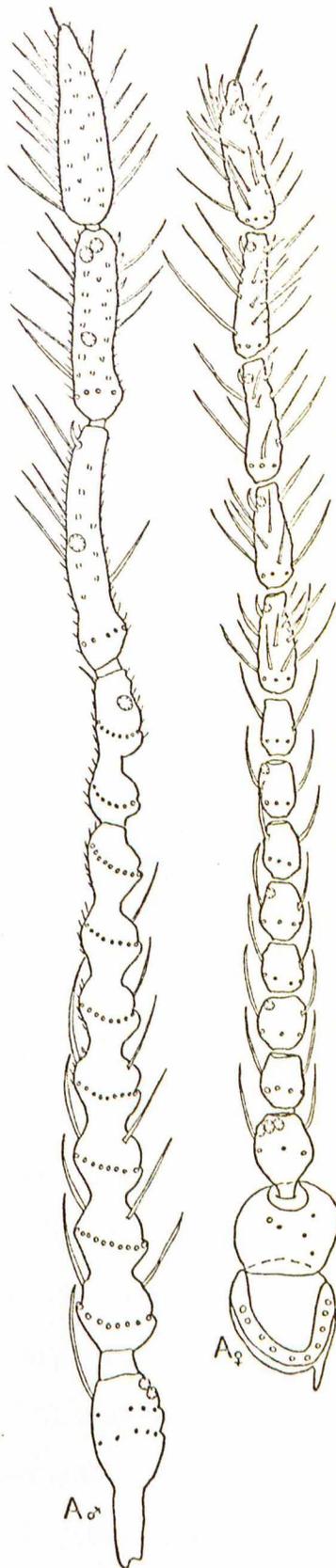
T



G



S



A♂

A♀

1.27, $n = 5$); sensilla coeloconica on segments 3, 5, 7, 9, 10 - 14, the sensorium may be absent on segment 5, total number of sensilla coeloconica 9 - 10; sensilla chaetica on segments 1 - 14, terminal seta present.

Third palpal segment (Plate 34P) with single sensory pit, not deep; palpal segments 2 - 5 lengths 69 - 83 - 37 - 29 ($n = 5$) microns; PR 2.50 (2.00 - 2.80, $n = 5$). Mandible with 14 - 15 teeth.

Thorax: Mesonotum brown without pattern based on slide mounted specimens; scutellum somewhat lighter than mesonotum. Wing (Plate 34W) spots in form of 4 light and 3 dark bands across the wing, first radial cell in light area and second radial cell completely dark, radial cells equal; macrotrichia present all over the wing including basal cell; wing length 1.05 (0.98 - 1.12, $n = 10$) mm, breadth 0.49 (0.47 - 0.52, $n = 10$) mm, CR 0.53 (0.50 - 0.55, $n = 10$). Halter pale. Legs (Plate 34L) lighter than thorax without pattern; tibial comb (Plate 34T) with 5 spines, the first and second from spur equal and longest.

Abdomen: Light brown with 1 egg-shaped spermatheca (Plate 34S); measuring 98 by 61 ($n = 5$) microns.

Male. - Same as female with usual differences. Wing length 0.98 ($n = 1$) mm, breadth 0.35 ($n = 1$) mm, CR 0.51 ($n = 1$). Antenna (Plate 34A) with sensilla coeloconica on segments 3, 12 - 14, the sensorium on segment 12 may not be present, the location of 1 sensorium on segments 13 and 14 in the lower part of the segments are in agreement with a specimen examined from the USSR, Alma Ata, 14-8-1964, the location of sensorium on segments 3 and 12 are same as illustrated;

sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 34P) not swollen with single sensory pit.

Genitalia: (Plate 34G) 9th tergum elongated and slightly wider at the base, apicolateral processes well developed and slightly divergent, posterior margin with deep V-shaped notch and 2 well developed processes; basistyle slender, the ventral and dorsal roots well developed, however, the ventral root is very slender and visible only in a certain position, dististyle slightly curved; 9th sternum with deep excavation, membrane spiculate. Aedeagus with high V-shaped arch. Paramere basal knob foot shaped, stem narrowed toward the apex and pointed, apex bent twice at right angle.

Distribution - Afghanistan; Saudi Arabia; USSR.

Slide mounted material studied - Afghanistan: Kunduz Prov., Bulla Quchi, 10 September 1968, D. P. Wojcik, black light trap, 34 females; Kunduz Prov., Bulla Quchi, 12 September 1968, D. P. Wojcik, black light, 10 females, 1 male; Helmand Prov., Gawargin, 670 m, 20 km S. Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 1 female.

Saudi Arabia: Dhahran, September 1964, R. L. Peffley, light trap, 1 female.

The female drawings of Plate 34 were done from the only female collected from Saudi Arabia, the male drawings were done from specimens from Afghanistan, Kunduz Prov., Bulla Quchi, 12 September 1968.

All measurements were done from specimens from Afghanistan.

Discussion - The descriptions given by Gutsevich, 1959 and 1960, are different in 2 points with the present description: the extra

dark band at the base of the wing and the absence of the ventral root of the basistyle. The 3 specimens from USSR, Alma Ata 14 August 1964, 1 female, 1 male and Salavat 29 May 1962, 1 female, determined by Gutsevich presently in the University of Maryland, Department of Entomology collection are in agreement with the present description, but as mentioned before, the ventral root of basistyle is hardly visible.

Culicoides (Beltranmyia) Sp. 5 n. sp.

Plate 35

Wing clear; size medium; eyes separate.

Female. - Eyes separate (Plate 35F) and bare. Antennal segments 3 - 15 (Plate 35A) lengths in mean proportion of 17 - 10 - 10.5 - 11 - 12 - 11.5 - 12 - 12 - 19 - 20.5 - 24 - 24.5 - 31 (n = 10), AR 1.23 (1.13 - 1.32, n = 10); sensilla coeloconica on segments 3, 11 - 14, may be present on segment 7 (in 2 specimens present only on 1 side), total number of sensilla coeloconica 7 - 10; sensilla chaetica on segments 1 - 15, black setae on the middle of segments 14 and 15 as illustrated. Third palpal segment slightly swollen with single sensory pit (Plate 35P), not deep; palpal segments 2 - 5 lengths 45 - 68 - 26 - 33 (n = 8) microns; PR 2.12 (1.76 - 2.60, n = 10). Mandible with 10 - 12 teeth.

Thorax: Mesonotum light brown without pattern based on slide mounted specimens; scutellum same color as mesonotum. Wing (Plate 35W) clear without spot, the veins surrounding second radial cell slightly darker than the rest of the wing, radial cells equal; macrotrichia numerous, not present on basal cell; wing length 0.89 (0.80 -

Culicoides (Beltranmyia) Sp. 5 n. sp.

(only female)

A - antenna

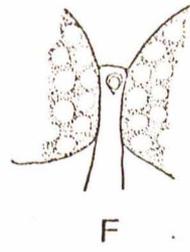
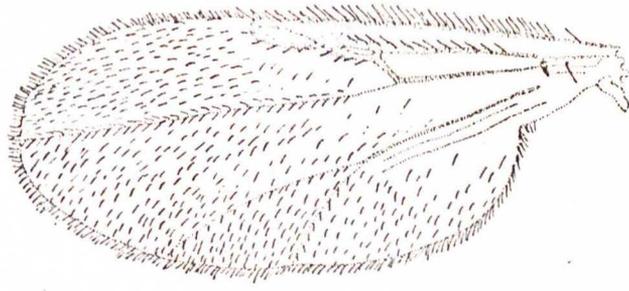
F - fronto-vitta

L₁ - 1st legL₂ - 2nd legL₃ - 3rd leg

P - palpus

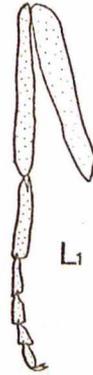
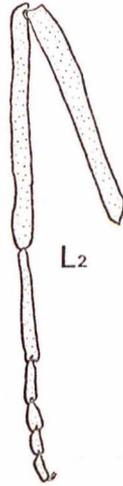
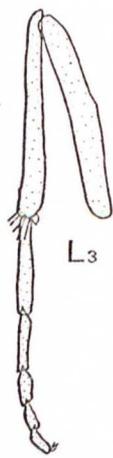
T - tibial comb

W - wing



W

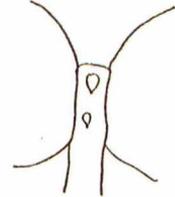
F



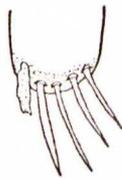
L3

L2

L1



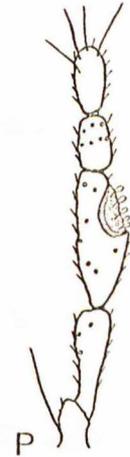
F



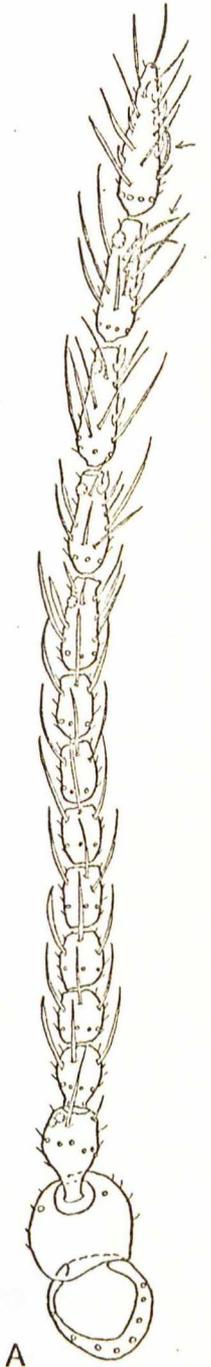
T



S



P



A

1.00, n = 10) mm, breadth 0.44 (0.38 - 0.50, n = 10) mm, CR 0.55 (0.53 - 0.56, n = 10). Halter yellowish. Legs (Plate 35L) light brown without pattern; tibial comb (Plate 35T) with 4 - 5 spines.

Abdomen: Light brown with 1 egg-shaped spermatheca (Plate 35S); measuring 80 by 44 (n = 10) microns.

Male. - Unknown.

Distribution - Saudi Arabia.

Types - Holotype female, Saudi Arabia: Dhahran, September 1964, R. L. Peffley, light trap. Paratype, 16 females same data as holotype. Type #75307.

The drawings of Plate 35 were done from holotype.

Discussion - This species is related to C. homochrous Remm, 1968, from West Crimea, but the size, color and presence of macrotrichia on basal cell are different. They can easily be recognized by the sensilla coeloconica arrangement on the antenna.

Culicoides (Beltranmyia) circumscriptus Kieffer, 1918

Plate 36

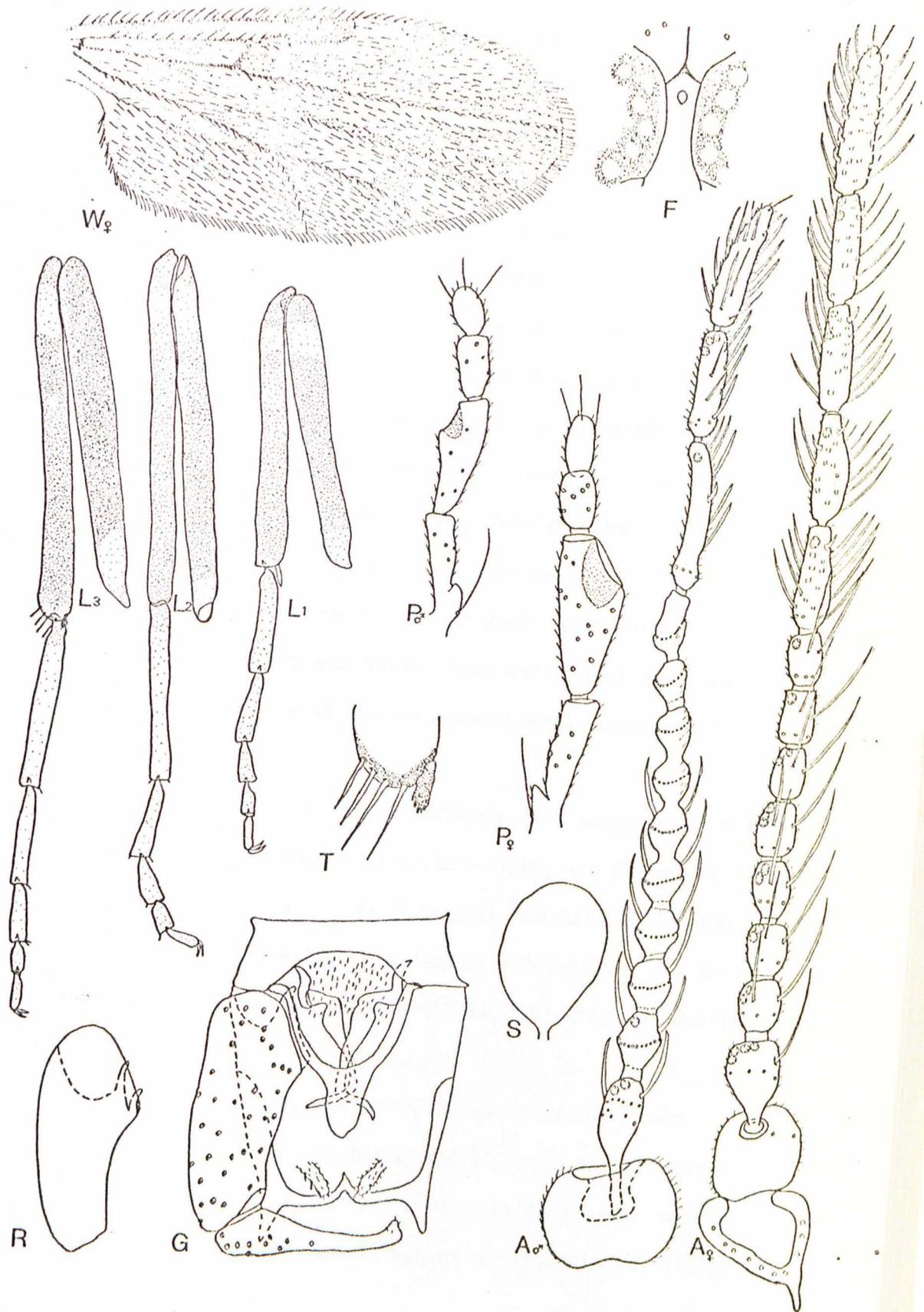
Culicoides circumscriptus Kieffer, 1918. Ann. Hist. Mus. Hung. 16: 49.

Size medium; wing spotted; eyes separate.

Female. - Eyes separate (Plate 36F) and bare. Antennal segments 3 - 15 (Plate 36A) lengths in mean proportion of 20 - 14 - 14 - 14 - 13 - 13 - 13 - 13 - 22 - 23 - 24 - 27 - 39 (n = 5), AR 1.17 (1.15 - 1.21, n = 5); sensilla coeloconica on segments 3 - 14, may be absent on segment 10, total number of sensilla coeloconica 22 - 27; sensilla

Culicoides (Beltranmyia) circumscriptus

- A - antennae, male and female
F - female fronto-vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
R - basistyle
S - spermathecae
T - female tibial comb
W - female wing



chaetica on segment 1 - 10, terminal seta present. Third palpal segment swollen with single deep sensory pit; palpal segments 2 - 5 lengths 62 - 79 - 29 - 32 (n = 4) microns; PR 2.06 (1.94 - 2.25, n = 5). Mandible with 14 - 18 teeth.

Thorax: Mesonotum brown without distinct pattern based on slide mounted specimens; suctellum same color as mesonotum. Wings (Plate 36W) with large light spots, radial cells equal, first radial cell in pale area and the second radial cell completely dark, a dark spot adjoining the r-m cross vein, wing pattern as illustrated; macrotrichia long and abundant extending to the base of wing and basal cell; wing length 1.04 (0.95 - 1.22, n = 10) mm, breadth 0.48 (0.43 - 0.57, n = 10) mm, CR 0.57 (0.55 - 0.58, n = 10). Halter pale. Legs (Plate 36L) light brown with pale bands as illustrated; tibial comb (Plate 36T) with 4 spines, the first and second from spur equal and longest.

Abdomen: Brown with 1 oval-shaped spermatheca; measuring 80 by 50 (n = 5) microns.

Male. - Same as female with usual differences. Wing length 0.84 (0.77 - 0.88, n = 4) mm, breadth 0.33 (0.30 - 0.36, n = 5) mm, CR 0.49 (0.49 - 0.50, n = 4). Antenna (Plate 36A) with sensilla coeloconica on segments 3, 4, 13, 14; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 36P) slightly swollen with single deep sensory pit.

Genitalia: (Plate 36G) 9th tergum with well developed subparallel apicolateral processes, posterior margin with notch; basistyle slightly wider at the base, dorsal root well developed, ventral root developed to the greater or lesser extent as illustrated, (Plate

36R), dististyle not curved with few fine hairs at the tip; 9th sternum with wide and deep emargination, membrane spiculate. Aedeagus with high U-shaped arch, median portion well developed. Paramere basal knob foot shaped, stem slightly swollen at the base and gradually narrowed toward the apex, bent at right angle at the apical end.

Distribution - Asia and Europe.

Slide mounted material studied - Afghanistan: Bamian Prov., Seyyadabad, 2439 m, 4 km N. Bamian, 18 - 21 Augsut 1968, D. P. Wojcik, black light trap, 11 females, 8 males; Kunduz Prov., Bulla Quchi, 10 - 12 September 1968, D. P. Wojcik, black light, 11 females, 1 male; Helmand Prov., Gawargin, 670 m, 20 km S. Lashkargah, 1 October 1968, D. P. Wojcik, black light trap, 1 female; Herat Prov., Karukh, 1280 m, 43 km E. Herat, 15 - 21 October 1968, D. P. Wojcik, black light trap, 17 females, 38 males.

Iran: Shemiran, August 1959, H. Barnett, light trap, 1 male.

Pakistan: Lahore, July - August 1957, J. Maldonado, 6 females, 4 males; Lahore, May - June 1958, J. Maldonado, light trap, 1 female, 3 males; Peshawar, 20 June 1958, J. Maldonado, light trap, 8 females, 1 male; Peshawar, N. W. Frontier Prov., June 1959, H. Barnett, light trap, 3 females, 6 males; Peshawar, 20 September 1960, J. Scanlon, light trap, 1 female; Rawalpindi, Ayub Natl. Park, June 1959, H. Barnett, light trap, 20 female, 3 males; Dhamyal, June 1959, H. Barnett, light trap, 7 females, 2 males.

Turkey: Adana, 13 October 1960, T. Curtin, light, 1 female, Izmir Prov., Bornova, October 1961, T. Curtin, light, 44 females, 53 males; Izmir Prov., June 1962, T. Curtin, light 51 females, 77 males;

Izmir Prov., Cigli, 29 March 1961, T. Curtin, light, 10 females, 2 males; Izmir Prov., Tire, T. Curtin, (no date), light, 1 female; Pirincilik, 19 May 1961, T. Curtin, light, 7 females, 9 males.

The drawings of Plate 36 were done from specimens from Afghanistan, Bamian Prov., Seyydabad, 2439 m, 4 km N. Bamian, 19 August 1968, D. P. Wojcik, black light trap. Figure R of Plate 36 was done from Pakistan, Ayub Natl. Park, Rawalpindi, June 1959, H. Barnett, light trap. Measurements were done from specimens from Pakistan.

Culicoides (Monoculicoides) Sp. 13 n. sp.

Plate 37

Wing clear; size medium; eyes bare.

Female. - Unknown.

Male. - Eyes bare. Antenna missing. Palpal segments 2 - 5 lengths 50 - 50 - 25 - 30 (n = 1) microns, third palpal segment slightly swollen with single deep sensory pit (Plate 37P).

Thorax: Mesonotum yellowish brown without pattern based on slide mounted specimen; scutellum same color as mesonotum. Wing (Plate 37W) clear, veins poorly developed, radial cells equal; macrotrichia mainly present on distal third of the wing, basal cell without macrotrichia; wing length 0.95 mm, breadth 0.44 mm, CR 0.52. Halter pale. Legs brown without pattern; tibial comb (Plate 37T) with 4 spines, the first 2 from spur equal and longest.

Genitalia: (Plate 37G) 9th tergum moderately long, wide at the base and narrowed toward the apex, distal margin uniquely formed and divided into 4 lobes of which the inner processes are sharply

Culicoides (Monoculicoides) Sp. 13 n. sp.

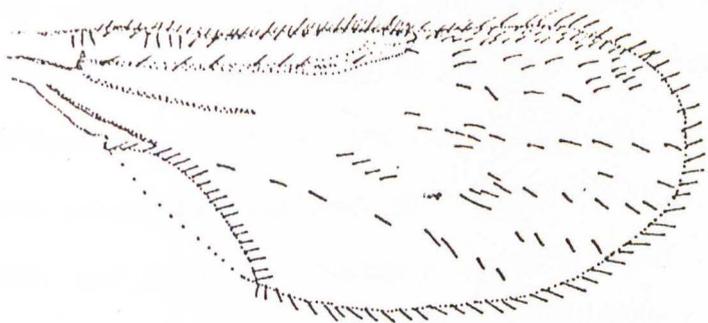
(only male)

G - genitalia

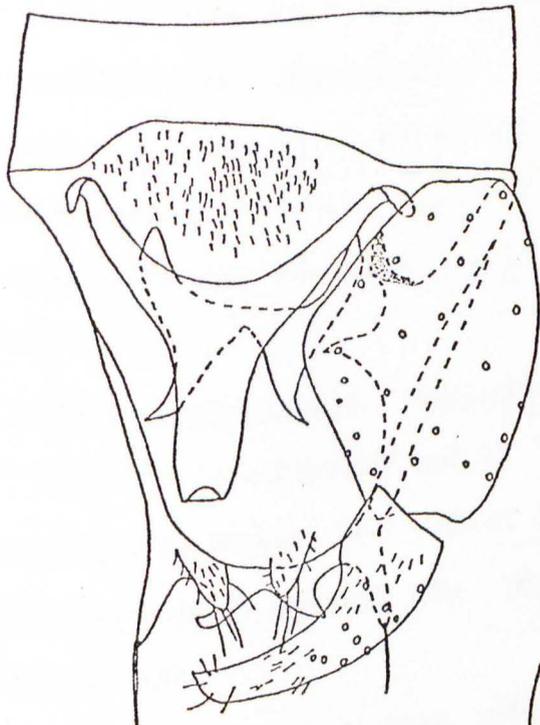
P - palpus

T - tibial comb

W - wing



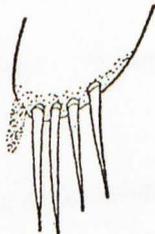
W



G



P



T

divergent and the apicolateral processes subparallel; basistyle short and broad with well developed dorsal and ventral roots, dorsal root darkly sclerotized, dististyle broad at the base then sharply narrowed and curved, slightly dark at the tip; 9th sternum with shallow excavation, membrane spiculate. Aedeagus with semicircle arch, median portion long, stout and truncate. Paramere joined at bases, the tips pointed and separated with a deep V-shaped emargination.

Distribution - Saudi Arabia.

Type - Holotype male, Saudi Arabia, Dhahran, September 1964, R. L. Peffley, light trap. Type #75308.

Discussion - This species is not closely related to the other species of this subgenus. The male genitalia are unique and this allowed me to describe this species from only 1 specimen.

Culicoides (Monoculicoides) puncticollis (Becker), 1903

Plates 38 and 39

Ceratopogon puncticollis Becker, 1903. Mitt. Zool. Mus. Berl. 2: 75.

Synonyme: Culicoides riethi Keiffer, 1914. Arch. Hydrobiol (Plankt) Suppl. 2: 237.

Culicoides longicollis Glukhova, 1971. Parasitology, 5 (6): 507.

Edwards, Oldroyd and Smart (1939) gave the following species as the synonyms of Culicoides puncticollis:

Culicoides pulicaris var. algecirensis Strobl., 1900.
Wein. Ent. Zeit. 19: 170.

Culicoides impressus Kieffer, 1918. Ann. Mus. Nat. Hung., 16: 47.

Culicoides algecirensis Kieffer, 1919. Ann. Mus. Nat. Hung., 17: 39.

Culicoides donatieni Kieffer, 1922. Arch. Inst. Past. Afr. Nord., 2: 504.

Culicoides sciniphes Kieffer, 1924. Bull. Soc. Ent. Egypte, 8: 261.

? Culicoides flavitarsis Vimmer, 1932. Sbornik, 8: 137.

? Culicoides vavrai Vimmer, 1932. Sbornik, 8: 140.

? Culicoides bipunctatus Vimmer, 1932. Sbornik, 8: 133.

? Culicoides nubeculosus (Meigen) Medwedewa, 1927. Mitt. Inst. F. Heimatskunde Univ. Saratow, 2: 1 - 18.

They also gave the following 3 species as the synonyms of

Culicoides riethi:

Culicoides pullatus Kieffer, 1915. Arch. Hydrobiol. Supp., 2: 474.

Culicoides crassiforceps Kieffer, 1924. Bull. Soc. Mos-elle, 29: 15.

? Culicoides cordatus Kieffer, 1921. Arch. Inst. Past. Afr. Nord., 1: 114.

Size large; wing spotted; eyes separate.

Female. - Eyes broadly separated (Plate 38F) and bare. Antennal segment 3 - 15 (Plate 38A) lengths in mean proportion of 24 - 16 - 17 - 17 - 17.5 - 18 - 17 - 17 - 19 - 20 - 20 - 20.5 - 34 (n = 10), AR 0.79 (0.74 - 0.84, n = 10), sensilla coeloconica on segments 3, 7 - 10, may be absent on segment 7, total number of sensilla coeloconica 4 - 7; sensilla chaetica on segments 1 - 15. Third palpal segment

Culicoides (Monoculicoides) puncticollis

A - antennae, male and female

ae - aedeagus

F - female fronto-vitta

G - male genitalia

L₁ - female 1st leg

L₂ - female 2nd leg

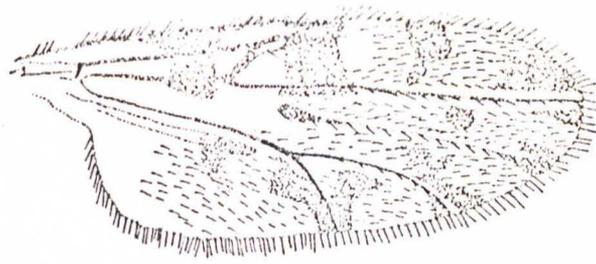
L₃ - female 3rd leg

P - palpi, male and female

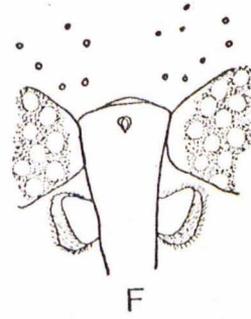
S - spermatheca

T - female tibial comb

W - female wing



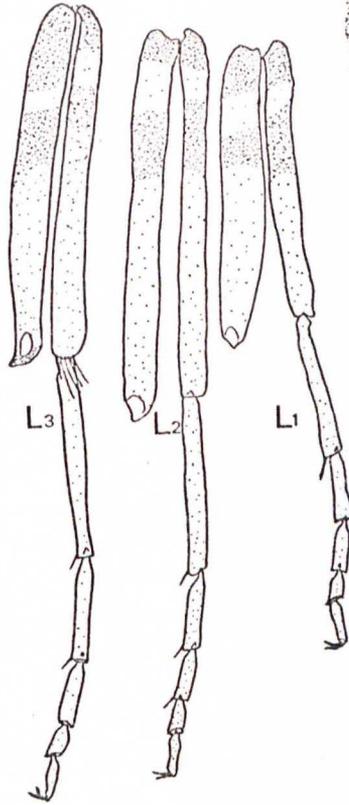
W_♀



F



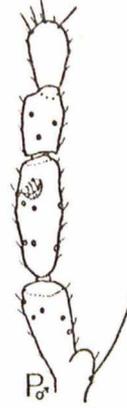
T



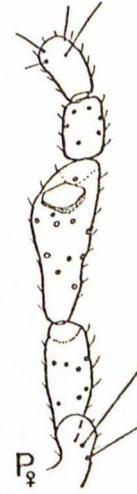
L₃

L₂

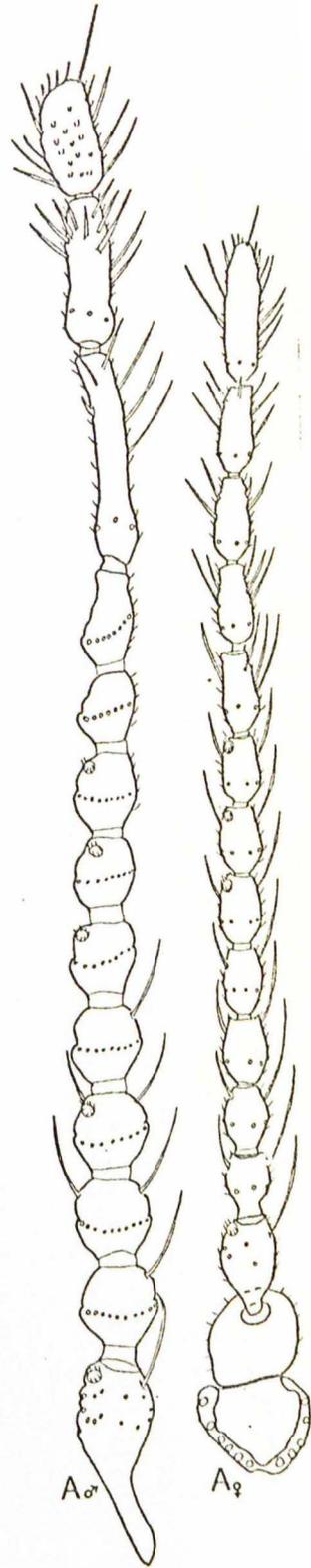
L₁



P_♂

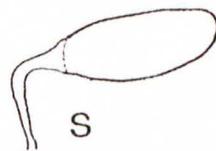


P_♀

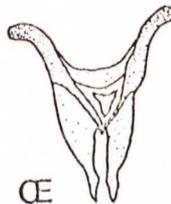


A_♂

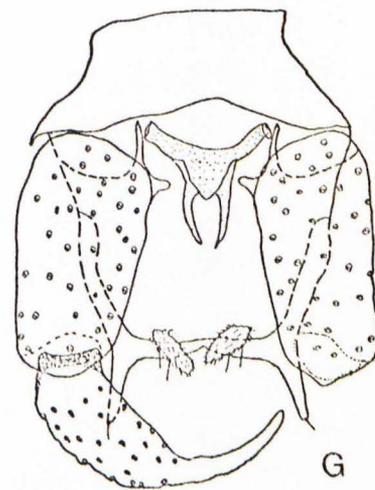
A_♀



S



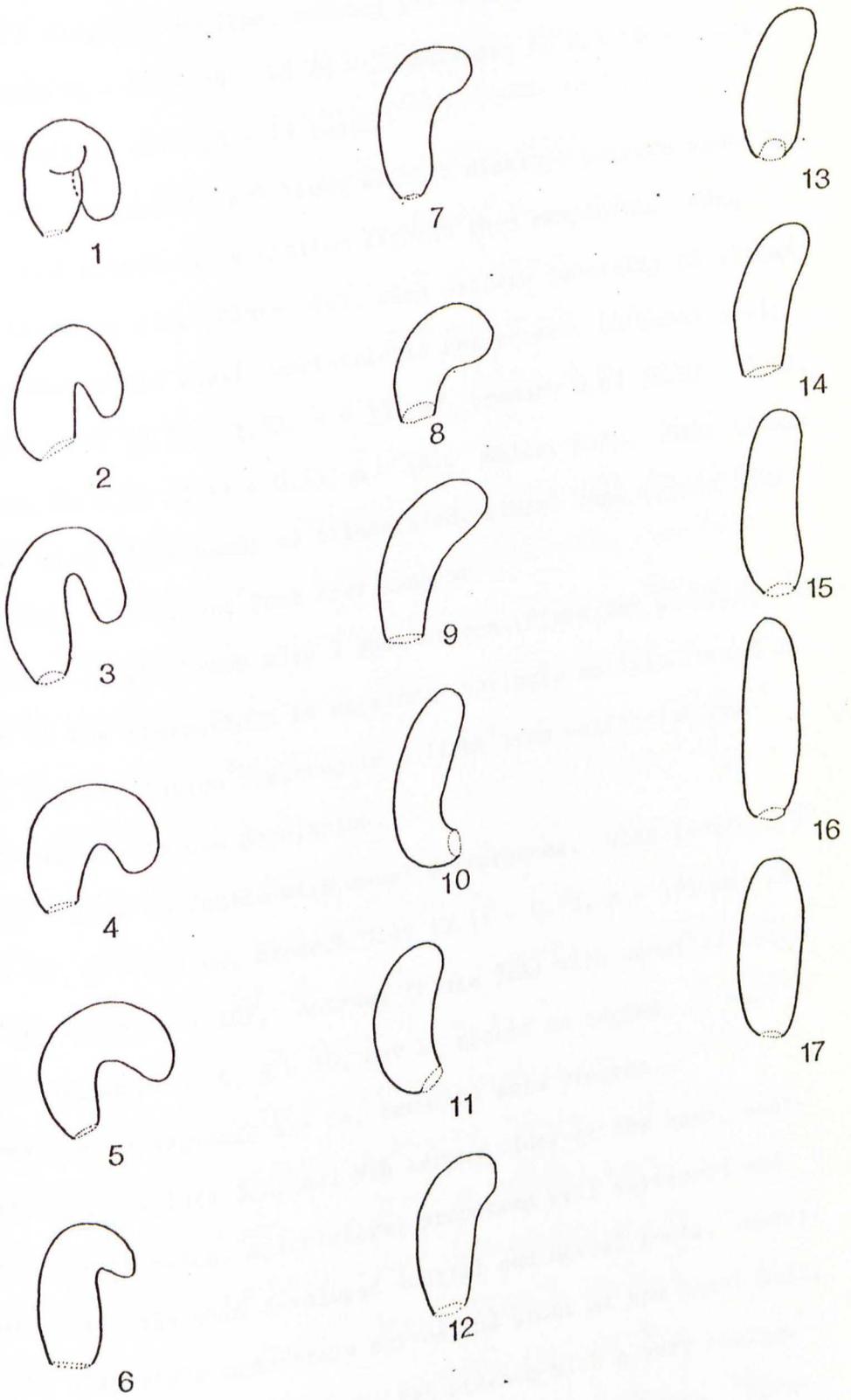
CE



G

Culicoides (Monoculicoides) puncticollis

No. 1 - 17 Spermathecae



(Plate 38P) slightly swollen, sensory pit not deep; palpal segments 2 - 5 lengths 74 - 92 - 32 - 46 (n = 5) microns; PR 2.5 (2.3 - 2.8, n = 5). Mandible with 10 - 13 teeth.

Thorax: Mesonotum dark brown without distinct pattern based on slide mounted specimens; scutellum lighter than mesonotum. Wing spots variable in size (Plate 38W), wing pattern generally as illustrated, radial cells equal; macrotrichia not present on basal cell; wing length 1.44 (1.26 - 1.55, n = 10) mm, breadth 0.61 (0.52 - 0.64, n = 10) mm, CR 0.53 (0.51 - 0.55, n = 10). Halter pale. Legs (Plate 38L) brown with light bands as illustrated; tibial comb (Plate 38T) with 5 spines, the second from spur longest.

Abdomen: Light brown with 1 spermatheca (Plate 38S and Plate 39), the shape of the spermatheca is extremely variable as illustrated in Plate 39, this variation occurred in a light trap collection and therefore perhaps in one population.

Male. - Same as female with usual differences. Wing length 1.32 (1.19 - 1.42, n = 10) mm, breadth 0.49 (0.45 - 0.55, n = 10) mm, CR 0.52 (0.49 - 0.54, n = 10). Antenna (Plate 38A) with sensilla coeloconica on segments 3, 6, 8 - 10, may be absent on segment 6; sensilla chaetica on segments 1 - 14, terminal seta present.

Genitalia: (Plate 38G, ae) 9th tergum wider at the base, posterior margin with notch, apicolateral processes well developed and divergent; basistyle with developed ventral and dorsal roots, ventral root small, dististyle moderately curved and stout at the basal half, terminal portion narrowed and bare; 9th sternum with a very shallow excavation. Aedeagus forked (Plate 38ae) with U-shaped arch. Para-

June 1959, H. Barnett, light trap.

Discussion - Culicoides puncticollis is a very common and widespread species. The wing pattern and the shape of spermatheca are extremely variable even among individuals from the same locality (Plate 39). In the past the spermatheca was the main character used to separate C. puncticollis from C. riethi, although the male of both species are the same. The immature stages of these 2 species cannot be distinguished, Gutsevich and Glukhova (1970) did not give key characters to separate these 2 species. Glukhova (1971) studied the variation range in species of the nubeculosus group and used the length of the spermathecal duct to separate these species and erected a new species, C. longicollis. I believe that the length of spermathecal duct is not a good character for determination at the species level as this duct is not always visible.

Culicoides (Monoculicoides) nubeculosus (Meigen), 1830

Plate 40

Ceratopogon nubeculosus Meigen, 1830. Syst. Besch. Eur. Zweift.

Ins. 6: 263.

Size large; wing spotted; eyes separate.

Female. - Eyes broadly separated from each other (Plate 40F) and bare. Antennal segments 3 - 15 (Plate 40A) lengths in mean proportion of 28 - 18 - 18 - 17 - 18 - 19 - 19 - 19 - 24 - 24 - 23 - 25 - 27 (n = 1), AR 0.79 (n = 1); sensilla coeloconica on segments 3, 8 - 10, total number of sensilla coeloconica 6; sensilla chaetica on segments 1 - 15. Third palpal segment (Plate 40P) not swollen and sensory organ in the form of several depressions very close

together on 1 side and in the form of a single pit on the other side as illustrated; palpal segments 2 - 4 lengths 30.5 - 45 - 18 (n = 1) microns (segment 5 not measurable); PR 3.3 (n = 1). Mandible with 11 teeth.

Thorax: Mesonotum dark brown without distinct pattern, based on slide mounted specimen; scutellum lighter than mesonotum. Wing (Plate 40W) dark with pale spots as illustrated, radial cells equal; macrotrichia not present on basal cell; wing length 1.64 (n = 1) mm, breadth 0.71 (n = 1) mm, CR 0.54 (n = 1). Halter pale. Legs brown (Plate 40L) with pale bands as illustrated; tibial comb with 6 spines, the third from spur longest.

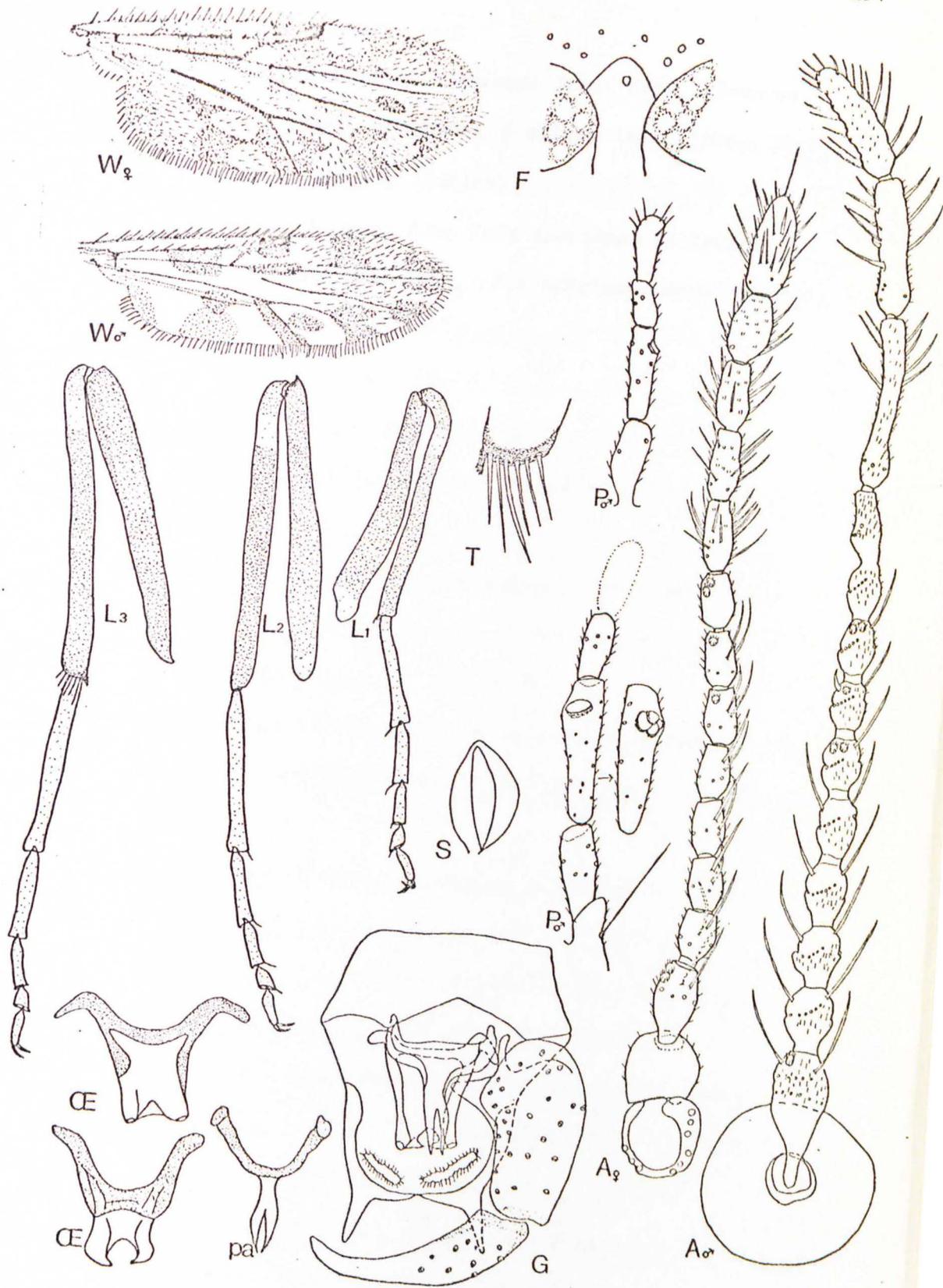
Abdomen: Brown with 1 spermatheca (Plate 40S), spermatheca length 32 microns.

Male. - Same as female with usual differences. Wing (Plate 40W) length 1.58 (1.22 - 1.80, n = 8) mm, breadth 0.56 (0.51 - 0.64, n = 8) mm, CR 0.52 (0.50 - 0.54, n = 8). Antenna (Plate 40A) with sensilla coeloconica on segments 3, 8 - 10; sensilla chaetica on segments 1 - 14, terminal seta present. Third palpal segment (Plate 40P) not swollen with single sensory organ.

Genitalia: (Plate 40G, ae, pa) 9th tergum wider at the base, apicolateral processes well developed and divergent, posterior margin with notch, not very deep; basistyle stout with well developed ventral and dorsal roots, dististyle long, wider at the base then gradually narrower toward the apex; 9th sternum with shallow emargination, membrane bare. Aedeagus (Plate 40ae) slightly variable in shape as illustrated. Paramere fused together and forked at the tip (Plate 40pa), arms dark sclerotized.

Culicoides (Monoculicoides) nubeculosus

- A - antennae, male and female
ae - aedeagus
F - female fronto vitta
G - male genitalia
L₁ - female 1st leg
L₂ - female 2nd leg
L₃ - female 3rd leg
P - palpi, male and female
pa - paramere
S - spermatheca
T - female tibial comb
W - wings, male and female



Distribution - Asia; Europe.

Slide mounted material studied - Turkey: Izmir Prov., Bornova, October 1961, T. Curtin, light, 1 female, 6 males; Izmir Prov., Bornova, June 1962, T. Curtin, light, 2 males.

The drawings of Plate 40 were done from specimens collected from Turkey, Izmir Prov., Bornova, 1961. All specimens were used for measurements.

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