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Biting midges from Northern Pakistan with descriptions of three new species (Diptera: Ceratopogonidae)¹⁾

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Key words: Ceratopogonidae, *Culicoides*, *kohistanensis*, *pakistanensis*, *papillatus*, Pakistan.

Abstract: Twenty-one species belonging to the genus *Culicoides* were recorded from six localities in northern part of Pakistan. Almost all species are the Central Asian elements. Three new species, *C. kohistanensis*, *C. pakistanensis* and *C. papillatus*, are described and figured.

Biting midges of the genus *Culicoides* in the neighboring areas of Pakistan have hitherto been reported from the Russian Central Asia (Gutsevich, 1973), Iran and Afghanistan (Navai, 1977), India (Sen and Das Gupta, 1959), Southeast Asia (Wirth and Hubert, 1989) and China (Lee, 1988), but the information of Pakistani *Culicoides* is nearly lacking except for some records by Navai (1977).

Biting midges used in this study were collected by light trap at Hunza, Gulmit, Mingora, Chilas, Kalam and Dir between 31 July and 12 August, 1987, by the junior author. The specimens were examined and found 21 species including three new species.

The holotypes and allotype of the new species are deposited in the National Science Museum (Natural History), Tokyo.

RECORDS OF COLLECTIONS

Subgenus *Avaritia* Fox, 1955

1. ***Culicoides imicola* Kieffer, 1913** Voy. Ch. Alluaud et R. Jeannel en Afr. orient., Schulz ed. Paris, 1911-1912, 43.

Specimens examined. 13 females (F), 7 males (M), 31 July, Mingora; 7F, 1M, 9 August, Kalam; 28F, 5M, 12 August, Dir.

Distribution. Africa, the Near and Middle East, India, and Pakistan.

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2. ***Culicoides maculatus* Shiraki, 1913** Taiwan Sotokufu Noji Tokubetsu Hokoku, 8: 296.

Specimens examined. 4F, 9 August; 6F, 12 August, Dir.

Distribution. Taiwan, the Indo-China, Indonesia, Philippines, China, Japan, and Pakistan.

3. ***Culicoides obsoletus* Meigen 1918** Syst. Besch., 1: 76.

Specimens examined. 6F, 9 August, Kalam.

Distribution. Widespread in Eurasia and North America.

Remarks. Female morphological characters of some species related to *C. obsoletus* very similar, therefore the present identification is indefinite due to no male specimens available.

Subgenus *Beltranmyia* Vargas, 1953

4. ***Culicoides circumscriptus* Kieffer, 1918** Ann. Mus. Nat. Hung., 16: 49.

Specimens examined. 1F, 3 August, Gulmit; 1F, 1M, 4 August, Mingora; 1F, 9 August, Kalam; 1 intersex, 12 August, Dir.

Distribution. North Africa, Europe, the Near East to India, the Indo-China, Japan and Pakistan.

5. ***Culicoides desertorum* Gutzevich, 1959** Ent. Oboz., 38: 675.

Specimens examined. 2F, 4 August, Mingora.

Distribution. France, Central Asia, Mongolia, and Pakistan.

Subgenus *Culicoides* Latreille, 1809

6. ***Culicoides papillatus* sp. n.**

Female (Figs. 1, 5 and 8). Body: Large, brown.

Head: Eyes contiguous for a short distance, bare. Antenna with segments in lengths (μm) of 60-47-50-50-50-50-47-60-62-75-87-129, AR 1.02; sensilla coeloconica on segments 3, 11-15, number of sensilla on one side 4, 1, 1, 1, 2, 2. Palpal segments (Fig. 5) in lengths (μm) of 25-90-100-40-40, PR 3.4; third segment slightly swollen on distal half with sensilla scattered on surface of distal portion of segment. Mouthparts long, P/H Ratio 0.93; mandible with 16 teeth. Epipharyngeal wall of cibarial pump with about 80 small papillae.

Thorax: Brown, scutum without prominent pattern, scutellum each a pair of mid-scutellar and lateral bristles.

Legs: Brownish, apices of all femora pale, apex of hind tibia pale with five spines, the first longest.

Wing (Fig. 1): Length 1.55 mm, CR 0.63. Pattern as figured, anterior wing margin with three narrow transverse, dark areas; first spot not very dark, located halfway from costa to media and a small spot on veins Cu_2 and 1st A; second spot dark, lying at apex of first radial cell and base of second, with reduced intensity as a spot across median fork and following course of vein Cu_1 to posterior wing margin; third spot appearing as a transverse spot located from end of costa near vein M_1 to vein M_2 , vein M_2 to a third way of vein M_{3+4} ; veins M_1 and M_2 with dark streaks apically. Microtrichia sparse, confined distal thirds of wing. Halter pale.

Figs. 1-4 Wings of *Culicoides* species.

1: *C. papillatus* sp. n., female. 2: *C. pakistanensis* sp. n., female. 3: *C. pakistanensis* sp. n., male. 4: *C. kohistanensis* sp. n., female.

Figs. 5–11 Palpi and spermathecae of females and male genitalia of *Culicoides* species.

5: Palpus of *C. papillatus* sp. n. 6: palpus of *C. pakistanensis* sp. n. 7: palpus of *C. kohistanensis* sp. n. 8: spermathecae of *C. papillatus* sp. n. 9: spermathecae of *C. pakistanensis* sp. n. 10: spermathecae of *C. kohistanensis* sp. n. 11: genitalia of *C. pakistanensis* sp. n.

Abdomen: Brown, spermathecae (Fig. 8) probably ovoid, with short necks, ca 54 by 60 and 54 by 50 (μm), very long rudimentary spermatheca and ring present.

Holotype. 1F, 9 August 1987, Kalam, Pakistan, S. Shinonaga.

Discussion. The wing pattern of *C. papillatus* sp. n. is generally similar to those of the Japanese *C. dubius* Arnaud, 1959 and the Malaysian *C. trimaculipennis* Wirth and Hubert, 1989, but the presence of about 80 cibarial papillae is very characteristic among the species belong to the subgenera *Culicoides* or *Hoffmania*.

7. ***Culicoides pulicaris* (Linnaeus, 1758)** Syst. Nat., 1: 10.

Specimens examined. 1F, 31 July, Hunza.

Distribution. Widespread in Eurasia.

Subgenus *Oecacta* Poey, 1951

8. ***Culicoides azerbaijdzhanicus* Dzhafarov, 1962** Ent. Oboz., 41: 211.

Specimens examined. 1F, 4 August, Mingora.

Distribution. Kenya, Azerbaijan, Turkmen, and Pakistan.

9. ***Culicoides clavipalpis* Mukerji, 1931** Ind. J. Med. Res., 18: 1052.

Specimens examined. 1F, 4 August, Mingora.

Distribution. India, Indonesia, the Indo-China, Borneo, Taiwan, Japan, and Pakistan.

10. ***Culicoides comosioculatus* Tokunaga, 1956** Sci. Rep. Saikyo Univ., Agr., (8): 121.

Specimens examined. 1F, 12 August, Dir.

Distribution. Europe to Japan.

Remarks. The holotype and paratype specimens had been collected by S. Kitaoka at the top of Mt. Hijiri about 3,000 m high, where the midges fed on him.

11. ***Culicoides dzhafarovi* Remm, 1967** Trud. Zool., 4: 3.

Specimens examined. 1F, 12 August, Dir.

Distribution. Central Asia, China, and Pakistan.

12. ***Culicoides karakumensis* Gutzevich et Molotoya, 1973** Fauna USSR (Diptera), 3(5): 180.

Specimens examined. 4F, 23M, 31 July, Hunza; 1F, 5 August, Chilas; 222F, 7 August, Kalam; 28F, 4M, 12 August, Dir.

Distribution. Turkmen, and Pakistan.

13. ***Culicoides kohistanensis* sp. n.**

Female (Figs. 4, 7 and 10). Body: Medium-sized, brown.

Head: Eyes narrowly separated, bare. Antennal segments in lengths of 30-25-25-25-25-25-25-50-47-52-55-75, AR 1.09; sensilla on segments 3-10, mean number of sensilla 2.5, 2.0, 2.0, 2.0, 1.5, 1.5, 1.0, 2.0. Palpal segments (Fig. 7) in lengths of 17-45-62-17-22, PR 1.6; third segment greatly swollen with large deep pit opening by a smaller pore. Mouthparts short, P/H Ratio 0.56; mandible with 13 teeth.

Thorax: Light brown, scutellum without prominent pattern, scutellum with 1 mid-scutellar bristle and a pair of lateral bristles.

Legs: Light brown, fore and mid femora with apical pale areas fore and mid tibiae with subapical bands, hind leg totally dark, tibial comb with 4 spines the first longest.

Wing (Fig. 4): Length 0.92 mm, CR 0.54; pale brown with faint spots; anterior margin with two pale costal spots, the first on crossvein, the second distad of second radial cell; two pale spots between median fork and mediocubital fork in cell M_2 and each one in cell M_4 and anal cell. Macrotrichia distributed on distal half and anal cell. Halter pale.

Abdomen: Light brown, spermathecae (Fig. 10) two, subequal, elongate oval, pigmented with long developed necks, 67 by 35 and 62 by 35, long rudimentary spermatheca and mushroom-shaped ring present.

Holotype. 1F, 12 August 1987, Dir. S. Shinonaga.

Discussion. *Culicoides kohistanensis* sp. n. is very similar to *C. azerbaijdzhanicus* Dzhabarov, 1962 which it resembles in wing pattern, but the latter has a shallow palpal pit.

14. ***Culicoides morishitai* Tokunaga, 1940** Tnethredo, 3: 149.

Specimens examined. 1F, 4 August, Mingora; 3F, 5 August, Chilas; 1F, 9 August, Kalam; 5F, 12 August, Dir.

Distribution. Iran, China, Taiwan, Japan, and Pakistan.

15. ***Culicoides odiatus* Austen, 1921** Bull. Ent. Res., 12: 107.

Specimens examined. 1F, 31 July, Hunza; 2M, 5 August, Chilas; 2F, 2M, 12 August, Dir.

Distribution. Central Asia, and Pakistan.

16. ***Culicoides oxystoma* Kieffer, 1910** Mem. Ind. Med., 2: 193.

Specimens examined. 1F, 31 July, Hunza; 37F, 17M, 4 August, Mingora; 5F, 3M, 9 August, Kalam.

Distribution. Southern Asia from Israel, east to India, S.E. Asia, New Guinea, northern Australia, and Japan.

17. ***Culicoides pakistanensis* sp. n.**

Female (Figs. 2, 6 and 9). Body: Medium-sized, brown.

Head: Eyes separated about 1.5 facets, bare. Antennal segments in lengths of 47-25-30-32-32-32-32-55-55-56-57-80, AR 1.15 (1.12-1.18, $n=4$); sensilla on segments 3-15, mean number of sensilla 4.0, 1.0, 1.0, 1.0, 1.0, 0.7, 0.7, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0. Palpal segments (Fig. 6) in lengths of 35-85-87-27-30, PR 2.7; third segment moderately swollen, with a shallow large pit on distal portion. Mouthparts with 13 to 15 teeth.

Thorax: Brown; scutum without prominent pattern, scutellum with each a pair of mid-scutellar and lateral bristles.

Legs: Brown, apices of all femora pale, tibiae with subbasal pale rings; hind tibial comb with 4 bristles, the first longest.

Wing (Fig. 2): Length 1.14 (1.12-1.18, $n=4$), CR 0.56. Pattern as figured; pale markings extensive; pale spot over r-m crossvein large, extending broadly from costal margin to cell M_2 , broader than the dark area on either side; stigmal spot moderately prominent, tip of second radial cell included in the poststigmal pale spot; the dark area distal to it; distal pale spot broadly meeting wing margin; cell M_4 filling with a large spot, anal cell with three coalescing pale spots, vein M_1 , M_2 , and M_{3+4} each with extensive streak. Microtrichia scanty on distal half of wing and anal cell. Halter pale.

Abdomen: Brown, spermathecae (Fig. 9) two, subspherical, with short necks, unequal, 55 by 40 and 40 by 30; rudimentary spermatheca and ring present.

Male (Figs. 3 and 11). Body: Medium-sized, brown. Similar to female with usual sexual differences.

Wing (Fig. 3): Length: 1.14 and 1.21 mm, CR 0.55. Macrotrichia distributed sparsely on distal thirds of wing.

Genitalia (Fig. 11): Sternum 9 with moderately deep and broad caudomedian excavation, ventral membrane not spiculated; tergum 9 moderately broad distad, with large triangular apicolateral processes, caudal margin between them deeply notched. Basistyle with ventral root very slender, long, dorsal root stout with pointed tip. Aedeagus with basal arms, arch low and rounded, extending to a thirds of total length, basal arms slender and distal process tapering to moderately slender, simple pointed, bent ventrad and mesad.

Holotype and allotype. 1F, 12 August, 1987, Dir, Pakistan, S. Shinonaga and 1M, 9 August, 1987, Kalam, Pakistan, S. Shinonaga.

Paratypes. 1F, 5 August, 1987, Chilas; 3F, 1M, 12 August, 1987, Dir, S. Shinonaga.

Discussion. *C. pakistanensis* sp. n. is apparently belong to the *ornatus* group and the wing pattern is generally similar to that of *C. niphanae* Wirth and Hubert, 1989 from Thailand, but the later lacks prominent pale streaks on vein M_1 , M_2 and M_{3+4} .

18. ***Culicoides pallidicornis* Kieffer, 1919** Ann. Mus. Nat. Hung., 17: 46.

Specimen examined. 1F, 31 July, Hunza.

Distribution. Europe to Siberia and Pakistan.

19. ***Culicoides pamiricus* Zhogolev, 1973** Parazit., 7: 185.

Specimen examined. 1F, 31 July, Hunza.

Distribution. Pamirs and Pakistan.

20. ***Culicoides turanicus* Gutzevich et Sumatov, 1966** Trud. In-ta Zool. AN Kaz. SSR., 25: 65.

Specimens examined. 2F, 1M, 31 July, Hunza; 1F, 4 August, Mingora; 5F, 5 August, Chilas; 2F, 1M, 12 August, Dir.

Distribution. Central Asia and Pakistan.

Subgenus *Ponticulicoides* Remm, 1958

21. ***Culicoides sejfadinei* Dzhabfarov, 1958** Rep. Acad. Sci. SSR. Azerb., 14: 245.

Specimens examined. 12F, 31 August, Hunza; 1F, 1M, 3 August, Gulmit; 23F, 4 August, Mingora; 1F, 12 August, Dir.

Distribution. Morocco to Iran, Central Asia, China, and Pakistan.

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摘 要

パキスタン北部のヌカカと 3 新種の記載 (双翅目: ヌカカ科)

パキスタン北部のヌカカについては断片的な記録があるのみで、今回の調査で 3 新種を含む 21 種を記録した。大部分は中央アジアに分布するものであった。新種は, *C. papillatus*, *C. pakistanensis*, *C. kohistanensis* と命名し記載した。