

The Mosquitoes of Pakistan

I. A Checklist*

M. Aslamkhan
Pakistan Medical Research Center
Lahore, Pakistan
&
Institute of International Medicine
University of Maryland
College Park, Maryland, U. S. A.

As a result of the division of British India, Pakistan was created on August 14, 1947, consisting of two wings bordering the east and west of the peninsular landmass known as Indo-Pakistan sub-continent. Pakistan's eastern wing consists of the southern part of Assam and the northern and eastern parts of Bengal. The western wing consists of the North-West Frontier, Baluchistan, Sind and the northern and western parts of the Punjab. Both wings of Pakistan are separated from each other by about 1000 miles (1,600 km.) of land. Each wing has its characteristic climate, fauna and flora. The eastern wing, approximately between 21° and 27° N. latitude, lies in the warm Temperate Zone, except its south-eastern part, which is situated in the Torrid Zone. It is included in the Oriental region. The western wing, approximately between 24° and 37° N. latitude, lies in the warm Temperate Zone. Although bordering the Oriental region, it belongs mainly to the Mediterranean sub-region with some Ethiopian elements. The northern and western parts of the disputed State of Kashmir, now known as Azad Kashmir, is in the Palaeartic Region.

Up till now little systematic effort has been made to study the Culicidae of Pakistan. The Fauna of British India dealing with anopheline (Christophers 1933) and culicine (Barraud 1934) mosquitoes still remains the standard reference work. It describes 43 species and 9 varieties of anophelines and 252 species and 17 varieties of culicine mosquitoes, out of which 34 species and 1 variety of anophelines and 66 species, 3 sub-species and 1 variety of culicine mosquitoes have been reported from localities now constituting Pakistan. From 1934 till today, only 1 species and 1 variety of anopheline and 3 species of culicine mosquitoes have been added to the mosquito fauna of Pakistan. An excellent survey of the taxonomic work done up till 1959 on the Culicidae of Ceylon, India and Pakistan has been given by Qutubuddin (1960). Since 1960, very little work has been done on the taxonomy (Khokhar and Tariq 1966; Tariq 1967; Aslamkhan 1971). The Culicidae of Pakistan remain poorly known except for the anopheline mosquitoes, which are better known because of their involvement in the transmission of malaria. The distribution of Anopheles is given by Covel (1927, 1931), Barraud (1933) and Puri (1936, 1948). After the partition

*This work was supported by U. S. P. H. S. Grant No. A 110049-11 from the Office of International Research, N. I. H. and a PL-480 Grant from the National Communicable Disease Center, U. S. A.

of India in 1947, the anopheline mosquitoes of Pakistan have been described by Talibi and Qureshi (1956) and that of the Punjab by Ansari and Shah (1950). Supplementary information about the Anopheles comes from the work on malaria, ecology and biology (Nasiruddin 1952b; Naqvi and Qutubuddin 1954; Ansari and Nasir 1955; Talibi and Hussain 1956 and Afridi, Talibi and Hussain 1958). Information about the culicine mosquitoes of Pakistan is still very meager. However, studies on bionomics, filariasis and cytogenetics have added some information concerning the distributional record of mosquitoes (Nasiruddin 1952a; Qutubuddin 1960; Tariq 1967; Aslamkhan and Baker 1969; Aslamkhan and Salman 1969; Baker and Aslamkhan 1969; Khan and Ameen 1970 and Aslamkhan and Wolfe 1971).

The synoptic catalog of the mosquitoes of the world and its four supplements (Stone, Knight and Starcke 1959; Stone 1961, 1963, 1967 and 1970) list only 42 species of mosquitoes occurring in Pakistan. To this could be added another 26 species which are Oriental, Palaearctic, Holarctic Ethiopian or Cosmotropical in distribution. The known number of mosquito species of Pakistan is 134. The list below consists of 37 species, 2 sub-species and 1 variety of anopheline and 89 species, 4 sub-species and 1 variety of culicine mosquitoes belonging to 15 genera and 28 sub-genera in East Pakistan (E) and West Pakistan (W). It includes only those species which have definitely been recorded from a known locality of Pakistan. Species reported in the literature as occurring in the "Western Himalayas", "Punjab" or "Bengal" have been excluded although they are very likely to be present, as has been pointed out by Ansari (1958). The names and taxonomic position have been corrected according to the synoptic catalog of the mosquitoes of the world. The numbers in the last column represent some of the references concerning these particular species. A + sign denotes collection by the author.

Anopheles (Anopheles)

<u>barbirostris</u> van der Wulp, 1884.	W, E 4,8,12,21,22,33
<u>barianensis</u> James, 1911.	W, - 4,12,23,33
<u>bengalensis</u> Puri, 1930*.	-, E 8,29
<u>gigas</u> Giles, 1901.	W, E 12,33
<u>gigas</u> var <u>similensis</u> (James, 1911).	W, E 4,12,33
<u>habibi</u> Mulligan and Puri, 1936.	W, - 22,33
<u>lindesayi</u> Giles, 1900.	W, - 4,12,19,23,33
<u>nigerrimus</u> Giles, 1900.	W, E 3,6,8,12,19,21
<u>umbrosus</u> (Theobald, 1903).	-, E 12,22

Anopheles (Cellia)

<u>aconitus</u> Dönitz, 1902.	-, E 8,12,21,22,23,33
<u>annularis</u> van der Wulp, 1884.	W, E 6,12,19,21,34
<u>culicifacies</u> Giles, 1901.	W, E 3,6,8,12,19,23
<u>dthali</u> Patton, 1905.	W, - 4,12,19,22,23,33
<u>fluviatilis</u> James, 1902.	W, E 3,4,12,19,23,33
<u>jamesii</u> Theobald, 1901.	-, E 12,22,23,33
<u>jeyporiensis</u> James, 1902.	-, E 8,12,23,33
<u>karwari</u> (James, 1903).	-, E 12,22,33
<u>kochi</u> Dönitz, 1901.	-, E 12,23,33

*Anopheles aitkenii ssp bengalensis raised to specific level. 29.

<u>leucosphyrus</u> Dönitz, 1901.	-, E 8,22
<u>maculatus</u> Theobald, 1901.	W, E 12,22,23,33,34
<u>maculatus</u> ssp <u>willmori</u> (James, 1903).	W, E 4,12,19,22,33
<u>minimus</u> Theobald, 1901.	-, E 12,21,22,33
<u>moghulensis</u> Christophers, 1924.	W, - 12,22,33
<u>multicolor</u> Cambouliu, 1902.	W, - 12,22,23,33
<u>pallidus</u> Theobald, 1901.	W, E 4,12,21,22,23,33
<u>philippinensis</u> Ludlow, 1902.	-, E 12,21,22,23,33
<u>pulcherrimus</u> Theobald, 1902.	W, - 3,4,7,12,19,23
<u>ramsayi</u> Covell, 1927.	-, E 12,21,22,23,33
<u>sergenti</u> (Theobald, 1907).	W, - 12,22,23,33
<u>splendidus</u> Koizumi, 1920.	W, E 3,4,12,19,23,33
<u>stephensi</u> Liston, 1901.	W, E 4,7,12,19,23,33
<u>stephensi</u> ssp <u>mysorensis</u> Sweet & Rao, 1937.	W, - 1,32
<u>subpictus</u> Grassi, 1899.	W, E 3,12,19,21
<u>sundaicus</u> (Rodenwaldt, 1925).	-, E 12,21,22,23.
<u>superpictus</u> Grassi, 1899.	W, - 12,19,22,23,33,34
<u>tessellatus</u> Theobald, 1901.	-, E 12,22,23,33
<u>theobaldi</u> Giles, 1901.	W, E 4,12,13,33
<u>turkhudi</u> Liston, 1901.	W, - 3,4,12,19,22,23
<u>vagus</u> Dönitz, 1902.	-, E 8,12,21,22,23,33
<u>varuna</u> Iyengar, 1924.	-, E 12,21,22,23,33
<u>Toxorhynchites</u> (<u>Toxorhynchites</u>)	
<u>albipes</u> (Edwards, 1922).	W, - 11
<u>splendens</u> (Wiedemann, 1819).	-, E 11,20
<u>Tripteroides</u> (<u>Rachionotomyia</u>)	
<u>aranoides</u> (Theobald, 1901).	-, E 8

Malayagenurostris Leicester, 1908. -, E 11jacobsoni (Edwards, 1930). -, E 11Ficalbia (Ficalbia)minima (Theobald, 1901). -, E 6,11Ficalbia (Mimomyia)chamberlaini ssp, clavipalpus (Theobald, 1908). W, E 6,11,+hybrida (Leicester, 1908). -, E 6,11Coquillettidia (Coquillettidia)crassipes (van der Wulp, 1881). W, E 11,+ochracea (Theobald, 1903). -, E 11Mansonia (Mansonioides)annulifera (Theobald, 1901). -, E 11,+dives (Schiner, 1868). -, E 11indiana Edwards, 1930. W, E 8uniformis (Theobald, 1901). W, E 7,8,11Uranotaeniaunguiculata Edwards, 1913. W, - 11Orthopodomyiaanopheloides (Giles, 1903). -, E 20Aedeomyiacatasticta Knab, 1909. -, E 11,+Heizmaniacovelli Barraud, 1929. -, E 20Aedes (Mucidus)scatophagoides (Theobald, 1901). W, E 7,8,11,+Aedes (Ochlerotatus)caspius (Pallas, 1771). W, - 7,11,34

<u>pulchritarsis</u> (Rondani, 1872).	W, - 11
<u>pulchritarsis</u> var. <u>versicolor</u> (Barraud, 1924).	W, - 11
<u>pulchritarsis</u> ssp. <u>asiaticus</u> Edwards, 1926.	W, - 11
<u>pullatus</u> (Coquillett, 1904).	W, - 11

Aedes (Finlaya)

<u>albolateralis</u> (Theobald, 1908).	W, E 11
<u>assamensis</u> (Theobald, 1908).	-, E 8,11,+
<u>christophersi</u> Edwards, 1922.	W, - 11
<u>dissimilis</u> (Leicester, 1908).	-, E 11
<u>khazani</u> Edwards, 1922.	-, E 11,20
<u>lophoventralis</u> (Theobald, 1910).	-, E 11,+
<u>niveus</u> (Ludlow, 1903).	-, E 11
<u>oreophilus</u> Edwards, 1916.	W, - 11,+
<u>pseudotaeniatus</u> (Giles, 1901).	W, E 11,20,+
<u>pulchriventer</u> (Giles, 1901).	W, - 11,+
<u>shortti</u> (Barraud, 1923).	W, - 11
<u>sintoni</u> (Barraud, 1924).	W, - 11,+

Aedes (Christophersiomyia)

<u>thomsoni</u> (Theobald, 1905).	W, E 7,8,11,+
-----------------------------------	---------------

Aedes (Stegomyia)

<u>aegypti</u> (Linnaeus, 1762).	W, E 11,15,20,25,+
<u>albopictus</u> (Skuse, 1894).	W, E 7,8,11,15,20,25
<u>annandalei</u> (Theobald, 1910).	-, E 20,+
<u>patriciae</u> Mattingly, 1954.	W, - 11,17,27
<u>unilineatus</u> (Theobald, 1906).	W, - 7,11,25,+
<u>vittatus</u> (Bigot, 1861).	W, E 11,20,25,+
<u>w-albus</u> (Theobald, 1905).	W, E 7,25,+

Aedes (Aedimorphus)

<u>caecus</u> (Theobald, 1901).	W, E 8,11,34
<u>culicinus</u> Edwards, 1922.	W, - 7,11
<u>pallidostriatus</u> (Theobald, 1907).	W, E 8,25,+
<u>pipersalatus</u> (Giles, 1901).	W, E 25
<u>punctifemoris</u> (Ludlow, 1921).	-, E 5,8
<u>taeniorhynchoides</u> (Christophers, 1911).	W, - 7
<u>vexans</u> (Meigen, 1830).	W, - 11

Aedes (Indusius)

<u>pulverulentus</u> Edwards, 1922.	W, - 11,+
-------------------------------------	-----------

Aedes (Neomelaniconion)

<u>lineatopennis</u> (Ludlow, 1905).	W, E 7,8,11,+
--------------------------------------	---------------

Aedes (Diceromyia)

<u>iyengari</u> Edwards, 1923.	-, E 20
<u>micropterus</u> (Giles, 1901).	W, - 11,25,+
<u>periskelatus</u> (Giles, 1902).	W, - 16,+
<u>reginae</u> Edwards, 1922.	-, E 20

Aedes (Neomacleaya)

<u>andamanensis</u> Edwards, 1922.	-, E 11
<u>indicus</u> (Theobald, 1907).	W, - 7,11,25,+
<u>yusafi</u> Barraud, 1931.	W, - 7,+

Armigeres (Armigeres)

<u>subalbatus</u> (Coquillett, 1898).	W, E 7,8,9,15,20,25
---------------------------------------	---------------------

Armigeres (Leicesteria)

<u>magnus</u> (Theobald, 1908).	-, E 8,11,+
<u>flavus</u> (Leicester, 1908).	-, E 11,+

Culiseta (Culiseta)

<u>alaskaensis</u> ssp, <u>indica</u> (Edwards, 1920).	W, - 25,29
<u>niveitaeniata</u> (Theobald, 1907).	W, - 11

Culiseta (Allotheobaldia)

longiareolata (Macquart, 1838). W, - 7,11,+

Culex (Lutzia)

fuscus Wiedemann, 1820. W, E 7,9,11,25

halifaxii Theobald, 1903* W, E 7,9,25,30

Culex (Barraudius)

modestus Ficalbi, 1889. W, - 11

Culex (Neoculex)

brevipalpis (Giles, 1902). -, E 11,20

quettensis Mattingly, 1955. W, - 18

Culex (Mochthogenes)

malayi (Leicester, 1908). W, - 11

Culex (Lophoceraomyia)

minutissimus (Theobald, 1907). W, - 11,25

Culex (Culiciomyia)

nigropunctatus Edwards, 1926. -, E 11

pallidothorax Theobald, 1905. W, E 11,20

viridiventer Giles, 1901. W, - 11,+

Culex (Culex)

afridii Qutubuddin, 1956. -, E 24

barraudi Edwards, 1922. W, - 11,25

bitaeniorhynchus Giles, 1901. W, E 7,8,9,11,25,+

epidesmus (Theobald, 1910). W, E 7,8,+

fuscocephalus Theobald, 1907. W, E 8,11,20,+

gelidus Theobald, 1901. W, E 8,11,15,+

mimeticus Noe, 1899. W, - 11,25,34,+

*Culex raptor synonymized with C. halifaxii. 30.

<u>mimulus</u> Edwards, 1915.	W, E 7,11
<u>pipiens fatigans</u> Wiedemann, 1828.	W, E 7,8,11,15,20,25,34
<u>pseudovishnui</u> Colless, 1957.	W, E 8,9,+
<u>sinensis</u> Theobald, 1903.	-, E 8
<u>sitiens</u> Wiedemann, 1828	W, E +
<u>theileri</u> Theobald, 1903.	W, - 6,7,8,11,25,+
<u>tritaeniorhynchus</u> Giles, 1901.	W, E 7,8,9,11,15,25,34
<u>univittatus</u> Theobald, 1901.	W, - 7,11,25,34,+
<u>vagans</u> Wiedemann, 1828.	W, E 8,11,34,+
<u>vishnui</u> Theobald, 1901.*	W, E 11,20,25,30,31,+
<u>whitmorei</u> (Giles, 1904).	W, E 8,+

*Culex annulus, synonymized with C. vishnui. 30.

REFERENCES

1. Afridi, M.K., Talibi, S.A., & Hussain, M.Z.Y., 1958. Identification of races of A. stephensi prevalent in the federal Karachi area by measurement of their ova. Pakistan J. Hlth., 8:71-76.
2. Ansari, M.A.R., 1958. A report on the culicine mosquitoes in the collection of the Department of Entomology and Parasitology (I.H.P.M.) Lahore. Pakistan J. Hlth., 8:25-36.
3. Ansari, M.A.R., & Nasir, A.S., 1955. A preliminary note on anophelism of Lahore suburbs. Pakistan J. Hlth. 4:212-223.
4. Ansari, M.A.R. & Shah, K.S., 1950. A guide to the mosquitoes of the Punjab. Supdt. Govt. Print. Lahore, 45pp.
5. Aslamkhan, M., 1971. A redescription of Aedes (Aedimorphus) punctifemoris (Ludlow) from Pakistan. Biologia, 17:61-65.
6. Aslamkhan, M., & Baker, R.H., 1969. Karyotypes of some Anopheles, Ficalbia and Culex mosquitoes of Asia. Pakistan J. Zool., 1:1-7.
7. Aslamkhan, M., & Salman, C., 1969. The bionomics of the mosquitoes of the Changa Manga National Forest, West Pakistan. Pakistan J. Zool., 1:183-205.
8. Aslamkhan, M., & Wolfe, M.S., 1971. Rural bancroftian filariasis in two villages in Dinajpur District, East Pakistan. II. Entomological investigations. Am. J. Trop. Med. Hyg., 20:(in press).
9. Baker, R.H., & Aslamkhan, M., 1969. Karyotypes of some Asian mosquitoes of the subfamily Culicinae (Diptera; Culicidae). J. Med. Ent., 6:44-52.
10. Barraud, P.J., 1933. Additional records of the distribution of anopheline mosquitoes in India (From January 1, 1931 to April 13, 1933). Rec. Mal. Surv. Ind., 3:507-525.

11. Barraud, P.J., 1934. The fauna of British India, including Ceylon and Burma. Diptera Vol. 5, Family Culicidae. Tribes Megarhinini and Culicini. London, XXXVIII + 463pp. London.
12. Christophers, S.R., 1933. The fauna of British India, including Ceylon and Burma. Diptera Vol. 4, Family Culicidae. Tribe Anophelini. London, XII + 371pp. London.
13. Covell, G., 1927. The distribution of anopheline mosquitoes in India and Ceylon. Ind. Med. Res. Mem., No. 5:1-85.
14. Covell, G., 1931. The distribution of anopheline mosquitoes in India and Ceylon. Additional records, 1926-1930. Rec. Mal. Surv. Ind. 2: 225-268.
15. Khan, N.I., & Ameen, M., 1970. A note on the seasonal variation of the adult culicine mosquitoes of Dacca City. Proc. 21st-22nd Pakistan Sci. Conf. Rajshahi, 3:D-34.
16. Khokhar, R.R., & Tariq, Z.K., 1966. A redescription of Aedes (Diceromyia) periskeletus (Giles, 1902) (Diptera: Culicidae). Pakistan J. Sci. 18:117-123.
17. Mattingly, P.F., 1954. Notes on the subgenus Stegomyia (Diptera: Culicidae) with a description of a new species. Ann. Trop. Med. Parasit. 48: 259-270.
18. Mattingly, P.F., 1955. Le Sousgenre Neoculex (Diptera: Culicidae) dans la sousespec et synonymie nouvelles. Ann. Parasit. Hum. Comp. 30:374-388.
19. Naqvi, S.H., & Qutubuddin, M., 1954. Report on the malaria survey of Kohat-Hangu Valley. Pakistan J. Hlth. 3:241-253.

20. Nasiruddin, M., 1952a. Mosquitoes breeding in tree-holes and bamboo stumps in Dacca (East Pakistan). Pakistan J. Hlth. 2:110-112.
21. Nasiruddin, M., 1952b. A note on the natural infectivity of mosquitoes in East Pakistan. Pakistan J. Hlth. 2:113-115.
22. Puri, I.M., 1936. The distribution of anopheline mosquitoes in India: Additional records, 1931-1935. Rec. Mal. Surv. Ind. 6:177-211.
23. Puri, I.M., 1948. The distribution of anopheline mosquitoes in India, Pakistan, Ceylon and Burma: Part V: Additional records, 1936-47. Indian J. Mal. 2:67-107.
24. Qutubuddin, M., 1956. Culex (Culex) afridii sp. n. a new species of mosquitoes (Diptera: Culicidae) from Dacca, East Pakistan. Mosquito News, 16: 140-142.
25. Qutubuddin, M., 1960. The mosquito fauna of Kohat-Hangu Valley, West Pakistan. Mosquito News, 20:355-361.
26. Qutubuddin, M., 1960. Mosquito studies in the Indian subregion. Part I. Taxonomy - A brief review. Pacific Insec. 2:133-147.
27. Stone, A., 1961. A synoptic catalog of the mosquitoes of the world, Supplement I. (Diptera: Culicidae). Proc. Ent. Soc. Wash. 63:29-52.
28. Stone, A., 1963. A synoptic catalog of the mosquitoes of the world, Supplement II. (Diptera: Culicidae). Proc. Ent. Soc. Wash. 65:117-140.
29. Stone, A., 1967. A synoptic catalog of the mosquitoes of the world, Supplement III. (Diptera: Culicidae). Proc. Ent. Soc. Wash. 69:197-224.
30. Stone, A., 1970. A synoptic catalog of the mosquitoes of the world, Supplement IV. (Diptera: Culicidae). Proc. Ent. Soc. Wash. 72:137-171.
31. Stone, A., Knight, K.L. and Starcke, H., 1959. A synoptic catalog of the mosquitoes of the world (Diptera: Culicidae). The Thomas Say Foundation Vol. 6:1-358.

32. Talibi, S.A., and Hussain, M.Z.Y., 1956. Incrimination of the vector of malaria in federal Karachi area (Pakistan). Pakistan J. Hlth. 6: 65-72.
33. Talibi, S.A. and Qureshi, M.S., 1956. Anopheline mosquitoes of Pakistan, their distribution, ecology and relation to malaria. Hlth. Bull. No. 4., Govt. of Pakistan Press, Karachi.
34. Tariq, Z.K., 1967. A preliminary report of the mosquitoes in the Gilgit Agency Area. Pakistan J. Sci., 19:47-56.