



Inventory of Culicinae fauna of Punjab (Culicidae: Diptera)

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Abstract

An inventory of Culicinae fauna of Punjab has been given in the present communication. A total number of 26 species have been enlisted along with their first references of species, material examined from different localities of state and remarks.

Keywords: mosquito, *Culex* and Punjab state

Introduction

Intensive and extensive surveys have been conducted during the past four years from 2013-2016 to study Culicinae fauna of Punjab state. As many as, 26 species have been procured and authentically identified with the help of relevant literature and by comparison with reference collection lying in Department of Zoology, Punjabi University, Patiala and NCDC, Delhi. Three species i.e. *Armigeres (Armigeres) kesseli* Ramalingam, *Armigeres (Armigeres) theobaldi* Barraud and *Hulecoeteomyia japonica* (Theobald) have been reported for the first from the Punjab state.

Materials and Methods

Immature and adult stages of Culicine mosquitoes were collected from the three major regions of Punjab i.e. Majha, Malwa and Doaba during Pre-monsoon, monsoon and post-monsoon seasons. The adult mosquitoes have been procured from cattle sheds, nurseries, forests, human dwellings etc. with test tubes and torch during dusk and dawn time. Keys given by Sirivanakarn (1976), Huang (1979), Darsie and Pradhan (1990), Reuda (2004) and Reinert *et al.* (2004) were followed for identification purposes.

Observations

In the present manuscript an updated list of species along with the material examined is given below:

1. *Armigeres (Armigeres) subalbus* (Coquillett, 1898)

Coquillett, 1898, *Proc. U. S. Nat. Mus.*, 21: 302.

Anandpur Sahib: (Jhinjhari) 20.IV.2012, 2♀♀, 25♂♂; (Nikuwal) 20.IV.2012, 35♀♀♀, 7♂♂♂; (Matour) 20.IV.2012, 10♀♀♀; (Sangatpura) 17.V.2012, 10♀♀♀; (Pachranda) 17.V.2012, 2♀♀♀; (Mankoo Majra) 17.V.2012, 2♀♀♀; **Nangal:** (Jandala) 17.V.2013, 17♀♀♀; (Daroli) 11.IX.2012, 1♀; **Mansa:** (Bhikhi) 19.VIII.2013, 1♀, 1♂; **Goindwal:** (Dhunda) 4.X.2012, 1♂, (Jhandhar) 4.X.2013, 1♀, 1♂; **Tarntaran:** (Adanawali) 5.X.2014, 1♀, 1♂.

Remarks: This is the very common species of genus *Armigeres* Theobald. Majority of the specimens of this species were collected during the April month of the year.

2. *Armigeres (Armigeres) kuchingensis* Edwards, 1915

Edwards, 1915, *Bull. Ent. Res.*, 12: 283.

Samana: (Shatrana) 25.III.2012, 6♀♀♀; **Patraan:** (Ghaga) 26.III.2012, 4♀♀♀, **Mansa:** (Rakhra) 26.III.2013, 1♀; **Anandpur Sahib:** (Brahampur) 16.V.2013, 35♀♀♀; **Nangal:** (Jandala) 17.V.2014, 23♂♂♂.

Remarks: The adult representatives of this species mostly collected from Anandpur Sahib area of Rupnagar district.

3. *Armigeres (Armigeres) kesseli* Ramalingam, 1987

Ramalingam, 1987, *Trop. Biomed.*, 4: 55-65.

Nangal: (Jandala) 17.V.2013, 9♂♂♂, 20♀♀♀; **Anandpur Sahib:** (Baddal) 16.V.2013, 48♀♀♀; Pathankot: (Lamini) 25.III.2014, 15♀♀♀.

Remarks: This species has been reported from Punjab state for the first time. The adult specimens of this species have been procured in the month of April-May from Nangal and Anandpur Sahib from Rupnagar district.

4. *Armigeres (Armigeres) theobaldi* Barraud, 1934

Barraud, 1910, *Rec. Ind. Mus.*, 5.

Mansa: 21.VIII.2014, 1♀.

Remarks: This species has been reported from Mansa District of Punjab state for the first time.

5. *Mansonia (Mansonioides) indiana* Edwards, 1930

Edwards, 1930, *Bull. Ent. Res.*, 21: 541.

Harike: (Nanaksar Ishardham) 3.VII.2012, 26♀♀♀, 2♂♂♂, 13.VIII.2013, 19♀♀♀; 20.X.2014, 30♀♀♀, 3♂♂♂; **Tarntaran:** 5.VII.2015, 1♀.

Remarks: Most of the specimens of this species have been procured from Harike wetland during dawn time and single specimen has been collected during dusk time from Tarntaran

District of Punjab.

6. *Mansonia (Mansonioides) uniformis* (Theobald, 1901)

Theobald, 1901, *Mongo. Culic.*, 2: 180.

Harike: (Nanaksar Ishardham) 3.VII.2012, 39♀♀, 4♂♂; 13.VIII.2013, 13♀♀; 20.X.2014, 18♀♀.

Remarks: The adult representatives of this species have been collected only from Harike wetland during the dawn time from Punjab in the present study. However, it could not be collected from any other area of Punjab.

7. *Culex (Culex) quinquefasciatus* Say, 1823

Say, 1823, *Nat. Hist.*, 10: 268-368.

Patiala: (Devigarh) 18. IV.2012, 57♀♀, 21♂♂; (Aukout) 18.IV.2012, 11♀♀, 1♂; (Bahadurgarh) 21.VIII.2012, 3♀♀, 1♂; (Kauli) 21.VIII.2012, 2♂♂; 21.IX.2012, 1♂; (Sealowal) 15.IX.2012, 4♀♀, 1♂; (Rasolpur) 15.IX.2012, 2♀♀; (Muradpur), 21.IX.2012, 3♀♀, 4♂♂; (Sanaur) 19.X.2012, 7♀♀, 13♂♂; **Ludhiana:** (Katani Kalan) 21.IV.2013, 17♀♀, 24♂♂; (Khanpur) 21.IV.2012, 8♀♀, 16♂♂; (Daba) 21.IV.2012, 3♀♀, 4♂♂; (Sangowal) 7.VIII.2013, 1♂; (Gill) 7.VIII.2013, 1♀, 1♂; (Meradoo Colony) 26.IX.2013, 1♀, 3♂♂; (Kalsan Kalan) 27.X.2013, 2♀♀; (Raikot) 27.X.2014, 3♀♀; (Hambran) 28.10.2014, 2♀♀, 1♂; **Kapurthala:** (Lakhan Kalan) 21.VII.2012, 2♀♀; (Hamira) 7.X.2012, 29♀♀, 16♂♂; **Mukeria:** 3.VIII.2013, 24♀♀; Tanda: 4.VIII.2013, 8♀♀; Dassuha: 4.VIII.2012, 8♀♀; **Pathankot:** (Bharyllahri) 5.VIII.2012, 2♀♀, 4♂♂; (Kanwah) 5.VIII.2012, 1♂; (Sujanpur) 6.VIII.2012, 5♀♀, 5♂♂; (Daultpur) 6.VIII.2013, 33♀♀, 1♂; (Lamini) 6.VIII.2013, 18♀♀; **Talwara:** (Hajipur) 4.VIII.2013, 24♀, 7♂♂; **Barnala:** (Harigarh) 12.VIII.2012, 17♀♀, 1♂; (Badbar) 24.X.2012, 22♀♀, 1♂; **Sunam:** (Sheron) 11.VIII.2013, 12♀♀, 2♂♂; **Mansa:** 21.VIII.2014, 4♀♀, 7♂♂; (Bhikhi) 19.IX.2014, 8♀♀, 7♂♂; **Patraan:** (Moonak) 25.VIII.2014, 5♀♀, 3♂♂; **Muktsar:** 12.X.2014, 1♀; (Thandaywal) 2.X.2014, 8♀♀, 2♂♂; **Faridkot:** (Narayangarh) 1.X.2015, 3♀♀; (Tibiyaan) 1.X.2015, 1♀; (Sher Singh Wala) 2.X.2015, 3♀♀; **Harike:** (Nanaksar Ishardham) 3.X.2014, 4♀♀, 1♂; **Tarntaran:** 4.X.2014, 5♀♀, 6♂♂; (Daburgi) 4.X.2014, 14♀♀, 12♂♂; **Goindwal:** (Dhunda) 4.X.2014, 6♀♀, 7♂♂; (Jhandhar) 4.X.14, 9♀♀, 3♂♂; **Amritsar:** (Balla) 5.X.2015, 3♀♀, 2♂♂.

Remarks: A good number of specimens were also collected during the study period from almost all the Districts of Punjab. This species occurs throughout the year even in the months of December and January.

8. *Culex (Culex) univittatus* Theobald, 1901

Theobald, 1901, *Mongo. Culic.*, 2: 29.

Patiala: (Devigarh) 18.V.2012, 25♀♀; (Aukout) 18.V.2013, 1♀; **Anandpur Sahib:** (Baddal) 19.IV.2013, 2♀♀; (Nikuwal) 20.IV.2013, 2♀♀; **Ludhiana:** (Lohara) 21.IV.2013, 1♀; (Katani Kalan) 21.IV.2014, 2♀♀; **Mukeria:** 3.VIII.2014, 2♀♀, 2♂♂; **Dassuha:** 4.VIII.2014, 2♀♀, 1♂; **Pathankot:** (Daultpur) 6.VIII.2014, 1♀; (Lamini) 6.VIII.2014, 1♀; **Mansa:** (Bhikhi) 19.VIII.2014, 2♀♀, 2♂♂; **Tarntaran:**

4.X.2014, 1♀, 2♂♂; (Daburgi) 4.X.2015, 1♀, 4♂♂.

Remarks: During the present tenure of research work, this species was prevalent in the months of April-May and most of the specimens have been procured from Patiala.

9. *Culex (Culex) vishnui* Theobald, 1901

Theobald, 1901, *Mongo. Culic.*, 1: 355.

Jalandhar: (D.A.V. College) 21.VII.2012, 41♀♀, 22♂♂; **Kapurthala:** (Hamira) 7.X.2013, 4♀♀; (Lakhan Kalan) 21.VII.2013, 59♀♀, 16♂♂; **Mukeria:** 3.VIII.2013, 15♀♀, 1♂; Tanda: 4.VIII.2013, 1♀, 1♂; **Dassuha:** 4.VIII.2013, 3♀♀; **Talwara:** (Hajipur) 4.VIII.2013, 13♀♀; **Pathankot:** (Bharyllahri) 5.VIII.2012, 5♀♀; (Kanwah) 5.VIII.2012, 6♀♀, 3♂♂; (Sujanpur): 6.VIII.2012, 6♀♀; (Daultpur) 6.VIII.2012, 1♀; **Ludhiana:** (Sangowal): 7.VIII.2012, 15♀♀, 5♂♂; (Gill) 7.VIII.2012, 6♀♀, 5♂♂; **Sunam:** (Sheron): 11.VIII.2013, 27♀♀; **Barnala:** (Harigarh) 12.VIII.2014, 14♀♀, 1♂; **Mansa:** 21.VIII.2012, 4♀♀; (Bhikhi) 18.VIII.2012, 3♀♀, 6♂♂; (Cheema) 20.VIII.2012, 4♂♂; **Patraan:** (Moonak) 21.VIII.2013, 2♀♀, 2♂♂; **Patiala:** (Silver Jubilee Hostel, P.U.P) 18.VIII.2013, 7♀♀, 8♂♂; 31.VIII.2013, 8♀♀, 11♂♂; 25.IX.2013, 2♀♀, 4♂♂; (Bahadurgarh) 21.VIII.2012, 23♀♀, 9♂♂; (Kauli) 21.VIII.2012, 7♀♀, 14♂♂; (Harinder Nagar) 10.IX.2013, 1♀; (Sealowal) 15.IX.2013, 3♀♀; (Rasolpur) 15.IX.2014, 8♀♀; (Almadipur) 15.IX.2014, 6♀♀; (Muradpur) 21.IX.2012, 1♀; (Sanaur) 19.X.2012, 1♀; **Muktsar:** 1.X.2012, 3♀♀; (Thandaywal) 2.X.2012, 18♀♀; **Faridkot:** (Sher Singh Wala) 2.X.2012, 1♀; **Harike:** (Nanaksar, Ishardham) 3.X.2013, 2♀♀; **Tarntaran:** (Daburgi) 4.X.2014, 3♀♀; (Adnawali) 5.X.2014, 3♀♀; **Goindwal:** (Dhunda) 4.X.2012, 2♀♀; (Jhandher) 4.X.2012, 1♀; **Amritsar:** (Balla) 5.X.2012, 5♀♀.

Remarks: The present species is the most common in all the districts of Punjab and majority of the specimens were collected in the months of July-August.

10. *Culex (Culex) tritaeniorhynchus* Giles, 1901

Giles, 1901, *J. Bomb. Nat. Hist. Soc.*, 13: 606.

Jalandhar: (D.A.V. College) 21.VII.2012, 16♀♀; (Lakhankalan) 21.VII.2012, 26♀♀; **Pathankot:** (Bharyllahri) 5.VIII.2013, 9♀♀; (Kanwah) 5.VIII.2013, 9♀♀; (Sujanpur) 6.VIII.2013, 8♀♀; (Daultpur) 6.VIII.2013, 1♀; (Lamini) 6.VIII.2013, 4♀♀; **Mukeria:** 3.VIII.2012, 12♀♀; **Tanda:** 4.VIII.2012, 4♀♀; **Dassuha:** 4.VIII.2012, 3♀♀; **Talwara:** (Hajipur) 4.8.2012, 1♀; **Ludhiana:** (Sangowal) 7.VIII.2012, 28♀♀; (Gilla) 7.VIII.2012, 12♀♀; (Kalsan Kalan) 27.X.2012, 5♀♀; (Raikot) 27.X.2013, 2♀♀; **Sunam:** (Sheron) 11.VIII.2012, 6♀♀; **Barnala:** (Harigarh) 12.VIII.2013, 18♀♀; **Patiala:** (Silver Jubilee Hostel, P.U.P) 11.VIII.2012, 7♀♀; 18.VIII.2012, 8♀♀; 31.VIII.2013, 16♀♀; 25.IX.2014, 2♀♀; (Bahadurgarh) 21.VIII.2012, 41♀♀; (Kauli) 21.VIII.2012, 22♀♀; 21.IX.2012, 2♀♀; (Sealowaal) 15.IX.2012, 7♀♀; (Rasolpur) 15.IX.2012, 16♀♀; (Almadipur) 15.IX.2012, 21♀♀; (Muradpur) 21.IX.2012, 6♀♀; (Sanaur) 19.IX.2012, 1♀; Mansa: 21.VIII.2012, 4 ♀♀; (Bhikhi) 19.VIII.2012, 9♀♀; **Patran :** (Moonak) 21.VIII.2013, 1♀;

Muktsar: 1.X.2014, 1♀♀; (Thandaywal) 2.X.2014, 25♀♀;
Faridkot: (Sher Singh Wala) 2.X.2013, 6♀♀; **Tarntaran:**
(Daburgi) 4.X.2012, 7♀♀; (Adanawali) 5.X.2012, 5♀♀;
Goinwal: (Dhunda) 4.X.2012, 10♀♀; **Amritsar:** (Ballā)
5.X.2012, 15♀♀; **Kapurthala:** (Sultanpur Lodhi) 6.X.2015,
1♀; (Hamira) 7.X.2015, 3♀♀.

Remarks: The present species were procured from all the Districts of Punjab during the months of July and August. No male specimen of this species could be collected during many surveys.

11. *Culex (Culex) pseudovishnui* Colless, 1957

Colless, 1957, *Am. Trop. Med. Para.*, 51: 88-93.

Jalandhar: (D.A.V. College) 21.VII.2012, 1♀; **Mukeria:**
3.VIII.2012, 1♀; **Pathankot:** (Kanwah) 5.VIII.2012, 1♀;
(Sujanpur) 6.VIII.2012, 3♀♀, 2♂♂; (Daultpur) 6.VIII.2012,
1♀; **Ludhiana:** (Sangowal) 7.VIII.2012, 3♀♀, 3♂♂;
Barnala: (Harigarh) 12.VIII.12, 1♀; **Patiala:**
(Bahadurgarh) 21.VIII.2015, 1♀; (Sealowal) 15.IX.2015, 1♀;
(Harinder Nagar): 23.IX.2015, 1♀; (P.U.P) 25.IX.2015, 1♂;
(Sanaur) 19.X.2015, 3♂♂; **Patraan:** (Moonak) 25.VIII.2012,
1♀, 1♂; **Nangal:** (Daroli) 11.IX.2013, 1♀.

Remarks: A few specimens of this species could be collected from some Districts of Punjab during the present surveys.

12. *Culex (Culex) mimeticus* Noè, 1899

Noè, 1899, *Bull. Soc. Ent. Ital.*, 31: 240.

Nangal: (Daroli) 11.IX.2013, 3♀♀.

Remarks: Only a few specimens were collected from Rupnagar district of Punjab.

13. *Culex (Oculeomyia) bitaeniorhynchus* Giles, 1901

Giles, 1901, *J. Bomb. Nat. Hist. Soc.*, 13: 607.

Talwara: (Hajipur) 4.VIII.2012, 2♀♀, 1♂; **Mansa:**
21.VIII.2012, 1♂; (Bhikhi) 19.8.12, 1♂; **Faridkot:** (Tibiyaan)
1.X.2013, 1♀, 1♂; (Narayangarh) 1.X.2013, 3♀♀, 2♂♂.

Remarks: The prevalence of this species is very low in Punjab.

14. *Culex (Eumelanomyia) brevipalpis* (Giles, 1902)

Giles, 1902, *Handbook* 2nd ed. p 384.

Patiala: (P.U.P) 25.IX.2016, 4♀♀.

Remarks: This species was collected during dusk and dawn hours period from cattle sheds and mixed dwellings

15. *Lutzia (Metalutzia) fuscana* (Wiedemann, 1820)

Wiedemann, 1821, *Dipt. Exot.*, 1: 9.

Patiala: (Silver Jubilee Hostel, P.U.P) 23.XI.2012, 1♀.

Remarks: This species was collected during dusk and dawn

period from cattle sheds and mixed dwellings.

16. *Lutzia (Metalutzia) vorax* Edwards, 1921

Edwards, 1921, *Bull. Ent. Res.*, 12: 327.

Patiala: (Silver Jubilee Hostel, P.U.P) 23.XI.2014, 4♀♀.

Remarks: Few specimens of this species could be procured from Patiala District of Punjab state from outdoor resting sites.

17. *Aedes aegypti* (Linnaeus, 1762)

Patiala: (Harinder Nagar) 10.IX.2012, 6♀♀, 2♂♂;
23.IX.2012, 3♀♀, (Botanical Garden, P.U.P) 25.IX.2012,
2♀♀; **Ludhiana:** (Shimla Puri) 23.IX.2013, 46♀♀, 3♂♂;
(Preet Nagar) 8.X.2013, 28♀♀, 5♂♂; (Kalsan Kalan)
27.VIII.2014, 1♀; (Raikot) 27.X.2014, 17♀♀, 5♂♂;
(Meradoo Colony) 26.X.2012, 13♀♀, 15♂♂; (Hambran)
28.X.2012, 21♀♀, 5♂♂; **Barnala:** 24.X.2016, 2♂♂.

Remarks: The adult representatives of this species have been prevalent in Muktsar, Bathinda, Pathankot, Patiala and Ludhiana Districts of Punjab.

18. *Aedes albopictus* (Skuse, 1895)

Skuse, 1894, *Indian Mus. Notes*, 3(5): 20.

Pathankot: (Daultpur) 6.VIII.2012, 1♀; **Mansa:**
21.VIII.2013, 5♀♀, 2♂♂; (Bhikhi) 19.VIII.2013, 2♀♀, 1♂;
Muktsar: (Thandaywal) 2.X.2014, 1♀; **Patiala:** (Sealowal)
15.VI.2014, 45♀♀; (Harinder Nagar) 23.IX.2014, 1♀;
(Botanical Garden, P.U.P) 19.IX.2012, 50♀♀, 2♂♂;
25.IX.2013, 3♀♀.

Remarks: The adult representatives of this species were prevalent during June.

19. *Fredwardsius vittatus* (Bigot, 1861)

Bigot, 1861, *Ann. Soc. Ent. France*, 1: 227.

Rupnagar: (Nangal) 27.VI.2015, 7♂♂, 10♀♀.

Remarks: During present surveys, a good number of adult specimens and larvae were procured from Nangal area of Rupnagar District of Punjab.

20. *Hulecoeteomyia japonica* (Theobald, 1901)

Theobald, 1901d, *J. trop. Med.*, 385pp.

Rupnagar: (Nangal) 28.VI.2015, 2♂♂, 6♀♀.

Remarks: Presently, this species has been reported from Rupnagar district of Punjab state for the first time.

21. *Neomelaniconion lineatopenne* (Ludlow, 1905)

Ludlow, 1905, *Can. Entomol.*, 37: 133.

Amritsar: (Majitha) 23.VIII.2016, 5♀♀.

Remarks: The prevalence of this species is low in the state.

22. *Stegomyia unilineata* (Theobald, 1906)

Theobald, 1906, *2nd Rept. Wellc. Res. Lab.*, 70.

Rupnagar: (Nangal) 2.VII.2014, 5♀♀.

Remarks: Only some female specimens could be collected in the month of July.

23. *Stegomyia gardnerii gardnerii* (Ludlow, 1905)

Ludlow, 1905, *Can. Entomol.*, 37: 99.

Fatehgarh Sahib: (Alampur) 5.V.2014, 3♀♀.

Remarks: In the present study, only a few female specimens have been procured from Fatehgarh Sahib District of Punjab.

24. *Stegomyia w-albus* Theobald, 1905

Theobald, 1905, *Ann. Mus. Nat. Hung.*, 3: 74.

Rupnagar: (Ropar) 27.VI.2015, 2♀♀.

Remarks: Some female specimens could be procured from Rupnagar District of Punjab during recent surveys.

25. *Christophersomyia thomsoni* (Theobald, 1905)

Theobald, 1905, *J. Eco. Bio.*, 1:18.

Fatehgarh Sahib: 12.IX.2014, 3♀♀.

Remarks: Only two female specimens of this species could be collected from the Fatehgarh Sahib District of Punjab.

26. *Verrallina (Neomacleaya) indica* (Theobald, 1907)

Theobald, 1907, *Mongo. Culic.*, 4: 238.

Amritsar: (Chherata) 7.IV.2013, 3 ♀♀; (Himmatpura) 13.X.2014, 5♀♀.

Remarks: A few adult representatives of this species were collected from Amritsar District of Punjab during the present study.

Discussions

During present study, an effort has been made to study the Culicinae fauna of Punjab state. As many as, 11,273 adult representatives of mosquitoes referable to 11 genera and 26 species have been examined and studied in detail. Three new records i.e. *Armigeres (Armigeres) kesseli* Ramalingam, *Armigeres (Armigeres) theobaldi* Barraud and *Hulecoeteomyia japonica* (Theobald) have been reported. Sagandeep *et al.* (1994) gave an account of 16 mosquito species belonging to family Culicidae from Punjab and Himachal Pradesh. Kaur and Kirti (2003) published an inventory from Haryana. Such studies are warranted from different states of the country because a lot of deforestation has taken place during 2-3 decades. The vector fauna of various regions is facing tremendous changes due to climate change and global warming also. In light of this inventory will prove useful for the vector biologists of the state and country.

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