

## ACKNOWLEDGEMENTS

The first author (PMS) is grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Kolkata and the Officer-in-charge, Zoological Survey of India, Western Regional Station, Pune and Western Ghats Regional Station, Calicut, for providing facilities and encouragement. He is also grateful to Dr. Steven L. Heydon, Bohart Museum of Entomology, University of California, USA for providing the relevant literature on *Theocolax*.

## REFERENCES

- Boucek, Z. 1988. Australasian Chalcidoidea (Hymenoptera). CAB International. Wallingford, U.K., pp. 832.
- Boucek, Z., Subba Rao, B. R. and Farooqi, S. I. 1979. A preliminary review of Pteromalidae (Hymenoptera) of India and adjacent countries. *Oriental Insects*. **12** : 433-467.
- Gahan, A. B. 1946. Review of some chalcidoid genera related to *Cerocephala* Westwood. *Proc. United States National Museum*. **96** : 349-375.
- Noyes, J. S. 2001. Interactive catalogue of the world Chalcidoidea. (CD). Dickys. s Yu. Bentall centre. Canada.
- Sureshan, P. M. and Narendran, T. C. 2003. A checklist of the Pteromalidae (Hymenoptera : Chalcidoidea) from the Indian subcontinent. *Zoos print Journal*. **18**(5) : 1091-1095.



*Rec. zool. Surv. India* : **104** (Part 1-2) : 147-155, 2005

## INVENTORY OF THE TRUE FLIES (DIPTERA) OF THE THAR DESERT

BULGANIN MITRA, R. M. SHARMA\* AND P. PARUI

*Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India*

### INTRODUCTION

Great Indian Desert or the Thar Desert with its xeric environment is known to harbour an improvised fauna. The members of the order Diptera are commonly known as flies, gnats, midges, mosquitoes, keds, bots, etc. This diversity of names documents the importance of the group to man and reflects the range of organisms in the order. However, it is admittedly true that there is a paucity of knowledge on the account that does not show the Diptera of distinction that are absolutely prone to the arid and semi-arid situations in the desert.

A perusal of literature revealed that Kumar and Kumar (1996) have provided first exhaustive list of dipterans of the Thar Desert enumerating 84 species belonging to 45 genera spread over 22 families. However, recent studies on this group from Thar Desert by Parui and Mitra (2000), Banerjee and Mitra (2002) and Mitra *et al.*, (2002) have further substantially increased our knowledge bringing the tally of the species to 155 belonging to 77 genera spread over 27 families. The systematic list is as follows :

Suborder NEMATOCERA

Family 1. PHLEBOTOMIDAE

1. *Phlebotomus* (*Anaphlebotomus*) *colabaensis* Young & Chalam
2. *Phlebotomus* (*Euphlebotomus*) *argentipes* Annandale & Brunetti
3. *Phlebotomus* (*Paraphlebotomus*) *sergenti* Parrot
4. *Phlebotomus* (*Phlebotomus*) *papatasi* Scopoli
5. *Phlebotomus* (*Phlebotomus*) *salehi* Mesghali

\*High Altitude Zoology Field Station, Zoological Survey of India, Solan-173 211, (H.P.).

Mitra, Sharma & Parui, 2005

6. *Sergentomyia (Parrotomyia) babu* (Annandale)
7. *Sergentomyia (Parrotomyia) baghadadis* (Adler & Theodor)
8. *Sergentomyia (Sergentomyia) punjabensis* (Sinton)
9. *Sergentomyia (Sintonius) christophersi* (Sinton)
10. *Sergentomyia (Sintonius) clydei* (Sinton)
11. *Phlebotomus bailyi* (Sinton)

## Family 2. CULICIDAE

## Subfamily ANOPHELINAE

12. *Anopheles (Anopheles) barbirostris* van der Wulp
13. *Anopheles (Anopheles) nigerrimus* Giles
14. *Anopheles (Cellia) annularis* van der Wulp
15. *Anopheles (Cellia) culicifacies* Giles
16. *Anopheles (Cellia) dthali* Patton
17. *Anopheles (Cellia) fluviatilis* James
18. *Anopheles (Cellia) pallidus* Theobald
19. *Anopheles (Cellia) pulcherrimus* Theobald
20. *Anopheles (Cellia) splendidus* Koidzumi
21. *Anopheles (Cellia) stephensi* Liston
22. *Anopheles (Cellia) subpictus* Grassi
23. *Anopheles (Cellia) tessellatus* Theobald
24. *Anopheles (Cellia) turkhudi* Liston
25. *Anopheles (Cellia) vagus* Donitz

## Subfamily CULICINAE

26. *Aedes (Aedimorphus) culicinus* Edwards
27. *Aedes (Aedimorphus) taeniorhynchoides* (Christophers)
28. *Aedes (Finlaya) sintoni* (Barraud)
29. *Aedes (Neomacleya) yusafi* Barraud
30. *Aedes (Stegomyia) aegypti* Linnaeus
31. *Aedes (Stegomyia) vittatus* Bigot
32. *Aedes (Stegomyia) w-albus* Theobald
33. *Coquillettidia (Coquillettidia) crassipes* (van der Wulp)
34. *Culex (Culex) barraudi* Edwards

35. *Culex (Culex) perplexus quinquefasciatus* Say
36. *Culex (Culex) pseudovishnui* Colless
37. *Culex (Culex) bitaeniorhynchus* Giles
38. *Culex (Culex) sitiens* Wiedemann
39. *Culex (Culex) tritaeniorhynchus* Giles
40. *Culex (Culex) univittatus* Theobald
41. *Culex (Lutzia) halifaxii* Theobald
42. *Culex (Mochthogenes) malayi* (Leicester)

## Family 3. CECIDOMYIIDAE

43. *Contarinia prosopidis* (Mani)

## Suborder BRACHYCERA

## Family 4. STRATIOMYIDAE

44. *Adoxomyia heminopla* (Wiedemann)

## Family 5. TABANIDAE

## Subfamily TABANINAE

45. *Tabanus (Tabanus) rubidus* Wiedemann
46. *Tabanus (Tabanus) striatus* Fabricius

## Family 6. ASILIDAE

## Tribe LAPHRIINI

47. *Laxenecera albibarbis* Macquart
48. *Laxenecera flavibarbis* Macquart
49. *Nusa elva* (Walker)

## Tribe STICHOPOGONINI

50. *Stichopogon meridionalis* Oldroyd
51. *Stichopogon inaequalis* (Loew)
52. *Cophinopoda chinensis* (Fabricius)
53. *Michotamia aurata* (Fabricius)
54. *Ommatius hradskyi* Joseph & Parui
55. *Ommatius ponti* Joseph & Parui
56. *Ommatius pseudokempi* Joseph & Parui

## Tribe ASILINI

57. *Apoclea rajasthanensis* Joseph & Parui  
 58. *Astochia psedoguptai* Joseph & Parui  
 59. *Clephyroneura pulla* Oldroyd  
 60. *Philodicus pruthii* Bromley  
 61. *Philodicus femoralis* Ricardo  
 62. *Philodicus ceylanicus* Schiner  
 63. *Philodicus femoralis* Ricardo  
 64. *Philodicus javanus* (Wiedemann)  
 65. *Philodicus raoi* Joseph & Parui  
 66. *Promachus duvaucelii* (Macquart)  
 67. *Promachus melampyrgus* van der Wulp

## Family 7. BOMBYLIIDAE

## Subfamily TOXOPHORINAE

68. *Toxophora javana* Wiedemann

## Subfamily BOMBYLIINAE

69. *Bombylius maculatus* (Fabricius)

## Subfamily ANTHRACINAE

70. *Petrorossia albofulva* (Walker)  
 71. *Petrorossia nigrofemorata* (Brunetti)  
 72. *Anthrax bipunctatus* Fabricius  
 73. *Argyromoeba duvaucelii* (Macquart)

## Subfamily EXOPROSOPINAE

74. *Thyridanthrax (Exhyalanthrax) absalon* (Wiedemann)  
 75. *Exoprosopa (Exoprosopa) collaris* (Wiedemann)  
 76. *Ligyra aurantiaca* (Guérin-Méneville)  
 77. *Ligyra oenomaus* (Rondani)

## Family 8. PIPUNCULIDAE

78. *Tomosvaryella limpidipennis* (Brunetti)

## Family 9. SYRPHIDAE

79. *Asarkina (Asarkina) ericetorum* Fabricius  
 80. *Ischiodon scutellaris* (Fabricius)  
 81. *Scaeva latimaculata* (Brunetti)  
 82. *Baccha (Allobaccha) sapphirina* Wiedemann  
 83. *Baccha (Allobaccha) umbrosa* Brunetti  
 84. *Eristalinus arvorum* (Fabricius)

## Suborder CYCLORRHAPHA

## Family 10. DIOPSIDAE

85. *Sphyracephala hearseiana* (Westwood)

## Family 11. TEPHRITIDAE

86. *Euphranta (Staurella) crux* (Fabricius)  
 87. *Carpomyia vesuviana* Costa

## Family 12. OTITIDAE

88. *Chrysomya* sp.  
 89. *Physiphora aenea* (Fabricius)  
 90. *Physiphora demandata* (Fabricius)

## Family 13. SEPSIDAE

93. *Sepsis cynipsea* Linnaeus  
 94. *Sepsis nitens* Wiedemann  
 95. *Saltella setigera* Brunetti  
 96. *Australosepsis frontalis* (Walker)

## Family 14. AGROMYZIDAE

91. *Melanagromyza cuscutae* Hering  
 92. *Liriomyza trifolii* (Burgess)

## Family 15. MILICHIIDAE

97. *Desmometopa singaporensis* Kertész

## Family 16. CHLOROPIDAE

98. *Anatrichus pygmaeus* Lamb  
 99. *Pachylophus rufescens* (de Meijere)

## Family 17. EPHYDRIDAE

100. *Paralimna hirticornis* de Meijere  
 101. *Paralimna* sp.  
 102. *Brachydeutera longipes* Hendel  
 103. *Ochthera brevitibialis* de Meijere

## Family 18. DROSOPHILIDAE

104. *Drosophila (Sophophora) ananassae* Doleschall

## Family 19. HIPPOBOSCIDAE

105. *Hippobosca variegata* Megerle

## Family 20. NYCTERIBIIDAE

106. *Basilina (Basilina) blainvillii amiculata* (Speiser)  
 107. *Basilina (Paracyclopodia) roylii* Westwood

## Family 21. STREBLIDAE

108. *Brachyotheca lobulata* (Speiser)  
 109. *Brachytarsina (s.str.) maii* Advani & Vazirani  
 110. *Brachytarsina (s.str.) joblingi* Advani & Vazirani  
 111. *Brachytarsina (s.str.) theodori* Advani & Vazirani  
 112. *Brachytarsina (s.str.) sinhai* Advani & Vazirani  
 113. *Ascodipteron namrui* Maa  
 114. *Ascodipteron rhinopomatos* Jobling  
 115. *Parascodipteron scotophilus* Advani & Vazirani

## Family 22. MUSCIDAE

## Subfamily MUSCINAE

116. *Musca (Musca) domestica* Linnaeus  
 117. *Musca (Byomya) sorbens* Wiedemann

## Subfamily PHAONINAE

118. *Atherigona (Acritochaeta) orientalis* Schiner  
 119. *Atherigona (Atherigona) approximata* Malloch  
 120. *Atherigona (Atherigona) falcata* (Thomson)

121. *Atherigona (Atherigona) naqvii* Steyskal  
 122. *Atherigona (Atherigona) oryzae* Malloch  
 123. *Atherigona (Atherigona) soccata* Rondani

## Subfamily STOMOXIINAE

124. *Stomoxys calcitrans* (Linnaeus)

## Family 23. CALLIPHORIDAE

125. *Bengalia torosa* (Wiedemann)  
 126. *Chrysomya albiceps* (Wiedemann)  
 127. *Chrysomya megacephala* (Fabricius)  
 128. *Chrysomya rufifacies* (Macquart)  
 129. *Rhyncomya catalypsa* Séguy  
 130. *Stomorhina discolor* (Fabricius)

## Family 24. SARCOPHAGIDAE

## Subfamily SARCOPHAGINAE

131. *Parasarcophaga (Liopygia) ruficornis* (Fabricius)  
 132. *Parasarcophaga (Liosarcophaga) brevicornis* (Ho)  
 133. *Parasarcophaga (Liosarcophaga) dux* (Thomson)  
 134. *Parasarcophaga (Parasarcophaga) albiceps* (Meigen)  
 135. *Parasarcophaga (Parasarcophaga) hirtipes* (Wiedemann)  
 136. *Parasarcophaga (Parasarcophaga) misera* (Walker)  
 137. *Parasarcophaga (Parasarcophaga) knabi* (Parker)  
 138. *Parasarcophaga (Parasarcophaga) orchidea* (Böttcher)  
 139. *Parasarcophaga (Parasarcophaga) sericea* (Walker)  
 140. *Iranihindia futilis* (Senior-White)

## Family 25. TACHINIDAE

## Subfamily PHASIINAE

141. *Cylindromyia fuscipennis* (Wiedemann)  
 142. *Cylindromyia wiedemanni* Crosskey

## Subfamily TACHININAE

143. *Hystricovoria bakeri* Townsend  
 144. *Voria ruralis* (Fallén)

## Subfamily GONIINAE

145. *Peribaea orbata* (Wiedemann)  
 146. *Peribaea suspecta* Malloch  
 147. *Carcelia (Senometopia) illota* (Curran)

## Family 26. GASTEROPHILIDAE

148. *Gasterophilus intestinalis* (De Geer)  
 149. *Gasterophilus nasalis* (Linnaeus)  
 150. *Gasterophilus pecorum* (Fabricius)

## Family 27. OESTRIDAE

151. *Hypoderma bovis* (Linnaeus)  
 152. *Hypoderma lineatum* (Villers)  
 153. *Przhevalskiana silenus* (Brauer)  
 154. *Cephalopina titillator* (Clark)  
 155. *Oestrus ovis* Linnaeus

## DISCUSSION

The Thar Desert is decidedly arid, being characterized by low rainfall and high temperature. The subterranean water is certainly insufficient to support any but very scanty plant life. However, there is abundant growth of annual vegetation shortly after the commencement of the rainy season but the greenery withers with the withdrawal of the monsoon. All these adverse conditions impose restrictions also on the animal lives that not only interact among themselves but also with various plants, plant predators and plant parasites. Therefore, the desert does not exhibit a flourished fauna that normally occurs in other ecosystems.

The Great Indian Desert or Thar Desert covers part of the four Indian states (Punjab, Haryana, Rajasthan and Gujarat) and two provinces of Pakistan (Sind and Punjab). There are 28 districts of the 4 states coming under the Thar Desert of which major area lying in the states of Rajasthan (13 districts) and Gujarat (8 districts). Besides this, 4 districts of Haryana and 3 districts of Punjab are also fall under the Thar desert of Indian part.

However, among the 27 families so far reported from the Thar Desert major share has taken by the family Culicidae (31 spp.) and Asilidae (21 spp.) followed by Phlebotomidae (11 spp.), Bombyliidae & Sarcophagidae (10 spp.), Muscidae (9 spp.), Streblidae (8 spp.), Syrphidae & Calliphoridae (6 spp.), Oestridae (5 spp.), Sepsidae (4 spp.), Otitidae & Gasterophilidae (3 spp.), Tabanidae, Tephritidae, Agromyzidae, Chloropidae, Nycteribiidae & Tachinidae (2 spp.).

The families like Cecidomyiidae, Stratiomyidae, Pipunculidae, Diopsidae, Milichiidae, Drosophilidae, Hippoboscidae, are represented by single species.

The dipterans in their adult stage are generally terrestrial but some need to go to water for oviposition or so. Indeed, they are in their larval stages more moisture loving and the great majority live in water, in rotting vegetable or animal matter, inside living plant tissues or bodies of other animals or in substrata where necessary moisture for vital process exists. It is true that the scarcity of water in the desert prevents most aquatic Diptera from colonization and the semi-aquatic Diptera that live in soil or in plants and animals have to live either in or decaying matters thus cannot undergo complete development. In fact, the other cause of limitation to many such Diptera in the desert is the physiological draught mostly due to the salinity of soil and water they inhabit.

The arid and semi-arid situations of the desert are likely to support high size population of the Asilidae, the Bombyliidae, the Conopidae and the Nemestrinidae in their diversity but the recorded fauna does not depict the true picture except the Asilidae (21 species) and the Bombyliidae (10 species).

## ACKNOWLEDGEMENTS

We wish to express our thanks to Dr. J. R. B. Alfred, Director, Zoological Survey of India, for necessary facilities and encouragement. Thanks are also due to Dr. A. K. Hazra, Scientist 'E' for kindly going through the manuscript and making useful suggestions.

## REFERENCES

- Banerjee, D., Parui, P. and Mitra, B. 2002. Bee flies (Bombyliidae : Diptera) of the Thar Desert, *Insect Environment*, 7(4) : 190.  
 Kumar Sanjeev and Kumar Seema. 1996. Diptera Fauna of the Thar Desert. In : *Faunal Diversity in the Thar Desert : Gaps in Research*, pp. 243-251.  
 Parui, P. and Mitra, B. 2000. New Record of some Dipteran insects from the Thar Desert. *Bionotes* 2(4) : 73.  
 Mitra, B., Parui, P. and Banerjee, D. 2002. Diptera fauna of Balaram-Ambaji Wild life and Jessore Sloth Bear Sanctuaries, North Gujarat, India. *J. Interacademia*, 6(4) : 498-511.