

An annotated checklist of *Culicoides* Latreille, 1809 (Insecta: Ceratopogonidae: Diptera) with incorporation of a vector species list from India

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ABSTRACT: *Culicoides* Latreille, 1809 (Insecta : Diptera : Ceratopogonidae) are small nematoceros biological vectors of a wide range of pathogens of veterinary and medical importance. They are distributed worldwide but prefer warm, damp, and muddy areas. Female midges require blood for egg maturation. Studies on taxonomy, proper identification keys, and distribution patterns of these flies across different geographical regions of India of these flies are limited. This article provides an updated checklist of *Culicoides* spp. from India collected from various scattered publications, along with their synonyms and details on their subgenera, geographical distribution, and type locality. A compiled list of different *Culicoides* vectors from India has also been included separately in this article, along with the type of the diseases spread. **Journal of Vector Ecology 41 (2): 279-284. 2016.**

Keyword Index: India, *Culicoides*, taxonomy, checklist, vectors, distribution.

INTRODUCTION

The genus *Culicoides* (Insecta: Diptera: Ceratopogonidae) was erected by Latreille in 1809 with *Culicoides punctatus* (Meigen, 1804) as type species. These tiny, hematophagous nematoceros are commonly known as biting midges and are among the smallest insects (1-3 mm), with a worldwide distribution (Mellor et al. 2000). Their life cycle lasts two to six weeks and involves an egg, four larval instars, a pupa, and an adult (Mellor et al. 2000). *Culicoides* midges are found in warm, damp, and muddy areas rich in organic matter and on animal hosts they can feed upon. They tend to remain most active from about one hour before sunset until one hour after sunrise. (Mellor et al. 2000). Adults usually live for up to 90 days in cold weather conditions (Mellor 2004, Lysyk and Danyk 2007). Females of some these midges need to take a blood meal three or four days prior to egg laying and feed at roughly four-day intervals, while males feed on plant juices (Birley and Boorman 1982, Mellor et al. 2000).

A number of species in the genus *Culicoides* act as biological vectors of a wide range of pathogens of veterinary and medical importance (Table 1). They transmit a wide array of pathogens including bluetongue virus (BTV), epizootic hemorrhagic disease virus (EHDV), and African horse sickness virus (AHSV). During the last four decades, a number of outbreaks of bluetongue virus have been reported from India, where *Culicoides* spp. has been suspected to be the vector, and collected from various states of India (Bhatnagar et al. 1997). About 30 *Culicoides* species have been reported worldwide in the transmission of pathogens and parasites to man and other animals (Meiswinkel et al. 2004)

The genus *Culicoides* is known by a total of 1,343 species, 31 subgenera, and 64 species, with 12 subgenera with nine species (unplaced) from India. The available checklists of *Culicoides* spp. from India are outdated since many taxonomic changes were not incorporated in these checklists. The objective of this article is to provide an updated checklist of *Culicoides* spp. from India collected from various scattered publications, along with their synonyms, details on their subgenera, geographical distribution, and type localities and a separate list of different *Culicoides* vectors from India. This checklist contains 73 species under the genus *Culicoides* Latreille, 1809, of which 12 subgenera and nine unplaced species have been included.

MATERIALS AND METHODS

The current checklist has been prepared following available data from the literature (Bakhoum et al., 2013, Maheshwari 2012, Gangopadhyay and Das Gupta 2000, Das Gupta 1963, Edwards 1922). A comprehensive list has been maintained online by Borkent (2016). This checklist is the result of the materials collected from field studies as well as the materials already present in repository collections of Zoological Survey of India. The distribution maps provided in this article were prepared using QGIS software version 2.8.1.

Table 1. A list of *Culicoides* vectors from India along with the diseases spread.

Species	Distribution	Diseases
<i>Culicoides (Avaritia) actoni</i> Smith, 1929	Assam, Arunachal Pradesh, Bihar, Kerala, West Bengal	Cattle filaria, Bluetongue disease
<i>Culicoides (Avaritia) bolitinos</i> Meiswinkel, 1989	Tamil Nadu	Bluetongue disease
<i>Culicoides (Avaritia) brevitarsis</i> Kieffer, 1917	West Bengal	Bluetongue disease, Akabane disease
<i>Culicoides (Avaritia) definitus</i> Sen and Das Gupta, 1959	West Bengal	Bluetongue disease
<i>Culicoides (Avaritia) dumdumi</i> Sen and Das Gupta, 1959	West Bengal	Bluetongue disease
<i>Culicoides (Avaritia) fulvus</i> Sen and Das Gupta, 1959	West Bengal	Blue tongue disease
<i>Culicoides (Avaritia) imicola</i> Kieffer, 1913	West Bengal	Bluetongue disease
<i>Culicoides (Avaritia) orientalis</i> Macfie, 1932	Karnataka, Sikkim, West Bengal	Bluetongue disease
<i>Culicoides (Hoffmania) peregrinus</i> Kieffer, 1910	Assam, Orissa, West Bengal	Bluetongue disease
<i>Culicoides (Meijerehelea) arakawai</i> (Arakawa, 1910)	Assam	Fowl pox disease
<i>Culicoides (Remmia) oxystoma</i> Kieffer, 1910	Assam, Maharashtra, Bihar, Orissa, Himachal Pradesh, West Bengal	Cattle filaria, Akabane disease, Aino disease, Blue tongue disease
<i>Culicoides (Remmia) schultzei</i> Enderlein, 1908	Tamil Nadu, West Bengal	Bluetongue disease
<i>Culicoides (Trithecoidea) palpifer</i> Das Gupta and Ghosh, 1956	Assam, West Bengal	Bluetongue disease

ORDER DIPTERA

SUBORDER NEMATOCERA

SUPERFAMILY CHIRONOMOIDEA

FAMILY CERATOPOGONIDAE

SUBFAMILY CERATOPOGONINAE

Genus *Culicoides* Latreille 1809➤ **Subgenus *Avaritia*** Fox, 1955

- Culicoides (Avaritia) actoni* Smith, 1929. The species was first recorded in the northeastern region of Burnihat (Assam), which was placed as the holotype. Later, the species was found to be distributed in the states of Andhra Pradesh (Chittoor; Prakasam), Arunachal Pradesh, Bihar, Karnataka, Kerala, and Maharashtra (Marathwada). *Culicoides imperceptus* Das Gupta, 1962 has been placed as a junior synonym of *C. actoni* by Dyce and Wirth (1983).
- Culicoides (Avaritia) annandalei* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000). A female was first recorded from Rhenock (Sikkim) at an altitude of 3,500 m from sea level in September, 1968 which was placed as the holotype. It was named after Dr. N. Annandale.
- Culicoides (Avaritia) autumnalis* Sen and Das Gupta, 1959. Three male specimens were recorded by Sen and Das Gupta from Dumdum (North 24 Parganas: West Bengal) in September, 1957. One was placed as holotype and other two as paratypes.
- Culicoides (Avaritia) bolitinos* Meiswinkel, 1989. The species was originally recorded from South Africa. It was found in the southern state of Tamil Nadu in India (Illango, 2006).
- Culicoides (Avaritia) boophagus* Macfie, 1937. The details on type specimens are not available. The species was recorded from Kerala in India.
- Culicoides (Avaritia) brevitarsis* Kieffer, 1917. The species was originally recorded from Baguihati area (Kolkata: India). The species is also distributed in Karnataka (Bidar: Kamthana), Tamil Nadu, West Bengal (North 24 Parganas: Dumdum). *C. superfulvus* Das Gupta, 1962 was placed as the junior synonym of *C. brevitarsis*.
- Culicoides (Avaritia) certus* Das Gupta, 1962. The species was originally recorded from Hastings near Kidderpore Bridge (Kolkata, West Bengal).
- Culicoides (Avaritia) definitus* Sen and Das Gupta, 1959. In October, 1957, a female specimen was collected by Dr. S.K. Dasgupta from Dumdum area (North 24 Parganas, West Bengal) which was placed as the holotype.
- Culicoides (Avaritia) dumdumi* Sen and Das Gupta,

1959. In August, 1957, one male specimen was collected by Dr. S.K. Das Gupta from Dumdum area (North 24 Parganas) which was placed as the holotype. The species has also been collected from Baguihati (Kolkata, West Bengal).
10. *Culicoides (Avaritia) fulvus* Sen and Das Gupta, 1959. In September, 1957, one male specimen was recorded from Dumdum area (North 24 Parganas, West Bengal) by Dr. S. K. Das Gupta which was placed as the holotype. It has also been recorded from Baguihati (Kolkata, West Bengal) and southern parts of India like Tamil Nadu.
 11. *Culicoides (Avaritia) himalayae* Kieffer, 1911. Both sexes were recorded originally from Kurseong (Darjeeling, West Bengal). The species is also recorded from the northeastern state of Sikkim.
 12. *Culicoides (Avaritia) imicola* Kieffer, 1913. Originally a female was recorded in Kenya and preserved in Paris. In India, the species is distributed in the states of Karnataka (Bidar: Kamthana), Kerala, Maharashtra (Marathwada), Tamil Nadu, West Bengal. *C. minutus* Sen and Das Gupta, 1959 distributed in West Bengal (North 24 Parganas, Dumdum; Hooghly, Chinsura; Kolkata, Hastings) *C. pseudoturgidus* Das Gupta, 1962 distributed in West Bengal (Kolkata: Thakurpukur; North 24 Parganas, Dumdum) have been placed as junior synonyms of *C. imicola*.
 13. *Culicoides (Avaritia) inexploratus* Sen and Das Gupta, 1959. In July, 1956 one male was recorded from the Dumdum area (North 24 Parganas, West Bengal) by Dr. S.K. Das Gupta was placed as the holotype.
 14. *Culicoides (Avaritia) jacobsoni* Macfie, 1934. Originally a male was recorded from the islands of Sumatra. The species is recorded from the southern states of India near Kerala.
 15. *Culicoides (Avaritia) molestior* Kieffer, 1911. The species is originally recorded from the outskirts of Kolkata (West Bengal). *C. molestus* Kieffer, 1910 and *C. iniquus* Sen and Das Gupta, 1958 have been placed as junior synonyms of *C. molestior*.
 16. *Culicoides (Avaritia) odiosus* Kieffer, 1910. A female was originally recorded from the outskirts of Kolkata (West Bengal). The species is also recorded from Kurseong (Darjeeling, West Bengal).
 17. *Culicoides (Avaritia) orientalis* Macfie, 1932. Both sexes were originally recorded from Malaya, Java, and India were placed as syntypes. In India, first records were from Bombay Presidency (Mysore) and Dharwar in Karnataka. *C. nayabazari* Das Gupta, 1963 recorded from Nayabazar area in Sikkim has been placed as a junior synonym of *C. orientalis*.
 18. *Culicoides (Avaritia) sikkimensis* Das Gupta, 1963. In September, 1960, a male was first recorded from the Nayabazar area in Sikkim which was placed as the holotype.
- **Subgenus *Beltranmyia* Vargas 1953**
19. *Culicoides (Beltranmyia) circumscriptus* Kieffer, 1918. The species was originally recorded from Tunisia. It is also recorded from the southern state of Karnataka (Bidar: Kamthana) in India.
 20. *Culicoides (Beltranmyia) magnificus* Sen and Das Gupta, 1959. In November, 1956, two females were collected by Dr. S. K. Dasgupta from the outskirts of Kolkata (West Bengal), which were placed as holotypes.
- **Subgenus *Diphaomyia* Vargas, 1960**
21. *Culicoides (Diphaomyia) azerbaijanzhanicus* Dzhafarov, 1962. The species was originally recorded from Azerbaijan. In India, the species is recorded from the south near Bidar (Karnataka).
 22. *Culicoides (Diphaomyia) baueri* Hoffman, 1925. The species was originally recorded from Maryland, U.S.A. In India, the species was recorded from the Kolkata area (West Bengal).
 23. *Culicoides (Diphaomyia) causeyi* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000). In April, 2006, females were recorded from Kalyani (Nadia, West Bengal) by Dr. U. Majumdar.
 24. *Culicoides (Diphaomyia) clavipalpis* Mukerji, 1931. In August, 1957, a female was recorded from Dumdum area (North 24 Parganas, West Bengal). The species was also recorded from the states of Bihar, Kerala, Rajasthan (Jodhpur), Tamil Nadu, and West Bengal (Kolkata; Habra). *C. candidus* Sen and Das Gupta, 1959 was placed as a junior synonym of *C. clavipalpis*.
 25. *Culicoides (Diphaomyia) distinctus* Sen and Das Gupta, 1959. In August, 1957, both sexes were originally recorded by Dr S.K. Dasgupta from Dumdum area (North 24 Parganas: West Bengal). This species has also been recorded from the southern part of India in Kerala.
 26. *Culicoides (Diphaomyia) huffi* Causey, 1938. Originally, a male was recorded from Bangkok in Thailand. In India, the species is distributed in Karnataka, Kerala, Orissa, Tamil Nadu, and West Bengal (North 24 Parganas, Habra).
 27. *Culicoides (Diphaomyia) mukerjii* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000). In May, 1967, one female specimen was recorded from Habra (North 24 Parganas: West Bengal) and was placed as the holotype. The species is also distributed in West Bengal (Burdwan; Darjeeling, Siliguri; Nadia, Kalyani; Gobardanga, Itachuna).
 28. *Culicoides (Diphaomyia) punctatus* (Meigen), 1804. The type specimen of the genus *Culicoides* was originally recorded from Europe. In India, the species is found to be distributed in the state of West Bengal.
 29. *Culicoides (Diphaomyia) soleamaculatus* Nandi and Mazumdar, 2014. In June, 1967, a female was collected by Dr. S.K. Das Gupta from Habra (North

24 Parganas: West Bengal) and was placed as the holotype. The species is also distributed in Bihar (Dehri-on-sona), Jharkhand, West Bengal (Bankura; Burdwan: Raniganj; Hooghly: Chinsura; Kolkata: Diamond Harbour; Purulia).

➤ **Subgenus *Haemophoructus* Macfie, 1925**

30. *Culicoides (Haemophoructus) rariradialis* Das Gupta, 1963. In September, 1960, a female was collected by Dr. S. K. Dasgupta in the Nayabazar area (Sikkim).

➤ **Subgenus *Hoffmania* Fox 1948**

31. *Culicoides (Hoffmania) indianus* Macfie, 1932. Five females and three males are recorded as syntypes by R. Newstead and distributed in the states of Karnataka (Dharwar; Mysore, Bombay Presidency) and Tamil Nadu.

32. *Culicoides (Hoffmania) innoxius* Sen and Das Gupta, 1959. In November, 1955, one female was collected by Dr. S.K. Das Gupta from Thakurpukur area in Kolkata (West Bengal) which was placed as the holotype. The species is also distributed in the states of Andhra Pradesh (Chittoor and Prakasam), West Bengal (Kolkata, Thakurpukur; Howrah, Amta; North 24 Parganas, Dumdum).

33. *Culicoides (Hoffmania) isoregalis* Majumdar and Das Gupta, in Majumdar et al. (1997). In June, 1968, one male specimen was collected by Dr. P.P. Choudhuri from the Darjeeling Government College campus (Darjeeling, West Bengal), which was placed as the holotype.

34. *Culicoides (Hoffmania) neoregalis* Majumdar and Das Gupta, in Majumdar et al. (1997). In September, 1968, one male and one female were collected by Dr. S.K. Das Gupta near Darjeeling Government College campus (Darjeeling, West Bengal) which is placed as the holotype.

35. *Culicoides (Hoffmania) paraliui* Das Gupta, 1962. The species was originally recorded from Dumdum (North 24 Parganas, West Bengal).

36. *Culicoides (Hoffmania) pararegalis* Majumdar and Das Gupta, in Majumdar et al. 1997. In July, 1968, Dr. S.K. Das Gupta described one female species from Darjeeling Government College campus (Darjeeling, West Bengal), which is placed as the holotype.

37. *Culicoides (Hoffmania) peregrinus* Kieffer, 1910. A female was originally recorded from the coast of Puri (Orissa) which is placed as the holotype. It is also recorded from the states of Andhra Pradesh (Chittoor and Prakasam), Assam, Karnataka, Maharashtra (Marathwada), Orissa Coast (Puri), Tamil Nadu, West Bengal (Birbhum, Bolpur; Kolkata; Medinipur, Jhargram). *C. assamensis* Smith and Swaminath, 1932 has been placed as a junior synonym of *C. peregrinus*.

38. *Culicoides (Hoffmania) proximus* Nandi and

Mazumdar, 2013. In August, 1966, one male specimen was collected by Dr. U. Majumdar from Habra (North 24 Parganas: West Bengal). The species is found from Kolkata (Gobordanga).

39. *Culicoides (Hoffmania) pseudoregalis* Majumdar and Das Gupta, 1997. In August, 1968, one female was recorded by S.K. Das Gupta from the Darjeeling Government college campus (Darjeeling: West Bengal) which was placed as the paratype.

40. *Culicoides (Hoffmania) quasiregalis* Majumdar and Das Gupta, in Majumdar et al. 1997. In August, 1968, two females were recorded by Dr. S.K. Das Gupta from the Darjeeling Government College campus (Darjeeling, West Bengal). The species is also found in the Kurseong region (Darjeeling, West Bengal).

41. *Culicoides (Hoffmania) regalis* Majumdar and Das Gupta, in Majumdar et al. (1997). In September, 1968, three females and three males were collected by Dr. S.K. Dasgupta from Darjeeling Government College (Darjeeling, West Bengal) which were placed as paratypes.

42. *Culicoides (Hoffmania) subregalis* Majumdar and Das Gupta, in Majumdar et al. (1997). In July, 1978, two males and two females were collected by Dr. S.K. Das Gupta from Darjeeling (West Bengal) and placed as paratypes.

Subgenus *Meijerhelea* Wirth and Hubert 1961

43. *Culicoides (Meijerhelea) arakawai* (Arakawa, 1910). A female was originally described from Japan, which was placed as the lectotype. This species is distributed in different states of India, including Assam (Guwahati; Golaghat), and Karnataka (Bidar, Kamthana). *C. daleki* Smith and Swaminath, 1932 has been described as a junior synonym of *C. arakawai*.

44. *Culicoides (Meijerhelea) hegneri* Causey, 1938. A female was first recorded from Thailand which was placed as the holotype. The species is found in the state of West Bengal (India).

45. *Culicoides (Meijerhelea) magnithecalis* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000). The species was originally recorded from the Siliguri College campus (Darjeeling: West Bengal).

➤ **Subgenus *Monoculicoides* Khalaf 1954**

46. *Culicoides (Monoculicoides) homotomus* Kieffer, 1921. Females were originally recorded from Formosa which were placed as syntypes. The species is distributed in the Indian state of Karnataka (Bidar: Kamthana).

47. *Culicoides (Monoculicoides) rarus* Das Gupta, 1963. The species was originally recorded from the Nayabazar area in Sikkim.

➤ **Subgenus *Oecacta* Poey, 1853**

48. *Culicoides (Oecacta) distinctipalpis* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000).

- The species is recorded from the states of Bihar (Dehri-on-Sone), West Bengal (Burdwan: Raniganj; Darjeeling, Siliguri, Hooghly, Chinsura; Kolkata, Itachuna; North 24 Parganas, Habra).
49. *Culicoides (Oeacta) peliliouensis* Tokunaga, in Tokunaga and Esaki (1936). Females were first recorded from Palau Island in Japan. The species is also distributed in the Indian state of West Bengal (South 24 Parganas, Sagar Islands).
- **Subgenus *Pontoculicoides* Remm, 1968**
50. *Culicoides (Pontoculicoides) kamrupi* Sen and Das Gupta, 1958. No type specimens were maintained. But the species has been recorded from Assam (Guwahati). *C. albipennis* Smith and Swaminath, 1932 has been placed as a junior synonym of *C. kamrupi*.
- **Subgenus *Remmia* Glukhova, 1977**
51. *Culicoides (Remmia) oxystoma* Kieffer, 1910. A female was originally recorded from from the outskirts of Kolkata (West Bengal). The species has also been recorded from the states of Andhra Pradesh (Chittoor and Prakasam), Assam (Golaghat), Bihar (Pusa), Gujarat, Himachal Pradesh (Kullu valley), Karnataka (Bidar: Kamthana), Maharashtra (Mumbai), Orissa (Barkuda Island: Chilka, Balugaon: Puri), Tamil Nadu. *C. kiefferi* Patton, 1913, *C. alatus* Das Gupta and Ghosh, 1956, and *C. pattoni* Kieffer, 1921, were placed as a junior synonym of *C. oxystoma*.
52. *Culicoides (Remmia) schultzei* (Enderlein), 1908. The species was originally recorded from the Thakurpukur area (Kolkata: West Bengal). The species is also distributed in the states of Maharashtra (Marathwada), Tamil Nadu (Chennai), West Bengal (Birbhum; Howrah; Medinipur).
- **Subgenus *Synhelea* Kieffer, 1925**
53. *Culicoides (Synhelea) similis* Carter, Ingram, and Macfie 1920. The species was originally recorded from the Gold Coast (Africa). It was then recorded from India by Dr. S. K. Dasgupta from West Bengal (North 24 Parganas: Habra: Ashokenagar, Medinipur, Birbhum, Burdwan, Howrah), Jharkhand, Karnataka (Bidar, Kamthana), Tamil Nadu.
- **Subgenus *Trithecoides* Wirth and Hubert, 1959**
54. *Culicoides (Trithecoides) anophelis* Edwards, 1922. Females were first recorded from Malaysia which were placed as syntypes. The species was recorded from the Indian states of Andhra Pradesh (Chittoor; Parakasma), Assam (Golaghat), Bihar, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, West Bengal (Jalpaiguri; Kolkata, Thakurpukur, Gobra, Kestopur; South 24 Parganas, Port Canning; North 24 Parganas: Dumdum).
55. *Culicoides (Trithecoides) flaviscutatus* Wirth & Hubert, 1959. In 1948, both sexes were recorded from Borneo in Malaysia. The species is distributed in the Indian states of Assam, Kerala, Maharashtra and West Bengal.
56. *Culicoides (Trithecoides) forcepifinis* Nandi, Mazumdar and Chaudhuri, 2015. In June, 1968, a female was first recorded by Dr. S.K. Das Gupta from Habra (North 24 Parganas: West Bengal), which was placed as the holotype.
57. *Culicoides (Trithecoides) inciderus* Nandi, Mazumdar and Chaudhuri, 2015. In April, 1980, a female was recorded by Dr. S.K. Das Gupta from Habra (North 24 Parganas: West Bengal), which was placed as the holotype.
58. *Culicoides (Trithecoides) inornatithorax* Das Gupta, 1963. In September, 1960, a female was recorded from Nayabazar area in Sikkim, which was placed as the holotype.
59. *Culicoides (Trithecoides) insolens* Choudhuri and Das Gupta. The species is found to be distributed in the state of West Bengal in India.
60. *Culicoides (Trithecoides) macfie* Causey, 1938. In 1933, one male was recorded from Thailand which was placed as the holotype. The species was found in India from Kerala, West Bengal (Medinipur: Jhargram).
61. *Culicoides (Trithecoides) palpifer* Das Gupta and Ghosh, 1956. In October 1955, Dr. S.K. Das Gupta collected a female from the Thakurpukur area (Kolkata: West Bengal). The species is also recorded from the states of Assam and Karnataka.
62. *Culicoides (Trithecoides) parararipalpis* Das Gupta, 1963. In September, 1960, a female was recorded from the Nayabazar area in Sikkim.
63. *Culicoides (Trithecoides) raripalpis* Smith, 1929. According to the literature after Smith, no type specimens were preserved. Females were later recorded from the Burnihat village area in Assam and also from the states of Kerala, Sikkim, and West Bengal.
64. *Culicoides (Trithecoides) tympanus* Nandi, Mazumdar and Chaudhuri, 2015. In June 1979, a female was collected by Dr. S.K. Das Gupta from Jhargram (Medinipur: West Bengal) which was placed as the holotype.
- **Subgenus unplaced-*Chaetophthalmus* species group**
65. *Culicoides ateripes* Nandi and Mazumdar, 2014. The species was originally recorded from the Darjeeling area (West Bengal).
66. *Culicoides majorinus* Chu, 1977. In June, 1962, one female was recorded from Thailand which was placed as the holotype. The species is found in the Indian state of West Bengal (Darjeeling: Darjeeling: Govt. College).
67. *Culicoides yadongensis* Chu, 1984. The species was originally recorded from China. It is found

distributed in the Darjeeling area (West Bengal). *C. spinulosus* Chu, 1977 was placed as the junior synonym of *C. yadongensis*.

➤ **Subgenus unplaced-Shortii species group**

68. *Culicoides palpissimilis* Wirth & Hubert, 1989. The species was originally recorded from Malaysia. The species is distributed in the southern part of India in Karnataka (Bidar: Kamthana).
69. *Culicoides rectilis* Nandi and Mazumdar, 2014. In October, 1966, one female was recorded from Habra (North 24 Parganas: West Bengal) which was placed as the holotype. The species is also recorded from Darjeeling: Siliguri: Hugli: Chinsura of West Bengal.
70. *Culicoides shortii* Smith and Swaminathan, 1932. Females were originally recorded from Guwahati (Assam). The species is also found in the state of West Bengal (Howrah: Amta; Medinipur, Jhargram; North 24 Parganas, Dumdum, Habra; Darjeeling, Siliguri). *C. fortis* Sen and Das Gupta, 1959 has been placed as the junior synonym of *C. shortii*.
71. *Culicoides swaminathi* Gangopadhyay and Das Gupta, 2000. In March, 1967, both sexes were recorded by Dr. B.C. Majumdar from Taki (North 24 Parganas, West Bengal). The species is also distributed in West Bengal (Kolkata, Gobardanga; North 24 Parganas, Habra; Pasighat).

➤ **Miscellaneous unplaced species**

72. *Culicoides turgidus* Sen and Das Gupta, 1959. In August, 1955, a female was recorded from Thakurpukur area in West Bengal, which was placed as the holotype. The species is also distributed West Bengal (Hooghly: Uttarpara; Howrah: Amta: North 24 Parganas: Dumdum).
73. *Culicoides peculiaris* Majumdar and Das Gupta, in Gangopadhyay and Das Gupta (2000). The species is distributed in the state of West Bengal in India.

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