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Diversity of mites (ACARI) on wild mushrooms from West Bengal

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Abstract
This paper deals with a total of 44 species of mites belonging to 38 genera, 27 families and 4 orders, occurring on 15 species of wild mushrooms collected from 9 districts of West Bengal. Among those, some are damage causing, some are predatory, some are of accidental occurrence and some are of uncertain association with wild mushrooms. This paper includes species like *Cheylitus audex, Eucheyletia sinensis, Cunaxoides biscutum, Lasioseius floridensis, Sejus togatus and Cheiroseius laelaptoides which* are reported here for the first time from India. This report also includes 3 species as *Tydeus* sp. (family- Tydeidae), *Typhlodromous* sp. (family- Phytoseiidae), *Cheylostigmaeus* sp. (family- Stigmaeidae) which appear to be new to science and will be described later elsewhere. In addition, it includes a total of 18 species, the occurrence of which on mushroom/ wild mushroom was earlier unknown. All the species are listed taxa-wise giving their habitats, localities, date of collection, relative abundance, nature of association with the wild mushrooms and importance, if any. Lastly, a list of mushroom species- mite is also appended.

Keywords: wild mushroom, mites, new report, West Bengal

Introduction
Mushrooms, also known as macrofungi, sporocaps, sporophores etc., are spore producing fruit bodies and are important component for sustenance of ecosystems. They are of great economic importance as many are used as edible food, some are of medicinal values, some may prove as lethal if consumed, and some are of parasitic nature. Those which are edible mushrooms are full of food values, being rich with protein, sugar, glycogen, lipid, vitamins, amino acids, crude fibers and minerals. Regarding wild mushroom, very little information is available about their importance either as their edibility or as their lethal effect. Besides, very little study has been conducted not only in India but also in many other parts of the world regarding occurrence of mites on these mushrooms excepting Aiswarya *et al* (2018) [2] which reported some mites from mushroom/ wild mushroom from Kerala. A good amount of work has been done on mites of edible mushroom and those have been reviewed by Gupta (2012) [3].
Since, mite fauna of wild mushroom remains totally unexplored especially from West Bengal, it was thought desirable to undertake a preliminary study in this regard and keeping that in view, the present study was undertaken during January to November, 2019 in 9 districts of West Bengal and the result of that study has been included in this paper. This, in fact, is the maiden attempt made in this regard.

Material & Methods
Surveys were conducted in 9 districts of West Bengal *viz.* Kolkata, South 24 Parganas, North 24 Parganas, Murshidabad, Darjeeling, Kalimpong, Malda, North Dinajpur, and Nadia during January to November 2019 for occurrence of mites. The wild mushrooms were collected from forests, medicinal plant gardens, under logs and fallen tree trunks, etc. The mushroom samples were brought to the laboratory by putting those in a box to keep those undamaged. The mushroom samples were put into Tullgren funnel using a 60W electric bulb and maintaining a distance of 15cm between the bulb and the sample. The full extraction of mites took nearly 2-3 days depending upon moisture content of mushroom and season of collection. The extracted mites were collected in a receiver containing 70% ethyl alcohol and fitted with the stem of the funnel. After extraction, the extracted mites were examined under setereobinocular microscope for sorting out those into different families. The mites were mounted in Hoyer's medium and were gently warmed on hot plate for proper stretching of appendages and clearance of specimens. The mites were identified under research microscope using the updated literature. Most of the mushroom species were identified taking the help of publication by Acharya and Pradhan (2017) [1].

Results & Discussion
Results
A total of 44 species under 27 families, 38 genera belonging to 4 orders were collected from 15 species of wild mushrooms representing 9 districts of West Bengal. This includes some mites which appear to be new to science, some mites were there the occurrence of which from India as well as from mushroom was earlier unknown. The taxonomic account, collection data, relative abundance, nature of association and remarks for each of the collected species have been dealt with taxa-wise.

Order- Sarcoptiformes: Suborder- Oribatida: Cohort- Astigmata
Family I- Acaridae
1. *Acarus farris* Oudemans
Name of the mushroom- *Earliella scabrosa*

Locality- Chanchal, Dist. Malda
Date of collection- 03.06.2019
Relative abundance- Least abundant
Nature of association- Damage causing
Remarks- Only a few specimens were collected on the mentioned mushroom in association with unidentified beetle larvae. No damage on the mushroom was caused by this mite. This mite is more frequently available in stored product and its occurrence in edible mushroom was reported by Parveen and Gupta (2019) [5]. However, no record of this mite was made earlier on wild mushroom.

2. *Acarus siro* Linn.
Name of the mushroom - *Chlorophyllum hortense*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 24.10.2019
Relative abundance- Least abundant
Nature of association- Damage causing
Remarks- this mite was not reported earlier on edible mushroom and therefore, this forms the first record. It is more abundantly available at stored products and birds' nest (Gupta and Paul, 1985) [4]. No damage was caused to the mushroom.

3. *Tyrophagus longior* Gervais
Name of the mushroom - *Pseudohydnum gelatinosum* and *Earliella scabrosa*
Localities- Narendrapur, Dist. South 24 Parganas, Raigunj, Dist. North Dinajpur and Bethuadahari, Dist. Nadia
Dates of collection- 13.09.2019, 04.06.2019, 12.05.2019
Relative abundance- Moderately abundant
Nature of association- Damage causing
Remarks- Earlier to this, it was unknown to occur on wild mushroom. Its population was moderate and the associated organisms were larvae of Diptera, Coleoptera and Dermaptera.

4. *Tyrophagus putrescentiae* Schrank
Name of the mushroom - *Chlorophyllum hortense*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 24.10.2019
Relative abundance- Least abundant
Nature of association- Damage causing
Remarks- though it is quite abundandtly available in stored product and birds' nest and also was reported on edible mushroom (Parveen and Gupta, 2019) [5] but its occurrence on wild mushroom was made here for the first time. The associated insects were adult beetles (family-Cuculonidae) and its larvae.

Family II- Glycyphagidae
5. *Austroglycyphagus geniculatus* (Vitzthum)
Name of the mushroom - *Russula kanadii* and *Pseudohydnum gelatinosum*
Localities- Bethuadahari, Dist. Nadia; Raigunj, Dist. North Dinajpur; Barrackpore, Dist. North 24 Parganas
Dates of collection- 11.05.2019 and 04.06.2019
Relative abundance- Moderately abundant
Nature of association- Damage causing
Remarks- This is commonly available on stored products and house dust samples but its occurrence on wild mushroom was not reported earlier. Its population was moderate.

6. ***Lepidoglyphus destructor* Schrank**
Name of the mushroom- *Earliella scabrosa*
Locality- Raigunj, Dist. North Dinajpur
Date of collection- 04.06.2019
Relative abundance- Moderately abundant
Nature of association- Damage causing
Remarks- This mite was collected from the mushroom in association with the Diptera, Coleoptera and Dermapteran insects. It is being reported on wild mushroom for the first time, though it was earlier reported from edible mushroom (Parveen and Gupta, 2019) [5].

Family III- Suidasiidae
7. *Suidasia nesbitti* Sasa
Name of the mushroom- *Earliella scabrosa, Russula albonigra, Copelandia cyanescans, Crepidotus applanatum, Laccaria laccata, Ganoderma lucidum, Inocybe umbonata, Russula kanadi, Pseudohydnum gelatinosum*
Localities- Raigunj, Dist. North Dinajpur; Bethuadahari, Dist. Nadia; Sukna, Dist. Darjeeling; Tollygunj, Dist. Kolkata; Chanchal, Dist. Malda; Mehmanpur, Dist. South 24 parganas; Barrackpore, Dist. North 24 Parganas; Sargachi, Dist. Murshidabad; Narendrapur, Dist. South 24 Parganas
Dates of collection- 04.06.2019, 12.05.2019, 14.11.2019, 19.08.2019, 02.09.2019, 21.08.2019, 27.08.2019, 11.05.2019
Relative abundance- Highly abundant
Nature of association- Damage causing
Remarks- This was collected abundantly in several wild mushroom from different regions of West Bengal and in most of the cases its population was reasonably high. Its association with the mushroom was uncertain.

Family IV- Histiostomatidae
8. *Histiostoma feroniarum* Dufour
Name of the mushroom- *Copelandia cyanescens* and *Earliella scabrosa*
Localities- Tollygunj, Dist. Kolkata and Chanchal, Dist. Malda
Dates of collection- 19.08.2019 and 03.06.2019
Relative abundance- Highly abundant
Nature of association- Damage causing
Remarks- Earlier it was reported on edible mushroom (Parveen and Gupta, 2019) [5] and was reported to be abundantly available in stored products (Hughes, 1976) but this forms the first record of the species on wild mushroom. Its nature of association is uncertain.

9. *Histiostoma sapromyzarum* Dufour
Name of the mushroom- *Chlorophyllum hortense, Laccaria laccata, Ganoderma lucidum, Inocybe umbonata*
Localities- Bakhrahat, Dist. South 24 Parganas, Mehmanpur, Dist. South 24 Parganas, Sargachi, Dist. Murshidabad; Barrackpore, Dist. North 24 Parganas
Dates of collection- 10.03.2019, 20.05.2019, 27.07.2019, 21.08.2019
Relative abundance- Highly abundant
Nature of association- Damage causing
Remarks- Same remarks as given for species No.8 will also hold good for this species.

Order- Trombidiformes: Suborder- Prostigmata
Family V- Tydeidae
10. *Tydeus* sp.n.
Name of the mushroom - *Russula kanadi*
Locality- Bethuadahari, Dist. Nadia
Date of collection- 11.05.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This undescribed species of Tydeus was recorded on wild mushroom and the taxonomic features of this species do not match with any of the other known species. It is proposed to be described later.

Family VI- Tenuipalpidae
11. *Brevipalpus euphorbiae* Mohanasundarum
Name of the mushroom - *Crepidotus applanatum*
Locality- Chanchal, Dist. Malda
Date of collection- 02.06.2019
Relative abundance- Least abundant
Nature of association- Accidental occurrence
Remarks- Since, this is a plant feeding mite having no possibility of surviving on mushroom. Its occurrence on wild mushroom is appearing to be intriguing. May be it has contaminated the mushroom through fallen leaves infested with this mite. The occurrence of this mite in mushroom was not earlier known.

FamilyVII- Stigmaeidae
12. *Cheylostigmaeus* sp.n.
Name of the mushroom - *Chlorophyllum hortense*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 24.10.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This is another mite species which appears to be a new one and to be described later elsewhere. It is a predatory mite, may be feeding upon *Tyrophagus putrescentiae* and may be Beetle larvae also.

Family VIII- Tarsonemidae
13. *Tarsonemous granaries* Lindquist
Name of the mushroom- *Coriolopsis occidentalis*
Locality- Lava, Dist. Kalimpong
Date of collection- 26.01.2019
Relative abundance- Least abundant
Nature of association- Damage causing
Remarks- This mite has been reported earlier on stored products (Hughes, 1976) but so far it is unknown to occur any wild mushroom.

Family IX- Cheyletidae
14. *Cheylitus eruditus* (Schrank)
Name of the mushroom- *Pseudohydnum gelatinosum* and *Earliella scabrosa*
Localities- Narendrapur, Dist. South 24 Parganas, Barrackpore, Dist. North 24 Parganas; Raigunj, Dist. North Dinajpur
Dates of collection- 04.06.2019, 13.09.2019
Relative abundance- Moderate infestation
Nature of association- Predator
Remarks- This is very common predatory Cheyletid mite occurring on stored products, house dust, birds nests etc. But, so far it was not reported on wild mushroom. Hence, it is a new record. It might be feeding on *Suidasia nesbitti* with which it was intimately associated.

15. *Cheylitus audex* Oudemans
Name of the mushroom- *Russula kanadi*
Locality- Bethuadahari, Dist. Nadia
Date of collection- 11.05.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- The occurrence of this mite in India was unknown and so also was its occurrence on wild mushroom. It is again is a predatory mite and might be feeding upon *Suidasia nesbitti*.

16. *Eucheyletia sinensis* Volgin
Name of the mushroom- *Earliella scabrosa*
Locality- Chanchal, dist. Malda
Date of collection- 03.06.2019
Relative abundance- Moderetely abundant
Nature of association- Predator
Remarks- This is a predatory mite on *Histiostoma feroniarum*. Its occurrence in India was earlier unknown and so also was its occurrence on wild mushroom.

17. *Chelacaropsis moorei* Baker
Name of the mushroom- *Pseudohydnum gelatinosum*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 13.09.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This mite was associated with *Tyrophagus longior*, *Suidasia nesbitti* and *Austroglycyphagus geniculatus*. But on which it was feeding was not known with certainty. This mite was earlier known from birds' nest (Gupta and Paul, 1985) [4] but was unknown from mushroom.

Family X- Cunaxidae
18. *Cunaxoides biscutum* (Nesbitt)
Name of the mushroom- *Earliella scabrosa*
Locality- Raigunj, Dist. North dinajpur
Date of collection- 04.06.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This is the first record of this species from India and also from mushroom. Its abundance was poor and was found associated with *Suidasia nesbitti*, *Tyrophagus longior*, *Lepidoglyphus destructor* and with adults of Diptera, Coleoptera and Dermapteran insects.

Order- Mesostigmata
Family XI- Laelapidae
19. *Cosmolaelaps indicus* Bhattacharyya
Name of the mushroom- *Chlorophyllum hortense*
Locality- Bakhrahat, Dist. South 24 Parganas
Date of collection- 10.03.2019
Relative abundance- Moderately abundant
Nature of association- Uncertain association

Remarks- It is a leaf litter and soil inhabiting mite and may be through that it occurred on the present reported mushroom. It was found associated with *Histiostoma sapromyzarum*. It was not reported earlier on wild mushroom.

20. *Cyrtolaelaps* sp.
Collected from *Auricularia auricular-judae*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 22.10.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- No species of this genus was earlier known from India as well on as any wild mushroom from the world.

Family XII- Zerconidae
21. *Zercon prasadi* Blaszak
Name of the mushroom- *Chlorophyllum hortense*
Locality- Bakhrahat, Dist. South 24 Parganas
Date of collection- 10.03.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- Though it was earlier reported from India but was not on any wild mushroom in the world.

Family XIII- Polyaspididae
22. *Uropolyaspis* sp.
Name of the mushroom- *Chlorophyllum hortense*
Locality- Bakhrahat, Dist. South 24 Parganas
Date of collection- 10.03.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- The undetermined species of *Uropolyaspis* collected from *Chlorophyllum hortense* could not be identified upto species level for lack of adequate literature.

Family XIV- Blattisocidae
23. *Lasioseius floridensis* Berlese
Name of the mushroom- *Copalandia cyanescens*
Locality- Tollygunj, Dist. Kolkata
Date of collection- 19.08.2019
Relative abundance- Moderately abundant
Nature of association- Predator
Remarks- This forms a new record of this species in India. Its association with the mentioned mushroom is of predator in nature. No record of this species on mushroom was known earlier.

24. *Lasioseius mcgregori* Chant
Name of the mushroom- *Crepidotus applanatum, Inocybe umbonata*
Localities- Chanchal, dist. Malda and Sargachi, dist. Murshidabad
Dates of collection- 02.06.2019 and 27.07.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- Same as in case of species No. 23.

Family XV- Phytoseiidae
25. *Typhlodromous* sp.n.
Name of the mushroom- *Copelandia cyanescens, Ganoderma lucidum, Inocybe umbonata, Russula kanadi, Pseudohydnum gelatinosum*
Localities- Tollygunj, Dist. Kolkata; Mehmanpur, Dist- South 24 Parganas; Sargachi, Dist. Murshidabad; Barrackpore, Dist. North 24 Parganas; Bethuadahari, Dist. Nadia; Narendrapur, Dist. South 24 Parganas
Dates of collection- 20.05.2019, 17.07.2019, 27.07.2019, 19.08.2019, 21.08.2019, 13.09.2019
Relative abundance- Highly abundant
Nature of association- Predator
Remarks- This species of *Typhlodromous* appears to be new to science. It was recorded by 5 adult species collected from different localities during June to September. Its taxonomic character does not match with any of the known species of this genus. Hence, it will be described later elsewhere. This is a predatory mite and found associated with *Acarus* species upon which it might be feeding. This plant associated predatory mite is being reported here for the first time in wild mushroom in association with *Suidasia nesbitti, Histiostoma feroniarum* etc. probably, it was feeding upon those mites.

26. *Neoseiulus fallacies* (Garman)
Name of the mushroom- *Russula albonigra*
Locality- Sukna, Dist. Darjeeling
Date of collection- 14.11.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This predatory mite is more common on paddy and grass and its occurrence on this *Russula albonigra* may be because of its contamination through grass on which this mushroom had grown. Earlier to this, the occurrence of this mite on mushroom was unknown.

Family XVI- Uropodidae
27. *Leiodinychus krameri* (Canestrini)
Name of the mushrooms- *Coriolopsis occidentalis, Pseudohydnum gelatinosum*
Localities- Lava, Dist- Kalimpong; Narendrapur, Dist- South 24 Parganas; Barrackpore, Dist. North 24 Parganas
Dates of collection- 26.01.2019, 17.07.2019, 13.09.2019
Relative abundance- Moderately abundant
Nature of association- Uncertain association
Remarks- Its occurrence on wild mushroom was earlier unknown though it has been reported on stored products and ware houses.

28. *Fuscuropoda marginata* (Koch)
Name of the mushroom- *Auricularia auricular-judae*
Locality- Narendrapur, dist. South 24 Pargana
Date of collection- 22.10.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- This mite was abundantly available on the mentioned mushroom and its occurrence on wild mushroom is being made here for the first time. Parveen and Gupta (2019) [5] reported it on edible mushroom while Hughes (1976) reported from manure and ware houses.

Family XVII- Parasitidae

29. *Parasittus shillongensis* Bhattacharyya
Name of the mushroom- *Laccaria laccata*
Locality- Mehmanpur, Dist. South 24 Pargana
Date of collection- 21.08.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- This was reported earlier from leaf litter in Shillong but its occurrence on the wild mushroom is being reported here for the first time. Its nature of association with the mushroom appears to be predatory.

Family XVIII- Neoparasitidae

30. *Gamasiphis (Neogamasiphis) bengalensis* Bhattacharyya
Name of the mushroom- *Pseudohydnum gelatinosum*
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 13.09.2019
Relative abundance- Least abundant
Nature of association- Accidental occurrence
Remarks- This species was described from faecal litter of pigeon and hence its occurrence on mushroom is rather interesting. Its relationship with mushroom appears to be accidental. No report of this species on mushroom was available earlier.

Family XIX- Sejiidae

31. *Sejus togatus* Koch
Name of the mushroom- *Auricularia auricular-judae*
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 22.10.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- This forms first report of this species on wild mushroom.

32. *Sejus* sp.
Name of the mushroom- *Auricularia auricular-judae*
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 22.10.2019
Relative abundance- Least abundant
Nature of association- Uncertain association

Family XX- Macrocheliidae

33. *Macrocheles muscaedomesticae* (Scopoli)
Name of the mushroom- *Auricularia auricular-judae*
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 22.10.2019
Relative abundance- Least abundant
Nature of association- Predator
Remarks- this is a predatory mite might be feeding on immature insects with which it was associated. This is common on dung and known to feed on fly eggs, Hughes (1976).

Family XXI- Ascidae

34. *Gamasellodes bicolor* (Berlese)
Name of the mushroom- *Crepidotus applanatum*
Locality- Chanchal, Dist. Malda
Date of collection- 02.06.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- An undetermined species of this genus was reported on edible mushroom. But the occurrence of *Gamasellodes bicolor* on the wild mushroom is being made here for the first time.

35. *Zercoseius* sp. near *spathuliger* Leonardi
Name of the mushroom- Chlorophyllum hortense
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 24.10.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- The occurrence of this species in wild mushroom is being made here for the first time.

36. *Asca garmani* Hurlbutt
Name of the mushrooms- *Inocybe umbonata*, *Pseudohydnum gelatinosum*
Localities- Sargachi, Dist. Murshidabad; Barrackpore, Dist. North 24 Parganas; Narendrapur, Dist. South 24 Pargana
Dates of collection- 20.05.2019 27.07.2019; 13.09.2019
Relative abundance- Moderately abundant
Nature of association- Predator
Remarks- Earlier some undetermined species of Asca was reported on edible mushroom (Parveen and Gupta, 2019) [5] but the occurrence of this species on wild mushroom is so far unreported.

37. *Cheiroseius laelaptoides* (Berlese)
Name of the mushroom- *Coriolopsis occidentalis*
Locality- Lava, Dist. Kalimpong
Date of collection- 26.01.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- Though it is a predatory mite but its association with the mushroom is uncertain in this case. No report of this species on mushroom was available earlier.

38. *Platyseius subglaber* (Berlese)
Name of the mushroom- Undetermined
Locality- Takda, Dist. Darjeeling
Date of collection- 13.11.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remark- this is being reported for the first time on mushroom but its nature of association is uncertain.

Order- Sarcoptiformes: Suborder- Oribatida (excluding Astigmata)

Family XXII- Galumnidae

39. *Galumna flabellifera* Von Heyden
Name of the mushroom- *Inocybe umbonata*
Locality- Sargachi, Dist. Murshidabad
Date of collection- 27.08.2019
Relative abundance- Least abundant
Nature of association- Uncertain association
Remarks- Occurrence of this mite on wild mushroom was not known earlier and therefore this forms new record.

Family XXIII-Ceratozetidae

40. *Ceratozetes* sp.
Name of the mushroom- *Crepidotus applanatum*
Locality- Chanchal, Dist. Malda
Date of collection- 22.10.2019
Relative abundance- Moderetely abundant
Nature of association- Uncertain association

Family XXIV- Trhypochthoniidae
41. *Archegozetes* sp.
Name of the mushroom- *Pseudohydnum gelatinosum*
Locality- Narendrapur, Dist. South 24 Pargana
Date of collection- 13.09.2019
Relative abundance- Least abundant
Nature of association- Uncertain association

Family XXV- Oppiidae
42. *Oppia* sp.
Name of the mushroom- *Chlorophyllum hortense*
Locality- Narendrapur, Dist. South 24 Parganas
Date of collection- 24.10.2019
Relative abundance-Highly abundant
Nature of association- Uncertain association

Family XXVI- Oribatulidae
43. *Oribatula* sp.
Name of the mushroom- Undetermined
Locality- Takda, Dist. Darjeeling
Date of collection- 13.11.2019
Relative abundance- Least abundant
Nature of association- Uncertain association

Family XXVII- Austrachipteriidae
44. *Lemellobates* sp.
Name of the mushroom- *Russula kanadii*
Locality- Bethuadahari, Dist. Nadia
Date of collection- 11.05.2019
Relative abundance- Least abundant
Nature of association- Uncertain association

Table 1: A list of mushroom- mites collected from 9 districts of West Bengal during January to November, 2019

Species of Wild Mushroom	Mites species
Chlorophyllum hortense (Murrill) Vellinga	*Histiostoma sapromyzarum Tyrophagus putrescentiae Acarus siro Cheylostigmaeus* sp.n. *Zercoseius* sp. near *spathuliger Cosmolaelaps indicus Zercon prasadi Uropolyaspis* sp. *Oppia* sp.
Copelandia cyanescens (Berk. & Broome) Singer	*Histiostoma feroniarum Suidasia nesbitti Lasioseius floridensis Typhlodromous* sp.
Crepidotus applanatum (Pers.) P. Kumm.	*Suidasia nesbitti Brevipalpus euphorbiae Gamasellodes bicolor Lasioseius mcgregori Ceratozetes* sp.
Laccaria laccata (Scop.) Cooke	*Suidasia nesbitti Histiostoma sapromyzarum Parasittus shillongensis*
Ganoderma lucidum (Curtis) Karst.	*Suidasia nesbitti Histiostoma sapromyzarum Typhlodromus* sp.
Inocybe umbonata, Quel.	*Suidasia nesbitti Histiostoma sapromyzarum Lasioseius mcgregori Lasioseius floridensis Typhlodromus* sp. *Asca garmani Galumna flabellifera*
Russula kanadii, A. K. Dutta & K. Acharya	*Suidasia nesbitti Austroglycyphagus geniculatus Tydeus* sp.n. *Cheyletus audex Typhlodromus* sp. *Lamellobates* sp.
Pseudohydnum gelatinosum (Scop.) P. Karst.	*Tyrophagus longior Suidasia nesbitti Austroglycyphagus geniculatus Cheyletus eruditus Chelacaropsis moorei Typhlodromus* sp. *Asca garmani* *Leiodinychus krameri Gamasiphis (Neogamasiphis) bengalensis Archegozetes* sp.
Earliella scabrosa (Pers.) Gilb. & Ryvarden	*Histiostoma feroniarum Suidasia nesbitti Acarus farris Lepidoglyphus destructor Tyrophagus longior Cheyletus eruditus Eucheyletia sinensis Cunaxoides biscutum Typhlodromus* sp.
Auricularia auricular- judae (Bull.) J. Schrot	*Sejus togatus Sejus* sp. *Macrocheles muscaedomesticae Crytolelaps* sp. *Fuscuropoda marginata*
Coriolopsis occidentalis (Klotzsch) Murrill	*Tarsonemous granaries Cheiroseius laelaptoides Leiodinychus krameri*
Russula albonigra (Krombh.) Fr.	*Suidasia nesbitti Neoseiulus fallacis*
Undetermined	*Lepidoglyphus destructor Platyseius subglaber Oribatula* sp.

Discussion
The result of surveys conducted during January to November, 2019 in 9 districts of West Bengal on 15 species of mushroom revealed the occurrence of 44 species of mites which belonged to 27 families, 37 genera under 4 orders/ sub-orders. Out of these, 20 species belonged to Mesostigmata 9 each to Astigmata and Prostigmata and 6 to Oribatida. Among these species there were 10 species which were found to be damage causing, 14 belonged to predatory group, 10 were there the association of which with mushroom species was uncertain and 9 were of accidental occurrence. It included 3 species which appeared to be new to science, 6 species, the occurrence of which was earlier unknown from India and there were 18 species the occurrence of which on mushroom/ wild mushroom was unknown from India.

Among the damage causing mites, most of those caused browning of the mushroom cap and in some cases caused blackening and those mites belonged to families Acaridae, Suidasiidae, Glycyphagidae, Histiostomatidae, Tarsonemidae etc. The predatory mites belonged mostly to order Mesostigmata (Family- Blattisociidae, Phytoseiidae, Ascidae, Parasitidae, Macrochelidae) and also Prostigmata (families- Tydeidae, Stigmaeidae, Cheyletidae, Cunaxidae). Among the others, the uncertain associated mites belonged to families Laelapidae, Zerconidae, Uropodidae, Sejidae, Ascidae under order Mesostigmata and families like Galumnidae, Ceratozetidae, Trhypochthoniidae, Oppiidae, Oribatulidae, Austrachipteriidae under suborder Oribatida. Those which were of accidental occurrence belonged to family Tenuipalpidae under suborder Prostigmata and family

Neoparasitidae under order Mesostigmata.

As regards species diversity, the family Ascidae and Cheyletidae represented 5 species and 4 species each respectively. All the families of Oribatid mites represented 1 species each. Among the Mesostigmatid mites, famililies like Zerconidae, Polyaspididae, Parasitidae, Neoparasitidae and Macrochelidae represented only 1 species each. While Sejiidae, Europodidae, Phytoseiidae, Laelapidae, Blattisociidae represented 2 species each. Among Astigmatid mites Acaridae represented maximum of 4 species, Glycyphagiidae and Histiostomatidae represent 2 species while Suidaseidae had only 1 species.

Regarding occurrence of mites in different species of wild mushroom, the number of species under wild mushroom species can be arranged in the descending order as- *Pseudohydnum gelatinosum* (10 sp.) > *Earliella scabrosa* = *Chlorophyllum hortense* (9 sp.) each > *Inocybe umbonata* (7 sp.) > *Russula kanadi* (6 sp.) > *Crepidotus applanatum* = *Auricularia auricular- judae* (5 sp.) each > *Copelandia cyanesence* (4 sp.) > *Ganoderma lucidum* = *Laccaria laccata* = *Coriolopsis occidentalis* and one undetermined species of wild mushroom (3 sp. each) > *Russula albonigra* (2 sp.).

From the above, it is clear that wild mushrooms can be considered as good habitats of various species of mites not being explored earlier and it is also quite clear that the exploration of mites of these mushrooms, if made more intensively and extensively, will reveal many more species. The present study also reported 3 species of mites, 1 each under *Tydeus*, *Cheylostigmaeus* and *Typhlodromus* which do not conform to any of the known species of the respective genera hence in all probability those appear to be new species which will be published elsewhere after confirmation. In addition, there were 6 species 2 under Cheyletidae viz. *Cheyletus audex* and *Eucheyletia sinensis*, 1 under Cunaxidae (*Cunaxoides biscutum*) 1 under Blattisociidae (*Lasioseius floridensis)*, 1 under Sejidae *(Sejus togatus*) and 1 under Ascidae *(Cheiroseius laelaptoides*) were not reported earlier from India and therefore, those form new records from India. Strikingly, many species were there in all the 4 orders which were common both in edible and wild mushrooms.

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