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A new Eriophyoid mite causing damage to creeping fig plant, from India

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Abstract
Eryphyoid mites are tiny microscopic arachnids of the order Acari. They are obligatory plant parasites and cause damage to the plant by their sap sucking habits. During routine taxonomic field for work particularly for this group of mites in the sub Himalayan plains of Northeast are of India, a new parasitic mite *Diptilomiopus ficicolus* n. sp. belonging to family Diptilomiopidae is noticed along the ventral surface of the leaves of *Ficus heterophylla* L. (Moraceae). *Ficus heterophylla*, also known as Creeping fig, holds importance due to its medicinal uses, with parts of the plant used to treat conditions like rheumatism, ear infections, and as a poultice. The new species of the mite produces damage to the leaves of this beneficial plant by its sucking habit. This new mite species is studied thoroughly from the taxonomic point of view and described with proper illustrations from the collected specimen from northern district of West Bengal, India (Latitude: 24°50′40″ N and Longitude: 87°55′50″ E). After proper taxonomic diagnosis, the new mite is named according to the rules laid by the ICZN and the type specimens are registered in ZooBank account. The relationship of mite with its host plant is also discussed in this article. Taxonomic knowledge of the parasitic mite is very much essential for the proper eradication and control of this pest species.

Keywords: Plant mite, *Diptilomiopus ficicolus*, new species, *Ficus heterophylla*, Taxonomy, India.

Introduction

The super family Eriophyoidea of order Acari of class Arachnida includes ticks and mites. Mites belonging to the super family Eriophyoidea are entirely phytophagous and form a microenvironment in various plant parts where they live. (Shukla, 2021 [32], Vervaet, 2021 [34], Jeppson *et al*, 1975). They are morphologically as well as biologically highly specialized parasites that wonder biologists around the world. They are highly host specific and they show an intimate host parasite relationships (Abdel-Khalek & Momen, 2022 [1]; Brown et al., 2021, Oldfield, 2010) [26]. During their feeding on plant sap and they produce mechanical injury to the plant parts and are known to transmit various plant viruses along with their saliva they pour into it. Various damage symptoms like gall formation, hairy outgrowths, witches broom, yellowing of leaves, brown patchy are most common. (Druciarek et al., 2019; Sarwar, 2020 [28]; Stephan et al., 2008) [31]. Keifer *et al*. (routine survey is conducted for these mites in northern parts of west Bengal, India in the months of September to November, 2024. The detailed taxonomic study is done on the collection made on *Ficus heterphylla* from this locality a new mite species is found in the genus *Ditilomiopus*. This genus was erected by Nalepa in the year 1916. (see Nalepa 1916) [25]. *Ficus heterophylla*, known as the Creeping fig, is a tropical tree native to Southeast Asia and the Pacific Islands, with distinctive leaves that vary in shape and size, ranging from lobed to entire forms (Fig 1A.) It is also cultivated as an ornamental tree and has medicinal uses, with its bark and root powder used for cough, asthma, and chest pain (Ghuge 2024, Hamilton 2004, Devi *et al*, 2022, Dhanya *et al*., 2012 Sharma *et al*., 2014 [30], Kumar *et al*. 2002 [23], Satapathy and Kumar 2017) [29]. Fruits are eaten as vegetable item by the local communities. The new specie causes severe damage to the tender leaves of the plant. As of 2024, according to working Catalogue of Eriophyoidea of the World, Versio:10, 'The catalogue of the Eriophyidae' (Joel Hallan; biocat@ccms.net), the genus *Ditilomiopus* includes 104 valid species within it. (Sur *et al*, 2018 [33]; Craemer *et al*, 2017; Amrine and Stasny 1994, Amrine et al., 2003, Yan-mei yuan- Xiao-Feng Xue 2019 [35], chakrabarti *et al*, 2019). As of now, plant family Moraceae harbors 9 species and Anacardiaceae harbors 5 species of this genus *Diptilomiopus* in India (Chakrabarti *et al*, 2019). From India one new species is added to this genus from this taxomic research. As per taxonomic procedure the new mite species in this genus is named following ICZN rules and registration of the new species is done in Zoo-Bank Account. The holotype specimen has been kept in laboratory of Entomology Research Unit of the Serampore College of Calcutta University, a national repository recognized by ZSI.

Materials and Methods

The mite infested leaves are examined under stereomicroscope. Then the permanent slides of these specimens are prepared following the standard taxonomic procedure as stated by Amrine *et al*. 2003 [4] and subsequently modified by Lillo *et al*, 2010. Mites are mounted in Hoyer;s medium (Jeppson et al, 1975). After preparation of slides the specimens are studied in phase contrast microscope Model: Letiz Dialux 20. A camera Lucida line drawings of whole mite and different parts of the mites having taxonomic importance are made (Fig.1A-G). Measurements (as stated by Amrine and Manson, 1996) [3] of different body parts and the length of the setae are taken in micrometer (µm). In the text the morphological terminology and abbreviations are used as per Lindquist *et al*., (1996) [24]. In the text the measurements of the different morphological and anatomical characters of the holoype

specimens are flowed by the ranges of measurements of paratype specimens given in the brackets. All the slides bearing holotype and paratypes are now kept in Entomology laboratory of Serampore College of University of Calcutta. According to the ICZN Rules, after the publication of the new species the type specimen will be deposited in National Collections of Zoological Survey of India, Head Quarter in Kolkata, a National repository.

Results and Discussions

Taxonomic studies and differential diagnosis with the preexisting species of this genus reveals this mite species new to Science. The etymology of the new name of the species is given after the ICZN Rules and the Registration of new species in Zoo-Bank is properly done. The account link is generated here: urn:lsid:zoobank.org:pub:FF1E2FCE-A7FE-46C2-BB0B-E7F9D558AA0D.

Description of the Genus: *Diptilomiopus* Nalepa 1916 [25]

Body is robust, spindle shaped. Gnathosoma and chelicerae large and set at perpendicular or strongly recurved in between the leg I. Prodorsal shield wider than long, without frontal lobe, scapular tubercles and setae usually absent, in some species scapular tubercles without seta may be present. Legs with distinct genu or fused with femur, genual seta absent; only tarsal setae present on legs; tarsal empodium deeply divided. Coxae I may or may not be separated, with less prominent sternal line; *1b* tubercles absent; opisthosoma sub circular in cross section with 1 to 3 ridges just behind the prodorsal shield; seta *c2* missing, often tubercles present; epigynium may be smooth or provided with longitudinal ribs or lines and granules or tubercles; internal apodeme normal in length.

Type species: *Diptilomiopus javanicus* Nalepa, 1916 [25].

Taxonomic description of new species*: Diptilomiopus ficicolus* sp. nov. (Figs2. A-G)

[Zoo-Bank:urn:lsid:zoobank.org:pub:FF1E2FCE-A7FE-46C2-BB0B-E7F9D558AA0D]

Female (1 holotype 67 paratype) (Figs. 2): Reddish in colour, 123.2 (123.2-124.1) long, 62.5 (62.5-61.6) wide, robust, fusiform with 4 ridges running upto two-third of the body length. *Gnathosoma* 16.8 (15.8-16.8) long and curved downward, drsal pedipalp genual seta is 3.7 (3.3-3.7) long.

Prodorsal shield (Fig 2B: Antero-dorsal mite) 23.3 (22.8-23.3) long and 50.4 (50.4-51.3) in width, prodrsal shield design (Fig. 1B) shows a network of 22 closed cells including a central large polygonal cell, number and size of cells show bilateral symmetry, median line incomplete as the central cell do not have median line, admedian line complete and criss-crossing the entire length of prodorsal shield, sub-median lines also sinuate, each half of the prodorsal shield shows 5 anterolateral cells; scapular tubercle and seta *sc* absent.

Opisthosoma (Fig 2.A; lateral Mite) with 52 (52-54) long and dorsal annuli are smooth, 69 (69-72) ventral annuli bear micro tubercles. Rounded microtubercles are located on anterior margins of ventral annuli; last 8 ventral annuli with micro striations; seta c2 absent, seta d 10.2 (10.2-10.7) long on annulus 26 (26-27); seta *e* 7.4 (6.5-7.4) long and located on annulus 41; Seta *f* is 35.4 (34.5-35.4)in length and is located on 61st ventral annulus; seta *h1*is not present and seta *h2* is 33.60 (33.6-34.5) in length.

Leg I (Fig. 2C) from base of trochanter 36.4 (36.4-37.3) long; femur 14.0 (13.0-14.0) long, without basiventral femoral seta *bv*; genu fused with femur. Tibia is 5.6 (5.1-5.6) long and paraxial tibial seta *l'*absent; 3.7 (3.7-4.2) long tarsus with two identical paraxial fastigial tarsal seta *ft"*and antaxial fastigial tasal seta *ft"* 22.4 (22.4-23.3). paraxial unguinal tarsal seta *u'* is 4.6 (3.5- 4.7), slightly curved tarsal solenidion *ω* is knobbed and 5.6 (4.5- 5.7) ; tarsal empodium em is divided and with 6, tarsal empodium em is 7.3 (7.1-7.4).

Leg II (Fig 2.D) near the base of trochanter it is 3.4.5 (34.5-35.4); genu is completely fused with femur and 14.0 (13.8-14.0) ; basiventral femoral setae *bv* is absent; 2.8 (2.8-3.7) long tibia without paraxial tibial seta *1*'; 5.6 (5.1-5.6) long tarsus with, paraxial fastigial tarsal seta *ft*' 18.6 (17.7-18.6), antaxial fastigial tarsal seta *ft"*is lacking; the length of paraxial unguinal tarsal seta is 4.6 (3.7-4.6); tarsal solenidion *ω* 4.6 (4.6-5.5) long;

Tersal empodium (Fig. 2E.): 6 rayed divided tarsal empodium em 7.4 (6.5-7.4) long.

Coxal-genital region (Fig.2F.): Coxae I 14.9 (14.9-15.4) long and contiguous basally; coxal surface smooth; 1b tubercles with seta absent but 1a tubercles with seta present a little ahed of the line across the 2a tubercles with seta; 12.1 (12.1-12.5) long seta 1a. Coxa II 13.0 (13.0-14.0); Seta 2a is 23.4 (23.3-24.1). Genitalia 14.0 (14.0-14.9), 15.8 (15.8-16.3) wide; epigynium elipsoidal in shape, with anterolateral scorings, a median Y shaped scoring is seen, seta *3a* 4.6 (4.6-5.5) long.

Internal genitalia (Fig.1.G): It shows two round spermatheca and branched oviduct

Male: Males are not observed as the important taxonomic variables of this mite are found only in case of female individuals.

Type material: Holotype: Female (marked) on slide (no. 1418/76/2024), India: West Bengal: Malda, English bazar, Latitude: 24°50′40″ N and Longitude: 87°55′50″ E, 14.x.2024 from *Ficus heterophylla* L.(Moraceae), Coll. S. Sarkar. Paratypes**:** 13 females on slide bearing holotype and 54 females on 6 slides (nos. 1419-1424/76/2024), collection data same as in holotype.

Type Locality: India: West Bengal: Malda, English bazar, Latitude: 24°50′40″ N and Longitude: 87°55′50″ E

Relation to the host plant: Mites are found in maximum numbers on the ventral surface of leaves near the mid vein. Due to its sap sucking habit yellowing of leaves occurs and in severe infestation brown spots are seen on leaves. Shoots are eventually dried up. (Fig. 1C)

Etymology: The specific epithet of the name "*ficicolus*" is derived from combination of two different words, one is '*Ficus*'- the generic name of the host plant and other is a Latin word '*Colus*' means inhabitant or dwelling in. Thus the meaning of specific epithet '*ficicolus'* is the inhabitant of *Ficus* plant. From this binomial nomenclature one can easily understand the host of this mite.

1A 1B 1C

Fig: 1A. Fresh shoot of Ficus heterophylla; 1.B. Photograph of the mite taken through phase contrast microscope; 1C. Mite infested damaged shoot of *Ficus heterphylla*

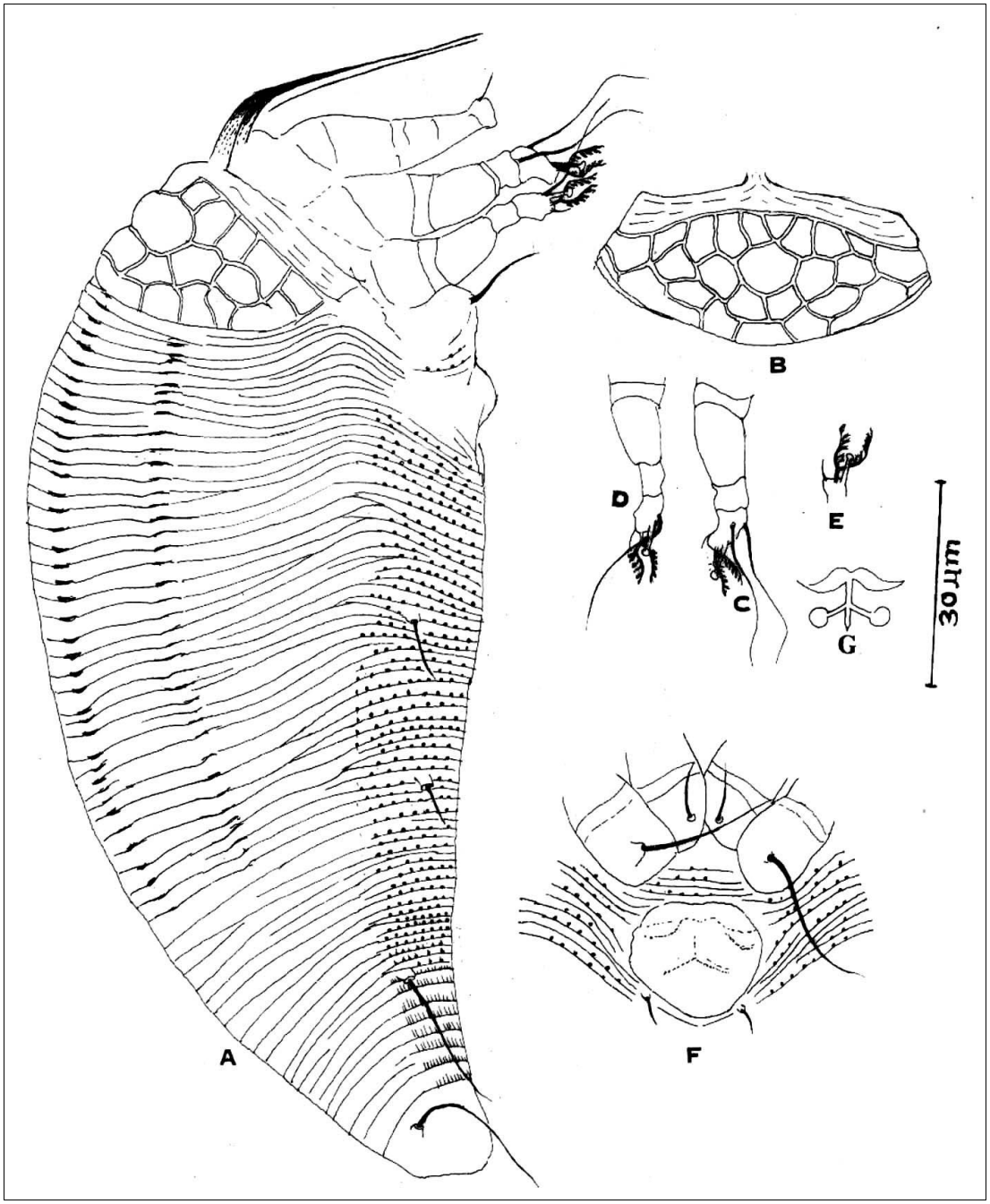

Fig 2: *Diptilomiopus ficicolus* sp.nov, holotype, no. 1418/76/2024: A-Antero-dorsal mite (AD); B- Antero-Dorsal mite (AD); C- Leg I (L1); D- Leg II (L2); E- Tarsal empodium of LI (em); F- Coxal-genital region (CG); G- Internal genitalia of female.

Taxonomic diagnosis

The species in *Diptilomiopus* fall under two distinguished group, first group having central cell with radiating lines on prodorsal shield and the second group having network of cells on prodorsal shield. The new species falls in the second group and shows similarities with *D. davisi* Keifer (1969), *D. holmesi* Keifer (1962), *D. javeremovici* Keifer (1960) and other 12 Indian species but differs from them by the numbers of closed cells on the dorsal shield. Among Indian species, this new species comes very close to *D. trewir* Chakrabarti and Mondal (1983) and *D. ficusis* Chakrabarti and Mondal (1983) in absence of scapular tubercles and scapular setae, but differs from them by the presence of 6 rayed tarsal empodium.

Conclusion

The new mite species discovered from this area appears a potential pest of *Ficus heterphylla* an important medicinal as well as vegetable yielding plant in India. This mite pest produces damage to the leaves by its feeding habit and parasitic mode of living. This finding may be helpful to provide the basis to the further taxonomic study including DNA Barcoding. Entomologist of plant protection department may identify the mite pest and the nature of damage through this research outcome.

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