

**TWO NEW SPECIES OF THE GENUS  
*TYPHLODROMUS* SCHEUTEN FROM INDIA  
(ACARINA: PHYTOSEIIDAE)**

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Received June 13, 1959

**INTRODUCTION**

WITHIN recent years as a result of the widespread use of organic insecticides, especially chlorinated hydrocarbons, economic entomologists have observed a tremendous increase in the population of phytophagous mites that infest agricultural crops and orchard trees. Indeed, the population is often so large that the mites almost assume the status of a major pest in place of the one that the economic entomologist sought to control by the use of chlorinated hydrocarbons. In this context, the role of predatory mites assumes particular significance. There is also some evidence to indicate that the predatory mites are more susceptible to these insecticides than the phytophagous ones and so with the disappearance of these predatory species in the field that keep the population of the phytophagous mites in a stabilized equilibrium, the latter multiply at a staggering rate and become very destructive to agricultural and horticultural crops.

The mites of the family Phytoseiidæ Berlese (1916) are of great economic importance as members belonging to this family are predators on the phytophagous mites of the families Tetranychidæ, Eriophyidæ and Acaridæ. On account of the importance of this family in the biological control of phytophagous mites, it has attracted the attention of Acarologists all over the world. The taxonomy and biology of these predatory mites are still in a formative stage and though some work has been done in Western countries during the last decade or so, nearly little has been done in India. In biological sciences, it is the experience of workers that in aiming at an enduring contribution on any group, an examination of its taxonomy would naturally engage their first attention. In view of this fact, the authors began a study of the taxonomy of this family sometime ago and the present paper deals with the description of two species that have proved to be new to science. Both of them belong to the subgenus *Amblyseius* Berlese (1914) of the genus *Typhlodromus* Scheuten (1857).

Bernhard (1955) recently revised the family Phytoseiidæ, wherein he has placed the genera *Amblyseius* and *Typhlodromus* as subgenera under genus *Typhlodromus* *sensu lato*. This has since been supported by Chant (1957) with the remark "The morphological distinctions between the two genera are artificial and such a combination seems logical and acceptable". Evans (1957) has also recognised Bernhard's work in his key to the Phytoseiidæ.

Chætotaxy of the dorsal shield has been used as the basis for this sub-generic separation. But here again confusion has arisen, as various workers (Bernhard, Chant and Evans) have taken different aspects of setal characters into consideration. Bernhard's original classification is based on the number of lateral setæ present on the dorsum between the scapular ( $S_1$ ) and the lumbar ( $S_2$ ) setæ. But this system would fail in the case of certain species in which  $S_2$  is absent. So, Chant (1957) devised a more natural system of classification based on the number of anterior lateral setæ on the dorsal shield and the position of  $S_1$  and  $S_2$ . This is as follows:—

1. Five or more pairs of anterior lateral setæ present on the dorsal shield; if both  $S_1$  and  $S_2$  present, then more than one lateral seta (L) between their bases .. .. .. Subgenus *Typhlodromus* Scheuten.

Only four pairs of anterior lateral setæ present on dorsal shield; if both  $S_1$  and  $S_2$  present, then only one lateral seta (L) between their bases .. .. .. Subgenus *Amblyseius* Berlese.

Evans (1957) in his key to the Phytoseiidæ used relative setal length as the basis for his classification which runs as follows:—

1. Setæ  $L_4$ ,  $M_2$  and  $L_8$  whip-like and considerably longer than the other dorsal setæ .. .. .. *Amblyseius* Berlese.

Setæ  $L_4$ ,  $M_2$  and  $L_8$  not conspicuously longer than other dorsal setæ .. .. .. *Typhlodromus* Scheuten.

But as Chant's (1958) work is more recent, more detailed and more comprehensive and is further based on certain chætotactic features of its immature stages, we are of opinion that his classification should have precedence over those of Bernhard and Evans, and so we have followed his classification in the present paper.

#### Subgenus AMBLYSEIUS Berlese, 1914

##### 1. *T. (A.) indicus* sp. n.

*Female*.—Dorsal shield faintly reticulated and ranging (ten specimens) from 0.325–0.364 mm. in length and from 0.169–0.195 mm. in width,

bearing seventeen pairs of setæ; nine in the lateral (L), two in the median (M), and six in the dorsal (D) rows. Setæ simple and except  $M_2$  and  $L_9$ , short and almost equal. Setæ  $L_1-L_4$  less than half as long as distances between their bases [Fig. 1, (1)].

Setæ  $S_1$  and  $S_2$  on interscutal membrane. Peritreme narrow with posterior portion of the shield slightly bulbous at first, tapering to a slender projection that curves around base of Coxa IV. Sternal shield normal, with three pairs of setæ, the third pair being on slight posterolateral projections of the shield. Metasternalia conspicuous, each with a seta. Genital shield normal; ventri-anal shield longer than broad and ranging from  $0.095-0.104$  mm. in length and  $0.074-0.082$  mm. in width, bearing three pairs of setæ in addition to para-anals and post-anal seta and with a pair of pores slightly posteromediad to third pair of setæ; [Fig. 1 (4)] shield surrounded by four pairs of setæ, one ( $VL_1$ ) being moderately long, the remainder short. Two pairs of meta-podal plates present, one long and slender almost thrice longer than broad, the other small and ovoid.

Gnathosoma and maxillary palps normal. Fixed digit of chelicera with three teeth and pilus dentilis; movable digit with one weak tooth. Legs normal, with one macroseta ( $0.053$  mm.) on basitarsus IV.

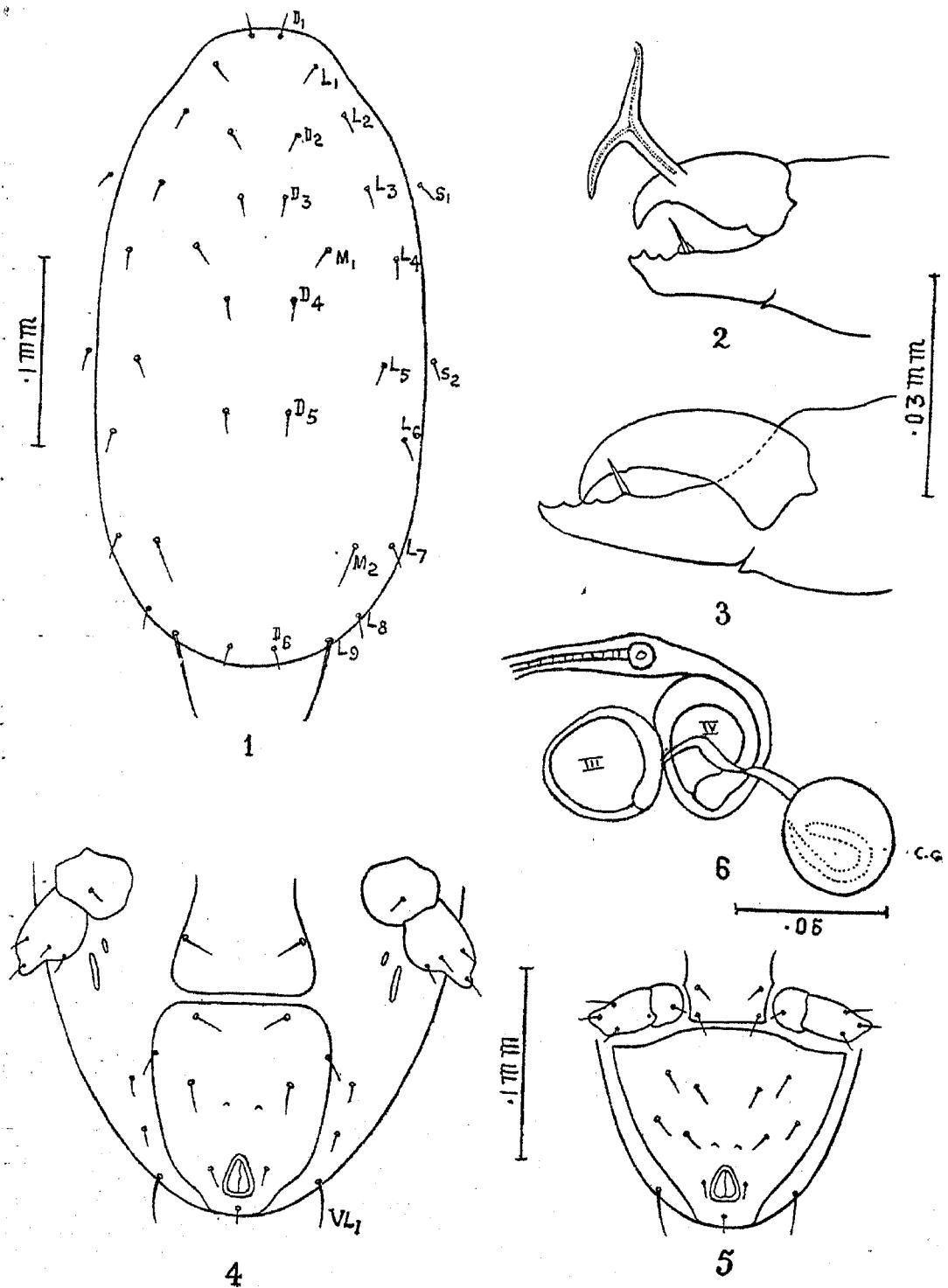
*Male*.—Dorsal shield ranging from  $0.234-0.26$  mm. in length and  $0.140-0.156$  mm. in width. Chætotactic pattern of the dorsal shield similar to that of the female except that setæ  $S_1$  and  $S_2$  appear on its edge instead of on the interscutal membrane.

Ventri-anal shield faintly reticulated,  $0.106$  mm. in length and  $0.115$  in breadth, bearing four pairs of setæ in addition to para-anals and post-anal seta. A pair of pores present as in female [Fig. 1, (5)].

Fixed digit of chelicera  $0.023$  mm. in length, bidentate, and bearing a strong pilus dentilis. Movable digit  $0.019$  mm. in length, with one weak tooth and a branched (or T-shaped) spermatophoral process [Fig. 1, (2)].

This species runs close to *T. marinus* (Willman) in having ventri-anal shield longer than broad and setæ  $L_1$ ,  $L_2$  and  $L_3$  less than half as long as distances between their bases, but differs chiefly in having all setæ (except  $M_2$  and  $L_9$ ) on the drosal shield equal in length whereas in *T. marinus* the setæ of the dorsal series are noticeably shorter than the lateral. The shape of the 'coxal glands' constitutes a good difference between the two species.

Described from twelve females and four males, collected from "Gnorimoschema operculella infested potatoes", feeding on *Tyrophagus putrescentiae*

FIG. 1. *T. (A.) indicus* sp. n.

Female: (1) Dorsum; (3) Chelicera; (4) Anal region;  
(6) C. G., Coxal gland.

Male: (2) Chelicera; (5) Anal region.

Schrink, at I.A.R.I., New Delhi. Holo-, allo- and para-types, deposited in National Pusa Collection, Indian Agricultural Research Institute, New Delhi.

Coll.—R. B. Kaur; February, 1959.

*Tyrophagus putrescentiae* Schrank is a widely distributed mite, which has been found associated with *G. operculella* on stored potatoes, with scales on Sugarcane and *Sorghum* in the field and with fungus growth wherever it is found. The mite, although sometimes suspected to be predaceous, is not actually so, but lives on cast skins and dead pupæ and scales, especially if slightly moist, as it prefers humid media to thrive and develop. It has been observed that if a dry healthy potato is offered to these mites, they do not feed on it, but make only aimless journeys on its surface. This may perhaps be ascribed to the fact that the mites are not able to pierce the skin of a healthy potato for feeding. But if it is tunnelled, and the tunnel after infestation is closed with either a piece of potato or a wet cotton plug, the mites reproduced, multiplied and fed till the tunnel was dried up. This is perhaps the reason for their association with *G. operculella* in cultures. After the insect larva has begun boring into the potato, the mites follow. As the larva goes on boring and feeding, its tunnels are utilized by the mites that take up their abode in their dark, humid and nutrient interior, multiply in millions and exhaust the tuber of its sap.

## 2. *T. (A.) delhiensis* sp. n.

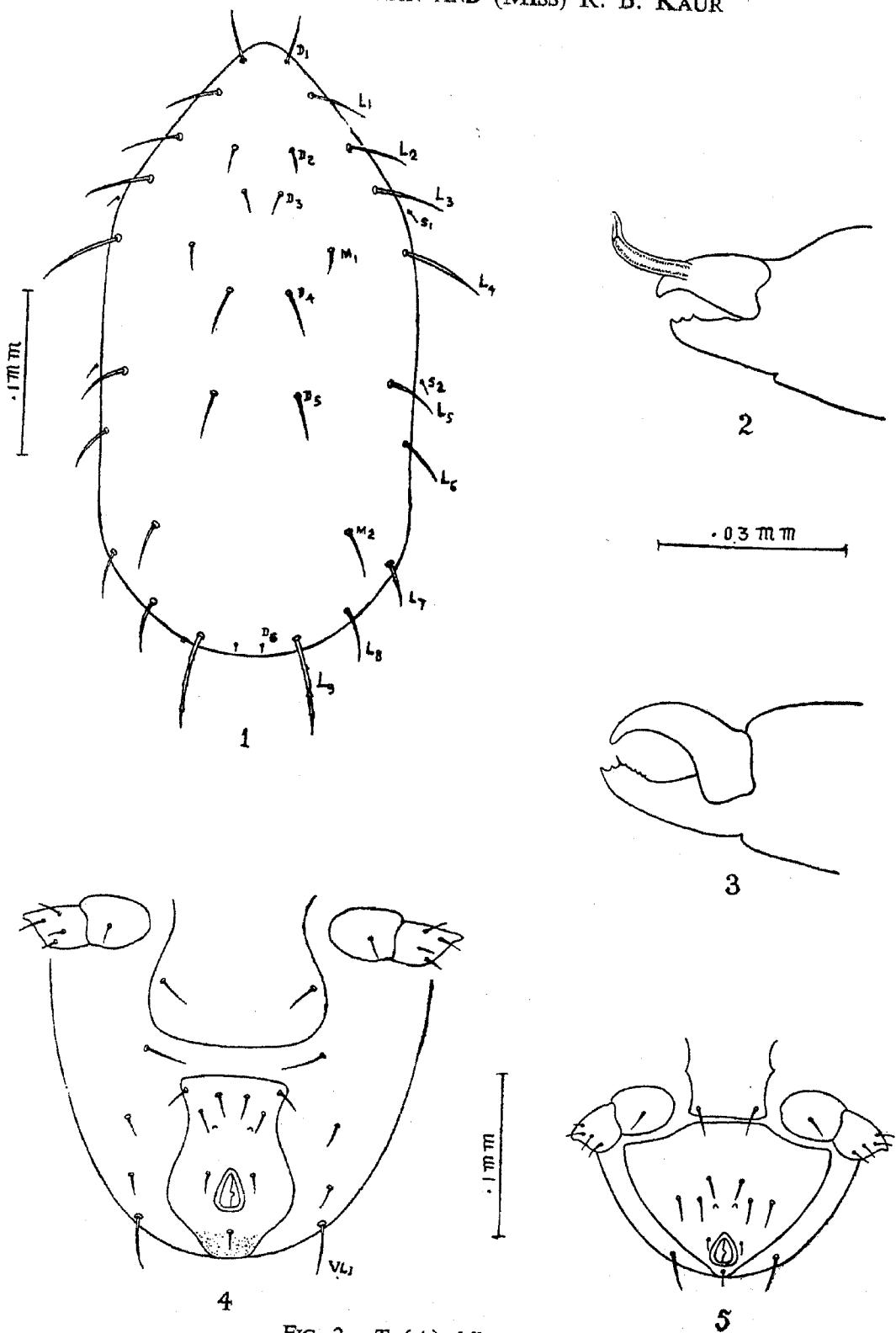
*Female*.—Length 0.35 mm., width 0.195 mm. Dorsal shield smooth, with seventeen pairs of setæ, arranged in a lateral row of nine, a dorsal row of six and a median row of two pairs [Fig. 2, (1)]. All setæ simple except  $L_9$ , which is slightly serrated and all setæ big and prominent except  $D_6$ . Setæ  $D_2$ ,  $D_3$  and  $M_1$  comparatively small and of equal length. Setæ  $L_9$  as long as  $L_4$ ; setæ  $D_4$ ,  $D_5$ ,  $L_5$ ,  $L_6$ ,  $L_7$ ,  $L_8$  and  $M_2$  almost equal in length.

Relative lengths of lateral, dorsal and median setæ of the dorsal shield as follows:—

$(L_1 - L_9)$  11:8:12:16:9:9:8:9:16:  $(D_1 - D_6)$  8:4:4:9:9:1:  $(M_1 - M_2)$  4:9.

Setæ  $M_2$  anterior to  $L_7$ . All anterior lateral setæ slightly longer than distances between their bases. Bases of setæ  $M_2$ ,  $L_7$  and  $L_8$  forming a triangle with unequal sides.

$S_1$  and  $S_2$  on interscutal membrane. Peritreme with the stigmata between coxae III and IV and running onto dorsum on level of coxa II. Ventral plates not well differentiated. Metasternalia only represented by the setæ.

FIG. 2. *T. (A.) delhiensis* sp. n.

Female: (1) Dorsum; (3) Chelicera; (4) Anal region;  
 Male: (2) Chelicera; (5) Anal region.

Ventrianal plate as figured, length 0.098 mm., width 0.054 mm., bearing 3 pairs of setæ in addition to para-anals and post-anal seta. A pair of pores present slightly posterior to the third pair of pre-anal setæ. Shield surrounded by four pairs of setæ, VL<sub>1</sub> being the longest [Fig. 2, (4)].

Gnathosoma and maxillary palps normal. Movable digit of chelicera 0.023 mm. in length, with an extremely weak tooth. Fixed digit 0.026 mm. in length, with two small teeth followed by a number of (about five) minute denticles and with an insignificant pilus dentillis as figured [Fig. 2, (3)].

Legs normal with three macrosetæ on Leg IV, on genu, tibia and basitarsus; the middle one is the smallest.

*Male*.—Length ranging from 0.25–0.27 mm. and width from 0.15–0.16 mm. Chætotoxy of the dorsal shield as in female except that setæ S<sub>1</sub> and S<sub>2</sub> occur on its edge instead of on the interscutal membrane. This is usual for the mites of this and allied genera (Evans, 1954). Ventri-anal shield as figured, faintly reticulated with three pairs of setæ in addition to pre-anals and post-anal seta. A pair of pores present posterior to the third pair of pre-anal setæ as in female [Fig. 2, (5)].

Fixed digit of chelicera with two prominent teeth (sometimes only one may be seen), pilus dentillis not seen; movable digit toothless and with a spur-shaped spermatophoral process as figured [Fig. 2, (2)].

*T. (A.) delhiensis* sp. n. is much closer to *T. (A.) finlandicus* (Oud.), *T. (A.) mesembrinus* Dean, *T. (A.) victoriensis* Womersley and *T. (A.) ovalis* Evans than to any other published species. It differs from all of these in the relative lengths of the setæ on the dorsal shield. It is also very close to *T. (A.) aferulus* Chant and *T. (A.) concordis* Chant (in press) but differs from these in the length of setæ D<sub>4</sub> and D<sub>5</sub>. The arrangement of the pre-anal setæ separates *delhiensis* from all species other than those mentioned above; the pre-anal setæ form a nearly transverse row across the anterior  $\frac{1}{3}$  of the ventri-anal shield.

Described from ten females and five males, collected from Tetranychid infested leaves of *Hibiscus esculentus* H. and *Gossypium* sp. at Indian Agricultural Research Institute, New Delhi. Holo-, allo- and para-types deposited in National Pusa Collection, I.A.R.I., New Delhi.

*Coll*.—R. B. Kaur; January, 1959.

#### ACKNOWLEDGEMENT

We are grateful to Dr. D. A. Chant of Entomology Institute for biological Control, Belleville, Canada, for going through the manuscript and making valuable suggestions.

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\* Original not seen.

† It refers to the date of issue of separates of this work and is therefore the date of publication of the new genus.