

HANDBOOK

PLANT MITES OF INDIA



S. K. GUPTA

This Handbook on Plant Mites of India is an attempt to provide up-to-date and complete taxonomic account of Indian species of plant mites, a group which has recently been found to be of immense economic importance. Apart from providing a full taxonomic treatment of all the species known till 1983 from India along with the keys for their identifications, this book also includes indepth information, wherever known, on various other aspects such as biology, ecology, nature of damage, control measures, etc. of the economically important phytophagous species and predatory behaviour for the others. General discussion has been made pertaining to morphology, basic techniques involved in studies of plant mites, habits and habitats, feeding habits, seasonal occurrence, sampling techniques, economic importance, control measures, classification, etc. Chapters are also devoted to Plant-Mite catalogue, list of mites known from each State and Union Territories of India, bibliography, glossary of acapological terms, etc.

This book, being the first of its kind from India, will help both taxonomists and economic entomologists in identifying their material as well as in getting summarised information on all applied aspects. Hence, this compendium will prove to be a valuable, informative and indispensable reference material to students of plant mites in India and abroad who will undoubtedly welcome it with open arms.

HANDBOOK
PLANT MITES OF INDIA

S. K. GUPTA
Zoological Survey of India
Calcutta



Edited by the Director, Zoological Survey of India, Calcutta.
1985

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FOREWORD

Insects and mites are the most important and significant pests of crops and plantations causing serious crop losses both in terms of quantity and quality of the produce. While insect pests have received sufficient attention in India, mites have remained neglected probably due to their microscopic size and obscure nature, even though they have the potentiality of causing extensive damage to tea plantations and agricultural crops. The mite problem in agriculture has gained further importance in the recent years because many of the plant mites earlier considered to be innocuous are becoming major pests due to random and indiscriminate use of chlorinated hydrocarbons which kill the natural enemies of mites. Development of resistance and cross resistance has aggravated the problem still further. Contrary to the injurious mites, there are beneficial plant mites too which act as our friends by predated upon mite and small insect pests.

The plant mites have generated interest among the entomologists. However, so far, there is no consolidated taxonomic account on plant mites of India as also their applied aspects such as biology, ecology, control, etc. Keys for easy identification of Indian phytophagous mites are also not available. As such, both the taxonomists and field level workers face difficulties in identifying their material and more so they need to scan through the scattered literature to take stock of the work done on plant mites of India.

This Handbook prepared by Dr. S. K. Gupta, Scientist-C, Zoological Survey of India, Calcutta, will fulfil this long felt need of both taxonomists and workers in applied fields. I am sure, this Handbook, the fifth in this series, published by the Zoological Survey of India, will prove useful.

- T. N. KHOSHOO
Secretary

New Delhi
January 14, 1985
Department of Environment
Government of India
New Delhi

EDITOR'S PREFACE

Among the several objectives of the Zoological Survey of India, probably the most important one is to provide a comprehensive systematic account on various groups of the Indian fauna. To achieve this objective, the department undertakes faunistic survey programmes and publishes the results in various books, journals, reports, etc., of which, the more important are the series on "Fauna of India", "The Handbooks" and the "Technical Monographs". The present contribution on the "Plant Mites of India" is published as a "Handbook" and is fifth in the series.

The importance of plant mite is well known as most of them are injurious pests of agricultural and horticultural crops causing considerable financial loss to the growers while some mites are important predators of mite and small insect pests of agricultural crops and, thus, help in control of pests and thereby in maintaining natural balance. Though the study of plant mite was started in India in the beginning of this century, its real extensive and intensive studies have been taken up only very recently and the results published through various journals in India and abroad are scattered and not easily accessible to majority of workers. The present "Handbook" gives a comprehensive taxonomic account of all the plant mites, both phytophagous and predatory, giving their diagnosis, mite-host, and host-mite list, distribution and also keys for identification. It includes other applied information, wherever known, in biology, ecology, control, etc. of the economically important species as well. A total of 557 species distributed over 131 genera, 18 families and 4 orders are dealt with here.

I congratulate Dr. S. K. Gupta, Scientist-C, Zoological Survey of India, Calcutta, who is a reputed acarologist in our country, for undertaking the enormous task of preparing this "Handbook" which, I am sure, will be useful to the students and researchers in the field of Agricultural and Horticultural Acarology both in India and abroad.

Calcutta
January 10, 1985

Dr. B. K. TIKADER
Director,
Zoological Survey of India,
Calcutta.

AUTHOR'S PREFACE

In view of the manifold economic importance of plant mites, a considerable amount of research work has been done in India during the past few decades and that has resulted in enriching our knowledge considerably in this field. Unfortunately, most of the works are scattered and, hence, there has been an increasing demand from acarologists and agricultural entomologists for a book giving a summarised and up-to-date information covering all aspects of plant mites of India. The present book is an attempt to that direction. It is believed that the book, being the first of its kind in India, will prove useful to a large section of workers both in India and abroad and will generate further interest among the workers in this group. Sincere efforts were made to give as much up-to-date information as possible yet there may be some omissions and it would be highly appreciated if those are pointed out for improvements in future.

I wish to express my sincere thanks and deep sense of gratitude to Dr. T. N. Khoshoo, the eminent biologist and Secretary, Department of Environment, Ministry of Environment and Forestry, Government of India, for his keen interest in this book and for kindly writing the foreword which has certainly increased its value. My grateful thanks are due to Dr. B. K. Tikader, Director, Zoological Survey of India, for his constant encouragements, valuable suggestions and for extending all the facilities. I am sure, without his personal interest, this book would not have been published so quickly. Thanks are also due to Prof. T. N. Ananthakrishnan, former Director, Z. S. I., who had given me the idea of writing this book and to Dr. S. K. Bhattacharyya, Dy. Director, for his sustained interest. I owe my sincerest gratitude to Prof. G. P. ChannaBasavanna, eminent Acarologist and President, Acarological Society of India, for taking the pains of critically going through the entire manuscript and offering many valuable suggestions for improving upon the quality of the book. A large number of scientists from India and abroad, viz. Drs. M. Mohansundaram, S. Ghai, S. Chakrabarti, Y. N. Gupta, G. L. Sadana, M. S. Dhooria, E. W. Baker, R. L. Smiley, D. A. Chant, S. Ehara, E. Swirski, M. K. P. Meyer, V. Prasad, L. R. Jeppson, C. B. Huffaker, M. H. Muma, H. A. Denmark and W. M. Chaudhri, extended valuable help by sending reprints of their works and illustrations, which were otherwise not available to me and have been freely used here, and for that I remain deeply indebted

to all of them. Some of the illustrations of this book were borrowed from 'Terrestrial Acari of British Isle', 'A manual of Acarology', 'Ph. D. thesis of Dr. Y. N. Gupta' and also from various journals and for according kind permission I am highly obliged to, Director, British Museum (Natural History), London, Dr. G. W. Krantz, Dr. Y. N. Gupta, Dr. G. P. ChannaBasavanna, Dr. M. Mohansundaram, Dr. S. Chakrabarti, Dr. D. Macfarlane and editors of various journals. Dr. A. K. Sanyal, Zoologist, Z. S. I., helped me in correcting some of the proofs ; Shri G. Sivagurunathan, the dynamic Publication Production Officer along with his colleagues *viz.* Shri B. C. Saha, Shri M. L. De and Shri P. K. Ghosh of the Publication Division, Z. S. I., made tireless efforts in expediting the publication of this book ; while M/S Sri Aurobindo Press, the printers of this book, made valuable assistance in timely supplying the proof and faithfully incorporating all corrections made thereon and all of them deserve my special appreciation. Shri Sitaram Mondal, Artist, Z. S. I. had designed and drawn the coloured illustration of the coverpage while Shri S. Biswas Artist, Z. S. I. helped me in preparing some of the illustrations of the text and to both of them I offer my heartfelt thanks. I record my deep sense of gratitude to Dr. A. P. Kapur, former Director, Z. S. I. and Late Prof. D. N. Raychaudhri, Calcutta University, as it was they who advised me in the very begining of my research career to take up work on plant mites and the present book is the outcome of that. Lastly, I shall be failing in my duty if I do not acknowledge with sincere thanks the help I have received from my wife Smt. Reba Gupta and daughter Km. Nilanjana Gupta in preparing the Plant-Mite Catalogue, Statewise list of mites and Index of scientific names.

S. K. GUPTA

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Many of the text figures used under Eriophyoidea are after the works of Drs. G. P. ChannaBasavanna, M. Mohansundaram, S. Chakrabarti, A. K. Das, S. Mondal and B. Ghosh. They gave the kind permission to use their illustrations in my book and I am specially thankful to them for this generosity.

I also acknowledge with sincere thanks the help I have taken from the following works for preparing some of the illustrations in the groups mentioned against each :

Evans *et al.* (1951)—for general morphology of Acarina

Ph. D. thesis of Y. N. Gupta,
Pritchard and Baker (1955) and } —for Tetranychidae
Meyer (1974)

Pritchard and Baker (1958)—for Tenuipalpidae

Beer (1954)—for Tarsonemidae

Baker (1949) and
Summers and Price (1970) } —for Cheyletidae

Baker (1965)—for Tydeidae

Khot (1963-65)—for Erythraeidae

Ghai and Menon (1969) }
and } —for Phytoseiidae
Chant (1960)

Narayanan and Ghai (1964)—for Ascidae

Robertson (1959) }
and } —for Acaridae
Manson (1972)

I also acknowledge the help I have taken from Jeppson *et al.* (1975) for keys specially for higher taxa in Eriophyoidea while Krantz (1970) and Evans & Till (1979) for keys to orders of Acarina.

Dedicated to
MY PARENTS
AND
FELLOW ACAROLOGISTS

ZOOLOGICAL SURVEY OF INDIA

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INTRODUCTION

Mites play an important role in agriculture as many species are plant feeders causing various types of direct damages like loss of chlorophyll, appearance of stipplings or bronzing of foliage, stunting of growth, producing various types of plant deformities and reduction of yield. Apart from direct damages, there are many species belonging to Eriophyidae and some Tetranychidae which are known as vectors of plant viral diseases causing more potential loss to the growers. In recent years, due to random use of chlorinated hydrocarbons for control of general pests, which in turn kill their natural enemies, and because of using high yielding varieties and improved agricultural practices, many species, which were of less importance or of no value at all, have assumed the status of major pests and all these have further aggravated the mite problem. Contrary to the injurious mites, there are some beneficial mites too which act as our friends by preying upon phytophagous mites and small insect pests like aphids, coccids, etc., and thus help in biological control.

In view of this importance, the plant mites have drawn the attention of the acarologists and agricultural entomologists and a good deal of work both on fundamental and applied aspects has been done in India resulting in exploration of fauna, discovery of new species, enriching our knowledge on bionomics and control of these mites and highlighting the importance of some predatory mites. Unfortunately, most of the information is scattered and often much is inaccessible to majority of the workers. Hence, there has been a growing need to have a comprehensive book on the subject dealing both with taxonomy and applied aspects of these mites so that one can get all the information under one cover and the present book is to fulfil that long felt need.

Altogether, 557 species of mites known to be associated with plants in India till 1983 are dealt with here giving their diagnosis, host/habitat records, detail distribution and keys for the identification. For phytophagous mites, wherever known, information on nature of damage, bionomics, control, etc. are given and for other mites, predatory behaviour, wherever recorded, are highlighted. Various general aspects such as habits and habitats, techniques of study, sampling technique, general morphology, bionomics, economic importance, chemical

control, natural enemies, classification, etc. are discussed in brief to familiarise the readers with the subject. The measurements given in the text are all in microns.

HISTORY

The use of the term 'Akari' or mites originated as far back as 1650, though its existence was referred to as early as 850 B. C. by Homer. Linnaeus in 1758 in his '*Systema Naturae*' listed nearly 30 species. In the following 100 years, the major contributions came from Latreille, Leach, DeGeer, Duges, C. L. Koch and Michael. The importance of Acarology was further realised in 19th and 20th centuries through the outstanding works of Kramer, Megnin, Canestrine, Berlese, Vitzthum and Oudemans. Later, Baker & Wharton (1952) wrote the first comprehensive book in Acarology. Evans (1957), Evans *et al.* (1961), Krantz (1970) and Hughes (1976) increased our knowledge further in this subject. Jeppson *et al.* (1975) brought out the first ever comprehensive book on mites injurious to economic plants which will serve as a valuable reference for many years to come.

The earliest record of the study of mites in this country was made as far back as 1868 when Peal discovered mites on tea in Assam and named it red-spider. Wood Mason (1884) went further in investigating this mite by describing it as *Tetranychus bioculatus* which, in fact, is the first published reference on Indian plant mite of agricultural importance. Green (1890) studied another tea pest, *Eriophyes carinatus* Green (= *Calacarus carinatus*), from Assam. Cotes (1895) published an account on insects and mites attacking tea in India. Later, Watt (1898) and Watt & Mann (1903) published comprehensive books incorporating the observations made by the earlier workers. Hirst (1923-26) described some spider-mites from India. Subsequently, various workers, viz. Rahman & Sapra (1940), Puttarudriah (1947), Puttarudriah & ChannaBasavanna (1953-1961, 61a), Cherian (1931, 38), Das (1959-65), Narayanan & Ghai (1961-64, 64a), Narayanan *et al.* (1960), Narayanan & Kaur (1960), Ghai (1964), Ghai & Menon (1967, 69), ChannaBasavanna (1966), ChannaBasavanna *et al.* (1979), Gupta (1969-80), Prasad (1974, 75, 75a, 75b, 75c), Sadana & Chhabra (1974, 80, 80a, 80b), ChannaBasavanna (1981, 81a), Mohansundaram (1980-83), Chakrabarti and co-workers (1977-80), and Nassar & Ghai (1981), made significant taxonomic contributions towards advancement of our knowledge on mites associated with plants in India. There are

several other reports both in taxonomy and other aspects which have been referred separately under each species. For further classified references in the subject, the readers may consult the excellent bibliography by ChannaBasavana *et al.* (1979).

HABITS & HABITATS

Before collection of mites, it is absolutely needed to acquaint with the habits and habitats of the plant mites. Since most of the plant mites are negatively phototrophic, these are normally found on the under surface of the leaves either in colonies (like members of the families : Tetranychidae, Tenuipalpidae, Eriophyidae) or in solitary forms (like members of the family Tarsonemidae and majority of the predatory mites). But sometimes when the population on the lower surface increases considerably, some of the mites may also occur on the upper surface of the leaves. Some of the spider-mites cover their colonies with thin webs where all the developmental stages may be seen. Those who do not live in colonies are found either on leaf lamina or in angles formed by the major veins. A good number of mites (Phytoseiidae, Tydeidae etc.) may be found on twigs or stems or under barks. The eriophyid mites, the most peculiar among the mites, are often found on various malformed or deformed plant parts. A large number of mites may be found in the flowers, buds, axils of leaves, etc. The occurrence of mites within the galls are also not uncommon, but in case of mite galls, they are usually of open types contrary to the insect galls which are all of closed types.

TECHNIQUES

Collection

The wide range of habitats of mites has led to the development of a number of specialised collection techniques which are briefly summarised below :

Hand-picking ; Though it is most strenuous, but yet it is profitable as a rich and varied collection of plant mites can be made by this method. The infested leaves or plant parts are examined under a 10X lens in the field and the mites can be picked up by a fine sable-hair brush moistened with alcohol (75%). Better results are obtained if the infested leaves or plant parts are brought to the laboratory in

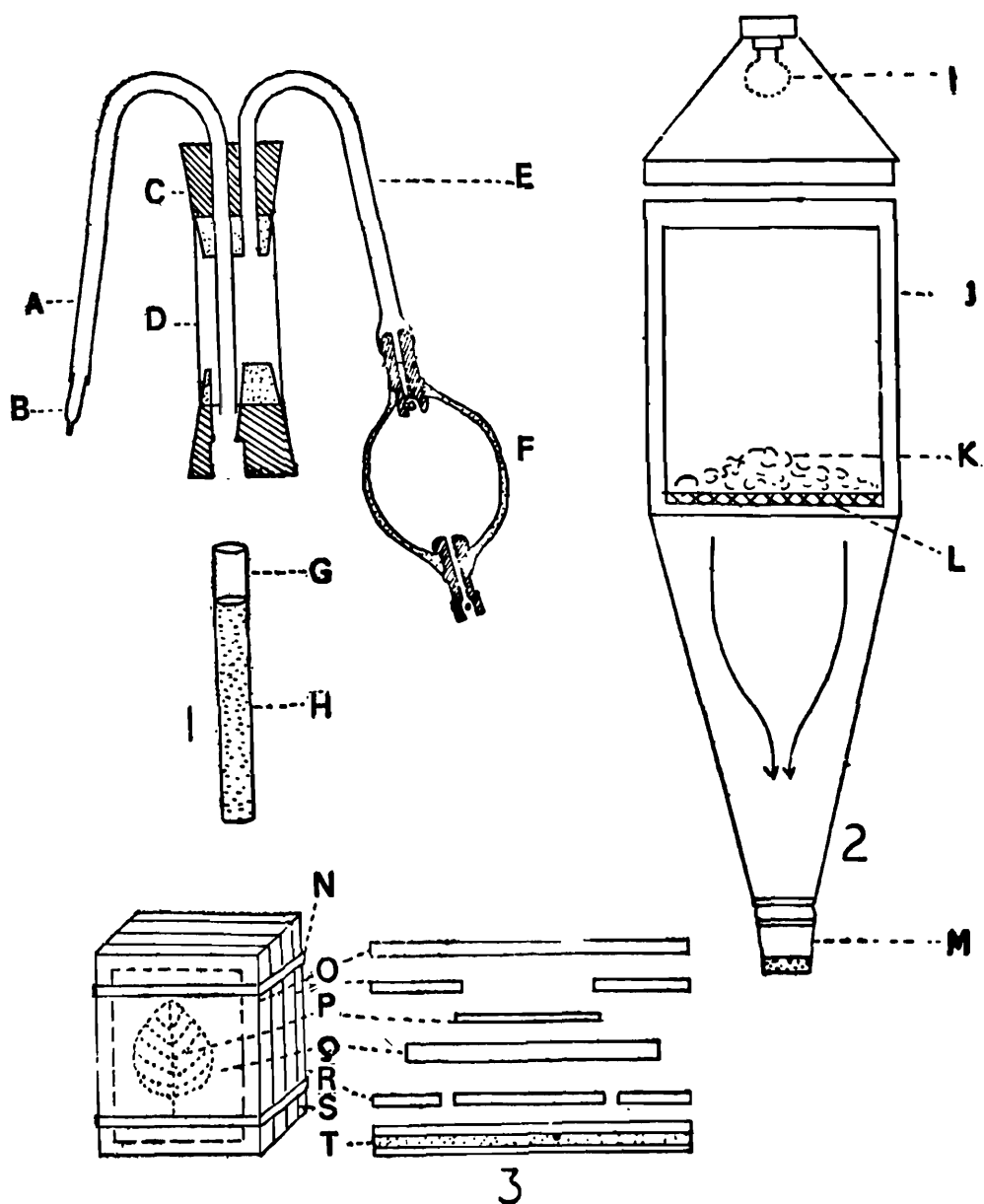
polythene bags after tightly closing the mouth of the bag with a rubber band and then examining those under a stereo-binocular microscope in the laboratory. Small mites as tydeids, etc. can be better collected by hand-picking. The identification of host-plant is most important and, hence, a herbarium of plants is to be maintained. In case of tetranychid mites, collection of male specimen is very essential for the identification of species and, therefore, necessary efforts should be made to get this sex in the collection.

Sweeping : Low herbaceous plants, grass land, etc. when swept with a fine net (the type commonly used for insect collection), a large number of mites will get lodged on the inner surface of the net wall and later those can be picked up with a sable hair brush.

Beating : A white enamel tray with a cotton pad at the inner surface is kept under portion of the plant wherefrom the mites need to be collected. The plant part is beaten with a wooden rod which will cause dislodgment of mites and subsequently those will fall on cotton pad and get entangled. Later, those are picked up with a brush (Gupta, Dhooria & Sidhu, 1975). Small mites as tydeids, etc. which are difficult to collect by heat treatment through funnel, can be easily collected by this method.

Aspirating : A Singer type aspirator (Singer, 1964) (Fig. 1) is quite convenient for collection of plant mites as it helps in collection of mites from its habitat into the preservative directly eliminating the necessity of handling the specimens.

Brushing : This is done in mite brushing machine which is somewhat modified from the one used by Henderson & McBurnie (1943) and later used by many including the present author (Gupta, Dhooria & Sidhu, 1975). This is a very handy machine and is made of two contrarotating brushes operated by a 6-volt battery. The leaf to be brushed is held between the brushes. The mites get dislodged and fall on a plastic disc kept below the brushes. Since the plastic disc is kept smeared with vaseline, all those mites which fall on it get attached in vaseline. Later, these are picked up with a brush. The leaves should be worked forward and backward several times to ensure thorough dislodgment of all the mites from it. For some time, the petiole should be held and the rest of the leaf should be inserted while this process should be reversed holding the apical portion of the leaf. This method is also very efficient for estimating the population density of mites.



Figs. 1-3. 1. Aspirator for collection of mites (after Krantz, 1970). A. Incurrent tube, B. Intake, C. Rubber stopper, D. Glass body, E. Excurrent tube, F. Bulb, G. Collecting vial, H. Collecting fluid.

2. Extraction chamber (after Krantz, 1970). I. Bulb, J. Chamber, K. Sample, L. Sieve, M. Collecting jar.

3. Rearing cell for mites (after Evans *et al.*, 1961). N. Rubber band, O. Lucite, P. Leaf, Q. Cotton gauze, R. Rubber gasket, S. Blotting paper, T. Waterproof plywood.

Flotation method : The leaves are plucked from the fields and are put in glass jar containing water and a detergent (Teepol) and is then vigorously shaken. The mites are dislodged and then are collected by filtration. The residue is washed with alcohol in a cavity block to get the mites (Dhooria & Gupta, 1975).

Scrapping & Teasing : Infested plant parts like inflorescence when scrapped or galls when gently teased, the mites come out and can be easily collected.

Galls which are gently opened are put into an open glass jar and the latter is kept in an airy room away from direct sunlight. As the galls gradually dry up, the mites come out of the galls and start crawling on the inside wall of the jar. The inside wall is wiped with glycerol upto 5 cm. below the mouth of the jar to avoid the escape of mites. Later, previously warmed chloropicric acid is poured over the dried plant part and the cylinder is vigorously shaken. The plant material is then allowed to settle and the liquid containing mites is poured off into a suitable container and stored. The vagrant eriophyids are best collected by wrapping the infested plant parts in a tissue paper and stored in an envelope. The mites are subsequently recovered by simmering the plant parts in Keifer's preparatory solution which is made of the following ingredients : Resorcinol—50 gms, Diglycolic acid—20 gms, Glycerol—25 ml., Iodine—enough to produce the desired colour and water—10 cc. When the mites are warmed in this solution, they get expanded, cleared and become suitable for slide preparation. In case of the leaf vagrants, the infested plant parts are put into a vial (10 cm. × 2.5 cm.) and the liquid (a thin sorbitol syrup in 25% solution of isopropyl alcohol + iodine crystals) is put into it after returning to the laboratory. Data are written on the outside wall of the tube.

Heat-treatment (Fig. 2) : A good number of plant mites can also be collected by subjecting the plant material to heat treatment in a modified Tullgren's funnel. An electric bulb (40 W) will be enough to facilitate complete extraction. The mites are collected in a receiver containing a preservative (75% alcohol) and fitted with the stem of the funnel.

Preservation

The plant mites (except Eriophyidae) are best preserved in ethyl alcohol (70-80%). A few drops of glycerol may be added to avoid drying of specimens through evaporation of alcohol. Some workers prefer the use of Oudemans' fluid which is made of the following ingredients : Alcohol—87 parts, Glycerol—5 parts and Glacial acetic acid—8 parts). In this preservative, the mites are killed with their appendages stretched helping in better orientation of the specimens. However, when lactic acid is used for clearing of specimens, this preservative is unnecessary. In case of eriophyids, as mentioned earlier, the infested plant parts when wrapped in tissue paper and dried can

be stored indefinitely. Jeppson *et al.* (1975) pointed out that tetranychids etc. can be kept in AGA solution which is made of the following ingredients : 70% Isopropyl alcohol or ethyl alcohol—8 parts, Glacial acetic acid—1 part, Glycerine—1 part and Sorbitol—300 gms to one gallon of the above. The preservative which is suggested for eriophyid (Jeppson *et al.*, 1975) is a thin sorbitol syrup in 25% solution of isopropyl alcohol. For this, 25% alcohol solution is made first and then sorbitol solution is added allowing the sugar to dissolve until fluid becomes a thick syrup. Small amount of iodine crystals are added to prevent mould. The preservative is to be kept in the laboratory and poured into a vial containing the plant parts. Recovering mites from dry infested plant parts consists of placing small amount of these parts, galls, etc. in a cavity slide, putting a drop of a preparatory medium and examining with transmitted light. Gentle heating may be required to obtain better clarity of specimens.

Mounting

Temporary : It is done in lactic acid (50-100%) depending upon the degree of sclerotization of the specimens and then gently warming the slides over an electric lamp (40W) for a few seconds until the fumes of lactic acid start emerging. Tetranychids, tydeids, cunaxids and other soft bodied specimens should better be mounted in cavity slide to avoid damage of specimens. The specimens after studying may be transferred back to alcohol or may be mounted in permanent mounting media. Instead of full size coverslip, broken pieces of coverslips should be used specially while mounting in lactic acid to avoid crushing of the specimens.

Permanent : Modified Hoyer's medium is the most convenient mounting medium for mounting of mites. It is made of the following ingredients when mixed in the order as mentioned : dist. water—50 gms, gum arabic—30 gms, chloral hydrate—200 gms, glycerol—20 gms. Recently, another mounting medium, Heinze's medium (Evans & Till, 1979), is also being used and the same is made of the following ingredients : polyvinyl alcohol—10 gms, dist. water—40—60 ml, lactic acid—35 ml, glycerol—10 ml, phenol 1% aqueous solution—25 ml, and chloral hydrate—100 gms. Both living as well as preserved specimens can be mounted in this medium directly and, if required, can be remounted by removing the coverslip by immersing the slide in water overnight. However, experience shows that in tropical climate none of the above mounting media can keep the specimens in perfectly good

condition for a longer period as in both the cases the mounting media get dried up causing shrinkage of specimens. To some extent, this difficulty can be avoided by sealing the slides with a good quality nail polish or DPX and keeping the slides in airconditioned room or at least in a refrigerator. While mounting the specimens, it should be borne in mind that as far as possible, the specimens should be mounted both dorsally and ventrally to examine structures of both the surfaces. In case of tetranychids, lateral mounting is required for male specimens for examining the aedeagus.

For mounting eriophyids, Jeppson *et al.* (1975) suggested Konos' medium. This involves mounting in two stages. The primary medium which is made of chloral hydrate—100 gms, glycerine-10 gms, water—50 ml, and conc. HCl-1 cc. Mites are gently cooked in Konos' preparatory mixture and when cleared, they are needled over into a wash of Hoyer's and to the final slide. Final slide should not be heated. There is another mounting medium for eriophyids i.e. Formaldehyde medium consisting of the following ingredients : sorbitol—3 gms, gum arabic powder-1 gm, iodine crystal-0.02 gm and 4% formalin solution—5 cc. These materials are allowed to dissolve with agitation for 24 hours or more and then the following are added : chloral hydrate crystal—14 gms, glycerine—20 drops, potassium iodide—0.1 gm or 0.2 gm, formalin solution (4%) may be added further, if necessary. While preparing slide, 2 drops of F. medium is put in the cavity of a slide and the mites are needled into it. A drop of HCl solution and a drop of phenol are added into it. The slide is then gently heated on a hot plate set below the boiling point of water till a gentle boiling is reached. Later, it is transferred to a drop of fresh F. medium to wash and to a drop of medium on a final slide. Some support to coverslip may be given by putting small broken pieces of coverslips or kapkok fibres to prevent crushing of mites.

Rearing

The most convenient method of rearing the mites is to confine those into an isolated leaf in small cages of Huffaker's type (Huffaker, 1948) (Fig.-3). For details regarding construction of cages, the readers may refer to Evans *et al.* (1961). Phytophagous mites feeding on plants can be reared in cells cutting circles out of the centre of small felt disc. These felt washers are fastened to the leaves with waterproof glue and covered with glass or cellophene. Mites can also be cultured in seedlings kept in pots. A petroleum jelly is applied around the base of the stem to prevent the escape of mites. A

commonly used method for rearing mites is the use of excised leaf and keeping the same in Petridish (5 cm dia.) over a cotton pad super-saturated with water. Leaf is periodically changed and water is added daily to maintain a film of water at the margin of the leaf to prevent escape of mites. Phytoseiid mites are best reared in plastic cages (Swirski *et al.*, 1970).

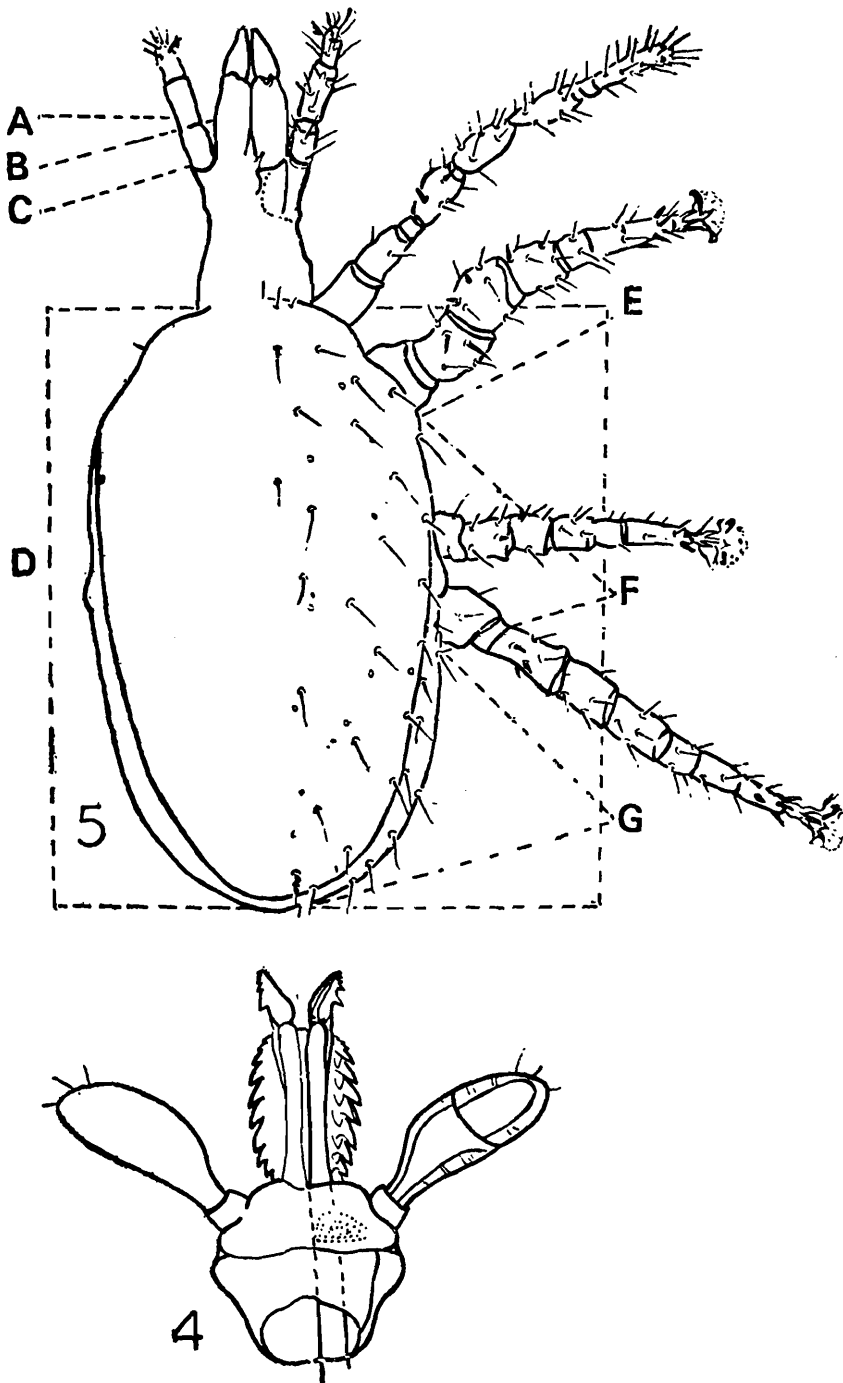
GENERAL MORPHOLOGY

The order Acarina can be distinguished from other arachnids by : (a) body not distinguished into cephalothorax and abdomen but at the most may be distinguished into Gnathosoma (body bearing mouth parts) and Idiosoma (rest of the body), (b) larvae have 3 pairs of legs while adults and nymphs have 4 pairs of legs. Most of the members of the Order Acarina are small while a few are tiny. Acarina includes both mites and ticks. The former can be separated from the latter as (a) mites lack Haller's organ but it is present on 1st tarsus of ticks, (b) hypostome without recurved teeth in mites whereas recurved teeth are present on hypostome of ticks (Fig.4), (c) most of the mites are soft bodied while ticks are usually with leathery texture, (d) mites have their stigmal opening either laterally between coxae III and IV associated with peritrematal shield (as in Mesostigmata), or stigmata are located on or near gnathosoma (as in Prostigmata) or trachea opens through acetabular cavities of legs (as in Astigmata), but in case of ticks, the stigmata are situated behind coxae IV or laterad between coxae II and IV and each is surrounded by stigmal plate. It is not within the purview of the present work to discuss in detail the morphology of mites as morphological characters of taxonomic importance for each family have been discussed separately in the later chapters. However, some of the salient morphological characters of mites in general are discussed here to give the readers a preliminary idea. Those interested to study this aspect in greater details may refer to Evans *et al.* (1961) and Krantz (1970).

Segmentation : Unlike most other arachnids, the mites show little evidence of segmentation except in Tarsonemina where segmentation is shown by a number of overlapping shields. Most authors believe that the anterior part is composed of (a) precheliceral segment (segment-I), (b) cheliceral segment (segment II), (c) pedipalpal segment bearing pedipalp (segment III) and is followed by 4 leg bearing segments (segments IV-VII). The number of segments which form the rest of

the body is not known definitely in the absence of any definite embryological evidence, and, therefore, opinions differ.

Cuticle : The cuticle in Acari is secreted by epidermis. The epidermis is differentiated into 4 layers, as : Tectostracum, Epiostracum, Ectostracum and Hypostracum (Vitzthum, 1940). The epidermis is also responsible for production of setae which are of various shape



Figs. 4-5. 4. Gnathosoma of ticks (after Evans *et al.*, 1961)
5. Body regionations of mites : A. Pedipalp, B. Chelicera, C. Gnathosoma, D. Idiosoma, E. Propodosoma, F. Metapodosoma, G. Opisthosoma.

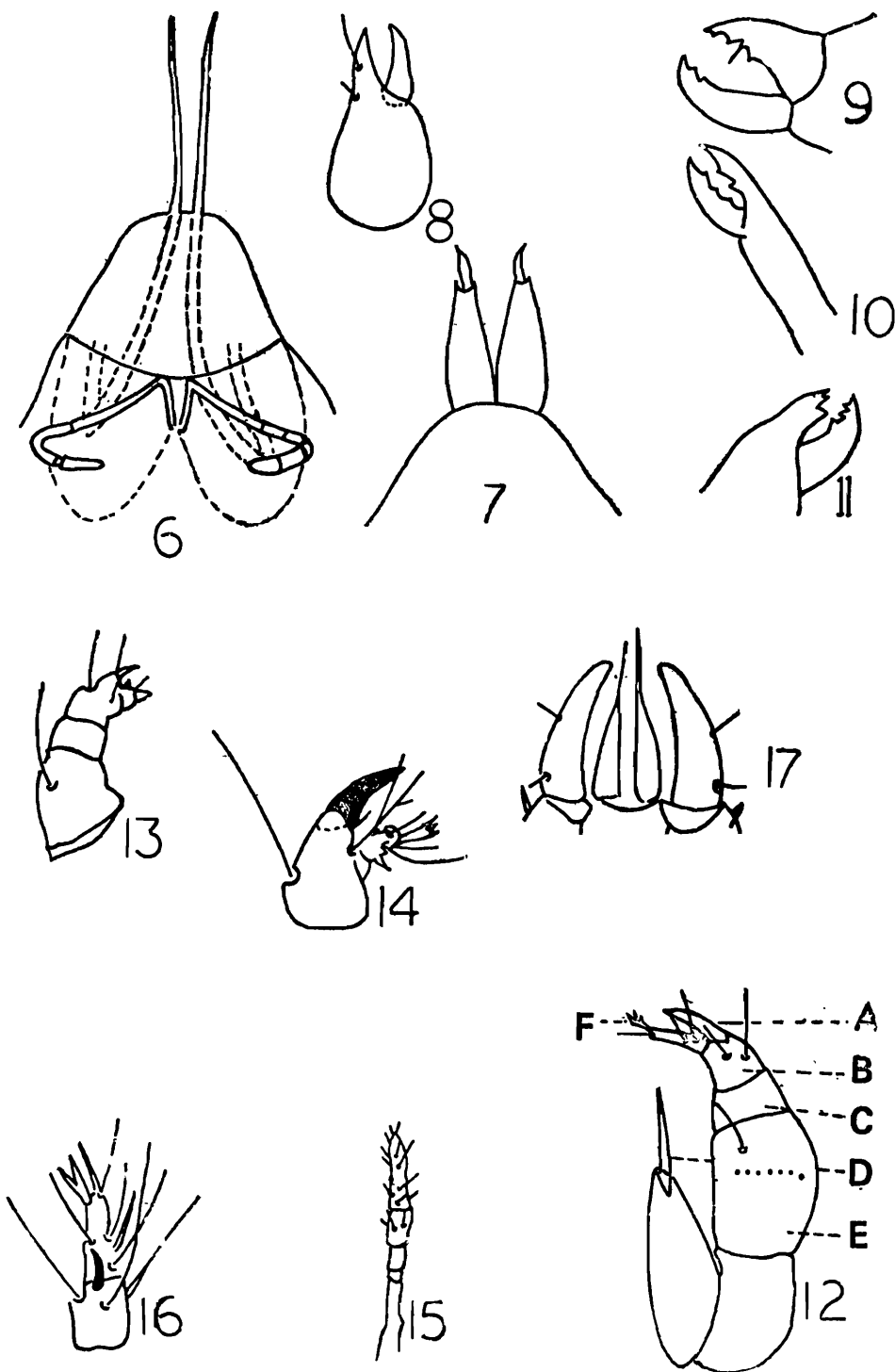
and size. Grandjean (1935), basing on the optical and chemical properties of setae distinguished two basic types, viz. one which has optically active chitin (Actinochaeta) and the other without active chitin (Anactinochaeta).

Gnathosoma : This consists of the anteriormost part of the body (Fig. 5) and is composed of three segments, the precheliceral, cheliceral and pedipalpal segments and the gnathosoma is movably articulated to the idiosoma by a synarthrodial membrane. Gnathosoma may often be enclosed within camerostome. The roof of the gnathosoma is formed by tectum, the lateral walls are formed by external walls of pedipalpal coxae which fuse dorsally with tectum and the floor is formed by the ventral extensions of the coxae. Mouth lies between and below the chelicerae. The mouth is bounded dorsally by an upper lip or labrum and ventrally by a pair of lateral lips. Gnathosoma bears various numbers of dorsal and ventral setae.

Chelicerae : It is essentially the feeding organ and in majority of the cases they are chelate. The chelicera of Astigmata and Prostigmata are 3-segmented consisting of small basal part (homologous with trochanter of other appendages), a large compound segment (may be formed by fusion of femur, genu, tibia and tarsus) and a short movable digit. In Anactinochaeta, eg. Mesostigmata, the chelicera is also basically segmented. The chelicerae exhibit considerable diversity in form and structure to suit with the different methods of feeding (Figs. 6-11).

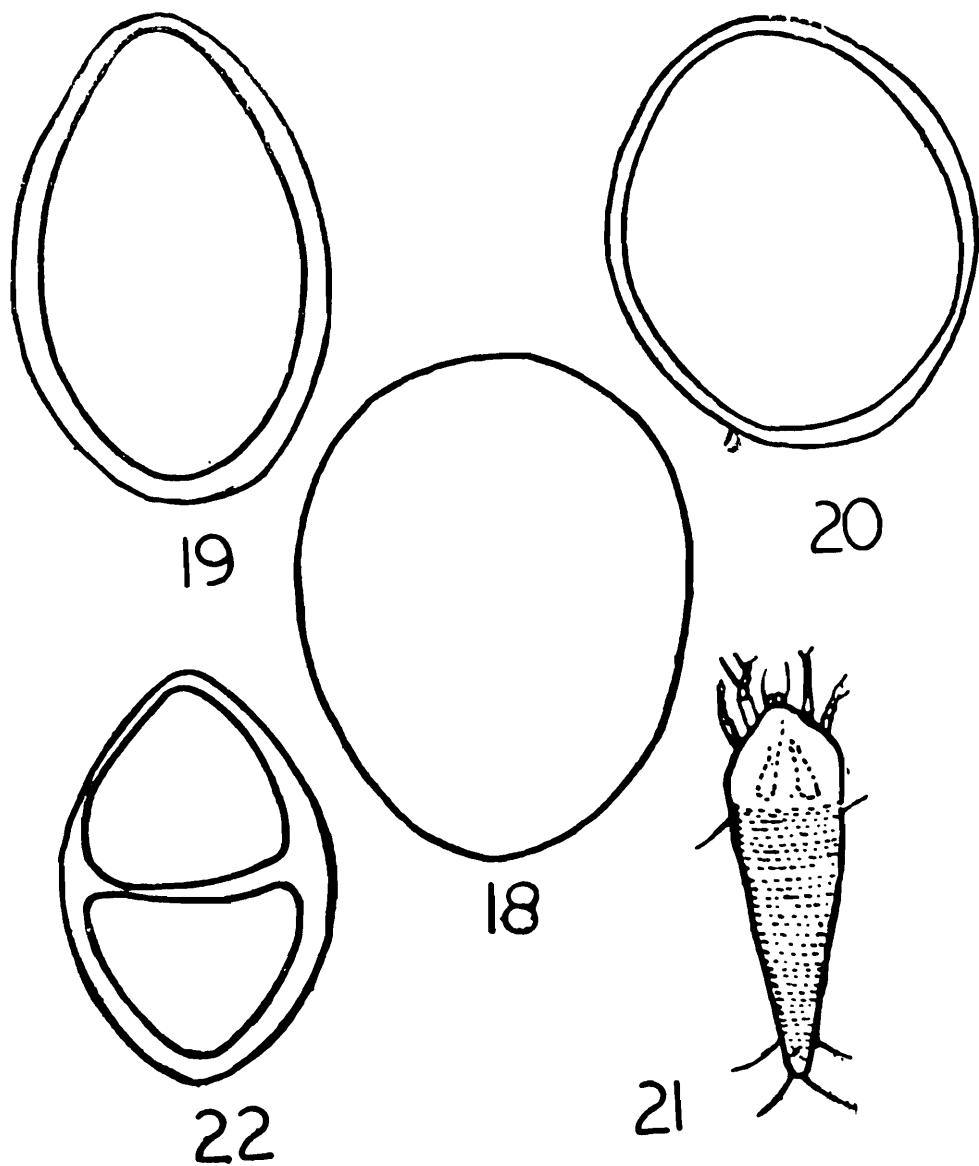
Pedipalpi (Figs. 12-17) : As has been mentioned earlier, the coxae of pedipalpi are fused to form gnathosomal base. The remaining segments of pedipalp are movably articulated to the body of the gnathosoma anterolaterally to form sensory appendages which may be modified for grasping food. The Mesostigmata has 6-segmented palp (trochanter, femur, genu, tibia, tarsus and apotele). The palpi of Prostigmata and Astigmata are 5-segmented, but often the number of segments may be reduced by fusion of one or more segments. In Prostigmata, the palp tarsus opposes distal claw like tibia to form a thumb-claw complex (Family : Cheyletidae). Setae of diverse types may be present on pedipalp.

Idiosoma : The idiosoma may be oval (Figs. 19, 22), subcircular, round (Figs. 18, 20) in free living forms while in parasitic forms (Fam. Eriophyidae) the body is elongated and worm like (Fig. 21). A furrow may often demarcate the propodosoma from hysterosoma (Fig. 357)



Figs. 6-17. 6-8. Chelicera of Prostigmata, 9. Chelicera of Mesostigmata,
 10. Chelicera of Cryptostigmata, 11. Chelicera of Astigmata,
 12. Parts of palp in Prostigmata : A. palp claw, B. Tibia,
 C. Genu, D. Chela, E. Femur,
 13-14. Palp in Prostigmata, 15. Palp in Mesostigmata,
 16. Palp in Cryptostigmata, 17. Palp in Astigmata

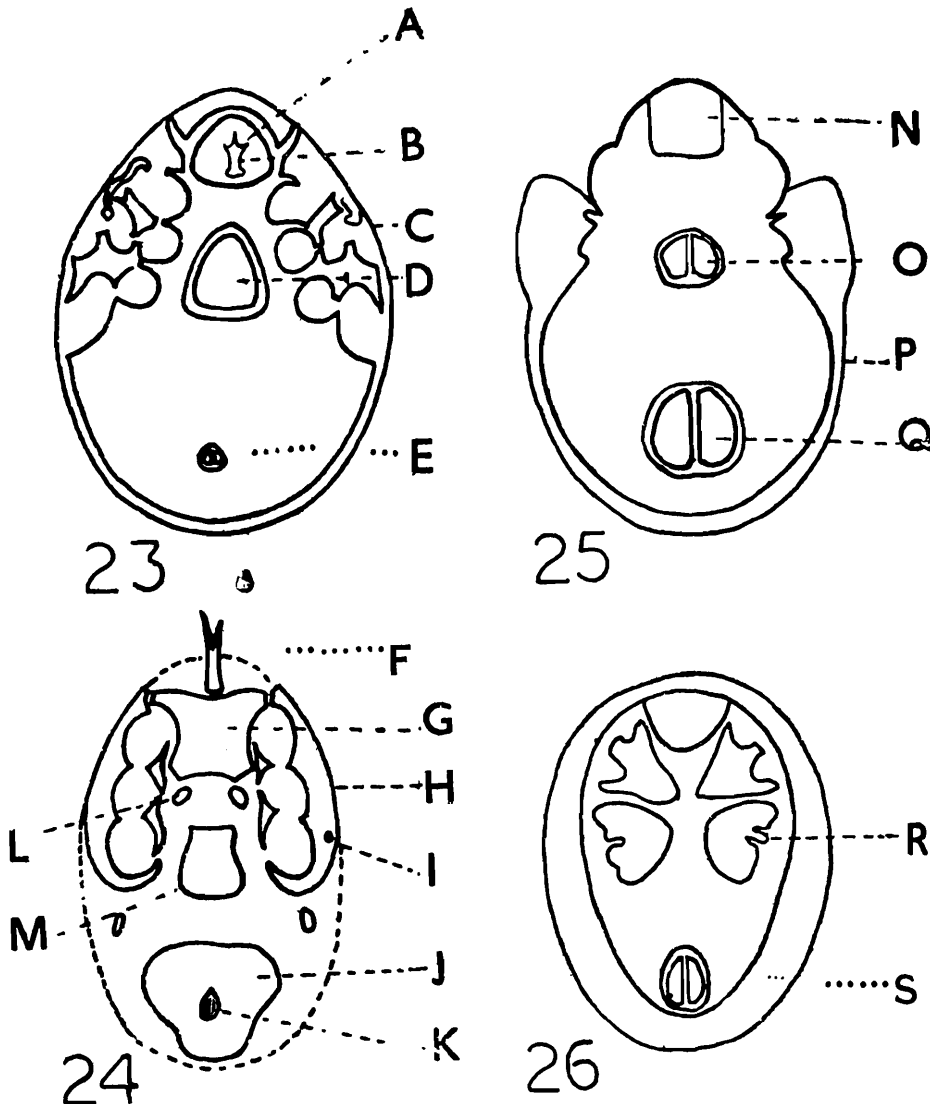
and the latter part may again be distinguished into metapodosoma and opisthosoma (Fig. 357). The cuticle of idiosoma is variously sclerotized into shields and plates (Figs. 23-26). In some Actinochaeta, the dorsal surface may be independently sclerotized to allow flexibility between these two body regions. In Astigmata, the propodosomal



Figs. 18-22. Different forms of idiosoma : 18. Spherical, 19. Oval, 20. Round, 21. Elongate, 22. Oval (Dorsal shield divided).

shield is almost constant. Among Prostigmata, the Tarsonemina possesses a number of overlapping horny shields (Fig. 214). In Stigmaeidae (Fig. 383) and Cheyletidae (Fig. 376), varying degrees of sclerotization occurs and shields are widely separated by striated cuticle. In Mesostigmata, the idiosoma is mostly covered by a single shield (Fig. 435) or it may be divided (Fig. 22). In Cryptostigmata, the idiosoma is heavily sclerotized. The setae on dorsal surface of idiosoma

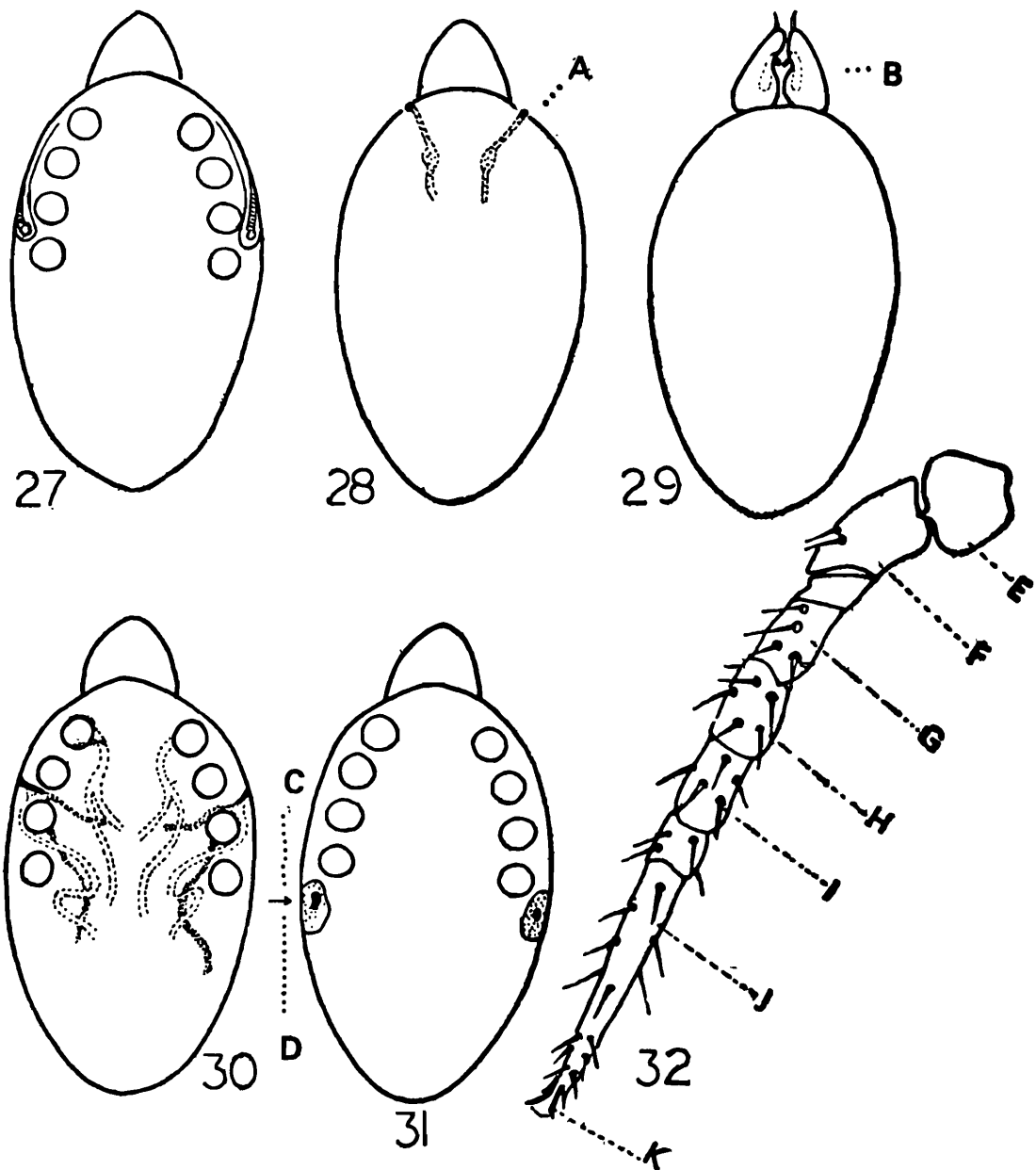
form a readily recognizable pattern and their relative size, number, shape, position and ontogeny are of taxonomic importance.



Figs. 23-26. Degree of sclerotization of venter in different Orders :
 23-24. Mesostigmata, 25. Cryptostigmata, 26. Prostigmata
 A. Camerostome, B. Tectum, C. Stigmal plate, D. Genital shield,
 E. Anus, F. Tritosternum, G. Sternal shield, H. Peritrematal
 shield, I. Stigmata, J. Anal shield, K. Anus, L. Metasternal
 shield, M. Genital shield, N. Camerostome, O. Genital valve,
 P. Pteromorpha, Q. Anal valve, R. Coxa, S. Genito-Anal valve.

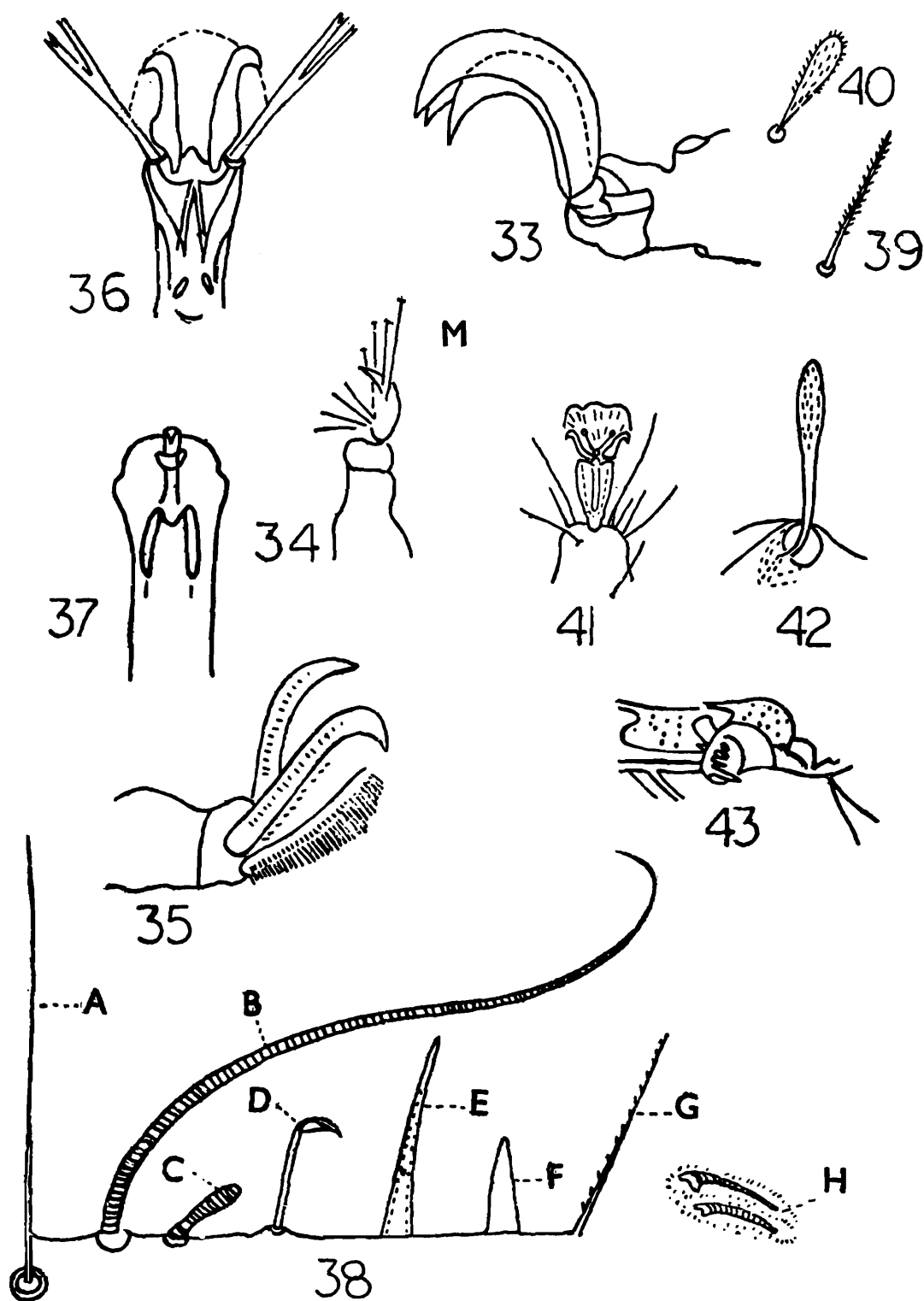
Ventrally, the sites of the ambulatory appendages, the anus and genital orifices are of great importance. The anus is situated medioventrally near the posterior end of body and in Mesostigmata, it is surrounded by a shield and the opening is covered by a pair of valves (Fig. 25). The position of genital opening is variable. In *Actinochaeta*, the genital orifice is in the form of transverse slit; in case of female, it is near the 4th coxae (Fig. 24) and sometimes is provided with a

shield. In Prostigmata (Fig. 201) and Cryptostigmata (Fig. 25) it is located on venter of opisthosoma while its position varies in Astigmata and is normally located between legs II-IV (Fig. 541). In some, the respiratory opening (stigmata) also may be located on the idiosoma and it may be surrounded by sclerotized shield. The position of stigmata may vary (Figs. 27-31).



Figs. 27-31. Position of stigmata in different Orders of Acarina (after Krantz, 1970) :
 27. Mesostigmata (stigmata laterally between coxae III and IV), 28. Prostigmata, A. stigmata at the base of gnathosoma, 29. Prostigmata, B. (stigmata at the base of chelicera), 30. Cryptostigmata, 31. Metastigmata (C. stigmata behind coxa IV and D. Stigmatal opening).

Fig. 32. Leg showing segments : E. Coxa, F. Trochanter, G. Femur, H. Genu, I. Tibia, J. Tarsus, K. Apotele.



Figs. 33-37. Ambulacra of Acari (after Evans *et al.*, 1961) : 33. Cryptostigmata, 34-35. Prostigmata (M-tenent hairs), 36. Mesostigmata, 37. Astigmata. 38. Diagrammatic representation of the structure of bifriengent setae of the Actinochaeta (after Evans *et al.*, 1961) : A. Trichobothrium, B, C, H. Solenidia, D. Famulus, E. Eupathidium, F. Spine, G. Barbed seta. Figs. 39-43. Sensory setae : 39-40. Prostigmata, 41. Mesostigmata, 42. Cryptostigmata, 43. Haller's organ in Metastigmata.

Legs : There are 3 pairs of legs in larva and 4 pairs in nymphs and adults except in case of Eriophyidae where there are 2 pairs of legs in all stages of development (Fig. 213). Normally legs are 6-7 segmented depending upon the fact whether basifemur and telofemur remain free or fused (Fig. 32). The number of claws on tarsus may vary from 1-3 and their type may also vary (Figs. 33-37). In Cryptostigmata, normally there are 3 claws (Fig. 33), when there are 2 claws, the median claw is either suppressed or modified in rayed (Fig. 34), pad-like empodium (Fig. 35). Most of the Anactinochaeta, are bidactyl and usually have membranous pulvillus (Fig. 36). The leg chaetotaxy and the presence and absence of various spurs, etc. are of significant taxonomic importance.

Sensory organs : Various types of setae (Figs. 38-43) are distributed over the body. The trichobothrium (Fig. 38A), a simple erect seta, occurs on legs or also on idiosoma performing tactile function. In Cryptostigmata and in some Prostigmata, specialised sensory organ, the pseudostigmatid organ (Fig. 42) is present which lies in distinct cavity called pseudosigmata. The body setae are normally simple, clubbed or clavate. In some Mesostigmata (*Ophionyssus*) the photoreceptive organ is present on the pulvillus of the 1st pair of legs (Fig. 41). Ticks have Haller's organ on tarsus of leg I. (Fig. 43).

Eyes in the form of circular differentiated area in cuticle may or may not be present. The lenses are in the form of dark pigments. Normally 2 pairs of eyes are present but 3 pairs of eyes are also not uncommon. Sometimes, out of 2 pairs, 1 pair may be lost. In Mesostigmata, the eyes are absent. Besides eyes, the other sensory structures are urstigma (situated between I and II pair of legs) and they vary in form.

BIOLOGY (Figs. 44-52)

Reproduction in Acarina is normally through Arrhenotoky. In some cases, as in *Bryobia* reproduction is also through Thelytoky. Fertilized females produce eggs with diploid number of chromosomes and unfertilized ones produce eggs with haploid number of chromosomes. The offsprings of the former are females while those of the latter are males only. Mating is generally accomplished immediately after the female emerges. In some mites, as tarsonemids, males often take in their possession female teliochrysalis by contact. During mating, male crawls down the posterior end of female and urches its abdomen upward to accomplish copulation. Male holds the female

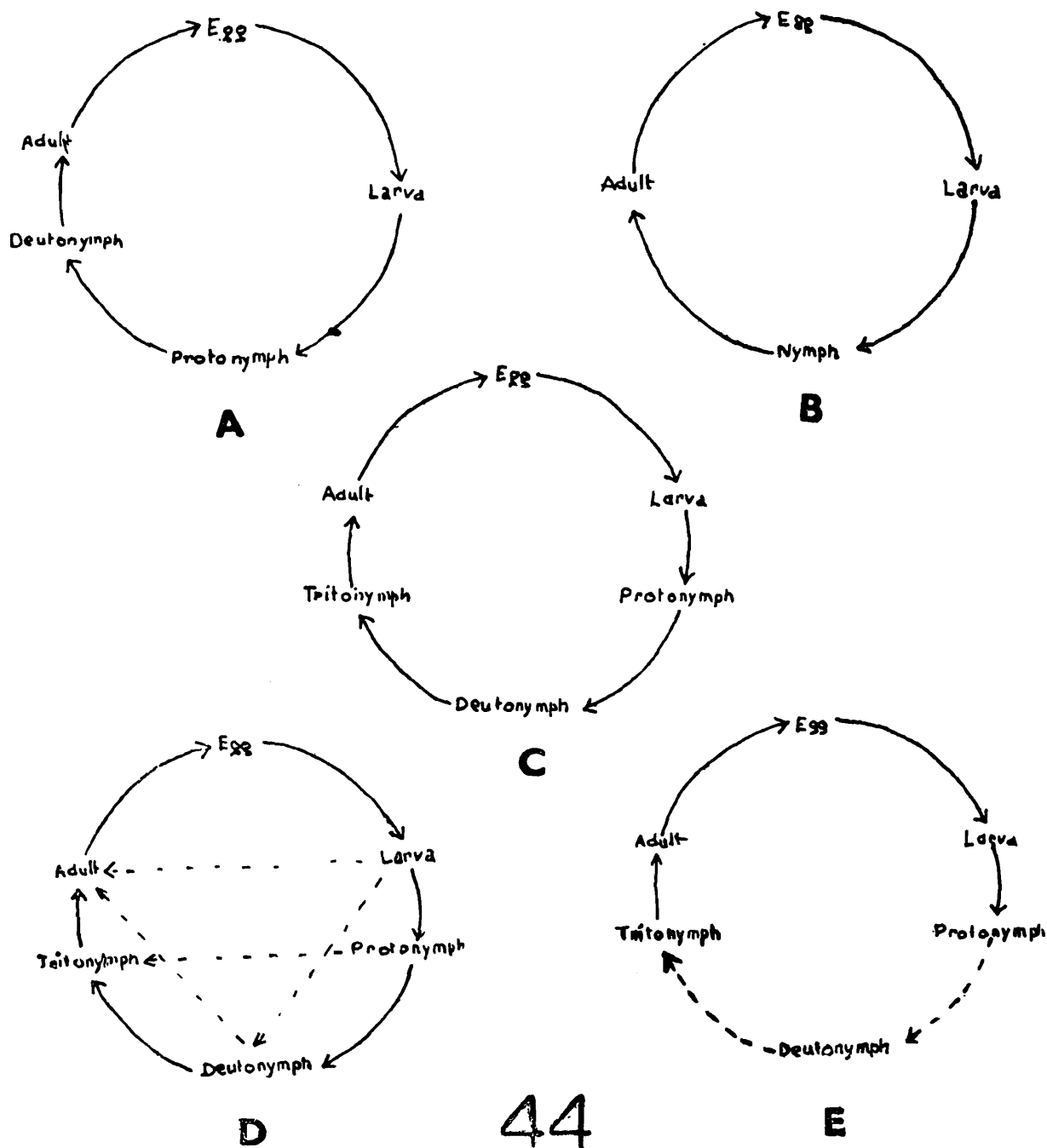
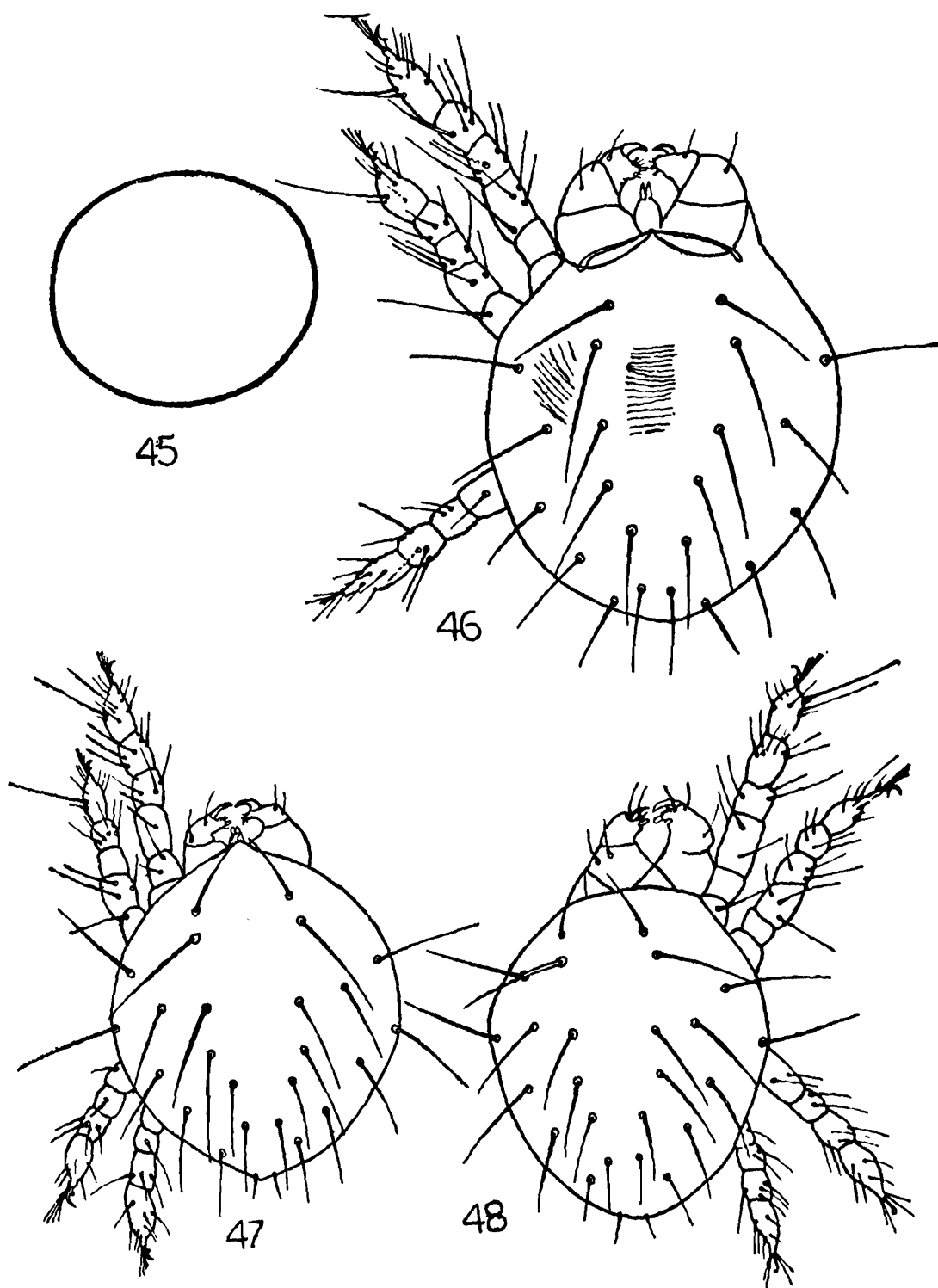


Fig. 44. Diagrammatic representation of life-cycles in Acarina (After Evans *et al.*, 1961) : A. Mesostigmata, B. Metastigmata, C. Cryptostigmata, D. Prostigmata, E. Astigmata.

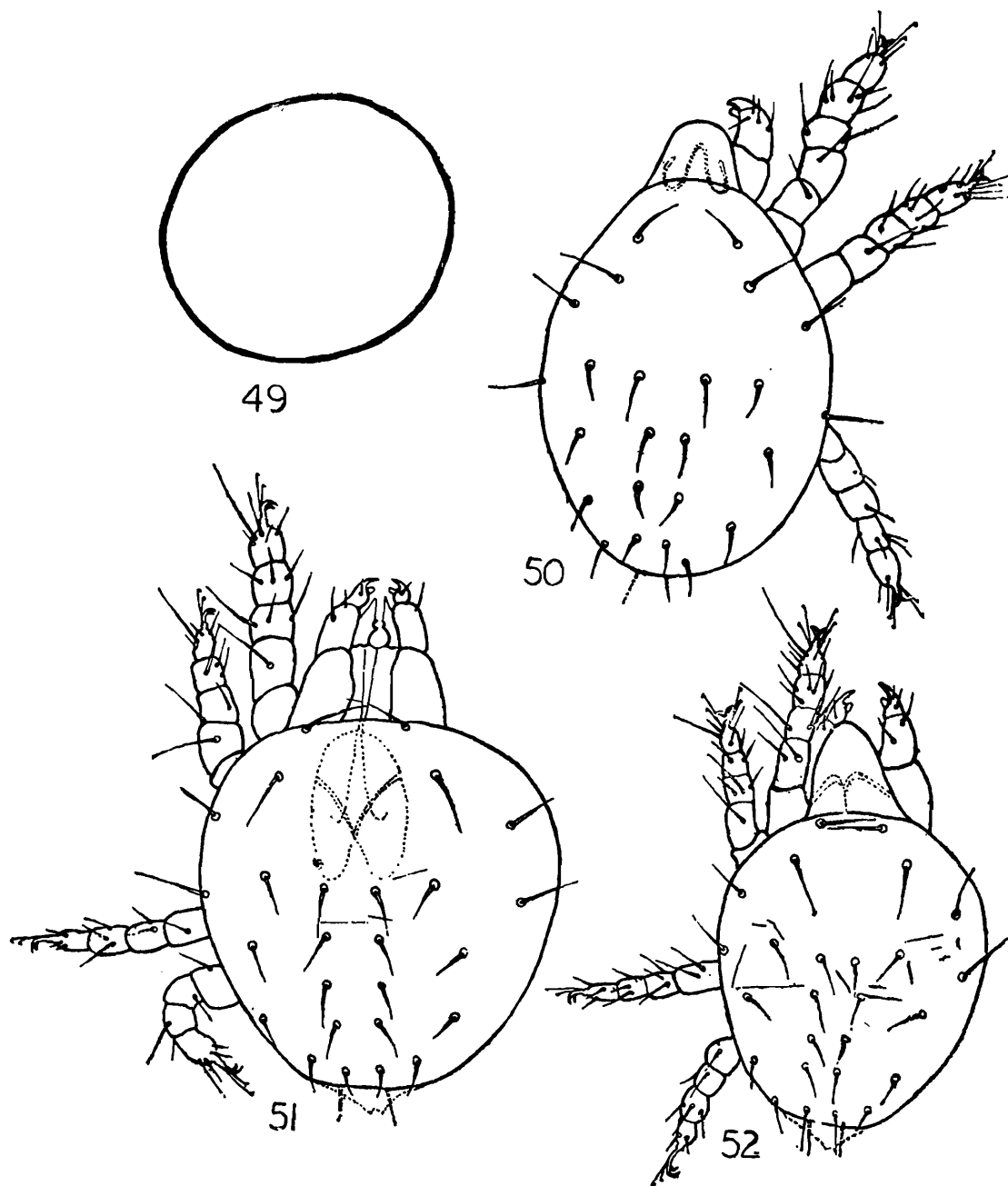
with the forelegs. The amount of spermatozoa introduced during copulation determines the sex ratio. The development cycle includes one or more active stages. In Mesostigmata, there are four active stages as larva, protonymph, deutonymph and adult. Males may miss one of the nymphal stages. In Prostigmata, the number of active stages vary greatly. In Tarsonemidae, only 2 stages are seen, *viz.* larva and adult. In Erythraeidae, the larval stage is followed by a single

nymphal stage. In Tetranychidae, the larva is followed by 2 nymphal stages, protonymph and deutonymph and in between these stages, there are quiescent stages. In some families of Prostigmata, viz. Tydeidae, Bdellidae, etc. the larva is followed by 3 nymphal stages, viz. protonymph, deutonymph and tritonymph. In Eriophyidae, there are 2



Figs. 45-48. Life-cycle of a tetranychid mite : 45. Egg, 46. Larva, 47. Protonymph, 48. Deutonymph.

active stages, the first stage nymph and second stage nymph. However, in some eriophyids, the life cycle is somewhat complicated as there are two types of females, the deutogyne adapted for hibernation and start reproduction in the next session, while the other type is the protogyne which generally reproduces throughout the summer and spring and dies with the advent of winter. In this case, an alternation of generation is exhibited. The presence of two different structural forms of females within a species is called Deuterogyny. Protogyne and deutogyne



Figs. 49-52. Life-cycle of a tetranychid mite : 49. Egg, 50. Larva, 51. Protonymph, 52. Deutonymph.

apply only to adults. The first and second stage of deutergynous species do not indicate whether they will produce protogyne, deutogyne or males. The deutogynes hibernate in the crevices and other shelters in previous year's wood on plants. They become active in winter and come out of hibernation site in search of suitable location for feeding and breeding. They produce protogyne and the same is repeated till early May when the deutogynes begin to appear amongst the protogynes. The deutogynes travel and enter into the crevices of the stem upto 15 cm or more and by middle of July when the leaves begin to fall, those deutogynes which reach the hibernation sites survive while the protogynes perish with the fall of leaves. The deutogynes after reaching hibernation sites become dormant and partially dry up. Winter rain and frost recondition the deutogynes for making active in the following spring (Baker & Wharton, 1952).

In many of the Astigmatid mites, often an optional hypopial stage (nonfeeding, active or inactive stage) occurs between protonymph and tritonymph. The significance of this stage is to withstand any unfavourable condition and also for dispersal purpose. Cryptostigmata possesses four active stages, viz. larva, protonymph, deutonymph and adult. The rate of egg laying, rate of development and sex ratio vary in different groups, in different seasons and also depend upon the availability of suitable food.

FEEDING HABITS

The members of the order Mesostigmata, Astigmata, Prostigmata show varying types of feeding habits as predaceous, phytophagous, mycetophagous or coprophagous. Some species have more than one type of feeding habits as Phytoseiidae feeds on animal food, nectar, plant juice and pollen.

Not much is known about actual mode of feeding. Mesostigmata and Prostigmata do not probably ingest solid food. In most of the Mesostigmata, the digestion is external. According to feeding habits, the chelicerae have been variously modified. Chelicera is suitable for grasping and chewing in many Mesostigmata, Astigmata and Cryptostigmata. The phytophagous forms usually have styliform chelicerae formed by the elongation of movable digits. In Tetranychidae, the chelicer basal segments fuse to form the eversible stylophore (Fig. 6). Pedipalpi are usually sensory but may be modified for grasping food as in Cheyletidae.

HOST-MITE RELATIONSHIP

Among phytophagous mites, eriophyids are to a great extent host specific. Tetranychidae, Tenuipalpidae and Tarsonemidae are, however, not host specific. Some are polyphagous and occur on a wide variety of plants. Among the tetranychids, some are quite specific as to the type of host. *Schizotetranychus* species mostly occurs on Monocotyledonous plants except of course *S. baltazari* which is an injurious pest of citrus. The genus *Platytetranychus* occurs normally on conifers. *Oligonychus*, *Eotetranychus* and *Tetranychus*, however, occur on diverse types of plants. Within a host also the mites may have certain preference for certain type of microhabitat. For example, *Oligonychus mangiferus* occurs only on the upper surface of leaves of grape vine while the lower surface of the same leaf may be infested by *Eotetranychus truncatus*.

Among the predatory plant mites, no specificity has been observed though one species may occur only on particular plant while another species may occur on a wide range of plants.

The chemical composition of the host plant, leaf size, its texture, vestiture, contents of nitrogen, phosphorus, calcium, magnesium, metal chelates, etc. influence the host specificity of mites. Nitrogen and phosphorus induce mite reproduction while calcium, magnesium and metal chelates retard it (Huffaker *et al.*, 1970). The presence and absence of alternate food in the field influence in making a particular plant more susceptible or resistant to a species.

SAMPLING OF MITES

Evaluation of population density is essential for undertaking any study on ecology and chemical control of mites. Since mites are not randomly distributed and also it is practically impossible to count all the mites in a field, it is necessary to estimate the relative population by sampling. Different workers take the sample in the field in different ways. Some take samples from each quadrant of a tree, some take samples only from the infested leaves while some use as sampling units all leaves on certain number of twigs. Some mites as *Bryobia*, *Phytoseiidae*, etc., also inhabit on twigs and for those mites, twigs also should be included in sampling.

No specific recommendation can be made for mites as a whole as to : (a) the number of trees to be selected for sampling, (b) the number of leaves to be plucked from each tree, (c) the zone of the tree where-

from the leaves are to be plucked, (d) the leaf area to be considered for counting of population and (e) the frequency of sampling. All these vary along with the crop and the type of mite to be sampled. Before taking any decision in that matter one should have a fair knowledge about dispersion pattern of the mite, variation of population, if any, in different zones of the tree as well as within the leaf itself. In this respect, Southwood (1966) may be consulted for getting general guidelines. In cases, where regular samplings are needed, efforts should be made not to pluck leaves to that extent as to restrict the food of the mite to be sampled as this may consequently affect its reproduction.

Several techniques are known for sampling of mites and those are briefly discussed below (see also Gupta, Dhooria and Sidhu, 1975).

Sampling of phytophagous mites

Direct counting : This is the commonest of all the methods. The sampled leaves are put into a Petridish containing chloroform soaked cotton to immobilise mites. Later, the leaves are put one by one under a stereo-binocular microscope and the mites are counted either from the entire leaf or from a definite leaf area depending on the intensity of population and intraleaf variation, if any. Some authors found that comparing the plotted values based on actual counting of mites with the number of leaves having no mites, one can have a rough estimate of mite population.

Imprinting method : A Whatman filter paper No. 1 is put over the undersurface (because mites normally inhabit undersurface) of a leaf and a wooden roller is rolled rapidly from base to apex of the leaf and back with pressure sufficient enough to crush all the mites. The mites after being crushed leave characteristic stains on the filter paper which make permanent records of the population. Later, those spots are counted. An experienced person can easily differentiate the stains left by the adults and nymphs which are normally brownish and those left by the eggs which are paler.

Flotation Method : Already discussed under collection technique.

Jarring Method : Already discussed under collection technique.

Brushing Method : Already discussed under collection technique. However, for counting of population from the sectors of plastic discs, there are definite formulae available and those are to be applied depending upon the population density of mite to be sampled.

Sampling of predators (both Predatory Mites & Insects)

In case of predatory mites, by and large, the methods discussed above for phytophagous mites can be used. However, some predatory mites inhabit on twigs and crevices of stems and therefore sampling of leaves may not give correct picture of its population. In such cases, samples should be made from all possible plant parts. In case of insect predators, some difficulty may arise because they may fly away or may fall off when the leaves or twigs are disturbed. The following methods may be used : (Huffaker *et al.*, 1970).

Counting after knocking down of predators : In this case, the predators are dislodged on a Petridish after spraying or dusting a pesticide and those are counted.

Jarring or beating method : This is done almost in the same way as discussed for phytophagous mites.

Suction Method : The predator can be collected quite easily by a suitable aspirator and then counted.

Visual Search : Without disturbing the predators, a visual search over a certain number of plants or trees, if made, for a desired period of time, a reasonably correct picture about the population of predator can be had.

Trapping Method : In this method, the predators are trapped by corrugated bands (Huffaker & Spitzer, 1950) and then the population is counted.

SEASONAL OCCURRENCE

Most of the phytophagous mites and predatory plant mites occur in the field throughout the year in tropical climate except, of course, in rainy seasons when the population declines considerably due to washing away of the leaf population and also during the severe winter months when the egg laying ceases due to dropping down of temperature below the development threshold. Temperature, humidity and light are the important factors influencing the dynamism of mites. In temperate climate, however, some of the tetranychids enter into diapausing stage (also called overwintering stage) during winter either in egg stage as in *Panonychus ulmi* or in adult female stage as in many species of *Tetranychus*. The diapausing eggs are laid on twigs or barks rather than on leaves. Those who enter diapause in adult female, take shelter in crevices and cracks of wood till temperature becomes favourable. Diapausing depends upon three conditions, viz.

photoperiod, temperature and nutrition. Of these, the first two conditions are most important though absence of healthy food may also induce diapausing (Boudreaux, 1963). Diapausing mites or their eggs must undergo a period of diapause development before environmental condition can trigger the resumption of activity.

The dispersal in mites is normally accomplished through transportation of hosts as has been seen in case of mites infesting ornamental plants, fruit trees, etc. The dispersal from one field to another takes place through crawling. In some tetranychids, the dispersal is done in very peculiar way called 'Balooning'. When the population of mite in a leaf reaches to a stage that can not provide enough food to the mite, the dispersal becomes a must. The mites lower themselves from the host plant on a fine silken thread and then subsequently are carried away to a distant place through a gentle wind current. The silken thread acts as baloon or as parachute.

ECONOMIC IMPORTANCE

Some of the mites associated with plants are quite injurious as they cause damage to their hosts either directly or indirectly. On the contrary, there are a good number of species which act as predators of other phytophagous mites and some small insect pests as aphids, coccids, etc. and thereby help in doing natural control of pests. The nature of direct and indirect injuries caused by plant mites have been elaborately discussed while dealing with the individual species in the following chapter. However, a general discussion is made here in brief to give an overall idea about the nature of damage caused by mites and the importance of the predatory mites in controlling them.

Injurious mites

Direct Injuries : Phytophagous mites while feeding on plants, penetrate the plant tissues by their needle-like chelicerae and suck the exuding sap. During this process, it damages the chlorophyll resulting in change of photosynthesis and transpiration rates. The photosynthesis is reduced by the damage of chlorophyll while the transpiration rate is increased due to disturbance in water balance. Sometimes the chlorophyll loss may be to the extent of 15-35% or more. These result in drying and dropping of leaves. The damage of mesophyll layer on the lower surface of the leaves due to feeding on that surface causes bronzing. Besides these direct injuries, many mites while feeding inject certain toxins resulting in diverse reactions in plants to those

toxins. The reactions may be different in different plants although the toxin might have been injected by the same species. All the above reasons stimulate the appearance of common mite-feeding symptoms as stippling, bronzing, defoliation, retardation of growth, reduction in size, quality and quantity of fruits and flowers, appearance of various types of plant deformities and all these affect the yield of the crop. In many cases, the infestation may be below the economic threshold level but often the damage becomes alarming causing great loss to the growers. The extent of loss may be between 2-10% as has been reported from U. S. A. (Huffaker *et al.*, 1969) but Kolbe (1968) reported the loss to be as high as 39-51%. It is a general observation that the loss is on the side of increase gradually with more use of pesticides and with the application of improved agricultural practices. In case of tetranychids, Van de Vrie *et al.* (1972) reported that the injuries caused by mites are related to many unpredictable variables including the intensity of attack, weather conditions either concurrent or immediately following, the species of mite, species and variety of crop, its relative degree of susceptibility, nutrient elements in leaves and the chemicals applied to the crop. Imbalance in growth regulatory substances was found associated with the degree of mite infestation as gibberellin and auxin like promoters were present in the tissues of mite infested plants (Van de Vrie *et al.*, 1972).

Members of the family Eriophyidae are known to cause various types of damages. Of these, the most common is the formation of galls and, hence, their name 'Gall mites'. The shape and structure of gall produced by one species vary from the one produced by the another species and this sometimes gives sufficient clue to differentiate the species. The eriophyids, in fact produce such varied types of damage symptoms that no single group of plant parasitic animal can probably match with this group. The damage symptoms produced by the eriophyids are summarised below :—

Production of dense hairy outgrowth : Some mites as *Aceria puttardriahi* and *A. jasmini* attack tender leaves and cause the appearance of dense white hairs. *A. litchii* also produces chocolate brown erineum.

Production of galls : A good number of species produce galls of varying size and shape, as hemispherical, button-shaped, pouch shaped, bead-shaped, etc. The galls have hairy lining inside. The galls are always of open types.

Production of blisters : Some eriophyid species produce blisters on the leaves, eg. *A. sacchari*,

Russetting of leaves : Several species cause russetting of leaves, stems, and fruits to varying degree of intensity. The citrus rust mite, *Phyllocoptura oleivora* is the most common example.

Witches Broom Effect : Some of the eriophyids, eg. *Aceria mangiferae* cause the extensive production of accessory and terminal buds of mango giving the appearance of crowding of buds.

The damage symptoms produced by the tenuipalpid mites are almost similar to those produced by the tetranychids. However, *Brevipalpus californicus* is known to cause leprosy of citrus.

The mites of the family Tarsonemidae cause curling, twisting, etc. of leaves. This may be because of the injection of certain toxins.

Indirect Injuries : Among the plant associated mites, eriophyids and a few tetranychids are known to act as vectors of plant viral diseases. In India, as many as four plant viral diseases are known to be transmitted by mites :

<i>Name of disease</i>	<i>Name of mite</i>	<i>Reference</i>
Fig Mosaic Virus (FMV)	<i>Aceria ficus</i>	Nagaich & Vashisth (1962)
Pigeon-Pea Sterility Virus (PSV)	<i>A. cajani</i>	Seth (1962)
Wheat Streak Mosaic Virus (WSMV)	<i>A. tulipae</i>	Jeppson <i>et al.</i> , (1975)
Dolichos Enation Mosaic Virus (DEMV)	<i>Tetranychus ludeni</i>	Rajagopalan (1974)

In addition, there is another plant viral disease which is suspected to be transmitted by mite, as : Sugarcane Streak Mosaic Virus transmitted by *A. sacchari* (Sithanantham *et al.*, 1972). Besides, there are other viral diseases transmitted by mites as : Current Reversion Disease by *Phytoptus ribis* ; Wheat Spot Mosaic Virus by *A. tulipae* ; Peach Mosaic Virus by *Eriophyes insidiosus* ; Rye Grass Mosaic Virus by *Abacarus hystrix* ; Potato Virus Y by *Tetranychus cinnabarinus*, etc. None of the above virus diseases is so far known to occur in India. For further information on this aspect, readers may refer to Oldfield (1970).

Beneficial Mites :

Unlike the injurious mites, there are some beneficial mites too which are of significant importance in achieving biological control of mites. Of these, the predatory mites of the family Phytoseiidae have

received worldwide attention. Other plant associated mites which have the potentiality of use in biological control are Stigmaeidae, Cheyletidae, Erythraeidae and also probably some members of the families Cunaxidae, Bdellidae, Tydeidae and Blattisocidae (now called Ascidae).

PHYTOSEIIDAE : These are very efficient predators since they have shorter life cycles than their prey, equivalent reproductive potentiality, good searching capacity, ability to survive on a low prey density and can thrive on alternate food as nectar, honey dew, plant sap. etc. However, the amount of prey they consume is poor. Several species from India have been found to be of potential importance. Of these, mention may be made of : *Amblyseius* (*Neoseiulus*) *longispinosus*, *A. (N.) fallacis*, *A. (E.) ovalis*, *A. (Typhlodromips) tetranychivorus*, *A. (A.) channabasavanni*, *A. (A.) largoensis*, *A. (Paraphytoseius) multidentatus*, *Indoseiulus ricini* and *Typhlodromus (Orientiseius) rickeri*. All these were found to have the capability of suppressing the prey population. Proper and judicious utilisation of these species may bring effective biological control.

STIGMAEIDAE : Since this family is very inadequately known from India, not much information on the efficiency of these mites as biocontrolling agents is available. However, in other parts of the world, the species *Zetzellia mali* (Ewing) is of significant importance.

CHEYLETIDAE : *Cheletogenes ornatus* has been found to feed voraciously on *Aceria mangiferae* in India.

Though the mites of the families Cunaxidae, Bdellidae, Erythraeidae, Tydeidae, etc. were found to be important as biocontrolling agents from other parts of the world, but due to the paucity of our knowledge about these mites from India nothing definite can be said as to their importance in biological control. Proper exploration and experimentation are needed in these respects.

CONTROL OF MITES

Chemical control :

The principle of mite control and the different chemicals used for this purpose have been discussed elaborately by Jeppson (1965). However, just to give general idea about control of mites, a brief discussion is made here mainly basing upon the work cited above. Control measures for the individual species are dealt with separately in the following chapter.

Sulphur had been used as an acaricide for quite some time against tetranychid mites, tenuipalpids and eriophyids. The vapour released by sulphur kills the mites. It has a number of advantages as it is less costly, less hazardous to man and its effect on natural enemies of mites is not harmful. However, under certain conditions, it shows phytotoxicity. Petroleum oil in the form of dormant spray has been often used specially against those who lay eggs on twigs. Dinitrophenols have also been used as acaricides for control of mites but some show phytotoxicity. The use of synthetic organic pesticides started during 1940s. The first to be used was Neotran. Later, several others, as Ovex, Aramite, demeton, chlorobenzilate, dicofol, fenson, dioxathion, tetradifon, carbophenothion, ethion, binapacryl, Morestan, Plictran, Galecron, etc. appeared. Aramite though was found to be quite promising with long residual effect but because of its carcinogenic effects, it has been discarded. Ovex and dicofol are quite good on a number of crops against several species of Tetranychidae, Tenuipalpidae and Tarsonemidae and both are specially effective against eggs. But reports are available about their toxic effects on the mite and insect predators. Chlorobenzilate and tetradifon are known to have significant effectiveness against phytophagous mites but the latter has no translaminar migration and, hence, is unsuitable for mites occurring on undersurface of leaves. It is also not very effective against eriophyids. Omite is also an effective pesticide. Recently, binapacryl and Morestan have been found to be promising against tetranychids and tenuipalpids. However, the latter is toxic to the predaceous mites. Among the other promising chemicals, mention may be made of Plictran and Galecron but the former has phytotoxic effect and the latter has poor residual effect needing frequent applications. Among the organophosphorous (O. P.) compounds, parathion has long been used to be potential pesticide against a wide range of mites but because of the development of resistance against this chemical, its use became limited. Demeton and malathion, etc. are the other O. P. compounds found promising against phytophagous mites. There are some carbamates having acaricidal properties but their repeated applications cause the development of resistance amongst mites and, thus, become unsuitable for field application.

Often the mites develop resistance to a wide range of pesticides and that property often shows cross resistance to chemically related and nonrelated compounds. Rarely any morphological difference appears in the resistant population. Appearance of resistance is more common

with carbamate and O. P. type compounds and less so with other acaricides.

The principles involved in chemical control of mites are basically the same as applicable in case of insects. Use of improved agricultural practices, application of DDT and reduction of predator population due to random use of general pesticides, are some of the reasons which necessiated the adaptation of chemical control of mites. Several factors should be borne in mind before going in for chemical control of mites. The factors are : the extent and nature of damage, presence of natural enemies of mites, if any, weather conditions, nature of pest along with its population density, etc. Acaricides are somewhat specific in their actions. A certain pesticide may be effective for a certain group of mites but may be quite ineffective against a related group. On the contrary, some as Morestan have wide range of toxicity. The acaricides not only kill by direct contact and penetration through its integument but also as stomach poison and as fumigant. Therefore, before a pesticide is spread some factors as to its mode of action, its translocation property, if any, its residual property, the plant on which it is to be spread, the stage of the mite to be spread, climatic condition prevailing before and after spraying, population migration in relation to reinfestation, etc. should be considered to assess the efficiency of the pesticides. To have an idea of the possible development of resistance and cross resistance, the history of the pesticides already used in the field is essential.

Natural control :

Several natural enemies are known to have the power to check population of phytophagous mites in the field and this aspect has been extensively reviewed by McMurtry *et al.* (1970). A general idea is given here in brief basing mainly upon the above work.

The natural enemies of plant mites can be classified as below :

- ACARINA : Phytoseiidae, Stigmaeidae, Bdellidae, Cunaxidae, Cheyletidae, Tydeidae, etc.
- ARACHNIDA : Argiopidae, Theridiidae, Linyphiidae
- INSECTA : Coleoptera (Coccinellidae, Staphylinidae, Endomychidae)
Hemiptera (Anthocoridae, Miridae, Lygaeidae, Nabidae)
Thysanoptera (Thripidae, Aelothripidae, Phlaeothripidae)
Diptera (Cecidomyiidae, Syrphidae)
Neuroptera (Chrysopidae, Hemrobiidae, Conyopterygidae)
- PATHOGENS : Virus, Bacteria, Fungus.

Acarine predators : This has been discussed earlier under beneficial mites while treating the economic importance of mites.

Arachnid predators : Not much is known from India regarding arachnid predators. Chant (1956, 57) and Hukusima (1961) reported 30 and 36 species, respectively, predating upon phytophagous mites in England in case of former and in Japan in case of the latter. Spiders belonging to the families Argiopidae, Threidiidae and Linyphiidae were found to be efficient predators.

Insectan predators : Coccinellidae and Staphylinidae among Coleoptera are the most efficient mite predators. In Coccinellidae, *Stethorus punctillum* Weise, *S. punctum* Leconte, *S. gilvifrons* Muls., *S. oicipes* Casey, *S. pauperculus*, and *Scymnus gracilis* and under Staphylinidae *Oligota flaviceps*, *Oligota oviformes* (Casey), *O. pygmaea* Sol. are some of the most important Coleopteran mite predators. *Stethorus* species reproduce, only on mite food. From India, *S. pauperculus* and *Oligota flaviceps* were found important. In Neuroptera, chrysopids, though normally aphid predators, are known to feed on mites as well. *Chrysopa carnea* Stephens is known to feed upon *P. ulmi* in many parts of the world. The other predatory species are *C. perla* L., *C. vulgaris* Schneider, etc. The last instar larva of *C. carnea* is known to consume an average of 1000-1500 citrus red mites daily at 30-50/hour. *Hemerobius humulinus* L. (Fam. : Hemerobiidae) and *Parasemidalis flaviceps* Banks (Fam. : Conyopterygidae) are also efficient predators on *P. ulmi* in England and California, respectively. Under Hemiptera, *Anthocores musculus* Say and *Orius insidiosus* (Say) (Fam. : Anthocoridae) are very efficient predators of spider mites consuming 10-30 mites/hour. Among other Hemipteran predators, *Blepharidopterus angulatus* (Fall.) (Fam. : Miridae) on *P. ulmi* in Europe, *Nabis apterus* Fab. (Fam. : Nabidae) on spider mites in Europe and *Gecocoris* sp. (Fam. : Lygaeidae) on *Tetranychus* sp. in U. S. A., are some of the important Hemipteran predators. Under Thysanoptera, *Scolothrips sexmaculatus* (Perg.), *S. longicornis* Priesner (Fam. : Thripidae) are reported to be efficient mite predators. *Aelothrips melaleucus* Haliday on *T. urticae* in Canada and *Cryptothrips nigripes* Reuter (Fam. : Phlaeothripidae) on *T. urticae* in East Germany are also efficient predators. Under Diptera, *Arthrocnodax occidentalis* Felt (Fam. : Cecidomyiidae) and syrphyid larvae are also known to be important mite controlling agents.

Like other predators, the efficiency of mite predators depends upon several factors as rate of development of the predator, its rate of prey

consumption, functional, numerical and total responses of the predator, host specificity, searching capacity of predator and seasonal synchrony. Since many of the pesticides as O. P. compounds and carbamates do have adverse effects specially on predatory mites, the success of the mite predator will also depend upon the spray-schedule already adapted in the field.

PATHOGENS : Among pathogens, fungus (*Hirsutella*, *Entomophthora*), bacteria (*Bacillus*) and some viruses have detrimental effects on populations of phytophagous mites. Therefore, proper utilisation of these agents may prove to be profitable in achieving mite control.

CLASSIFICATION

Mites and ticks belong to the Phylum ARTHROPODA (because of the presence of : chitinous skeleton, jointed appendages, homocoel and dorsal blood vessel), Subphylum CHELICERATA (because of the presence of : 2 preoral appendages, the precheliceral and cheliceral, the latter bearing chelicera), Class ARACHNIDA (because being terrestrial and lack compound eyes) and Subclass Acari (because body shows only traces of segmentation and may be divided by transverse furrow between legs II and III into propodosoma and hysterosoma, gnathosoma at the anterior end of body bearing 3-segmented chelicera and 6-segmented pedipalpi, 2-4 pairs of ambulacral appendages, genital and anal opening in variable position, respiration through trachea which opens by paired stigmata or respiration cutaneous and presence of hexapod larva).

Regarding higher classification of ACARI, there exists difference of opinion. Evans *et al.* (1961) treated Acari as Subclass having two Superorders, *viz.* ACARI-ANACTINOCHAETA having 4 Orders under it as NOTOSTIGMATA, TETRASTIGMATA, MESOSTIGMATA and METASTIGMATA and the other Superorder as ACARI-ACTINOCHAETA having 3 Orders under it as CRYPTOSTIGMATA, ASIGMATA and PROSTIGMATA. Krantz (1970) divided the Subclass Acari into 3 Orders, I. OPILIOACARIFORMES having 1 Suborder as NOTOSTIGMATA, II. PARASITIFORMES having 2 Suborders : MESOSTIGMATA and METASTIGMATA and III. ACARIFORMES having 3 Suborders : PROSTIGMATA, ASTIGMATA and CRYPTOSTIGMATA. Evans & Till (1979) divided the Class Arachnida into 2 Subclasses, I. ACARI-PARASITIFORMES having 4 Orders under it as MESOSTIGMATA, NOTOSTIGMATA, TETRASTIGMATA and METASTIGMATA and II. ACARI-ACARIFORMES having 3 Orders under it as : ASTIGMATA, PROSTIGMATA and CRYPTOSTIGMATA.

The division of the 2 Subclasses was done on the basis of the following key (after Evans & Till, 1979) :

1. Body and leg setae optically isotropic, palp often with ambulacrum represented by claws or tined claw like structure ; sternum and free leg coxae usually present ; idiosoma without a sejugal furrow between legs II and III, chelicera often with a dorsal lyrifissure, podocephalic canal absent. ... **ACARI-PARASITIFORMES**
- Body and leg setae optically anisotropic, palp without vestige of ambulacrum, without free sternum and leg coxae but with coxa-sternum or epimera, sejugal furrow usually present, chelicera never with a dorsal lyrifissure. ... **ACARI-ACARIFORMES**

The plant mites belong to 4 Orders, viz. Prostigmata, Mesostigmata, Astigmata and Cryptostigmata, and those can be separated with the help of the following key (after Evans & Till, 1979) :

1. With free coxae to ambulatory appendages ; pedipalpal ambulacrum represented by a tined claw like structure (apotele) near the inner basal angle of the palptarsus ; stigmata situated lateral to coxae II-IV and typically with elongate peritreme. ... **MESOSTIGMATA**
- Lacking free coxae to ambulatory appendages ; pedipalpal ambulacrum completely lost ; stigmata never situated lateral to legs II-IV. ... **2**
2. Pedipalp small and comprising of 2 free podomeres and closely adpressed to the sides of the hypognathum ; chelicera chelate ; ambulacra of legs comprising a median (empodial) claw with an associated pulvillus or a sucker like pulvillus situated on an elongate pretarsus ; stigmata and trachea never present ; idiosoma without trichobothria ; body never vermiform. ... **ASTIGMATA**
- Pedipalp usually with 3-5 podomeres and conspicuous ; if small with fewer podomeres and inconspicuous, then idiosoma either vermiform or with overlapping sclerites dorsally in the female ; chelicera chelate or variously modified into piercing stylets or hook-like organs ; a respiratory system usually present ; idiosoma with trichobothria. ...

3. Gnathosoma with conspicuous rutella, chelicera typically chelate-dentate ; one pair of podosomal trichobothria almost invariably present and comprising piliform, barbed or clavate pseudostigmatid organ (sensilla) arising from conical depressions, the pseudostigmata (bothridia) ; pedipalp simple, tibia never with distal spurs ; tracheal system when present opening to the exterior in the acetabular cavities of legs I and III or through pseudostigmata ; idiosoma heavily sclerotized in the adult stage and with ridges or wing like expansions of the idiosoma which is never uniform. ...

... CRYPTOSTIGMATA

- Gnathosoma only rarely with rutella ; chelicera rarely chelate-dentate ; propodosomatic trichobothria, when present, usually without conspicuous pseudostigmata ; tarsus forming thumb-claw complex ; trachea when present opening by paired stigmata situated between the chelicerae or on to the dorsal surface of the propodosoma and often with associated peritremes ; usually weakly sclerotized, never with ridge or wing-like expansions of the idiosoma which may be vermiform or covered dorsally by a number of discrete, usually overlapping sclerites. ...

... PROSTIGMATA

Order PROSTIGMATA

Diagnosis : Acarina with a pair of stigmata on or near the gnathosoma, some with no discrete stigmal opening. Chelicera may be chelate, stylet or reduced. Palp simple or fang-like or with a palp tibial claw. Empodia II-III may be claw like or sucker like, pad like, membranous or rayed. Body weakly sclerotized. Genital shield never more than two ; 2-3 pairs of discs or suckers may flank genital opening. Ocelli present or absent.

Key to the Plant Mite Families and Superfamilies of PROSTIGMATA (Based on Krantz, 1970)

1. Body annulate, usually worm-like and elongate ; with 2 pairs of legs. ...	...	Sup. family ERIOPHYOIDEA
With transverse genital aperture located behind second pair of legs, plant feeders. ...	...	Fam. ERIOPHYIDAE
— Body more or less rounded, not elongated worm-like. ...	...	2

2. Gnathosoma usually circular with minute palpi lying closely appressed laterally, chelicera tiny, stylet like, with 4 pairs of legs, empodium of tarsi II-III usually a broad membranous pad. Stigmata of female opening on propodosoma behind gnathosomal base, males without stigmata or tracheae. ...
- ... Sup. family
TARSONEMOIDEA
- Leg IV of female without claws or empodium, with two terminal whip-like setae, plant feeders or associated with insects. ...
- ... Fam. **TARSONEMIDAE**
- Gnathosoma variously shaped, generally conspicuous and with distinct chelicerae, palpi usually well developed. Empodia usually variable. Stigmata opens at base of chelicerae. ...
- ... 3
3. With a distinct palpal thumb-claw process. ...
- ... 7
- Without a distinct palpal thumb-claw process. ...
- ... 4
4. Chelicera whip-like and long, genital aperture transverse, plant feeders. ...
- ... Sup. family
TETRANYCHOIDEA
Fam. **TENUIPALPIDAE**
- Chelicera with opposed stylet or scissors-like, free living, plant feeders. ...
- ... 5
5. Cheliceral bases fused or if not fused not capable of lateral scissors-like movement over gnathosoma. ...
- ... Sup. family
TYDEOIDEA
- Fixed cheliceral digits reduced, movable digits short and needle like. Propodosoma with a pair of sensory setae, pseudostigmatic organ distinguishable by their length and by their type of insertion. ...
- ... Fam. **TYDEIDAE**
- Cheliceral bases not fused, the chelicerae moving scissors-like over gnathosoma ; anterior portion of gnathosoma produced with a long snout, with 2 pairs of long sensory setae, or sensilla. ...
- ... Sup. family
BDELLOIDEA, 6
6. With 2 pairs of genital discs, palpi extending beyond gnathosoma or shorter and approximately equal to the chelae in length, with distal segment raptorial adapted for grasping. ...
- ... Fam. **CUNAXIDAE**
- With 3 pairs of genital discs, palpi long, often elbowed usually with strong distal setae, antenniform. ...
- ... Fam. **BDELLIDAE**

7. Body of adults and nymphs densely clothed with setae, stigmal opening between cheliceral bases, larvae usually heteromorphic, parasitic ; adults and nymphs free living predators. ...
- Movable chela of adults long, straight and extrusible, empodia absent, larval morphology variable, predator or parasitic on insects. ... Sup. family ERYTHRAEOIDEA
- Gnathosoma large, incapable of withdrawing into body, propodosoma not elongate anteriorly, generally with an ossiform crista, body setae simple or pectinate and often broad ended. ... Fam. ERYTHRAEIDAE
- Body setae of adults and nymphs relatively few, arranged in transverse rows. Stigmal opening behind cheliceral bases. Larva homomorphic, similar to nymphs and adults in habits. ... 8
8. Cheliceral bases fused with gnathosoma and without indication of suture. Peritreme present on gnathosoma, often shaped like an arch or like 'M'. ... Sup. family CHEYLETOIDEA (in part)
- Tarsi II and IV (also usually tarsus I) with claws and empodia. Free living predators or associate of vertebrates. ... Fam. CHEYLETIDAE
- Cheliceral bases closely contiguous or fused with each other but not generally with gnathosoma. Peritreme usually present on anterior portion of propodosoma ; predators or plant feeders. ... 9
9. Chelicerae long, recurved and whip-like and arising from a stylophore, genital aperture transverse, plant feeders. ... Sup. family TETRANYCHOIDEA, 10
- Chelicerae not long and whip-like but rather short and stylet-like, genital aperture longitudinal and free living. ... Sup. family RAPHIGNATHOIDEA
- Peritreme confined to anterior edge of propodosoma. ... Fam. STIGMAEIDAE

10. Claws with a series of comb-like tenent hairs, empodia similarly ornamented, caudal aspect of idiosoma with a series of flagelliform setae Fam. TUCKERELLIDAE
- Each claw terminating in a pair of tenent hairs or bordered with combs of tenent hairs, empodia claw like or pad-like (rarely appearing absent) often divided distally or with a basal divided spur, with or without tenent hairs, caudal aspect of idiosoma without highly modified setae Fam. TETRANYCHIDAE

Order MESOSTIGMATA

Diagnosis : Its size varies from 200-2000 microns, dorsum weakly sclerotized. Idiosoma rarely shows division, normally with shield. Chelicera 3-segmented, chelate, dentate, may be variously modified. Movable digit of male chelicera often bears spermatophoral process. Palpi 5-segmented, tectum present. An unpaired tritosternum usually present with a pair of lacinae or a divided lacina. A sternal shield is present. Genital orifice is in the form of transverse slit at the intercoxal area and is protected in female by 1,3 or 4 shields and in the male by 1 or 2 shields. Anus subterminal and protected by a sclerotized shield. Leg I sensory and normally lack ambulacrum. Legs II and IV may be spurred in males. A pair of stigmata present dorsolaterally in the region of coxae II-IV ; peritreme extends anteriorly as a tube. Majority are free living in soil, decaying organic matter or on plants ; a few are parasitic to animals. (Based on Evans *et al.*, 1961).

Key to the Families of Mesostigmata

1. Sternal shield of female with 2 pairs of setae ; palpus apotele 2 or 3 tined ; corniculae may be divided distally or otherwise modified in the distal portion AMEROSEIIDAE
- Sternal shield with 0-4 pairs of setae, corniculae not modified as above. 2
2. Normally with fewer than 20 pairs of dorsal setae except in Gnoriminae where there are upto 23 pairs of setae. PHYTOSEIIDAE
- Always with more than 20 pairs of dorsal setae. BLATTISOCIDAE

Order ASTIGMATA

Diagnosis : Body weakly sclerotized ; gnathosoma usually visible from above. The infracapitulum with normally a setal complement of two pairs, lacks adoral setae and rutella but is characterised by a pair of anterior ventral cuticular flaps. Pedipalp 2-segmented. Idiosoma often divided into propodosoma and hysterosoma by a sejugal furrow and relatively with a few setae. Sclerotized dorsal shield may be present on propodosoma. In Acaroidea, a characteristic Grandjean's organ situated anterolaterally on the propodosoma and pilose supra coxal seta on leg I protect the podocephalic canal. A pair of oil glands usually present opening dorsolaterally on the opisthosoma. Genital orifice normally a longitudinal slit, occasionally transverse also located in the intercoxal region and is often provided with 2 genital suckers. Males with sclerotized penis. Anus ventral and in male is flanked with adhesive suckers. The legs with ambulacra. The tarsal solenidia bacilliform while those of tibia and genu setiform. Tibial solenidia usually long and whip-like. Usually fungivorous, many are parasitic.

The order is represented on plants in India only by one family, Acaridae.

Order CRYPTOSTIGMATA

Though specics of this order occur on plants and may be fungus feeder (Haq & Prabhoo, 1976) but unfortunately no species has so far been identified from plants in India except one. Of course, several species (approx. 160 spp.) in this order are known from India but all were recorded from soil and litter. In view of this, no detail discussion of the cryptostigmatid mites of plants is made here. Hence there exists a vast scope to work in this aspect in India.

PHYTOPHAGOUS MITES

Family : TETRANYCHIDAE *Donnadieu*

(*Tetranychidae* *Donnadieu*, 1875, *Faculte des sciences de Lyon*, p.—9)

History : *Donnadieu* erected this family in 1875. *Womersley* (1940) and *McGregor* (1945) made valuable contributions. *Pritchard & Baker* (1955) brought out the excellent revisionary work in this family. Later, the important taxonomic contributions worth mentioning are : *Baker & Pritchard* (1960), *Gutierrez* (1966-70), *Ehara* (1956-78), *Ehara & Lee* (1971), *Manson* (1963, 67, 67a, 67b), *Meyer* (1965, 74), *Bagdasarian* (1957), *Reck* (1959), *Fletcher & Baker* (1970), *Wainstein* (1960), *Tuttle & Baker* (1964, 68), *Tuttle et al.* (1976), *Chaudhri et al.* (1974), etc. and over 800 species are known from the world (*Baker*, 1979). From India, only 61 species are known. On biology and ecology, the important review references are *Huffaker et al.* (1970), *Boudreaux* (1963), *Huffaker et al.* (1969), *Van de Vrie et al.* (1972), etc.

Diagnosis : Chelicerae movable stylet like set in stylophore which is formed by fusion of cheliceral bases. Palpi 4-segmented with strong claw. Propodosoma with 3-4 pairs of setae ; hysterosoma with 8-13 pairs of setae. Tarsi of legs I-II with duplex setae. Genital portion of female with characteristic wrinkles, tenent hairs present on tarsal claws. Empodium well developed, reduced or absent, with or without tenent hairs. Aedeagus of male is characteristic of the family, and is of great use in separating the species.

These mites are soft bodied, popularly known as spider mites as some of them can spin webs like spiders to cover their colonies. Normally they are of various colours and inhabit the undersurface of the leaves. A few may occur on the upper surface of leaf as well. They are exclusively plant feeders and many are important plant pests.

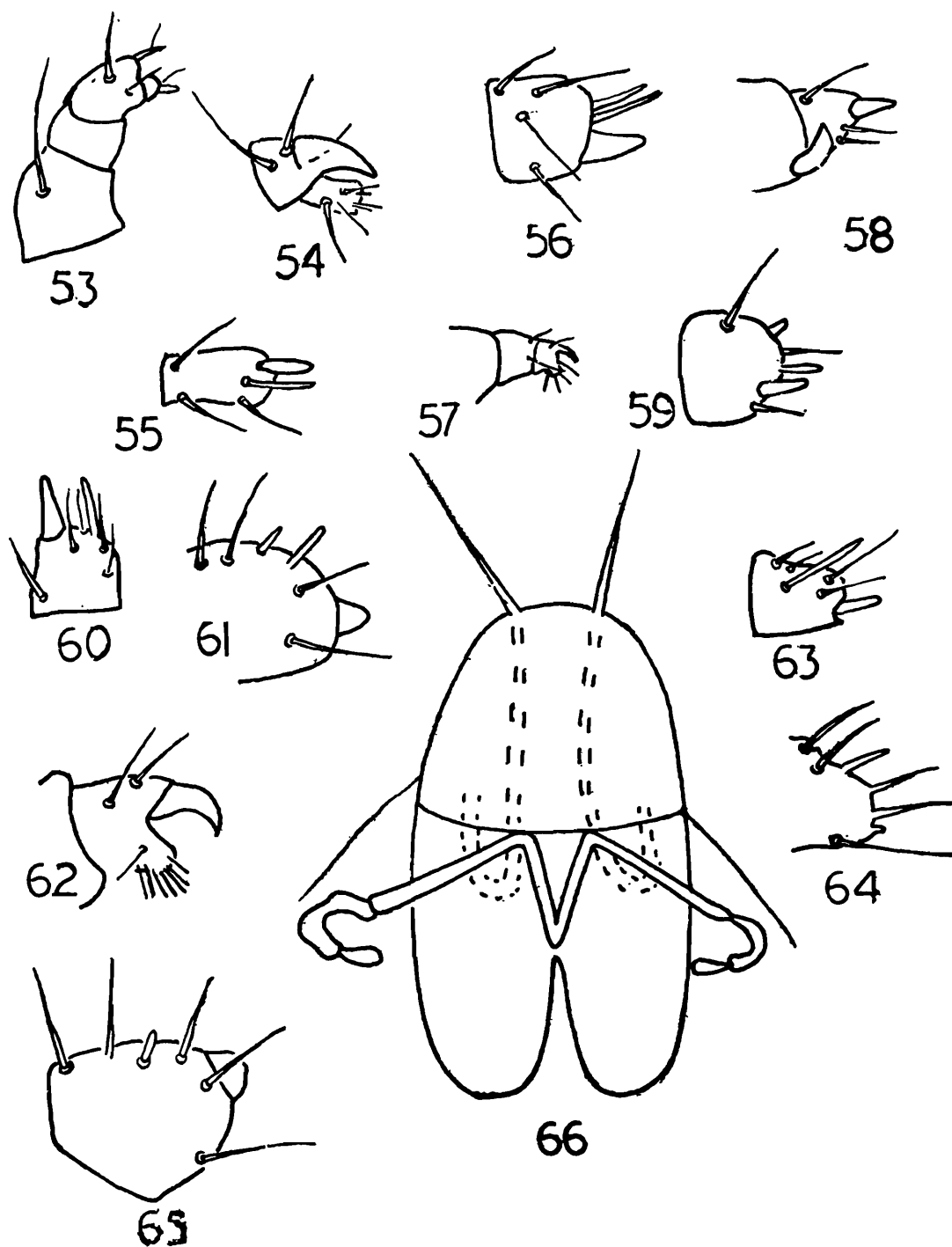
MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

The body is differentiated into gnathosoma and idiosoma.

Gnathosoma : Gnathosoma is provided with a pair of chelicerae and a pair of pedipalpi. The mouth opening also lies in between.

Chelicera : Chelicera is a fine needle-like structure enclosed in stylophore (Fig. 6) which is formed by fusion of cheliceral bases.

Pedipalp : Each pedipalp is 4-segmented, each segment bearing a complement of setae. Terminal segment bears 6-7 setae which are of two types : tactile and sensory. Structure of palp, tibia and tarsus is of taxonomic importance (Figs. 53-65).



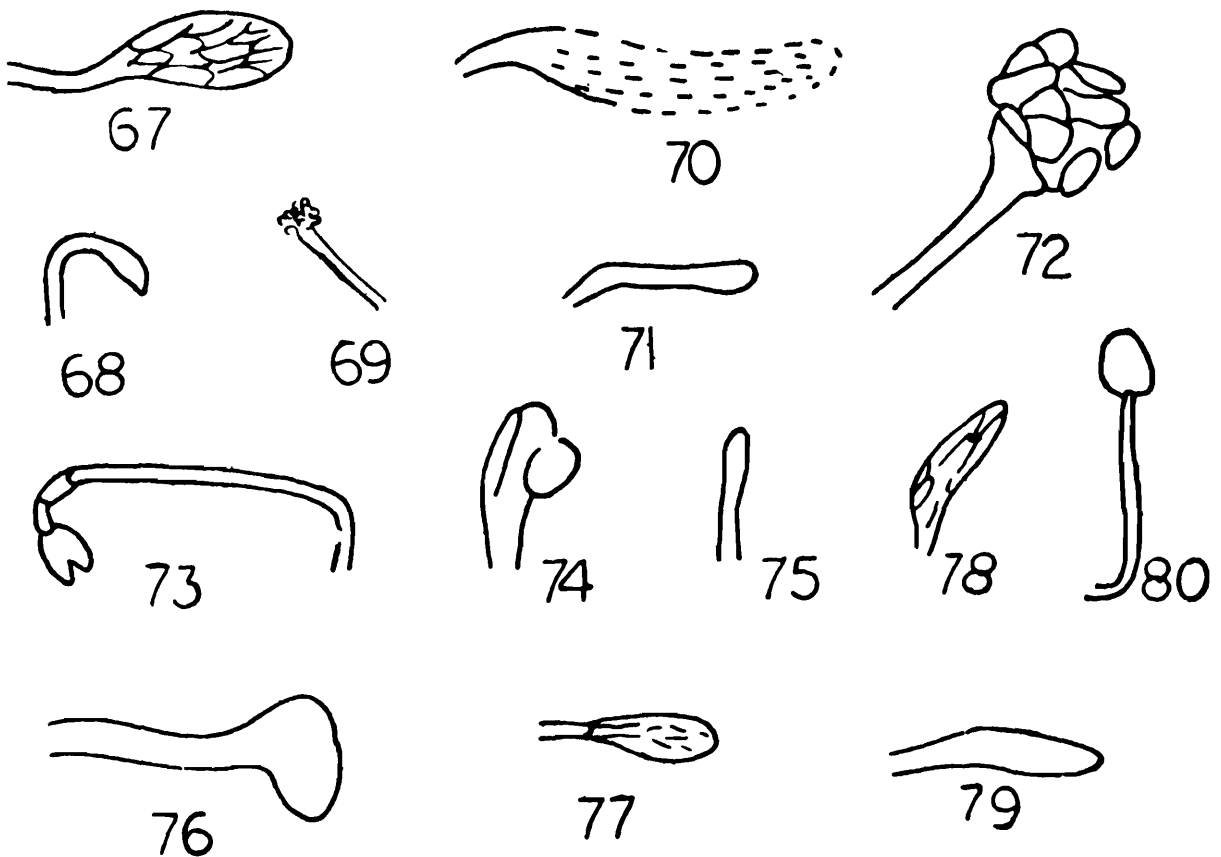
Figs. 53-66. 53. Palp of a tetranychid mite.

54-65. Terminal segments of palp of female in tetranychid genera, 54. *Bryobia*, 55. *Bryobiella*, 56. *Porcupinychus*, 57. *Mesobryobia*, 58. *Tenuipalponychus*, 59. *Schizotetranychus*, 60. *Bakerina*, 61. *Panonychus*, 62. *Neopetrobia*, 63. *Eutetranychus*, 64. *Eotetranychus*,

66. Anterior portion of Propodosoma of a tetranychid mite showing location of peritreme.

Peritreme : It is provided with two arms (Fig. 66) which diverge on the dorsal surface of stylophore. The ends of the bulb may be simple, bulging or anastomosing or sometimes hooked (Figs. 67-80).

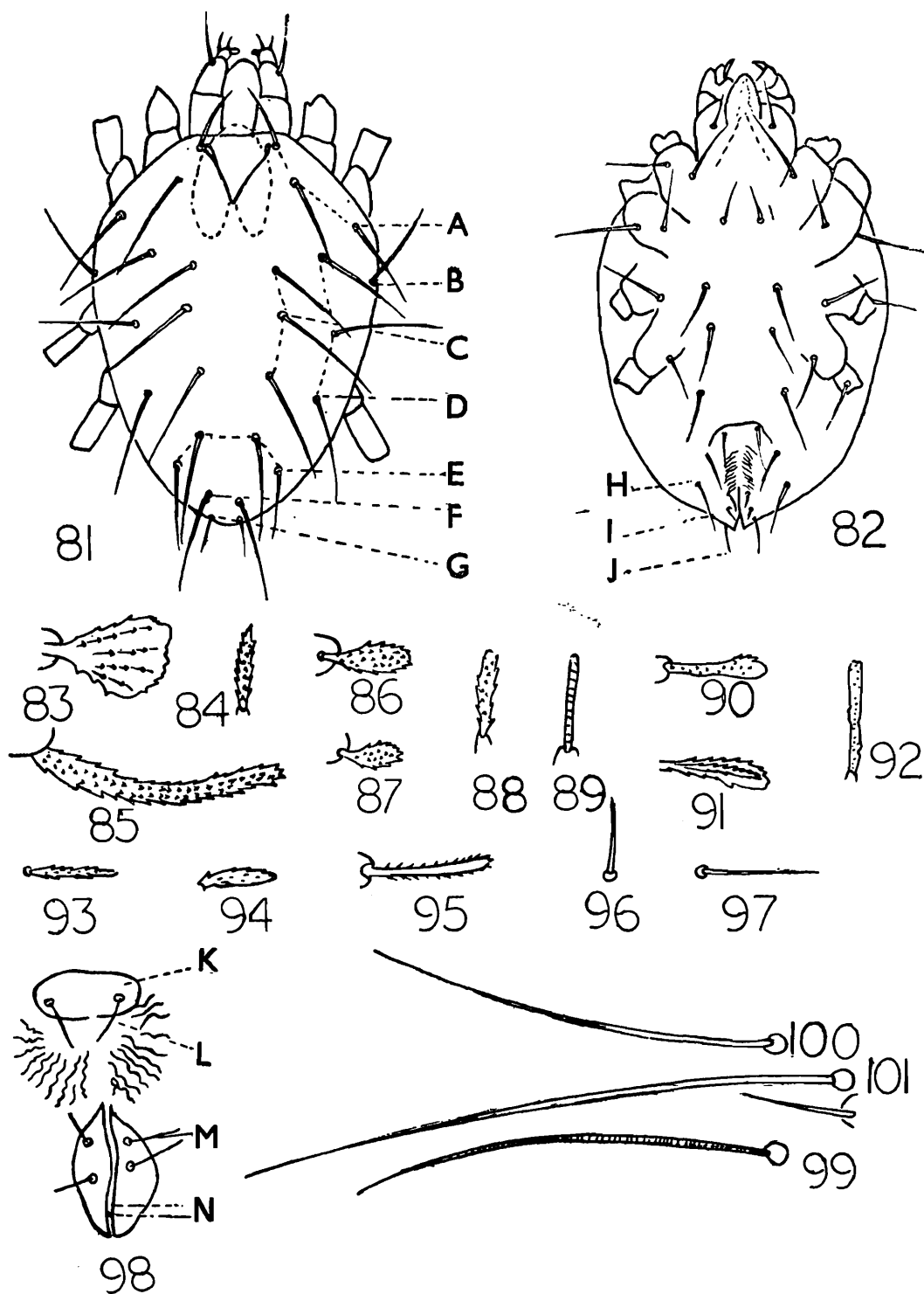
Idiosoma : Dorsum (Fig. 81) may be smooth or punctate. The integument may be variously striated. The striation pattern serves as important character for separation of species. Idiosoma is composed of two parts, the anterior part is the Propodosoma (from base of gnathosoma upto second pair of legs) which bears 3-4 pairs of setae



Figs. 67-80. Termination of peritreme in different tetranychid genera :

67. *Neopetrobia*, 68. *Panonychus*, 69. *Platytetranychus*, 70. *Bryobia*,
 71. *Bryobiella*, 72. *Porcupinychus*, 73. *Schizotetranychus*,
 74. *Eutetranychus*, 75. *Aponychus*, 76. *Tenuipalponychus*,
 77. *Mesobryobia*, 78. *Monoceronychus*, 79. *Schizotetranychus*,
 80. *Bakerina*,

(Fig. 81) and a pair of eyes, and the posterior part is called Hysterosoma (from base of third pair of legs upto posterior tip of body) which bears 8-13 pairs of setae (Fig. 81) arranged in different rows like dorsocentral, dorsolateral, humeral, sacral and clunals. Setae are of different types (Figs. 83-97) may or may not be borne on tubercles. The nature of setae, number of setae, relative length of setae and relative

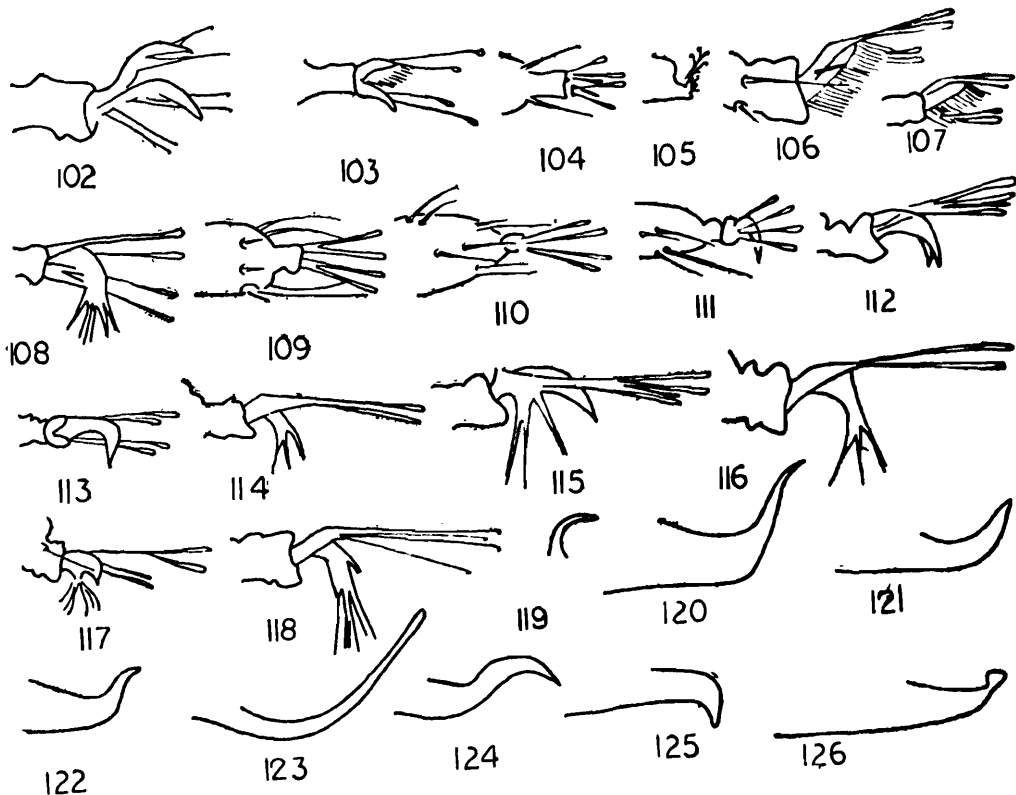


Figs. 81-101. 81. Dorsum of a tetranychid mite showing position of different setae : A. Dorsal propodosomal, B. Humeral, C. Dorsocentral hysterosomal, D. Dorsolateral hysterosomal, E. Sacral, F. Anal, G. Postanal. 82. Ventral surface of a tetranychid mite : H. Anterior paraanal, I. Anals, J. Postanal. 83-97. Dorsal idiosomal setae in different tetranychid genera : 83. *Bryobia*, 84. *Bryobiella*, 85. *Porcupinychus*, 86. *Mesobryobia*, 87. *Monoceronychus*, 88. *Neopetrobia*, 89. *Petrobia*, 90. *Eutetranychus*, 91. *Aponychus*, 92. *Tenuipalponychus*, 93. *Schizotetranychus*, 94. *Bakerina*, 95. *Panonychus*, 96. *Platytetranychus*, 97. *Tetranychus*. 98. Opisthosomal venter in tetranychid mite (Female) : K. Genital plate, L. striation in genital area, M. anal seta, N. Anal pore. 99. Sensory seta 100. Tactile seta 101. Duplex setae.

position of setae serves as important taxonomic character for separating genera and species.

Ventral portion (Fig. 82) also possesses setae which show variations specially at the opisthosomal region. The number of anal and preanal setae serves as useful tool for separation of species. Genital portion of female possesses characteristic wrinkles (Fig. 98).

Nymphs and adults have 4 pairs of legs while larvae have 3 pairs of legs. All the leg segments possess setae and those on tarsus and tibia I are of two types, viz. sensory (Fig. 99) and tactile (Fig. 100). The former is with blunt tip with transverse striations and the latter is smooth with pointed tip. Tarsi of legs I and II often have duplex setae (Fig. 101). The pretarsus is furnished with 2 true claws and empodium. Claws may be provided with tenent hairs (Fig. 102) or



Figs. 102-118. Tarsal appendages in different tetranychid genera :
 102. *Bryobia*, 103. *Bryobiella*, 104. *Panonychus* 105. *Mesobryobia*,
 106. *Monoceronychus*, 107. *Neopetrobia*, 108. *Petrobia*, 109. *Eutetranychus*,
 110. *Aponychus*, 111. *Tenuipalponychus*, 112. *Schizotetranychus*,
 113. *Bakerina*, 114. *Platytetranychus*, 115. *Panonychus*, 116. *Eotetranychus*,
 117. *Oligonychus*, 118. *Tetranychus*.

Figs. 119-126. Aedeagi in different tetranychid species

those may be lacking. The variation among the striation pattern serves as important tool for separation of genera. Different types of pretarsi are shown in figures (Figs. 102-118). Aedeagi of males are of diverse

shape and serve as important character for separation of species (Figs. 119-126).

Key to the Subfamilies, Tribes and Genera of TETRANYCHIDAE

1. Empodium with tenent hairs.	...	...	Subfamily BRYOBIINAE, 2
— Empodium without tenent hairs.	...	...	Subfamily TETRANYCHINAE, 9
2. True claw uncinatc or if pad like the propodosoma with 4 well developed lobes ; empodium pad like.	...	...	Bryobiini, 3
— True claw pad-like ; empodium pad-like or uncinatc.	...	...	4
3. With 3 pairs of propodosomal setae	...	..	<i>Bryobiella</i>
— With 4 pairs of propodosomal setae	...	...	<i>Bryobia</i>
4. Claws and empodium pad-like	...	...	Hystrichonychini, 5
— Claws pad-like, empodium uncinatc.	...	...	Petrobiini, <i>Petrobia</i>
5. Hysterosoma with 8-9 pairs of dorsal body setae.	...	...	<i>Porcupinychus</i>
— Hysterosoma with 10 or more setae.	...	...	6
6. Propodosoma with projections or elevations over the rostrum, body elongate considerably, less than twice as long as broad.	...	...	7
— Propodosoma without projections over rostrum, body not elongate about twice more or less as broad as long.	...	...	8
7. With 2 anterior projections over the rostrum.	...	...	<i>Mesobryobia</i>
— With 3 anterior projections over the rostrum.	...	...	<i>Monoceronychus</i>
8. Members of 4th pair of dorsocentral setae as widely spaced as 4th pair of dorsolateral setae or nearly so.	...	...	<i>Neopetrobia</i>
— Members of 4th pair of dorsocentral setae closer together than 4th pair of dorsolateral setae.	...	...	<i>Georgiobia</i>
9. Tarsus I dorsally with a single pair of usually associated duplex setae, if 2 pairs of closely associated duplex setae are present then tarsus II is still without closely associated duplex setae, empodium claw-like or rudimentary.	...	...	Eurytetranychini, 10
— Tarsus I dorsally with 2 pairs of closely associated duplex setae and tarsus II with 1 pair of duplex setae ; empodium claw-like or splits distally.	...	...	11

10. With 2 pairs of anal setae.	...	...	<i>Eutetranychus</i>
— With 1 pair of anal setae.	...	...	<i>Aponychus</i>
11. Hysterosoma with 4th pair of dorsocentral setae marginal or absent.	...	...	<i>Tenuipalpoidini</i> , 12
— Hysterosoma with 4th pair of dorsocentral setae in normal dorsal position.	...	...	<i>Tetranychini</i> , 13
12. Peritreme simple, bulb-like, femoral setal formula 9-6-4-2.	...	...	<i>Tenuipalponychus</i>
— Peritreme simple or hooked, femoral setal formula 8-6-4-4.	...	...	<i>Bakerina</i>
13. With 2 pairs of preanal setae.	...	...	14
— With 1 pair of preanal setae.	...	...	17
14. Empodium claw like.	...	...	15
— Empodium ending in a tuft of hairs or splits dorsally.	...	...	16
15. Dorsal body setae very short, not as long as interval between their bases.	...	...	<i>Platytetranychus</i>
— Dorsal body setae as long as or longer than the interval between their bases.	...	...	<i>Eotetranychus</i>
16. Empodium a simple claw like structure.	...	...	<i>Panonychus</i>
— Empodium splits into 2 claw like structures, usually with appendent hairs.	...	...	<i>Schizotetranychus</i>
17. Empodium claw like with proximoventral hairs, duplex setae on tarsus I distal and approximate.	...	...	<i>Oligonychus</i>
— Empodium splits distally usually into 3 pairs, of hairs, duplex setae on tarsus I well developed.	...	...	<i>Tetranychus</i>

Subfamily BRYOBIINAE Berlese

Bryobiini Berlese, 1913, *Acarotheca Italica Firenze*, p. 17.

Bryobiinae Reck, 1950, *Akad. Nauk. Gruzinskoi SSR. Trudy Inst. Zool. Tbilisi*, 9 : 122.

Tribe BRYOBIINI Berlese

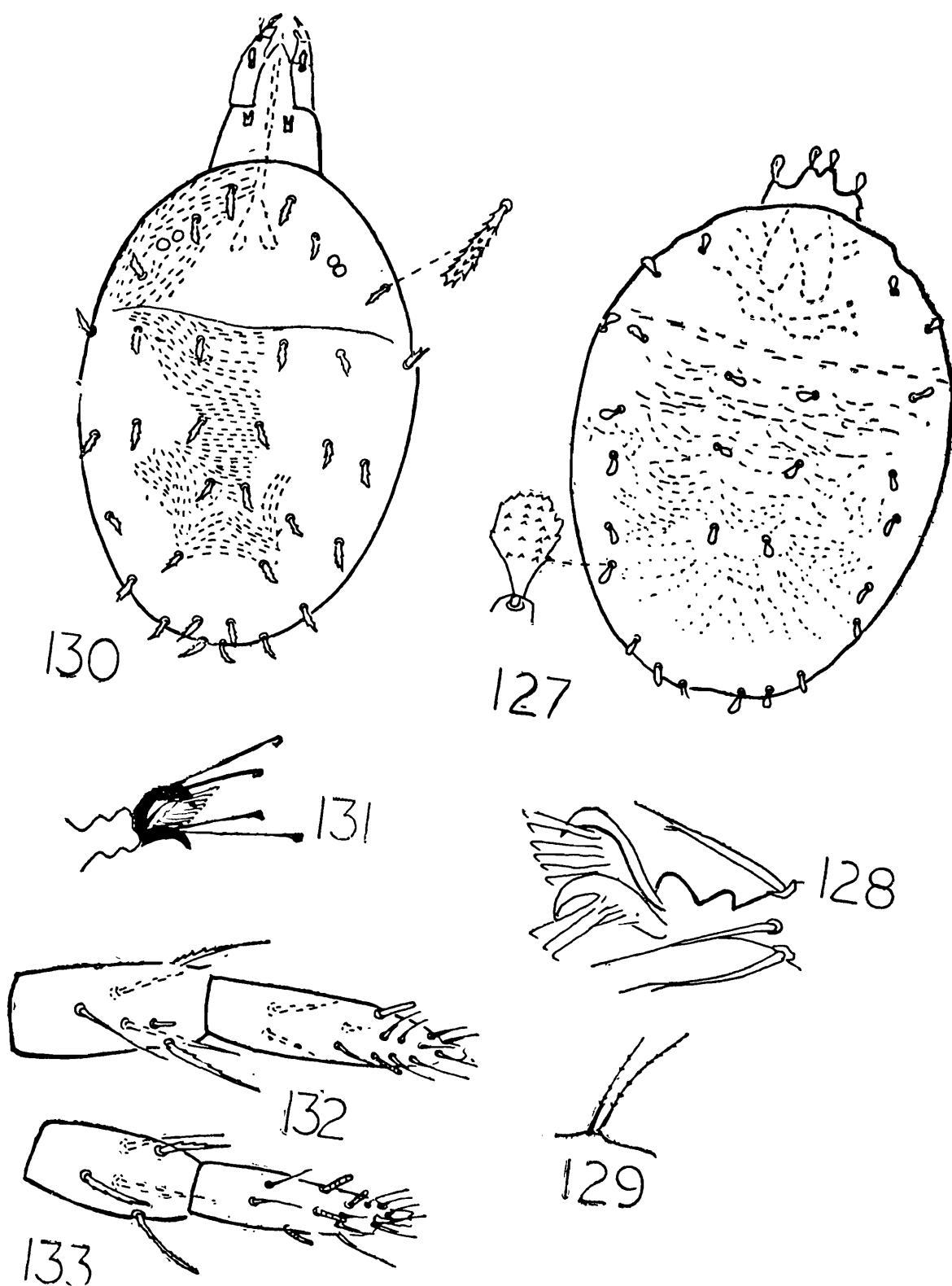
Bryobiini Berlese, 1913, *Acarotheca Italica Firenze*, p. 17.

Genus *Bryobia* Koch (Figs. 127-129)

Bryobia Koch, 1836, *Deutsche Crustacea Myriapoda, Arachnida*, Fasc. 1 : 8.

Key to the Species of *Bryobia*

1. Propodosomal and hysterosomal setae broadly spatulate	...	...	<i>praetiosa</i>
— Propodosomal and hysterosomal setae sub-spatulate.	...	...	<i>eharal</i>



Figs. 127-129. *Bryobia* sp.: 127. Dorsum, 128. Tarsus IV, 129. Duplex setae in female tarsus I

Figs. 130-133. *Bryobiella* sp.: 130. Dorsum, 131. Tarsus I, 132. Leg I (part), 133. Leg II (part)

1. *Bryobia eharai* Pritchard and Keifer

Bryobia eharai Pritchard & Keifer 1958, *Ann. Ent. Soc. Amer.*, **51** : 506.

Bryobia eharai, Menon & Ghai, 1968a, *Indian J. Ent.*, **30** : 88.

Diagnosis : Yellowish brown mite found normally on upper surface of leaves. Idiosomal setae 15 pairs, clavate and serrate, borne on tubercles. Empodium on tarsus I bears 2 rows of ventrally directed tenent hairs. First pair of legs shorter in comparison to that of *B. praetiosa*. Body broadly rounded and few rounded wrinkles present rather than dorsal striae. Leg I as long as length of body. Duplex setae of tarsus II approximate. In female, tibia I with 2 tactile setae, tarsus I with 8 tactile setae proximal to duplex setae, tibia II with 5 tactile setae proximal to duplex setae.

Hosts : *Chrysanthemum* sp. ; *Colocasia antiquorum*.

Nature of damage : Feeding of this mite causes the yellowing of leaves which later turn brown. This retards growth of young plants (Menon & Ghai, 1968a).

Bionomics : It occurs in the field throughout the year. Sapro (1940) reported this mite occurring on the upper surface of leaves. It overwinters in egg stage in foliage. This mite is more active during April to July and the population dwindles with the monsoon rains. Information about its biology is not available.

Distribution : INDIA : Maharashtra, Punjab, U. P., Delhi, Karnataka, Jammu & Kashmir ; outside India : Japan, Pakistan and Taiwan.

2. *Bryobia praetiosa* Koch

Bryobia praetiosa Koch, 1836, *Deut. Crust. Myr. Arach.*, **1** : 8.

Bryobia praetiosa, Menon & Ghai 1968a, *Indian J. Ent.*, **30** : 88.

Diagnosis : Dark brown mite ; first pair of legs very long ; dorsum with 15 pairs of fan-like setae ; anterior propodosomal projection strong ; peritreme at the distal end long, broad and slender. Propodosoma with irregular striae and coarsely granulate ; hysterosoma bears transverse striae and also coarsely granulate. Empodium II-IV pad like with 2 rows of ventrally directed tenent hairs. In female, tibia I with 1 sensory seta, 1 solenidion and 9 tactile setae, tarsus I with 6 tactile setae proximal to duplex setae ; tibia II with 4 solenidia and 5 tactile setae, tarsus II with 4 tactile setae proximal to duplex setae.

Hosts : Pear, litchi, plum, peach, clover, *Zizyphus jujuba*, loquat, radish, lentil, *Lectica*, rose, cherry, Ibea creeper, Liliaceae, *Brassica*

campestris, *Spinacea oleracea*, *Triticum aestivum* ; outside India : It is also known to occur on apple, prune, cherry, nectarine, wheat, barley, grass (Pritchard & Baker, 1955)., cabbage, clover, strawberry, grapes, (Ehara, 1969), In addition, Chaudhri *et al.* (1974) listed a large number of hosts from-Pakistan (*Vide* Plant-Mite catalogue).

Nature of damage : Injury to plants by this mite is evidenced by appearance of minute yellowish spots. Gradually those spots turn brown and the leaves dry up and fall off. A severely infested tree gets denuded (Menon & Ghai, 1968 ; Gupta, *et al.*, 1975).

Bionomics : Information as regards bionomics is not available from India. Basing on information available from abroad, this mite is known to overwinter both in egg and active stages in warm climate. It oversummers in egg stage. In September, the eggs start hatching until stopped by cold weather. Mite activity increases in spring when they migrate to their new host plants. Feeding continues till early June when active stages die and eggs become dormant. The bright red disc-shaped larvae after feeding become dark green and spherical. Later, they migrate to some sheltered places to moult. The mites also drop off the plants when disturbed and remain quiet after folding their legs. A few of the eggs deposited by spring adults do not aestivate but hatch in early summer giving rise to continuation of generation. They are also known to act as pests of dwelling houses (English & Snetsinger, 1957).

Control : Gupta *et al.* (1975) got good result by application of oxydemeton methyl (0.025%) and dimethoate (0.023%) for its control in Punjab infesting pear.

Distribution : INDIA : Himachal Pradesh, Punjab, Jammu & Kashmir, Delhi, Meghalaya, West Bengal ; outside India : It is widely distributed in Europe, U. S. A., South America, Southern part of Africa, Australia, New Zealand, Taiwan, Japan, Pakistan.

Genus *Bryobiella* Tuttle & Baker

(Figs. 130-133)

Bryobiella Tuttle & Baker, 1968, *Univ. Arizona Press*, p. 15.

3. *Bryobiella punjabensis* Prasad

Bryobiella punjabensis Prasad, 1975b, *Internat. J. Acarol.*, **1** (1) : 13-16.

Diagnosis : Dorsal idiosomal setae of different shape and much

shorter than interval between their longitudinal bases. Propodosoma with longitudinal striae on lateral sides.

Host : House—sparrow.nest.

Distribution : INDIA : Punjab.

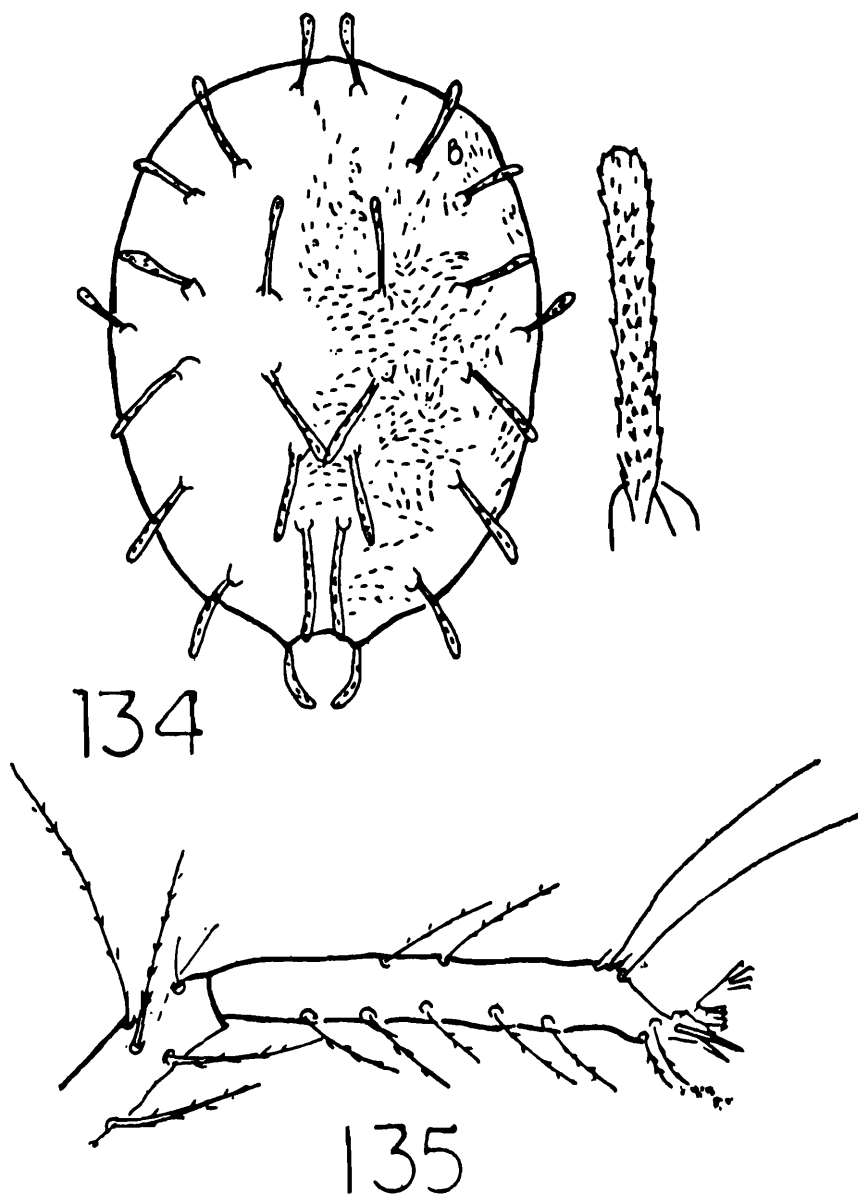
Tribe HYSTRICHONYCHINI Pritchard & Baker

Hystrichonychini Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 35.

Genus *Georgiobia* Wainstein

(Figs. 134-135)

Georgiobia Wainstein, 1960, *Entomolog. Obozrenie Akad. Nauk. SSR.*, 39(1) : 217.



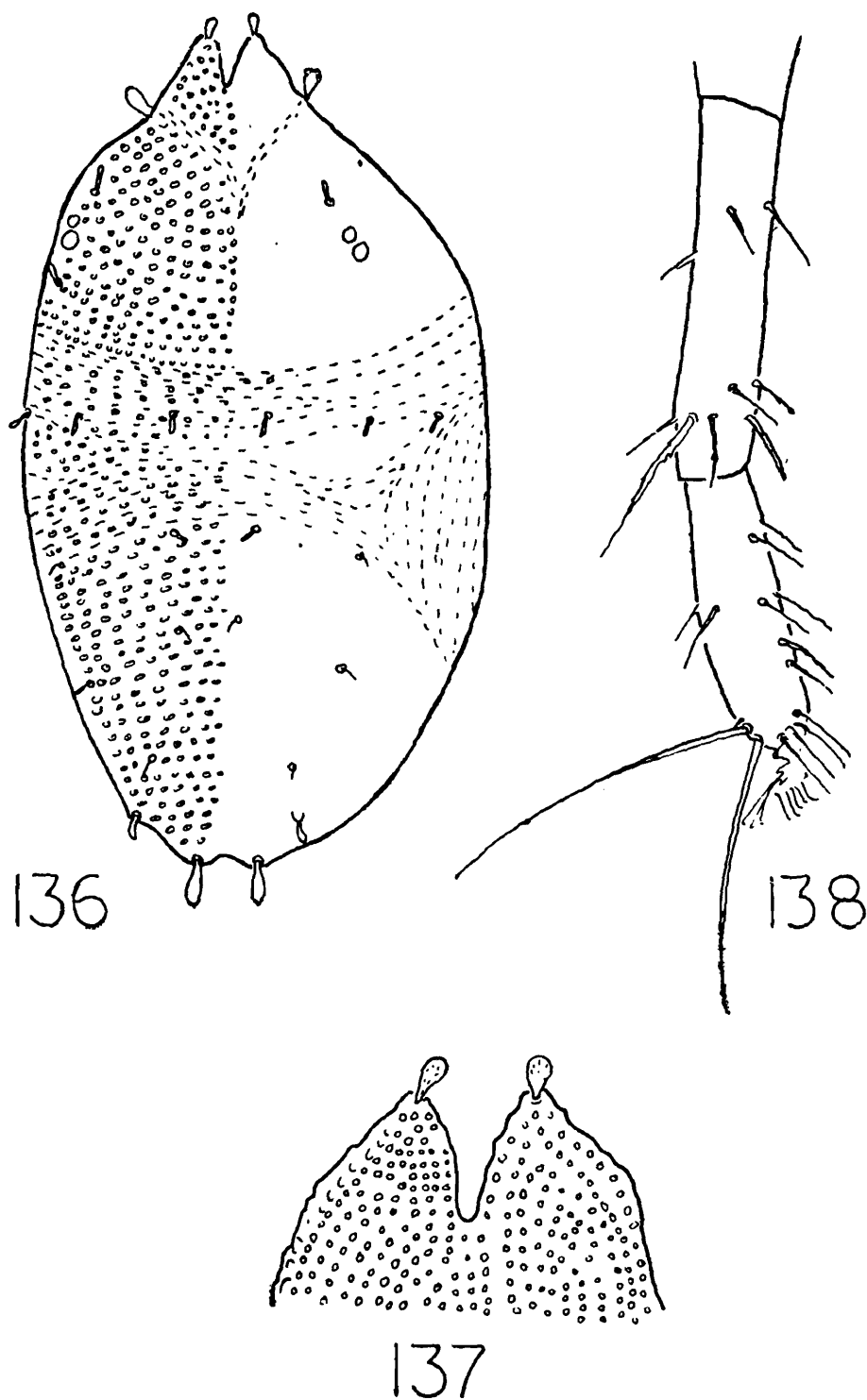
Figs. 134-135. *Georgiobia* sp. : 134. Dorsum, 135. Tibia and tarsus I (Female)

4. *Georgiobia sphaeralceae* Tuttle & Baker

Georgiobia sphaeralceae Tuttle & Baker, 1968, *Univ. Arizona Press*, Arizona, p. 69.

Georgiobia sphaeralceae, Sadana & Chhabra, 1980, *J. Adv. Zool.*, 1(2) : 105-106.

Diagnosis : Dorsocentral setae I-IV contiguous, all dorsocentrals on tubercles. Dorsocentral setae short reaching about half way to



Figs. 136-138. *Mesobryobia* sp. : 136. Dorsum (after Meyer, 1974), 137. Propodosomal lobes, 138. Tibia and tarsus of leg I

margin of body. Leg I shorter than body. Propodosoma with 3 pairs of setae ; hysterosoma with 10 pairs of setae. Peritreme anastomosing distally.

Hosts : *Ranunculus* sp., outside India : *Sphaeralcea ambigua*.

Distribution : INDIA : Punjab ; outside India : U. S. A.

Remarks : No information is available on the nature of damage and bionomics of this species.

Genus *Mesobryobia* Wainstein

(Figs. 136-138)

Mesobryobia Wainstein, 1956, *Trudy respub. Sta. Zashch Rast Kazifilial Vaskhnil.* 3 : 73.

5. *Mesobryobia jobneri* Prasad

Mesobryobia jobneri Prasad, 1975c, *Internat. J. Acarol.*, 1(2) : 20-22.

Diagnosis : Dorsal idiosoma with 13 pairs of setae, of those, the 1st median propodosomal, 2nd median propodosomal, lateral hysterosomal and clunals large, remaining setae thin and tiny ; first to third lateral hysterosomal being heavier than 1st to 4th median hysterosomals. Clunals and 4th lateral hysterosomal borne on well developed tubercles ; 2nd median propodosomal larger and thicker than 2nd lateral propodosomal and 1st median propodosomal much larger and heavier than 2nd median propodosomal.

Host : Napier grass.

Distribution : INDIA : Rajasthan.

Remarks : This mite is not known to cause any damage to the host and nothing is known on its bionomics.

Genus *Monoceronychus* McGregor

(Figs. 139-140a)

Monoceronychus McGregor, 1945, *Proc. Ent. Soc. Wash.*, 47 : 100.

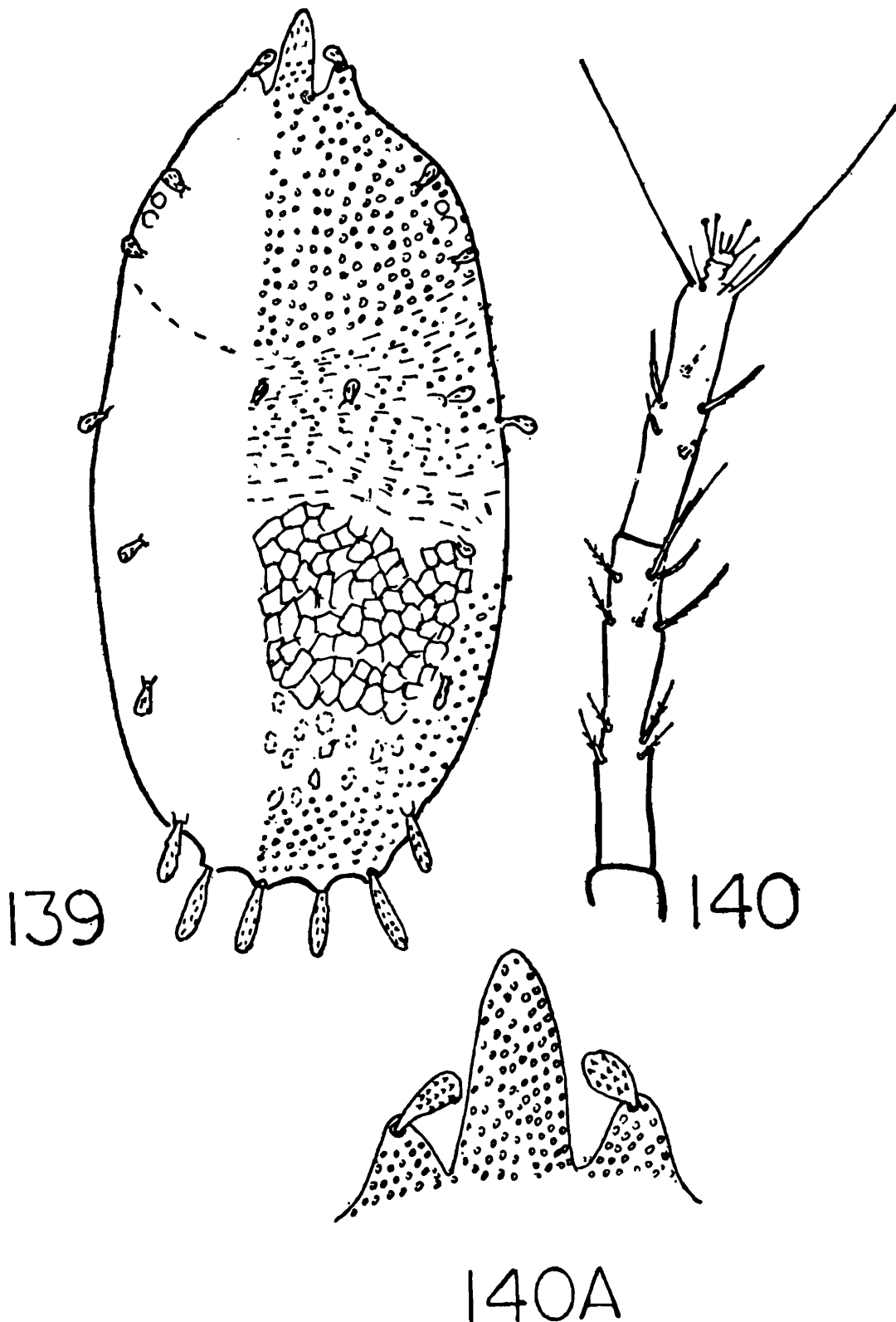
6. *Monoceronychus terpoghossiani* (Bagdasarian)

Petrobia terpoghossiani Bagdasarian, 1959, *Lect. Armenian Acad. Sci., U. S. S. R.*, 28 : 139-142.

Monoceronychus terpoghossiani, Menon & Ghai, 1968a, *Indian J. Ent.*, 30 : 88.

Diagnosis : Body oval with transverse striations at the opisthosomal region and with fan-shaped setae. Peritreme at distal end anasto-

mosing. Rostrum with 2 projections each bearing a seta. All idiosomal setae not borne on tubercles. Empodial claw pad like with tenent hairs.



Figs. 139-140a : *Monoceronychus* sp. : 139. Dorsum (after Meyer, 1974), 140. Tibia and tarsus of leg I, 140a. Propodosomal lobes

Host : Grass.

Distribution : INDIA : Delhi ; outside India : U. S. S. R.

Remarks : Nothing is known on its nature of damage and bionomics.

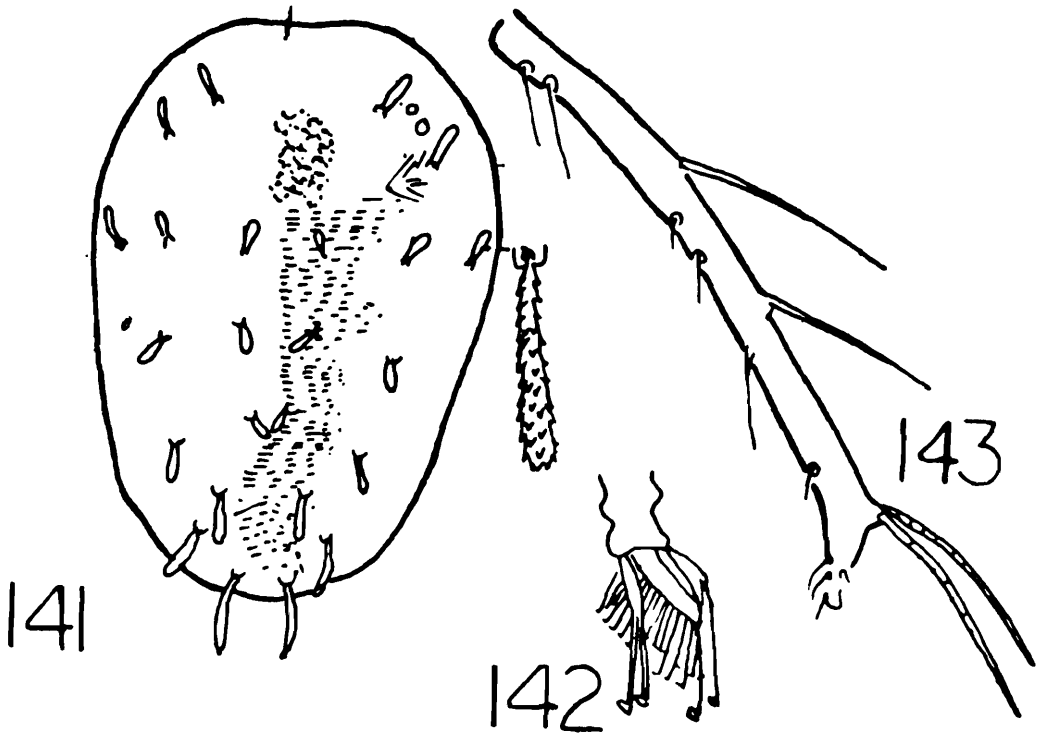
Genus *Neopetrobia* Wainstein
(Figs. 141-143)

Neopetrobia Wainstein, 1956. *Trudy respub. Sta. Zashch. Rast. Kazifilial Vaskhnil*, 3 : 151.

7. *Neopetrobia simlaensis* Prasad

Neopetrobia simlaensis Prasad, 1975b, *Internat. J. Acarol.*, 1(1) : 16-18.

Diagnosis : Hysterosomal setae large, broad, 4th median hysterosomal seta shorter than 4th lateral hysterosomal seta ; hysterosomal



Figs. 141-143 : *Neopetrobia* sp. : (after Prasad, 1975) : 141. Dorsum, 142. Pretarsus, 143. Tarsus I (female)

striae transverse between median hysterosomals except between 3rd median hysterosomal setae and slightly posterior to 4th hysterosomal setae, where it is irregular. Most setae borne on tubercles ; of these, the tubercles of 4th median hysterosomal, 4th lateral hysterosomal and clunals being well pronounced, all setae well serrate. Palp without terminal sensillum, dorsal sensillum small and slender. Peritreme anastomosing distally. Tibia 1 with 2 sensory and 8 tactile setae, tarsus

1 with 7 tactile setae proximal to duplex setae. Genital flap with transverse striae.

Host : Bamboo.

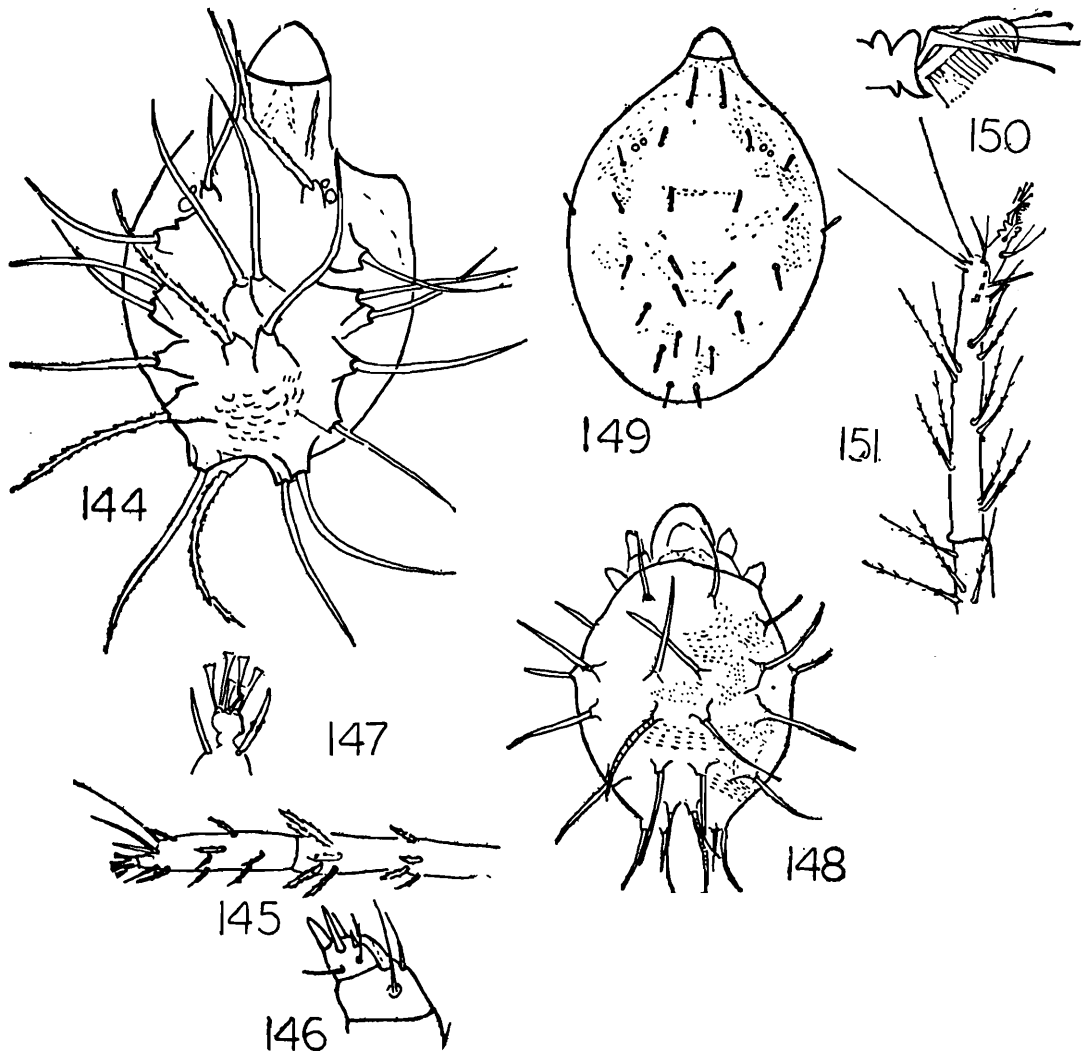
Distribution : INDIA : Himachal Pradesh.

Remarks : No information on nature of damage and bionomics of this species is available.

Genus **Porcupinychus** Anwarullah

(Figs. 144-147)

Porcupinychus Anwarullah, 1966, *Can. Ent.*, 98 : 71.



Figs. 144-148 : *Porcupinychus* sp. : 144. Dorsum, 145. Tibia and tarsus I (Female), 146. Terminal segment of palp, 147. Tarsal appendage, 148. *Petrobia* (*Tetranychina*) sp. Dorsum

Figs. 149-151 : *Petrobia* (*Petrobia*) sp. : 149. Dorsum, 150. distal end of Tarsus I (Female), 151. Tarsus I (Female)

8. *Porcupinychus abutiloni* Anwarullah

Porcupinychus abutiloni Anwarullah, 1966, *Can. Ent.*, **98** (1) : 71.

Porcupinychus abutiloni, Prasad, 1975c, *Internat. J. Acarol.*, **1** (2) : 24.

Diagnosis : Three pairs of propodosomal setae and 8 pairs of hysterosomal setae, all being set on prominent tubercles ; only 4 pairs of dorsocentral setae, the last 2 pairs being marginal. There are 2 sets of duplex setae on tarsus I and 1 set on tarsus II. Fine striations present on middle of propodosoma. Tibia I with small solenidia.

Hosts : *Sida* sp. ; outside India : It is known to occur on *Abutilon indicum* (Anwarullah, 1966). Chaudhri *et al.* (1974) recorded it on a number of other hosts from Pakistan (*Vide* Plant-Mite catalogue).

Distribution : INDIA : Tamil Nadu ; outside India : Pakistan.

Remarks : Nothing is known about its nature of damage and bionomics.

Tribe PETROBIINI Reck

Petrobiini Reck, 1952, *Soobshch Akad. Nauk. gruz.*, **13**(7) : 423.

Genus *Petrobia* Murray

Petrobia Murray, 1877, *Economic Entomology*, Aptera, Lond. p. 118.

Key to the Subgenera of *Petrobia*

1. Dorsal setae set on tubercles.	...	...	<i>Tetranychina</i>
— Dorsal setae not set on tubercles.	...	...	<i>Petrobia</i>

Subgenus *Tetranychina* Banks

Tetranychina Banks, 1917, *Ent. News.*, **28** : 195.

9. *Petrobia* (*Tetranychina*) *harti* (Ewing)

(Fig. 148)

Neophyllobius harti Ewing, 1909, *Trans, Amer. Ent. Soc.*, **35** : 405.

Petrobia harti, ChannaBasavanna & Banu, 1972, *Mysore J. Agric. Sci.*, **6** : 67.

Diagnosis : The dorsal body setae set on prominent tubercles and longer than the intervals between their bases ; 5th pair of dorsal setae much shorter than others. First pair of legs of female about twice as long as body. Peritreme ends in a simple bulb. The setae of male shorter than those of females ; legs being longer in relation to body.

Hosts : *Oxalis corniculata*, *O. pilosa*, Liliaceae, apple, jackfruit, 'Sarkanda', brinjal, black berry, *Crotalaria angyroides*, Khandi weed, *Raphanus sativus*.

Distribution : INDIA : Karnataka, Jammu & Kashmir, Delhi, West Bengal, Assam, Punjab ; outside India : South America, Hawaii, Africa, Australia, Taiwan, Japan, Middle East.

Remarks : This mite causes no appreciable damage to its host and nothing is known as to its bionomics.

Subgenus **Petrobia** Murray

Petrobia Murray, 1877, Economic Entomology, Aptera, Lond. p. 118.

10. **Petrobia (Petrobia) latens** (Müller)

{ Fig. 149-151 }

Acarus latens Müller, 1776, Zool. Dan. Prodr., 187.

Petrobia latens, Bindra & Kittur, 1961, Indian J. Ent., 23 : 71.

Diagnosis : Body dark brown or greenish brown ; legs light yellow ; dorsal setae serrate, not set on tubercles, shorter than intervals between consecutive setae. The anterior pair of legs much longer than the body ; empodium claw like. Peritreme ends in a slender enlargement which is longer than broad.

Hosts : Wheat, barley, pigeon-pea, 'Bathwá', citrus, common vetch, *Cynodon dactylon*, 'Gajri', maize, wind weed, fodder grass, clover, Liliaceae ; outside India : sorghum, gladiolus, iris (Pritchard & Baker, 1955) ; straw-berry (Ehara, 1964) ; *Mentha incana*, *Althea rosea* (Chaudhri, et al., 1974).

Nature of damage : It is a serious pest of wheat in unirrigated fields (M. P., Haryana, Delhi, Rajasthan, Punjab). Because of feeding, the leaves turn drying from tip backwards even when there exists sufficient soil moisture. Damage symptoms are similar to dry-drought. In case of heavy infestation, the occurrence of thousands of mites on a single leaf is not uncommon. In other crops, feeding causes the appearance of yellowing or bronzing symptoms. The infested leaves are never with webs.

Bionomics : A single female lays 6-10 winter eggs and 1-3 summer eggs per day, and during life time as many as 23-90 winter eggs and 8-27 summer eggs are produced per female (Khan et al., 1969). Incubation period varied between 9-14 days during February-March (during Max.

temperature 26.7°-30°C, Min. temperature 7.8°-8.3°C, R.H. 48%). Larval, protonymphal and deutonymphal periods lasted, respectively, 1-2 days, 1-3 days and 1-4 days.

The time required to reach from larva to adult was 7.20 days. This mite developing in the later part of the cropping period produces summer eggs which hatch with the advent of the favourable weather. The emerging mites appear in the wheat field in December. This generation after becoming adult lays winter eggs which hatch immediately and spread in the neighbouring fields through various means. The period of activity is during December-mid-April, with the peak during February-March. Low temperature and drought condition were the optimum conditions for rapid multiplication while rain checked the population. Gupta, Dhooria and Sandhu, (1973) studied the relative susceptibility of different varieties of wheat to the attack of this mite.

Control : Several chemicals are known in literature proving efficiency against this mite, of those, mention may be made of sulphur dusting @ 30-40 kg/ha (Bindra & Kittur, 1961); thiometon 0.15% @ 700 L/ha (Rawat & Sahu, 1969); dimethoate, monocrotophos and oxydemeton methyl @ 0.1, 0.15 and 0.1 kg a.i./ha, respectively. (Deol *et al.*, 1972; Sandhu *et al.*, 1976); thiometon 0.15%, dimethoate 0.15%, parathion EC 0.06% @ 900 L/ha and parathion dust 1.5% @ 24.7 kg/ha (Rawat, 1979).

Distribution : INDIA : Bihar, U. P., Punjab, M. P., Rajasthan, Delhi, Jammu & Kashmir, Haryana; outside India : U. S. A., Pakistan, Africa, Egypt, Europe, U. S. S. R., Australia, Japan, South Africa.

Subfamily TETRANYCHINAE Berlese

Tetranychinae Berlese, Reck 1950, *Akad. Nauk. Gruz. SSR., Trudy Inst. Zool. Tbilisi*, 9 : 123.

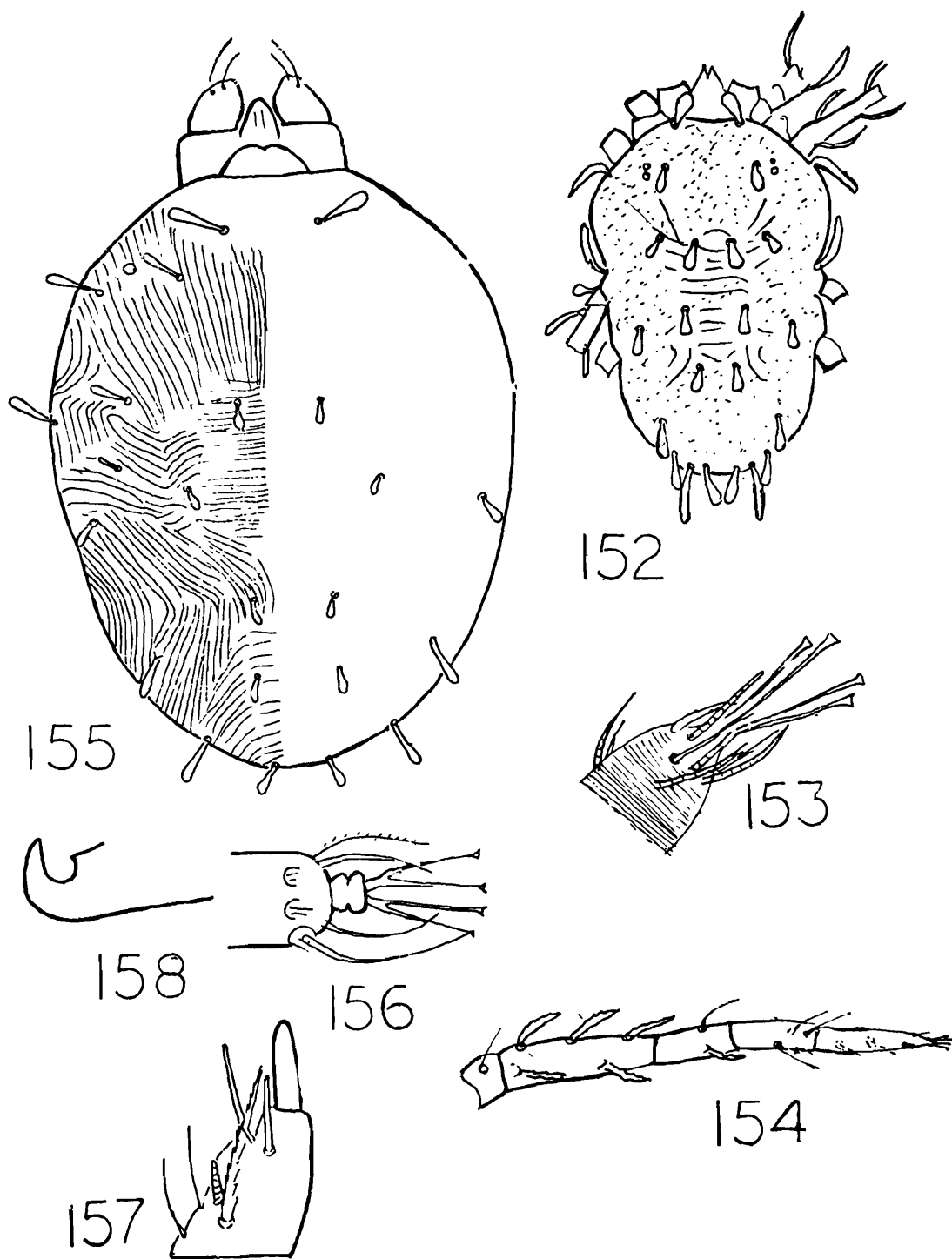
Tribe EURYTETRANYCHINI Reck

Eurytetranychini Reck, 1950, *Akad. Nauk. Gruz. SSR., Trudy Inst. Zool. Tbilisi*, 9 : 123.

Genus *Aponychus* Rimando

(Figs. 152-154)

Aponychus Rimando, 1966, *Philipp. Agr.*, 50 : 105.



Figs. 152-154 : *Aponychus* sp. : (after Chaudhri, 1972), 152. Dorsum, 153. Terminal end of tarsus (Female), 154. Leg IV (Female)
 Figs. 155-158 : *Eutetranychus* sp. : 155. Dorsum, 156. Distal end of tarsus I, 157. Palp (Female), 158. Aedeagus

Key to the Species of Aponychus

1. Dorsocentral hysterosomals I-III very long and approach the bases of next setae in the dorsocentral row	...	...	<i>lalii</i>
— Dorsocentral hysterosomals I-III not so long	...	...	2
2. Dorsocentral hysterosomal setae I-III sub-spatulate	...	...	<i>corpuzae</i>
— Dorsocentral setae I-III spatulate, long	...	...	3
3. Dorsal idiosomal setae 12 pairs, inner sacrals absent, outer sacrals and clunals almost of same length	...	...	<i>baghensis</i>
— Dorsal idiosomal setae 13 pairs, inner sacrals smaller than rest of the idiosomal setae, outer and inner sacrals not of same length but outer sacrals and clunals of same length.	...	...	4
4. Propodosomal seta I one and half times as long as propodosomal seta II.	...	...	<i>sulcatus</i>
— Propodosomal setae I and II almost equal	...	...	<i>sarjui</i>

11. *Aponychus corpuzae* Rimando

Aponychus corpuzae Rimando, 1966, *Philip. Agr.*, 50 : 107.

Aponychus corpuzae, Gupta, 1976, *Oriental Ins.*, 10 : 332-333.

Diagnosis : Body dorsoventrally compressed ; dorsal integument wrinkled ; dorsal idiosomal setae serrate, long and spatulate. Genital flap wrinkled. Terminal sensillum of palp slender, subconical. In male, tibia I with 3 tactile setae. In female, tibia I with 5 tactile setae ; tibia II with 3 tactile setae.

Host : Bamboo.

Nature of damage : These mites live in colonies on the under surface of the leaves covered with thin webs. The feeding of this mite causes the appearance of yellow specks.

Bionomics : It occurs in the field throughout the year but the population is negligible in the rainy season.

Distribution : INDIA : Assam, Meghalaya, Orissa, Andaman Nicobar Islands ; outside India : Japan, Philippine, Thailand.

12. *Aponychus (Stylophoronychus) baghensis* Prasad

Aponychus (Stylophoronychus) baghensis Prasad, 1975a, *Internat. J. Acarol.*, 1(1) : 2-4.

Diagnosis : Idiosoma with 12 pairs of setae ; I-III dorsocentral hysterosomals very large, leaf like and approaching the next setae in

the medio-hysterosomal row, I dorsocentral hysterosomals very short and thin ; most dorsal idiosomal setae leaf like ; IV dorsocentral hysterosomals absent, only one seta present on each of genu I, II and tibia II, 4 setae on femur I.

Host : Bamboo.

Distribution : INDIA : Bihar.

Remarks : No damage is caused by this mite and nothing about its biology is known.

13. *Aponychus* (*Stylophoronychus*) *lalii* Prasad

Aponychus (*Stylophoronychus*) *lalii* Prasad, 1975a, *Internat. J. Acarol.*, 1(1) : 8-10.

Diagnosis : Twelve pairs of setae present on idiosoma ; 1-3 dorso-central hysterosomals very large, leaf like and approaching the next setae in the mediohysterosomal row ; 1st dorsocentral hysterosomals very short and thin ; most dorsal idiosomal setae leaf like ; 4th dorso-lateral hysterosomals absent, only one seta present on each of genu I, II and tibia II, 4 thick setae on femur I.

Host : Bamboo.

Nature of damage : No damage is caused by this mite.

Bionomics : Nothing is known in this regard.

Distribution : INDIA : Bihar.

14. *Aponychus* *sarjui* Gupta

Aponychus sarjui Gupta, 1980, *Rec. Zool. Surv. India.*, 77 : 111-112.

Diagnosis : Body oblong. Idiosomal setae spatulate, serrate. Dorso-centrals I and II, dorsolateral hysterosomals minute, III propodosomal, humeral, III dorsocentral, all of same length. Inner sacrals small, outer sacrals and clunals large and of same length. Peritreme 'U' shaped. Genital flap with transverse striae. Tibia I with 1 sensory and 4 tactile setae, tarsus I with 10 tactile setae ; tibia II with 1 sensory and 2 tactile setae, tarsus II with 10 tactile setae (in female).

Host : Bamboo.

Remarks : No damage is caused by this mite and bionomics is not known.

Distribution : INDIA : Andaman Isl.

15. *Aponychus sulcatus* Chaudhri

Aponychus sulcatus Chaudhri, 1972, *Pak. J. Zool.*, 4 (2) : 161-162.

Aponychus sulcatus, Sadana & Chhabra, 1980, *J. Adv. Zool.*, 1(2) : 104.

Diagnosis : Body oblong with expansion of lateral margins of propodosoma between propodosomal setae III and humeral setae. Peritreme slender with slightly broad distal end. Dorsum finely granulated with transverse wrinkles in the middle. Propodosomal setae 3 pairs, 1st strongly serrate and spatulate on tubercles and one and half times longer than propodosomal seta II which is fan shaped ; III well developed, serrate ; dorsocentral hysterosomals 3 pairs, fan shaped, strongly serrate on tubercles. Dorsolateral hysterosomal 3 pairs I fan shaped, II and III spatulate, serrate ; sacrals 2 pairs ; genital setae 2 pairs ; anal setae 1 pair.

Hosts : *Carica papaya*, *Arundo donax* ; outside India : *A. donax*, *Boerhaavia diffusa*.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Remarks : It is not known to cause any damage to its host. No work has been done on its bionomics.

Genus *Eutetranychus* Banks
(Figs. 155-158)

Neotetranychus (Eutetranychus) Banks, 1917, *Ent. News.*, 28 : 197.

Eutetranychus Banks, McGregor, 1950, *Ann. Midl. Nat.*, 44 (2) : 267.

Key to the Species of Eutetranychus

1. Striae forming 'V' pattern between second and third pairs of dorsocentral hysterosomal setae	...	2
— Striae longitudinal between second and third pairs of dorsocentral hysterosomal setae.		4
2. Dorsocentral hysterosomal setae relatively much longer, reaching to the bases of setae next behind ; third pair even going beyond the bases of 4th pair.		<i>maximae</i>
— Dorsocentral hysterosomal setae very short, not reaching to the bases of setae next behind.	...	3
3. Propodosomal mediodorsal striae with less developed lobes ; third pair of dorsocentral setae tapering, third and fourth dorsocentral hysterosomal setae forming a rectangle.		<i>phaseoli</i>

— Propodosomal mediodorsal striae with developed lobes, third pair of dorsolateral setae similar to other lateral setae ; third and fourth dorsocentral hysterosomal setae forming a square.	<i>orientalis</i>
4. Propodosoma with mediodorsal striae anastomosing.	5
— Propodosoma with mediodorsal striae not anastomosing.	6
5. Dorsal setae set on small tubercles, dorsal body setae slender, slightly enlarged distally.	<i>breidin</i>
— Dorsal setae set on strong tubercles, dorsal body setae slender, serrate and tapering.	<i>africanus</i>
6. Peritreme ending in simple bulb, longitudinal striae starting at the bases of second pair of dorsocentral hysterosomal setae.	7
— Peritreme ending in bilobed bulb, longitudinal striae starting behind the bases of second dorsocentral hysterosomal setae.	<i>bilobatus</i>
7. Tibia II with 5 tactile setae.	8
— Tibia II with 6 tactile setae.	9
8. All dorsocentrals, humerals and third pair of propodosomal setae not set on tubercles.	<i>citri</i>
— All setae on idiosoma set on tubercles.	<i>caricae</i>
9. First pair of dorsolateral setae situated anterior to first pair of dorsocentral setae.	<i>nagai</i>
— First pair of dorsolateral setae situated at the level of first pair of dorsocentral setae.	<i>anneckeii</i>

16. *Eutetranychus africanus* (Tucker)

Anychus africanus Tucker, 1926, *Union S. Afri. Dept. Agri. Div. Ent. Mem.*, 5 : 5.
Eutetranychus africanus, Manson, 1963, *Acarologia*, 5 : 352.

Diagnosis : Body with dorsal setae subspatulate and long ; longitudinal striae on propodosoma bears weaker lobes ; striae longitudinal between second and third pairs of dorsocentral hysterosomal setae. Palp tarsus of female three and half times as long as broad. Distal bent of aedeagus relatively shorter than dorsal margin of shaft.

Hosts : Orange ; outside India : lemon, frangipini (Baker & Pritchard, 1960).

Nature of damage : In India, it is not known to cause any damage.

However, in other countries it is known to produce fine stipplings on the leaves causing premature leaf drop.

Bionomics : Not much is known about its bionomics. Heavy rain acts as the limiting factor to the population build-up of this mite.

Distribution : INDIA : Assam, Karnataka ; outside India : Durban, Mauritius, Natal.

17. *Eutetranychus anneckeii* Meyer

Eutetranychus anneckeii Meyer, 1974, *Ent. Mem. Dept. Agr. Tech. Serv. Repub. S. Afr.*, 36 : 148.

Eutetranychus anneckeii, Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 349-351.

Diagnosis : This species is close to *E. orientalis*, but can be separated from it by having striae between second and third pairs of dorsocentral hysterosomals not 'V' shaped but longitudinal, dorsal sensillum on palp tarsus of female about 0.67 length of terminal sensillum. The terminal sensillum on the palp tarsus of male about 2 times as long as its greatest thickness and with relatively shorter dorsal sensillum.

Hosts : *Luffa acutangula*, sapota, jackfruit, peach, mulberry, *Ficus* sp., citrus, sour orange.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi ; outside India : Mozambique.

18. *Eutetranychus bilobatus* Nassar & Ghai

Eutetranychus bilobatus Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 343-345.

Diagnosis : Dorsum with 3 pairs of propodosomal and 10 pairs of hysterosomal setae set on tubercles, all setae strongly serrate and varying in length ; dorsocentral hysterosomal shorter than intervals between their bases and decidedly more spatulate than dorsolaterals. Humerals and first pair of dorsolateral setae situated anterior to first pair of dorsocentral hysterosomal setae ; third pair of dorsocentral hysterosomals forming a square with 4th pair of dorsocentral hysterosomals. Propodosoma with longitudinal striae with distinct lobes ; hysterosomal striae between second and third pairs of dorsocentral longitudinal. Peritreme bilobed distally.

Host : *Zizyphus* sp.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi.

19. *Eutetranychus bredini* Baker & Pritchard

Eutetranychus bredini Baker & Pritchard, 1960, *Hilgardia*, 29 : 466-467.

Eutetranychus bredini, Singh & Putatunda, 1974, *Indian J. Pl. Prot.*, 1 : 51.

Diagnosis : Setae on mediodorsal integument of propodosoma anastomosing ; lobes of striae strongly developed. Peritreme gradually enlarging distally ; dorsal setae on strong tubercles ; marginal setae long and slender.

Hosts : Brinjal ; outside India : palm.

Distribution : INDIA : U. P. ; outside India : Africa.

Remarks : It causes no damage to its host and no information is available as to its bionomics.

20. *Eutetranychus caricae* Nassar & Ghai

Eutetranychus caricae Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 347.

Diagnosis : Dorsum with 3 pairs of propodosomal and 10 pairs of hysterosomal setae set on strong tubercles, all setae strongly serrate, varying in length ; propodosomal, humeral and dorsolateral hysterosomal setae serrate, rod like and enlarged distally ; third pair of dorso-central hysterosomal setae reaching to the bases of 4th pair of dorsocentral hysterosomals ; humerals and first pair of dorsolaterals situated anterior to first pair of dorsocentral hysterosomals ; third pair of dorsocentral hysterosomals forming a square with the fourth pair of dorsocentral hysterosomals. Propodosoma having longitudinal striae with weak lobes.

Host : *Ficus carica*.

Nature of damage : No economic importance of this species is known.

Distribution : INDIA : Delhi.

21. *Eutetranychus citri* Attiah

Eutetranychus citri Attiah, 1967, *Bull. Soc. Ent. Egypte*, 51 : 15-16.

Eutetranychus citri, Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 345.

Diagnosis : This species differs from *E. orientalis* in first pair of dorsolaterals and the humerals which are situated anterior to the first pair of dorsocentrals ; the third pair of dorsocentrals form a slight rectangle with the fourth pair of dorsocentrals, all being spatulate, dorsolaterals being relatively longer ; humerals, dorsocentrals and third pair of propodosomals not set on tubercles ; rest of the setae on

tubercles. Peritreme ends in simple bulb. Tibia I and tibia II bear 9 and 5 tactile setae, respectively.

Host : Citrus.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi ; outside India : Egypt.

22. *Eutetranychus maximae* Nassar & Ghai

Eutetranychus maximae Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 339.

Diagnosis : Dorsum with 3 pairs of propodosomals and 10 pairs of hysterosomal setae set on strong tubercles, all being long, serrate, rod like except third pair of propodosomals, humerals, second and third pairs of dorsolateral setae mostly tapering ; dorsocentral hysterosomals long and touch the bases of the next setae in line. Propodosoma having longitudinal striae with a strong lobe ; striae between second and third pairs of dorsocentral hysterosomals forming a 'V' pattern. Ventrally genital area with 1 pair of pregenital, 2 pairs of genital, 2 pairs of anals and 2 pairs of paraanal setae, all simple.

Host : *Cucurbita maxima*.

Nature of damage : No damage is known to be caused by this mite.

Distribution : INDIA : Delhi.

23. *Eutetranychus nagai* Nassar & Ghai

Eutetranychus nagai Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 347-349.

Diagnosis : Dorsum with 3 pairs of propodosomals and 10 pairs of hysterosomal setae on prominent tubercles except humerals and dorsocentrals ; all setae strongly serrate and varying in length, propodosomals, humerals and dorsolateral hysterosomals tend to be subspatulate ; third pair of dorsocentral hysterosomals forming a square with fourth pair of dorsocentrals. Propodosoma having longitudinal striae strongly lobed, striae longitudinal between second and third pairs of dorsocentrals. Terminal sensillum of palp tarsus 4 times as long as broad.

Host : *Eriobotrya japonica*.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi.

24. *Eutetranychus orientalis* (Klein)

Anychus orientalis Klein, 1936, *Bull. Agric. Res. Stn. Rehovoth*, **21** : 3.

Anychus ricini Rahman & Sapra, 1940, *Proc. Indian Acad. Sci.*, **11** : 194.

Diagnosis : Greenish brown mite with dorsal striae on propodosoma parallel and lobed ; dorsal setae short, broad and set on small tubercles. Lateral setae longer than dorsomedian setae, slightly spatulate. In male, tarsus I with 1 sensory and 11 tactile setae ; tarsus II with 1 sensory and 11 tactile setae. Aedeagus hook-like with distal bent longer than dorsal margin of shaft which is slightly concave. In female, tibia I with 2 sensory and 3 tactile setae, tarsus I with 1 sensory and 14 tactile setae ; tibia II with 1 sensory and 5 tactile setae.

Hosts : Citrus, peach, fig, plum, walnut, castor, cotton, *Cassia fistula*, maize, beans, *Croton*, *Tabernaemontana coronaria*, *Melia azedarach*, *Azadirachta indica*, oleander, *Euphorbia*, papaya, *Glyricedia*, *Zizyphus jujuba*, rose, *Aegle marmelos*, grass, *Anacardium viridis*, *Cassava*, banana, *Luffa* sp ; outside India : *Bauhinia variegata*, squash, frangipini, grapefruit, lemon, *Nerium indicum*, *Thevetia peruviana*,. Besides, Dhooria 1982a and Chaudhri *et al.*, 1974 reported a number of hosts from India and Pakistan, respectively (*vide* Plant-Mite catalogue).

Nature of damage : This is a serious pest of a wide variety of fruits, of those, citrus is the most important one. All stages of mites suck sap from leaves, tender shoots, bark as well as from fruits. The affected leaves turn yellowish brown which afterwards dry up and fall off. The mites are usually seen on the upper surface of leaves being covered under heavy webs with dust particles adhered to it. The infested leaves get crumpled. All these affect the normal physiological activities of the plants and thereby the growth and vigour are retarded. Injury is more where the plants lack moisture. Sadana & Kanta (1972) reported that out of 6 different varieties of citrus, lemon was highly susceptible. In another study, Sadana & Kanta (1972a) reported that out of 48 plants tested for hosts of this mite, 30 plants were suitable for feeding and breeding, 17 were suitable for short feeding and oviposition but unsuitable for feeding and breeding.

Bionomics : The life-cycle is completed as : egg 1-2 days in summer, may be as long as 35 days in winter ; larval, protonymphal and deutonymphal stages take 1-4 days each. The longevity of adult female is 6-12 days while the same during winter is 10 days. A single female lays as many as 29-30 eggs in a life time. The optimum temperature for development is 25°-30°C but mortality is high at 35°C (Banu &

ChannaBasavanna, 1972). The life cycle was also studied by Lal (1977). The population of this mite is abundant during summer months (March-June), absent during rainy season (July-September) and very low during winter (December-February). High temperature, low humidity and bright sunny days are favourable for development of population (Lal & Mukharji, 1980). The population build-up is positively correlated with number of oil glands and negatively correlated with thickness of leaf cuticle (Mohamad, 1965). Population on cassava was absent or very low during June-December and thereafter the increase was sudden. Peak infestation was during January-April (Lal, 1982). Sweet lime and sour lime were more susceptible as higher fecundity, longevity, feeding and oviposition responses were more on these varieties. Kagzi and Musambi varieties had little preference (Dhooria, 1982). Bitter gourd, bottle gourd, cabbage, *Datura*, egg plant, litchi, ornamental plant, phalsa and tomato exhibit nonpreference for oviposition (Dhooria, 1982b).

Control : Different chemicals have been found to be effective against this mite in different experiments. To name a few : carbo-phenothion 0.02% (Sethi, 1967 ; Rai *et al.*, 1964), ethion 0.03-0.05%, phosalone, monocrotophos and dicofol (0.05%), cyhexatin (Plictran) 0.05% (Pareek & Sharma, 1982), monocrotophos 0.07% (Dhooria & Butani, 1982a). Dicofol is effective against all stages while chlorfenson, chlorofenethol + chlorfenson were very effective against adults larvae and nymphs, (Dhooria & Butani, 1982).

Natural enemies : The natural enemies recorded on this mite are : *Pronematus* sp., *Amblyseius* (*Neoseiulus*) *cucumeris*, *A. (Euseius) alstoniae*, *A. (E.) delhiensis*, *A. (E.) finlandicus*, *Typhlodromus (A.) divergentis*, *T. (A.) fleschneri*, *Agistemus* sp., *Pronematus elongatus*, *Cheyletus eruditus*, *Cunaxa setirostris*, *Scolothrips indicus*, *Scymnus gracilis*, *Stethorus pauperculus*, *Anthocoris* sp. (Gupta *et al.*, 1971 ; Sadana & Kanta, 1971 ; Dhooria, 1981 ; Dhooria, 1982).

Distribution : INDIA : Assm, Jammu & Kashmir, Karnataka, Delhi, Maharashtra, Punjab, West Bengal, Gujarat, Haryana, U. P. ; outside India : Israel, Turkey, Jordan, Iran, Egypt, Cyprus, Sudan, South Africa, Afghanistan, Pakistan, Taiwan, Thailand, East Transvaal.

25. *Eutetranychus phaseoli* Nassar & Ghai

Eutetranychus phaseoli Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 341-343.

Diagnosis : Dorsum with 3 pairs of propodosomal and 10 pairs of hysterosomal setae, all set on prominent tubercles, mostly serrate ;

dorsocentral hysterosomals shorter than the interval between them and subspatulate except first pair of propodosomals and third pair of dorsolaterals long and tapering ; first pair of dorsocentral hysterosomals equal in length to fourth pair of dorsocentral hysterosomals and both longer than second and third pairs of dorsocentral hysterosomal setae. Propodosomal striae with weak lobes ; hysterosomal striae also with weak lobes.

Host : *Phaseolus vulgaris*.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi.

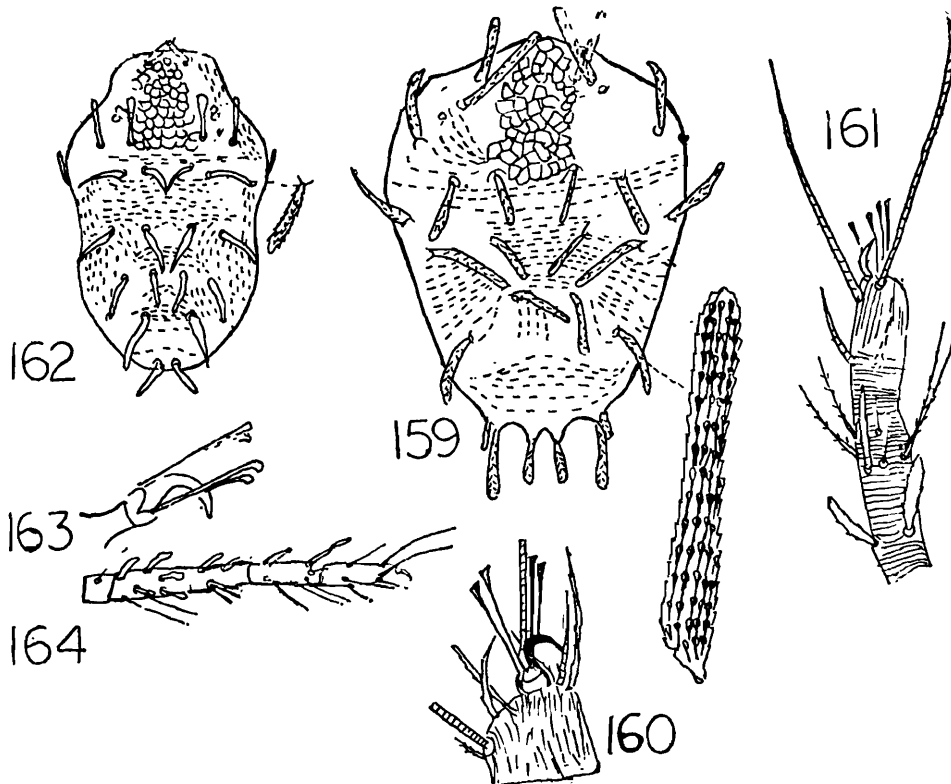
Tribe TENUIPALPODINI Pritchard & Baker

Tenuipalpodini Pritchard & Baker, 1966, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 97.

Genus *Tenuipalponychus* ChannaBasavanna & Lakkundi

(Fig 159-161)

Tenuipalponychus ChannaBasavanna & Lakkundi, 1977, *Indian J. Acar.*, 1 : 23.



Figs. 159-161 : *Tenuipalponychus* sp. : (after ChannaBasavanna & Lakkundi, 1977) : 159. Dorsum, 160. Distal end of tarsus I (Female), 161. Tibia and tarsus I (Female)

Figs. 162-164 : *Bakerina* sp. : (after Prasad, 1975) : 162. Dorsum, 163. Terminal end of tarsus I (Female), 164. Leg I (Female)

26. *Tenuipalponychus citri* ChannaBasavanna & Lakkundi

Tenuipalponychus citri ChannaBasavanna & Lakkundi, 1977, *Indian J. Acar.*, 1(1-2) : 23-26.

Diagnosis : Female with 13 pairs of rod like dorsal setae ; all on moderate tubercles ; each seta on dorsal surface studded with row of pear shaped tubercles. Propodosoma with fine granulations laterally and reticulate mediodorsally. Peritreme ends in a simple bulb without terminal branches. Terminal sensillum of palpus two and half times as long as broad. Aedeagus forming a knob at the dorsally turned distal end.

Host : Citrus.

Nature of damage : It infests different varieties of citrus in Karnataka. Its infestations cause the appearance of brownish scars on the fruits. Later, those coalesce to form white patches on the surface.

Distribution : INDIA : Karnataka.

Genus *Bakerina* Chaudhri

(Figs. 162-164)

Bakerina Chaudhri, 1971, *Pak. J. Zool.*, 3(2) : 195.

Key to the Species of *Bakerina*

1. Dorsal idiosomal setae 12 pairs ; setae leaf-like	...	...	<i>orissaensis</i>
— Dorsal idiosomal setae 13 pairs ; setae lanceolate	...	...	<i>aculus</i>

27. *Bakerina aculus* Chaudhri

Bakerina aculus Chaudhri, 1971, *Pak. J. Zool.*, 3(2) : 197-199.

Bakerina aculus, Sadana, Chhabra & Kumari, 1981, *Entomon*, 6(4) : 325-326.

Diagnosis : Dorsal setae 13 pairs, all setae pointed, lanceolate. Propodosoma with dorsal reticulations in the middle, fine dashes within reticulations, minute alveoli in lining of each reticulations. Hysterosoma with irregular simple longitudinal striations along the margin and irregular, dimpled, transverse striations in the middle. Peritreme hooked. Dorsocentral seta I shorter than the distance between dorso-central I and II ; dorsocentral seta II shorter than the distance between dorsolateral II and III.

Host : *Thuja orientalis*.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Remarks : No damage is caused by this mite.

28. *Bakerina orissaensis* Prasad

Bakerina orissaensis Prasad, 1975, *Internat. J. Acarol.*, 1(2) : 18-20.

Diagnosis : Dorsal idiosomal setae 12 pairs, leaf-like, borne on tubercles ; clunals very short ; hysterosomals mostly smaller ; solenidia present on tibia I and none present on tibia II-IV.

Hosts : Jackfruit, onion.

Nature of damage : It is not known to cause any damage to its hosts.

Bionomics : No work has been done on its bionomics.

Distribution : INDIA : Orissa.

Tribe TETRANYCHINI Reck

Tetranychini Reck, 1950, *Akad. Nauk. Gruz. SSR., Trudy Inst. Zool. Tbilisi*, 9 : 123.

Genus *Eotetranychus* Oudemans (Figs. 165-168)

Eotetranychus Oudemans, 1931, *Ent. Ber. Amst.*, 8(178) : 224.

Key to the Species of *Eotetranychus*

1. Dorsal idiosomal setae serrate	...	...	2
— Dorsal idiosomal setae not serrate	...	...	8
2. Dorsal idiosomal setae longer than the interval between their longitudinal bases	...	...	3
— Dorsal idiosomal setae as long as interval between their longitudinal bases	...	...	7
3. Dorsal idiosomal setae $1\frac{1}{2}$ times longer than interval between their longitudinal bases	...	...	4
— Dorsal idiosomal setae about 2 times longer than the intervals between their longitudinal bases	...	...	<i>fremonti</i>
4. Shaft of aedeagus short, broad and curved dorsad ; not forming a knob	...	...	5
— Shaft of aedeagus straight, turning slightly dorsad to form a knob	...	...	<i>rohila</i>

5. Aedeagus with proximal portion of shaft curved dorsad	...	...	<i>rajouriensis</i>
— Aedeagus with proximal portion of shaft not curved	...	...	6
6. Aedeagus greatly tapering and forming a broad ventral bent	...	...	<i>kankitus</i>
— Aedeagus greatly narrowed distally and curves dorsad and forming a distal knob	...	...	<i>broodryki</i>
7. Shaft of aedeagus bending dorsad to form slender sigmoid	...	...	<i>irregularis</i>
— Shaft of aedeagus bending ventrad to form slender but not sigmoid	..	...	<i>syzygii</i>
8. Distal portion of aedeagus sigmoid	...	...	9
— Distal portion of aedeagus curved but not sigmoid	...	...	10
9. Dorsal idiosomal setae as long as interval between their longitudinal bases	...	...	<i>hirsti</i>
— Dorsal idiosomal setae twice as long as the interval between their longitudinal bases	...	...	<i>frosti</i>
10. Distal portion of aedeagus strongly curved and hooklike	...	...	<i>suginamensis</i>
— Distal portion of aedeagus curved but not hooked	...	...	11
11. Peritreme at the distal end bends	...	...	<i>truncatus</i>
— Peritreme at the distal end not bends	...	...	12
12. Genital flap with longitudinal striae	...	...	<i>sexmaculatus</i>
— Genital flap with transverse striae	...	...	13
13. Peritreme distally ends in a bulb	...	...	14
— Peritreme distally curved	...	...	<i>ladakhensis</i>
14. Aedeagus bent dorsad to form a slender distal portion	...	...	<i>pamelae</i>
— Aedeagus bent dorsad to form a gradually tapering slender distal portion	...	...	<i>mandensis</i>

[The species *neoperplexus* and *uncatus* are not included in key because their records from India are doubtful.]

29. *Eotetranychus broodryki* Meyer

Eotetranychus broodryki Meyer, 1974, *S. Afr. Dept. Agr. Tech. Serv. Ent. Min.*, No. 36 : 201.

Eotetranychus broodryki, Das & Naik, 1979, *Acarl. Newsl.*, 4 : 6.

Diagnosis : Green mite, body linear, setae lanceolate, serrate and reach upto the bases of the next setae. Propodosomal striae lobed and

striae on hysterosoma transverse. Shaft of aedeagus narrow distally and curves dorsad forming a distal knob which is provided with a small anterior projection and a long posterior projection.

Host : Red-gram (*Cajanus indicus*).

Nature of damage : Das & Naik (1977) reported this species from Orissa infesting red-gram. The feeding by this mite causes chlorosis resulting in the appearance of yellow specks on the under surface of leaves. All these checked the growth and yield of the crop.

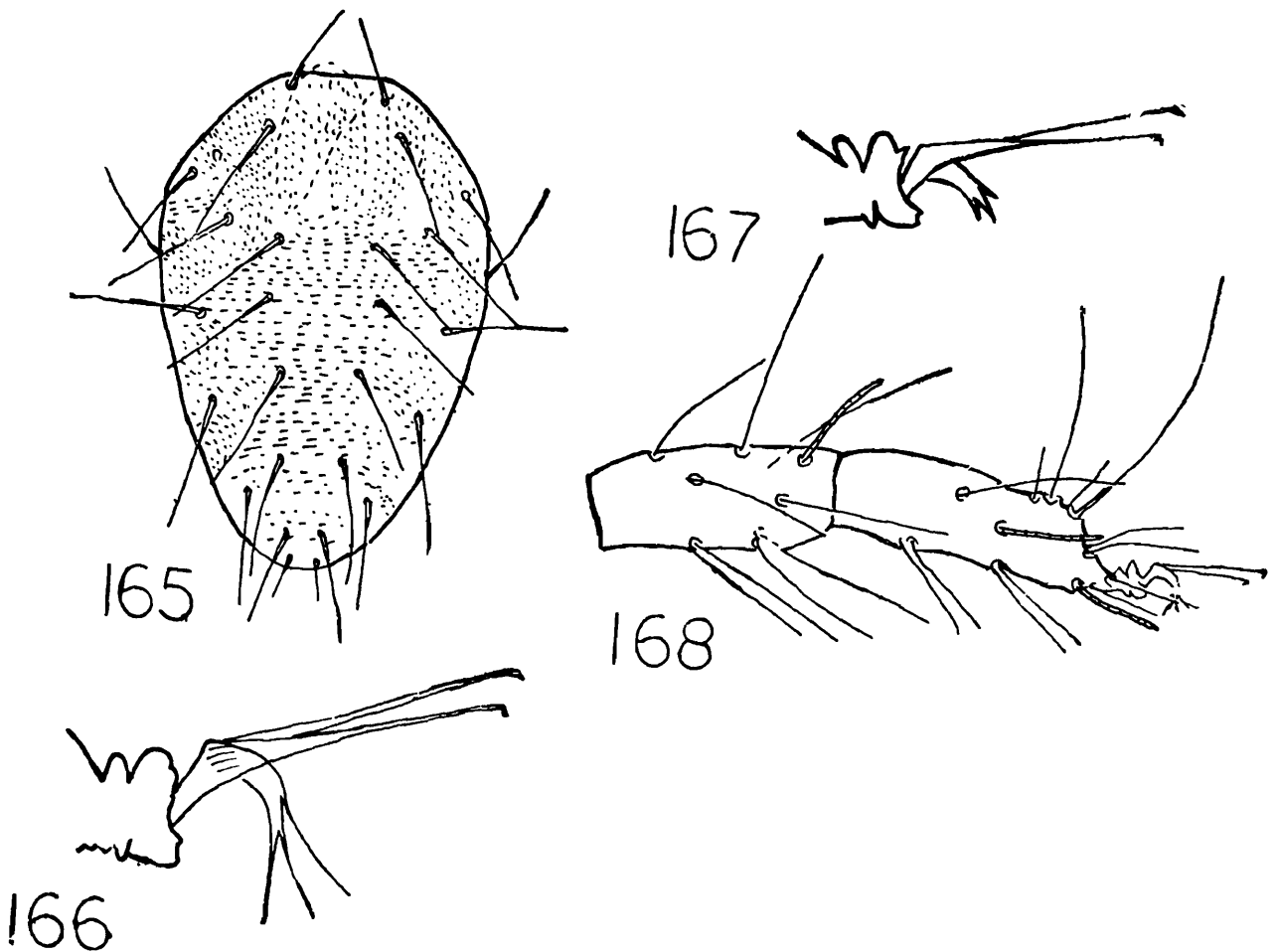
Bionomics : Infestation was noticed during January to April and disappeared during rainy season.

Distribution : INDIA : Orissa ; outside India : Rhodesia.

30. *Eotetranychus frosti* (McGregor)

Tetranychus frosti McGregor, 1952, *Proc. Ent. Soc. Wash.*, 54 : 142.

Eotetranychus frosti, Gupta & Gupta, 1976, *Acarl. Newsl.*, 3 : 67.



Figs. 165-168 : *Eotetranychus* sp. : 165. Dorsum. 166. Terminal end of tarsus I (Female), 167. Terminal end of tarsus I (male). 168. Tibia and tarsus I (Female)

Diagnosis : In male, tibia I with 4 sensory and 9 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 9 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 8 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae.

Hosts : Apple ; outside India : rose (McGregor, 1952), raspberry, blackberry (Pritchard & Baker, 1955).

Nature of damage : It is not known to cause any damage to its host.

Distribution : INDIA : Gujarat, Jammu & Kashmir ; outside India : Arizona, California, Louisiana, Missouri, North Dakota, Ohio, New York.

31. *Eotetranychus fremonti* Tuttle & Baker

Eotetranychus fremonti Tuttle & Baker, 1964, *Univ. Arizona Tech. Bull.*, 158 : 26.

Eotetranychus fremonti, Gupta, 1980, *Rec. Zool. Surv. India*, 77 : 113.

Diagnosis : In male, terminal sensillum of palpus minute and tapering, dorsal sensillum slender. Peritreme hooked at the distal end. Tarsus I with 2 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 7 tactile setae, tarsus II with 1 sensory and 2 tactile setae proximal to duplex setae. In female, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 2 sensory and 6 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae. Terminal sensillum of palpus $2\frac{1}{2}$ times as long as broad. Dorsal sensillum tapering.

Hosts : *Ficus* sp., *Zizyphus jujuba*, *Morus alba*.

Distribution : INDIA : Nicobar Isl. ; outside India : U. S. A.

Remarks : It causes no damage to its hosts and no information is available as to its bionomics.

32. *Eotetranychus hirsti* Pritchard & Baker

Tetranychus fici Hirst, 1926, *Proc. Zool. Soc. Lond.*, 828.

Eotetranychus hirsti Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 200.

Diagnosis : It is greenish yellow mite with black blotches all over dorsum ; dorsum with 14 pairs of setae ; clunals minute. Striations transverse on female genital flap as well as to the area anterior to the flap. In male, tibia I with 5 sensory and 9 tactile setae,

tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Aedeagus bends dorsal with upturned portion slender, tapering and sigmoid. In female, tibia I with 3 sensory and 7 tactile setae, tarsus I with 1 sensory and 5 tactile setae ; tibia II with 8 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae.

Hosts : *Ficus cunea*, *F. racemosa*.

Nature of damage : This is a serious pest of fig in India and also in Pakistan. Transparent green patches are produced on the under-surface of leaves when viewed across light. The patches turn yellowish green, then brown with rough and dry texture. Such leaves along with fruits drop prematurely, often resulting in complete defoliation of plants. These mites normally infest the under surface of leaves but in case of heavy infestations they may move to the upper surface of leaves and fruits as well. The infested fruits get shrivelled, fail to ripe and ultimately fall off. In November, when the leaves dry, the mites migrate to the terminal buds where they hibernate till February or early March when their activity resumes (Puttarudriah & ChannaBasavanna, 1959 ; Kanta *et al.*, 1963 ; Bindra & Verma, 1966).

Bionomics : This mite remains active in the field during May to October and overwinters in the axils of the buds.

Control : Bindra & Verma (1966) reported good mortality by applying phosphamidon (0.025%), mevinphos (0.025%) and parathion (0.025%) when applied against this mite in the field. Kanta *et al.* (1963) while studying relative toxicity found chemical I, chlorobenzilate, phosphamidon, parathion and dimethoate were 66.06, 1.69, 1.62, 1.56, and 1.07 times as toxic as chemical II at LC 50 level and endrin gave 59% kill at LC 90 level.

Distribution : INDIA : Andhra Pradesh, Bihar, Karnataka, Punjab, Tamil Nadu, Delhi, West Bengal ; outside India : Pakistan.

33. *Eotetranychus irregularis* Nassar & Ghai

Eotetranychus irregularis Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 357-359.

Diagnosis : Dorsal body setae 13 pairs including a pair of humerals all without tubercles, linear, lanceolate, serrate and slightly longer than the longitudinal intervals between them. Propodosoma bears longitudinal striae and those on hysterosoma mostly transverse ; lobes of striae

broadly triangular with an occasional rounded one. Tarsus I with 4 tactile setae proximal to duplex setae. Shaft of aedeagus bending dorsad to form a slender sigmoid distal and that strongly tapered and directed straight dorsocaudally.

Host : *Ficus carica*.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi.

34. *Eotetranychus kankitus* Ehara

Eotetranychus kankitus Ehara, 1955, *Annot. Zool. Jap.*, 28 : 178.

Eotetranychus kankitus, Manson, 1963, *Acarologia*, 5 : 353.

Diagnosis : The striation pattern in female genital flap longitudinal. In female, tibia I with 1 sensory and 9 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 8 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In male, tibia I with 4 sensory and 9 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 8 tactile setae, tarsus II with 1 sensory and 2 tactile setae proximal to duplex setae. Aedeagus slightly downcurved, tapering distally and slightly sigmoid.

Host : Citrus.

Nature of damage : This is a minor pest of citrus. The damage caused by it is of insignificant nature and is very similar to that of *E. sexmaculatus*.

Distribution : INDIA : Meghalaya ; outside India : Japan.

Remarks : No information on biology and control of this mite is available.

35. *Eotetranychus mandensis* Manson

Eotetranychus mandensis Manson, 1963, *Acarologia*, 5 : 358-360.

Diagnosis : Dorsal body setae slender, tapering ; dorsocentral hysterosomals as long as or longer than longitudinal intervals between them. Tarsus I with 13-14 tactile setae and 1 sensory setae, in addition to duplex setae. In male, tibia I with 9 tactile and 1 sensory setae ; tarsus II with 12 tactile and 1 sensory setae. The striation pattern of female genital flap transverse. The aedeagus abruptly tapers distally upward at right angle to the shaft and slightly sigmoid and tapers distally.

Host : Citrus.

Nature of damage : Though it attacks citrus in India but the damage caused by it is of insignificant nature. Infested leaves turn yellow.

Distribution : INDIA : Karnataka.

Remarks : Information on bionomics and control of this mite is lacking.

36. *Eotetranychus pamelae* Manson

Eotetranychus pamelae Manson, 1963, *Acarologia*, 5 : 353-356.

Diagnosis : In male, tibia I with 3 sensory and 10 tactile setae, tarsus I with 1 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 5 tactile setae, tarsus II with 1 sensory and 4 tactile setae. In female, tibia I with 1 sensory and 6 tactile setae, tarsus I with 1 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 1 tactile setae proximal to duplex setae. Peritreme bends distally. The striae of genital flap transverse posteriorly and longitudinal on central anterior portion, that anterior to flap is longitudinal.

Host : Citrus.

Distribution : INDIA : Assam.

Remarks : No information on its nature of damage, bionomics and control is available.

37. *Eotetranychus rohilae* Nassar & Ghai

Eotetranychus rohilae Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 355-357.

Diagnosis : Dorsum with 13 pairs of setae, all setae on tubercles, dorsal body setae extend beyond the bases of the setae next behind ; striae on propodosoma longitudinal while those on hysterosoma mostly transverse and provided with rounded lobes. Tarsus I with 4 tactile setae and 1 sensory setae proximal to duplex setae. Aedeagus with slender straight shaft turning slightly dorsad to form a knob ; the posterior projection rounded and about twice as long as posterior projection which is also rounded.

Host : *Morus* sp.

Distribution : INDIA : Delhi.

Remarks : Nothing is known about its economic importance.

38. *Eotetranychus rajouriensis* Nassar & Ghai

Eotetranychus rajouriensis Nassar & Ghai, 1981, *Oriental Ins.*, 15(4) : 359-361.

Diagnosis : Dorsal body setae 13 pairs including a pair of humerals, setae not on tubercles, all long, pointed distally and serrate ; dorsal setae much longer than the intervals between their bases ; striae on propodosoma longitudinal while those on hysterosoma mostly transverse ; lobes on striae mostly triangular with an occasional rounded one. Tarsus I with 4 tactile setae proximal to duplex setae. Shaft of aedeagus short, relatively broad, strongly curved dorsad forming distal portion, sigmoid tapered and directed caudally.

Host : *Zizyphus* sp.

Distribution : INDIA : Delhi.

Remarks : The economic importance of this species is unknown.

39. *Eotetranychus sexmaculatus* (Riley)

Tetranychus 6-maculatus Riley, 1890, *Insect Life*, 2 : 225-226.

Eotetranychus sexmaculatus, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 202-205.

Eotetranychus sexmaculatus, Gupta & Gupta, 1977, *Newsl. Zool. Surv. India*, 3(1) : 27-29.

Diagnosis : In male, tibia I with 3 sensory and 10 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 5 tactile setae, tarsus II with 2 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 8 tactile setae ; tarsus I with 2 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 4 tactile setae, tarsus II with 3 tactile setae proximal to duplex setae. Peritreme hooked distally. Striation longitudinal on anterior central portion of genital flap. Aedeagus curved dorsally near the middle of the shaft.

Hosts : Citrus, peach ; outside India : citrus and avocado.

Nature of damage : Its infestation in India is never of any severe nature. However, in other parts of the world it is a serious pest of citrus and avocado. It feeds on the upper surface of leaves causing the appearance of yellow depressions. The severely infested leaves become yellow, distorted and drop off prematurely.

Bionomics : In India, nothing is known as to its bionomics. The works done in other parts of the world indicate that a female lays

25-40 eggs in 10-20 days. The incubation period is 5-8 days and each development stage requires 2-3 days. The population is influenced by dry weather (Jeppson *et al.*, 1975).

Control : No information is available from India in this regard.

Distribution : INDIA : Karnataka, Meghalaya ; outside India : Taiwan, U. S. A., Formosa, New Zealand.

40. *Eotetranychus suginamensis* (Yokoyama)

Tetranychus suginamensis Yokoyama, 1922, *Bull. Imp. Ser. Stn. Japan*, 8 : 282.

Tetranychus mori Rahman & Sapra, 1940, *Proc. Indian Acad. Sci.*, 11B : 184.

Diagnosis : It is greyish green mite with black dots on dorsum. Aedeagus with a short shaft, tapering and bending distally to form a distal hook.

Hosts : Mulberry, *Casearia tomentosa* ; outside India : *Quercus* sp. (Ehara, 1964).

Nature of damage : This mite normally occurs on the under surface of leaves covered with thin webs. A heavy population on a single leaf is not unlikely. The feeding causes crinkling and crumpling of leaves. The infested leaves turn pale yellow and fall off prematurely.

Bionomics : It remains active in the field throughout the year but the population remains at low level during winter.

Control : Nothing in this regard from India is known.

Distribution : INDIA : Punjab, Delhi ; outside India : Japan.

41. *Eotetranychus ladakhensis* Gupta

Eotetranychus ladakhensis Gupta, 1981, *Bull. Zool. Surv. India*, 3(3) : 236.

Diagnosis : In male, terminal sensillum twice as long as wide while in female, it is thrice as long as wide. In male, tibia I with 3 sensory and 5 tactile setae, tarsus I with 2 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 4 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 5 tactile setae, tarsus I with 1 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Dorsal idiosomal setae longer than intervals between their longitudinal bases. Aedeagus long and slender.

Host : Undetermined plant.

Distribution : INDIA : Jammu & Kashmir.

Remarks : It is not known to cause any damage to its host. No information about its biology is available either.

42. *Eotetranychus neoperplexus* Estebanes & Baker

Tetranychus perplexus McGregor, 1950, *Amer. Midl. Nat.*, 44(2) : 298.

Eotetranychus perplexus (McGregor) Beer & Lang, 1958, *Univ. Kansas Sci. Bull.*, 38 (2) : 1242.

Eotetranychus neoperplexus Estebanes & Baker, 1968, *Ann. Esc. nac. Cienc. Biol. Mex.*, 15 : 80.

Eotetranychus neoperplexus, Sadana & Chhabra, 1980, *J. Adv. Zool.*, 1(2) : 107.

Diagnosis : Dorsum with 14 pairs of setae, stylophore rounded anteriorly. Tarsus I with 4 proximal tactile setae and tarsus II with 3 tactile setae, tibia II with 8 tactile setae. Genital flap and the portion anterior to it transversely striate. Aedeagus bent ventrad in rounded curve, the distal knob having angulation posteriorly.

Hosts : *Bauhinia variegata* ; outside India : *Cryptocarya* sp.

Distribution : INDIA : Punjab ; outside India : Mexico.

Remarks : The economic importance of this species is unknown.

43. *Eotetranychus syzygii* Gupta & Gupta

Eotetranychus syzygii Gupta & Gupta, 1979, *Indian J. Acar.*, 3 : 88.

Diagnosis : In male, palp without terminal sensillum, dorsal sensillum slender. Tarsus I with 3 tactile and 3 sensory setae proximal to duplex setae, tibia I with 9 tactile and 1 sensory setae ; tarsus II with 3 tactile and 1 sensory setae proximal to duplex setae, tibia II with 6 tactile setae. In female, tarsus I with 5 tactile and 1 sensory setae proximal to duplex setae ; tarsus II with 3 tactile and 1 sensory setae proximal to duplex setae, tibia II with 6 tactile and 1 sensory setae.

Host : *Syzygium cumini*.

Distribution : INDIA : M. P.

Remarks : Economic importance of this species is unknown.

44. *Eotetranychus truncatus* Estebanes & Baker

Eotetranychus truncatus Estebanes & Baker, 1966, *Ann. Esc. nac. Cienc. Biol. Mex.*, 15 : 81.

Eotetranychus truncatus, Gupta & Dhoooria, 1972, *Curr. Sci.*, 41 : 824-825.

Diagnosis : Sensillum on palpus small, almost as long as wide.

Peritreme bends distally. Dorsal body setae longer than intervals between their bases. Aedeagus bends dorsally making an obtuse angle, without knob, posterior angulation small.

Hosts : Grape vines ; outside India : *Helicteres guazumaefolia*.

Nature of damage : It is not known to cause any significant damage to its host.

Bionomics : In Punjab, the population of this mite is more on 'Charas', Chasselas Violet, Jaos Beli, Kabar Ravi, Lomanto, Medeleine, Angevine, Medelene Royal, Mukh Chalani and Muscat varieties of grape vines. High temperature and rainfall reduced the mite population (Dhooria & Sandhu, 1975).

Control : No work in this respect has been done.

Distribution : INDIA : Punjab ; outside India : Mexico.

45. *Eotetranychus uncatus* Garman

Eotetranychus uncatus Garman, in Pritchard & Baker, 1952, *Hilgardia*, 21 : 263.

Diagnosis : Body pale, lemon yellow, with small black dots behind eyes. Palp sensillum more than 2 times as long as broad. Peritreme slightly hooked distally. Tibia I with 10 setae (9 tactile and 1 sensory), tarsus I with 5 tactile and 1 sensory setae proximal to duplex setae. Aedeagus long, attenuate and sharply pointed.

Host : *Bauhinia variegata*.

Nature of damage : Feeding on the lower surface of the leaves causes uneven growth of two surfaces of leaves, thus forming cupping and crinkling of leaves from below. In heavy infestation, the entire area along two sides of midrib are affected.

Bionomics : The population increases in late January, reaches peak in March, declines in April with the increase in temperature and disappears in May-June. Moderate temperature and moderate humidity favour the population build-up (Lakshman Lal & Mukharji, 1980).

Control : No information from India in this regard is available.

Distribution : INDIA : U. P. ; outside India : U. S. A.

Genus *Oligonychus* Berlese

(Figs. 169-172)

Oligonychus Berlese, 1886, *Aeari dannosi alle piante coltivate*, Padova, p. 24.

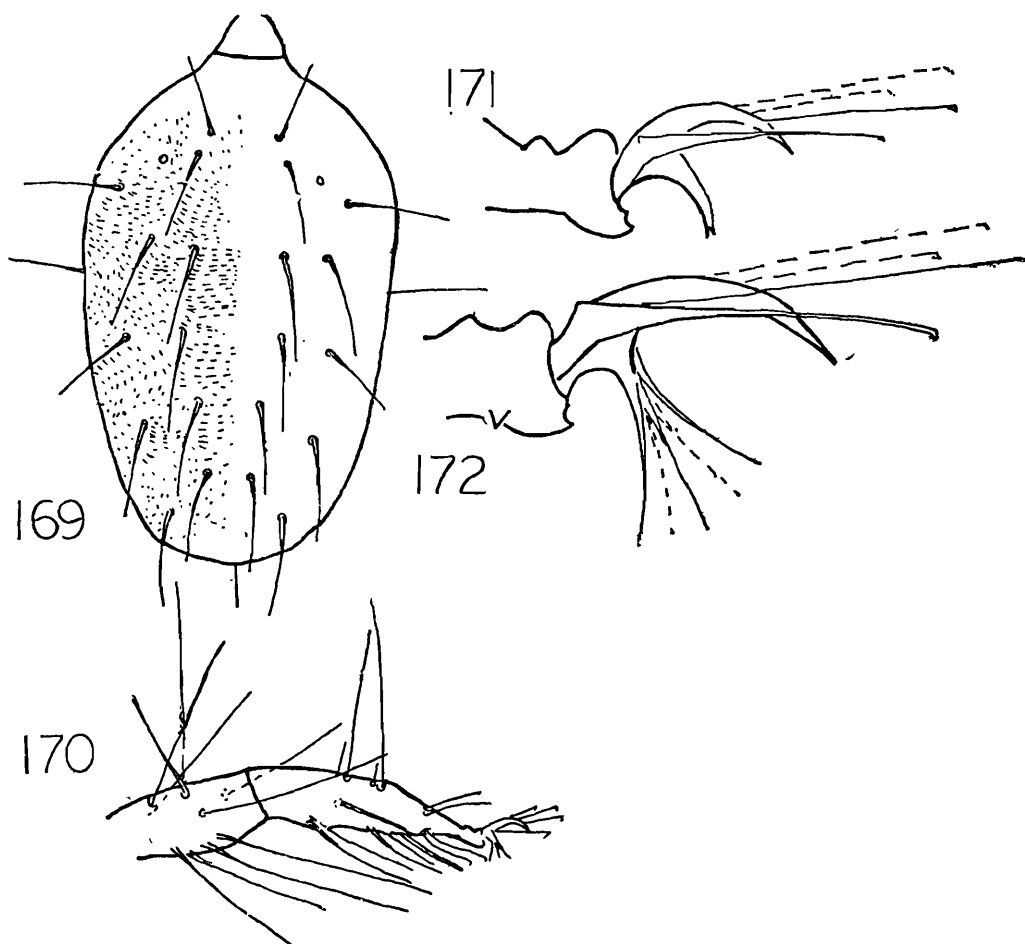
Key to the Species of Oligonychus

1. Aedeagus bent ventrad, tarsus I with not more than single tactile seta on venter just distad of duplex setae	...	...	2
— Aedeagus bent dorsad, although the distal end may be directed ventrad, tarsus I with 2 tactile setae on venter just distad of duplex setae	...	...	6
2. Aedeagus gradually narrowing distally	...	...	3
— Aedeagus with distal end abruptly narrowed	...	...	5
3. Aedeagus bent ventrad, forms acute angle with axis of shaft	...	...	4
— Aedeagus bent ventrad at right angle to shaft	...	...	<i>vitis</i>
4. Bent portion of aedeagus forming an acute angle to shaft	...	...	<i>mangiferus</i>
— Bent portion of aedeagus with tip directed ventrad	...	...	<i>coffae</i>
5. Aedeagus with bent portion forming a right angle with shaft	...	...	<i>punicae</i>
— Aedeagus with bent portion forming acute angle with shaft	...	...	<i>sapienticolus</i>
6. Tarsus I with proximoventral empodial appendages forming a pair of empodial spurs ; on monocot plants, mostly grass	...	...	7
— Tarsus I with 3 pairs of proximoventral hairs on empodium ; on other hosts	...	...	<i>biharensis</i>
7. Aedeagus with distal end enlarged	...	...	<i>indicus</i>
— Aedeagus with distal end not enlarged	...	...	8
8. Bent portion of aedeagus longer	...	...	<i>iseilemae</i>
— Bent portion of aedeagus shorter	...	...	9
9. Aedeagus with distal end strongly sigmoid	...	...	<i>sacchari</i>
— Aedeagus with distal end not strongly sigmoid	...	...	10
10. Aedeagus with bent portion dorsad slender, 'S' shaped	...	...	<i>oryzae</i>
— Aedeagus with dorsal bent tapering, small hook shaped	...	...	<i>manishi</i>

46. *Oligonychus biharensis* (Hirst)

Paratetranychus biharensis Hirst, 1925, *Proc. Zool. Soc. Lond.*, 69.
Oligonychus biharensis, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 364-365.

Diagnosis : In male, tibia I with 3 sensory and 8 tactile stae, tarsus I with 2 sensory and 4 tactile setae ; tibia II with 7 tactile setae, tarsus II with 1 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 5 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae. tarsus II with 2 tactile setae proximal to duplex setae. Aedeagus in male long and slender with axis of the distal enlargement parallel to the shaft.



Figs. 169-172. *Oligonychus* sp. : 169. Dorsum. 170. Tibia and tarsus I (Female). 171. Terminal end of tarsus I (Male). 172. Terminal end of tarsus I (Female) (after Pritchard and Baker, 1955).

Hosts : Arecanut, litchi, *Shorea robusta*, Cocoa, *Eriobotrya japonica* ; outside India : rose, loquat, *Crotoneaster*, camphor, *Euphorbia longana*, mango, *Cassava* (Moutia, 1958), *Diaspyros maritima* (Ehara, 1964), mango (Flechtmann & Baker, 1970).

Nature of damage : It is a sporadic pest in India. The feeding causes the appearance of numerous white spots on the leaves.

Distribution : INDIA : Bihar, Karnataka, Kerala, Delhi, Andaman Isl. ; outside India : Thailand, Philippine, Hawaii, Antigua, Mauritius, Brazil.

Natural enemies : *Stethorus vinsoni* Kapur and a cecidomyid fly are known to feed on this mite (Moutia, 1958) in Mauritius.

47. *Oligonychus coffeae* (Nietner)

Acarus coffeae Nietner, 1861, *Observ. Enem. Coffee Tree Ceylon* : 31.

Oligonychus coffeae, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2, 315-316.

Oligonychus coffeae, Das, 1959, *Bull. Ent. Res.*, 50 : 265-274.

Diagnosis : Body bright crimson, ventrally dark pruplish or bronzy. In male, tibia I with 3 sensory and 7 tactile setae, tarsus I with 3 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Aedeagus bends ventrally at right angle to the shaft and gradually narrows to slender distal end. In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae.

Hosts : Tea, coffee, jute, *Croton*, citrus, *Moghanis macrophylla*, *Prunus persica* ; outside India : indigo, grape, rubber, cashewnut, mulberry, oil palm, *Trumpheta neglecta*, *Urena lobata*, *Hibiscus ficulenus*, *H. panderiformes*, *H. abelmoschus*, *Crotalaria angyroides*, *Prunus persica*.

Nature of damage : It is a serious pest of tea specially in Northern India and causes more damage to the crop than by any other tea pest. Continuous sucking by all stages of this mite from leaves and petiols produces yellowish spots at the points of feeding which subsequently turn brown. Later, the entire leaf turns copperish and ultimately dries up and falls off. Attack is more severe on the old leaves than on the young ones. All these affect on the growth of the tea bushes. In case of severe attack, the young plants might be killed. It is also a serious pest of jute in India (Misra, 1913). The mites remain on the upper surface of the leaves covered with thin webs. The grown up leaves are more severely attacked. The affected leaves become brown, then become crinkled and fall off prematurely. A heavily infested crop becomes useless for fibre production. It is also known to infest cotton in Gujarat area but its damage on cotton is most insignificant in comparison to the damage done by other tetranychid species on cotton.

Bionomics : According to Das (1959) the life cycle is completed in 9.4-12 days in May-June while it takes 28 days in cold months.

Immediately after copulation, the egg laying starts but sometimes it may be delayed. Usually 4-6 eggs are laid per female per day. The durations of larval and nymphal (protonymph and deutonymph) stages are : 1.5 to 2.5 days and 3.5 days, respectively. Both the fertilized and unfertilized females lay eggs, the progeny of the former belongs to both the sexes and that of the latter belongs to males only. The average longevity of females and males are 24.4 and 12 days, respectively. Das and Das (1967) studied the effect of temperature and humidity on the development of this mite.

The attack starts in March, the population increases with the rise of temperature and becomes heavy during April-June. With the onset of monsoon it disappears from tea. The population develops again after rains but never attains that alarming stage. During cold months, the population remains at low level and mostly remains confined in bushes. No report on hibernation in winter is available. On the contrary, it breeds throughout the winter months. Early pruned tree is more prone to attack but there is not much difference between early and late clearing out and also between early and late skiffing (Das, 1960). The upper zone of the tree under shady condition shows highest mite population and is followed by middle and lower zones. In the unshaded tea, the middle zone has the highest mite population and the upper zone having the least. All the zones of shade tea have less mite population than corresponding zones of unshaded tea. Leaf temperature and light penetration within the bushes appear to regulate its distribution (Banerjee, 1980).

Control : Different pesticides from time to time were found to be effective against this mite. Those are sulphur (Fleet, 1900) ; chlorobenzilate and tetradifon (Ananthakrishnan, 1963) ; binapacryl, formothion and carbophenothion (Ananthakrishnan & Krishnamurthy, 1964) ; ethion 47% diluted at 1 : 500 (Mukherjee, 1967) ; dicofol, binapacryl, carbophenothion, dimethoate and phosalone (Tripathi & Singh, 1970). Dicofol, carbophenothion and binapacryl have ovicidal actions also.

Distribution : INDIA : Assam, West Bengal, Tamil Nadu, Delhi ; outside India : U. S. A., U. S. S. R., Africa, Australia, Japan, Indonesia, Taiwan, Sri Lanka.

48. *Oligonychus indicus* (Hirst)

Paratetranychus indicus Hirst, 1923, *Proc. Zool. Soc. Lond.*, 990.

Oligonychus indicus, Pritchard & Baker, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 354-355.

Diagnosis : Body greyish green with black blotches scattered over dorsum. Aedeagus forms acute angle with axis of the shaft. In male, tibia I with 2 sensory and 11 tactile setae, tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 2 sensory and 5 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 8 tactile setae, tarsus I with 2 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Sensillum on palp tarsus 2 times as long as broad.

Hosts : Sorghum, arecanut, Baru, *Dicanthium annulatum*, *Cynodon dactylon*, Madana grass, maize, banana, paddy, *Panicum distachyum*, *P. javanicum*, *Saccharum arundinaceum*, *S. munja*, *S. officinarum*, *Sorghum halepense*, *S. vulgare* (Prasad, 1974), *Elusine aegyptica* and *Nelumbo nucifera*.

Nature of damage : In case of sugarcane, maize and sorghum, the feeding of this mite causes the appearance of reddish spots which increase with the increase of attack. Those spots later coalesce to form large red patches and spread on the leaf surface to turn the colour of the leaf red. The leaves of severely infested plots turn red, as if burnt, which dry up and fall off. Its attack on paddy and banana results in the appearance of whitish spots which later turn yellow, and the infested leaves gradually wither. The attack of this mite on sugarcane is more in north India and less in south India but the result is just reverse in case of paddy. Desai & Chavada (1955) reported 20-30% damage to the sugarcane crop. Khot *et al.* (1955) reported that this mite produces reddish spots on sorghum but not on most of its alternate hosts. Kulkarni *et al.* (1978) studied the relative susceptibility of 19 varieties of sorghum against this mite. Sugarcane varieties with soft leaves appear to be more susceptible than those with harder leaves.

Bionomics : Rahman & Sapra (1940) reported that life cycle took $4\frac{1}{2}$ -6 days in males and $5\frac{1}{2}$ -7 days in females. Gupta, Dhooria and Sidhu (1974) studied the biology of this mite at five different temperatures (25°, 27.5°, 30°, 30.5°, and 35°C) and on three different food (sugarcane, sorghum and maize) and found that maize was the best food and 30°C was the most favourable temperature because of the minimum time taken to complete the life cycle and high fecundity of both fertilized and unfertilized females on this food and temperature. Sorghum was the second best food.

This mite is prevalent during pre-monsoon months and population dwindles with the onset of monsoon. However, it remains in the field throughout the year on one or the other host. Khan & Murthy (1956) reported that this mite developed on the leaves of 'Rabi' jowar and 'Eksali' sugarcane only after the cessation of southwest monsoon rains. Rainfall drastically inhibits its multiplication. According to them, sugarcane and jowar are the alternate hosts while *Dicanthium annulatum* is the primary host as the mite occurs on that host even during the rainy season. The rain affects the population differently on different varieties. The population reduction on maize is more on erect and narrow leaves and less so on broad and horizontal leaves (Sandhu *et al.*, 1975). Nitrogen fertilizer induces heavy infestation.

Control : Singh, Kalra & Sidhu (1961) found lime sulphur (1:6) to be very effective while Rai *et al.* (1965) reported chemical I, carbophenothion and phorate to be very effective against this mite. Gupta, Sidhu & Dhooria (1972) studied the ovicidal action of 20 pesticides and found that tetradifon and Galecron even at lower concentration (0.025%) and binapacryl, carbophenothion and dicofol at 0.075% killed 100% eggs. Sidhu *et al.* (1972) in a later experiment confirmed that binapacryl, carbophenothion, dicofol and monocrotophos, which in the earlier experiment found to have good ovicidal action, were also very effective against adults giving above 90% kill. Margal & Channa-Basavanna (1979) reported that carbofuran (3% granules, 147 gms a. i./ha) was the most effective against adults of this mite on sorghum while Mittal *et al.* (1979) found phosalone (0.075%) to be the best.

Natural enemies : Gupta *et al.* (1971) reported *A. (E.) delhiensis* to feed upon this mite infesting maize. Sandhu *et al.* (1973) found *A. (N.) indicus* feeding on all the stages of this mite. The other predators of economic importance are : *Scymnus gracilis*, *Orius* sp., *Stethorus gilvifrons*, *S. pauperculus* and *Scolothrips indicus*.

Distribution : INDIA : Andhra Pradesh, Bihar, Karnataka, Orissa, Punjab, Tamil Nadu, Delhi, U. P., West Bengal, Haryana ; outside India : Pakistan.

49. *Oligonychus iseilemae* (Hirst)

Paratetranychus iseilemae Hirst, 1924, *Ann. Mag. Nat. Hist.*, (9) 14 : 524.

Oligonychus iseilemae, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 358.

Diagnosis : Aedeagus bears a small sigmoid dorsal bent without

any distal enlargement with the tip directed upward. In male, tibia I with 3 sensory and 10 tactile setae, tarsus I with 3 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 3 tactile setae proximal to duplex setae. In female, tibia I with 2 sensory and 7 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Palp with terminal sensillum much wider than long. Dorsal sensillum slender.

Hosts : *Iseilema laxum*, grass.

Distribution : INDIA : Tamil Nadu, Andaman Nicobar Isls.

Remarks : This mite is not known to have any economic importance.

50. *Oligonychus mangiferus* (Rahman & Sapra)

Paratetranychus mangiferus Rahman & Sapra, 1940, *Proc. Indian Acad. Sci.*, 11B : 192.

Oligonychus mangiferus, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 330.

Diagnosis : Dark red dorsolaterally and pale red medio-dorsally. In male, tibia I with 4 sensory and 7 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 6 tactile setae proximal to duplex setae. Male with bent portion of aedeagus triangularly tapering to an acute angle with the shaft.

Hosts : Mango, grape vines, black berry, guava, pomegranate, *Eugenia* sp., *Prunus persica*, bottle brush, *Quisqualis indica*, *Lagestroemia indica*, *L. thorelii*, *Cassia fistula*, *Melia azedarach*, *Musa paradisica*, fig. ; outside India : loquat, peach (Moutia, 1958), *Anona squamosa*, rose (Pritchard & Baker, 1955).

Nature of damage : This mite infests the upper surface of leaves. It damages chlorophyll and sucks sap from the leaves resulting in the appearance of characteristic yellowish spots. In case of mango, the middle area of the lamina becomes much yellowish with less browning whereas in case of black berry, the attack is more near the margin. In case of grape vines, the entire upper surface of leaves becomes slight brownish but colour of the lower surface remains mostly unaffected.

Gradually, the infested leaves dry up and the trees suffer premature leaf-fall.

Bionomics : The duration of life stages are as follows : egg : 3-4 days, larva : 1-2 days, protonymph : 1-2 days, deutonymph : 1-2 days. However, the duration of all the stages are lengthened in winter. The life cycle takes 8-9 days in summer and $2\frac{1}{2}$ times as long as in winter. Pre-oviposition, oviposition and post-oviposition periods are : 1.25 days, 5.12 days, and 1.25 days, respectively, in summer. Out of four temperatures (20°, 25°, 30° and 35°C) tested, development was maximum at 30°C and minimum was at 20°C. Maximum mortality was noticed at 20°C and minimum was at 25°C (Sadana & Chander, 1973). The population remained in the field throughout the year with the peak during October to December. Dhooria & Sandhu (1975) tested 21 varieties of grape vines for their relative resistance against this mite and found that 'Angoor Kalan', Kismih, Charni, Kata Kurgan, and Perlette showed higher population of this mite and less of *Eotetranychus truncatus*. On the contrary, Jaoes Beli, Kabar Ravi, Lomanto, Medeleine Angevine, Medelene Royal, Mukh Chalani and Muscat showed just the reverse result. They observed that high population and low humidity reduced the population considerably. Sadana & Chhabra (1974) recorded several new hosts for this mite.

Control : High volume sprays (400 L/ha) on grape vines with 0.015% methyl demeton, dimethoate and carbophenothion ; 0.025% dicofol and 0.05% malathion could reduce the population by 92-100% within a week while endosulfan and tetradifon (0.025%) were rather ineffective (Sidhu & Singh, 1972).

Natural enemies : A number of natural enemies are known to feed upon this mite which are : *Amblyseius* (*Neoseiulus*) *cucumeris* (Narayanan & Khot, 1959) ; *A. (E.) delhiensis*, *A. (E.) finlandicus*, *Agistemus* sp., *Mediolata* sp., *Scolothrips* sp. and *Scymnus gracilis* (Sadana & Chhabra, 1974).

Distribution : INDIA : Haryana, Punjab, Himachal Pradesh, West Bengal, Kerala, Karnataka, Orissa, Bihar, Delhi ; outside India : Hawaii, Peru, Mauritius, Egypt.

51. *Oligonychus oryzae* (Hirst)

Paratetranychus oryzae Hirst, 1926, *Proc. Zool. Soc. Lond.*, 830.

Oligonychus oryzae, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 357.

Diagnosis : In male, tibia I with 2 sensory and 10 tactile setae,

tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae. In female, tibia I with 2 sensory and 6 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 2 tactile setae proximal to duplex setae. Aedeagus of male slender, sigmoid, tip broadly angled distally. In female, terminal sensillum 3 times as long as broad.

Hosts : Paddy, *Cynodon dactylon*.

Nature of damage : This mite infests paddy in Tamil Nadu and Karnataka (Nair, 1975 ; Rai *et al.*, 1977). It lives on the under-surface of leaves covered with thin webs. Infested plants become pale, show stunted growth and die soon after transplanting. Continuous feeding by all stages of this mite causes yellowing of leaves. The reduction in yield may be as high as 25%. Though the attack is sporadic but considering the heavy loss caused by this mite on isolated patches, Nagarajan (1957) rated this as a serious pest of paddy.

Bionomics : High population of this mite was noticed during July to January. Misra & Israel (1968) studied bionomics of this mite.

Control : Sulphur is quite good against this mite but eggs are resistant to it (Nagarajan, 1957). Phosphamidon (0.05%) and dimethoate (0.03%) are also efficient in achieving good control (Rai *et al.*, 1977).

Distribution : INDIA : Tamil Nadu, Orissa, Andaman Nicobar Isl., Punjab.

52. *Oligonychus punicae* (Hirst)

Paratetranychus punicae Hirst, 1926, *Proc. Zool. Soc. Lond.*, 830.

Oligonychus punicae, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 335-336.

Diagnosis : In male, tibia I with 3 sensory and 8 tactile setae, tarsus I with 2 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 2 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 1 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 4 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Palpus of female with terminal sensillum 2 times as long as broad. Aedeagus of male triangularly tapering to an acute angle with the shaft.

Hosts : Grape vines, pomegranate, litchi ; outside India : Avocado

(McGregor, 1941), *Persea americana*, *Eucalyptus* sp., *Fragaria* sp. (Flechtmann & Baker, 1970).

Nature of damage : Feeding by this mite causes the appearance of yellowish spots which later turn brown. Initially this mite confines their feeding near the midrib and with the increase of infestation it spreads over the entire leaf surface. Chlorophyll is also damaged.

Bionomics : Nothing is known in this regard from India. However, information available from abroad indicates that 7 days are needed for completion of a generation at a constant temperature of 25°C (Ebelling, 1959). It is prevalent in early summer, peak is seen in late summer and population declines thereafter.

Control : No information in this regard is available from India.

Natural enemies : *Scolothrips sexmaculatus* and *Stethorus* sp. are important predators of this mite.

Distribution : INDIA : Punjab, Tamil Nadu ; outside India : Central and South America.

53. *Oligonychus sacchari* (McGregor)

Paratetranychus sacchari McGregor, 1942, *J. Univ. Puerto Rico*, 26 : 91.

Oligonychus sacchari, Gupta, 1976, *Oriental Ins.*, 10 : 342.

Diagnosis : Aedeagus bends dorsal, tapering strongly and sigmoid, tip turned down. In male, tibia I with 3 sensory and 10 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 4 tactile setae, tarsus II with 1 sensory and 5 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 9 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 9 tactile setae, tarsus II with 1 sensory and 5 tactile setae proximal to duplex setae. Palpus with terminal sensillum 2 times as long as broad.

Hosts : Sugarcane ; outside India : Orchids.

Distribution : INDIA : West Bengal, Gujarat, Assam ; outside India : Puerto Rico.

Remarks : No work has been done on its bionomics and it is not known to have any economic importance.

54. *Oligonychus sapienticolus* Gupta

Oligonychus sapienticolus Gupta, 1976, *Oriental Ins.*, 10 : 342-343.

Diagnosis : Dorsal propodosomals and hysterosomals being longer than interval between their bases. In male, tibia I with 3 sensory and

9 tactile setae, tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 3 sensory and 7 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae.

Host : Banana.

Nature of damage : It causes no damage to its host.

Bionomics : No work on bionomics of this species has been done.

Distribution : INDIA : West Bengal.

55. *Oligonychus manishi* Gupta

Oligonychus manishi Gupta, 1979, *Rec. Zool. Surv. India*, 77 : 115-116.

Diagnosis : In male, terminal sensillum of palpus large, about 2 times as long as broad. Tibia I with 2 sensory and 9 tactile setae, tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 9 tactile setae ; tarsus II with 2 sensory and 3 tactile setae proximal to duplex setae.

Host : Paddy.

Nature of damage : It causes no damage.

Bionomics : No work on bionomics of this species has been done.

Distribution : INDIA : Andaman Isl.

56. *Oligonychus vitis* Zaher & Shehata

Oligonychus vitis Zaher & Shehata, 1965, *Bull. Soc. Ent. Egypte*, 49 : 67-69.

Oligonychus vitis, Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 364.

Diagnosis : This species is very close to *Oligonychus coffeae* and *Oligonychus mangiferus*. However, from the former it can be separated by the presence of 4 tactile setae and 1 sensory setae proximal to duplex setae on tarsus I of female and from the latter species by the aedeagus which bends ventrad at right angle. The striae on hysterosoma mostly transverse except for irregular striae between III dorsocentral hysterosomals.

Host : *Vitis vinifera*.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi ; outside India : Egypt.

Genus **Panonychus** Yokoyama
(Figs. 173-175)

Panonychus Yokoyama, 1929, *Saishin Nippon Sangyo Gaichu Zensho*, P. 531.

Key to the Species of Panonychus

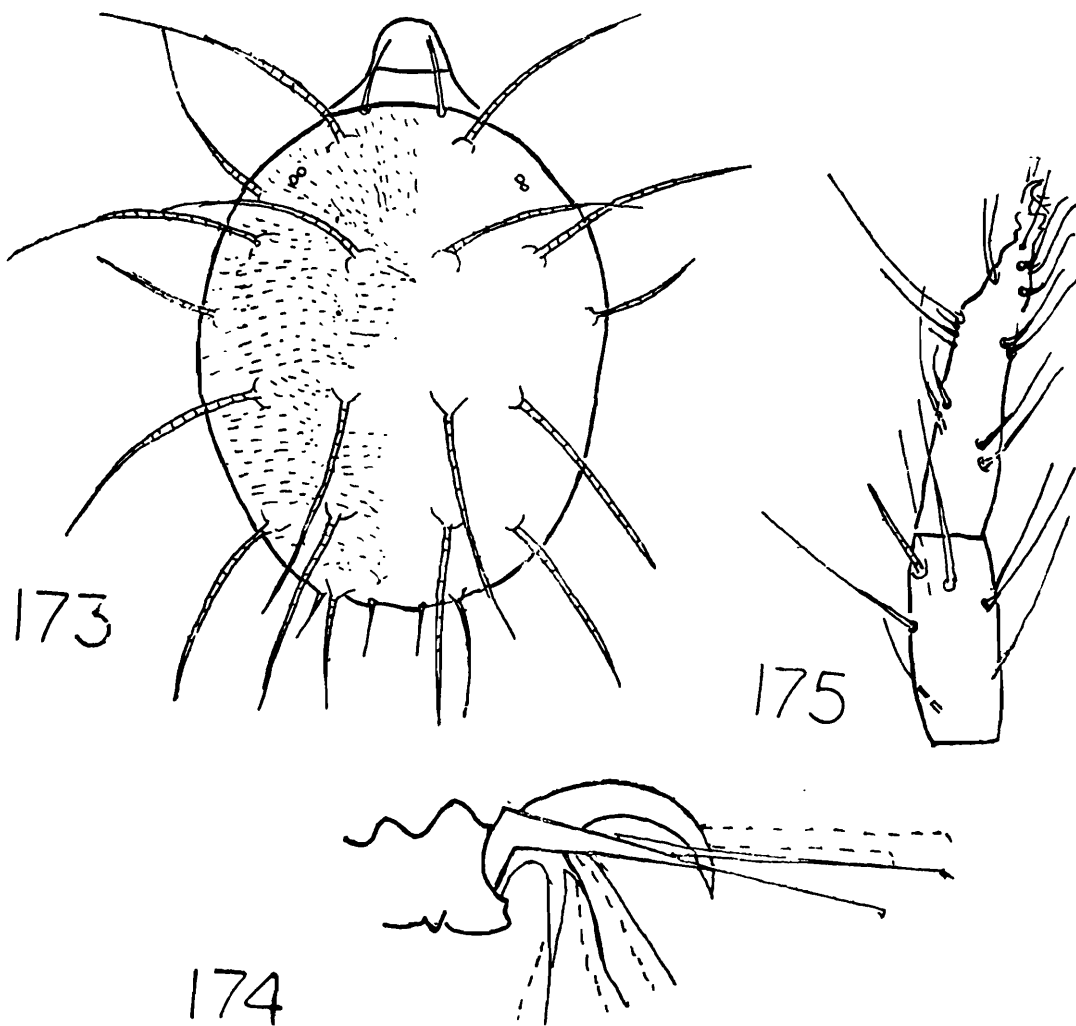
1. Fifth pair of dorsocentrals and 4th pair of dorsolaterals equal in length	...	...	<i>citri</i>
— Fifth pair of dorsocentral about 1/3 length of 4th pair of dorsolaterals	...	...	<i>ulmi</i>

57. **Panonychus citri** (McGregor)

Tetranychus citri McGregor, 1916, *Ann. ent. Soc. Amer.*, 9 : 284.

Panonychus citri, Bindra, 1966, *Punjab Hort. J.*, 6 : 111.

Diagnosis : Reddish mite with reddish dorsal long setae on strong tubercles. The striae on genital plate transverse and that on the area



Figs. 173-175. *Panonychus* sp. : 173. Dorsum, 174. Terminal end of tarsus I (Female), 175. Tibia and tarsus I (Female) (after, Pritchard and Baker, 1955).

anterior to it longitudinal. In male, aedeagus with distal sigmoid part about $1\frac{1}{2}$ times as long as dorsal margin of shaft. Tibia I with 3 sensory and 6 tactile setae, tarsus I with 2 sensory and 3 tactile setae proximal to duplex setae; tibia II with 5 tactile setae, tarsus II with 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 5 tactile setae; tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae.

Hosts : *Citrus*, papaya, *Artocarpus integrifolia*, apple; outside India : apple, *Citrus* (Ehara, 1975a); *Melia azedarach* (Flechtmann and Baker (1970).

Nature of damage : Though it is a serious pest of citrus in Europe but in India it rarely occurs in the form of pest. It damages chlorophyll resulting in the appearance of speckled effects. The infestation causes retardation of growth and defoliation. Sometimes the attack causes the browning and drying of terminal tips. Low humidity accelerates the rate of multiplication.

Bionomics : The time taken to complete the life cycle (egg-adult) varied with temperature and humidity. The maximum period in case of mated and unmated females is 14.75 ± 0.21 and 14.75 ± 0.20 days, respectively at $23.6 \pm 1^\circ\text{C}$ and 64.5% R.H., while the minimum is 12.46 ± 0.27 and 14.29 ± 0.20 days, respectively at $30 \pm 1^\circ\text{C}$ and 48.7% R.H. The longevity of adult female and male are 7-11 days and 6-9 days, respectively. The most favourable temperature and humidity are $30 \pm 1^\circ\text{C}$ and 48.7% R.H., respectively. The mite remains active in the field during August-March and scarce during hot summer. (Maity & Chakrabarti, 1977).

Control : Information in this regard is not available from India.

Distribution : INDIA : Assam, Meghalaya, Jammu & Kashmir, Punjab, West Bengal, Andaman Isl.; outside India : Argentina, Bermuda, California, China, Cuba, Florida, Japan, Mexico, Middle East, New Zealand, S. Africa, Thailand.

58. *Panonychus ulmi* (Koch)

Tetranychus ulmi Koch, 1836, *Deut. Crust. Myr. Arch.*, 1 : 11.

Panonychus ulmi, Prasad, 1975, *Internat. J. Acarol.*, 1 (2) : 22-24.

Diagnosis : Adults brick red with whitish dorsal tubercles; 5th pair of dorsocentral hysterosomals about $1/3$ the length of 4th pair of dorsolaterals. In male, tibia I with 3 sensory and 8 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae; tibia II

with 5 tactile setae, tarsus II with 2 tactile setae proximal to duplex setae. Aedeagus strongly bent dorsally, distal end slender and sigmoid.

Hosts : Apricot, fig, *Hibiscus*, apple, quinx, walnut, rose, plum, tomato, wheat, peach, jackfruit ; outside India : elm, gooseberry, fungus, moss, citrus, deciduous fruits, *Alnus glutinosa*, *Pyrus malus* (Pritchard & Baker, 1955).

Nature of damage : Characteristic white streaks appear on the upper surface of leaves due to injuries caused by this mite. Later, the leaf assumes the dusty gray hue, then yellowish brown and ultimately bronzy. The damaged leaves become rolled.

Bionomics : No information in this regard is available from India. The information available from abroad indicates that females take 6-8 days to reach adulthood while males take still shorter time. The population starts building in spring and the peak is attained in late summer (Jeppson *et al.*, 1975).

Control : Information in this regard is not available from India.

Distribution : INDIA : Himachal Pradesh, U. P., Jammu and Kashmir ; outside India : Europe.

Genus *Platytetranychus* Oudemans (Figs. 176-178)

Platytetranychus Oudemans, 1931, *Ent. Ber. Amst.*, 8 (178) : 224.

59. *Platytetranychus multidigituli* (Ewing)

Tetranychus multidigituli Ewing, 1917, *J. Econ. Ent.*, 10 : 497.

Eotetranychus multidigituli, Gupta & Gupta, 1976, *Acarl. Newsl.*, 3 : 6-7.

Diagnosis : Peritreme forms an anastomosing chamber distally. In female, tibia I with 7 tactile setae, tibia II with 5 tactile setae ; tarsus I with 3 tactile setae proximal to duplex setae. Dorsal body setae shorter than intervals between their longitudinal bases. Aedeagus bends sharply ventrad and forms a distal knob ; distal angulation being much shorter than the anterior angulation.

Host : Brinjal.

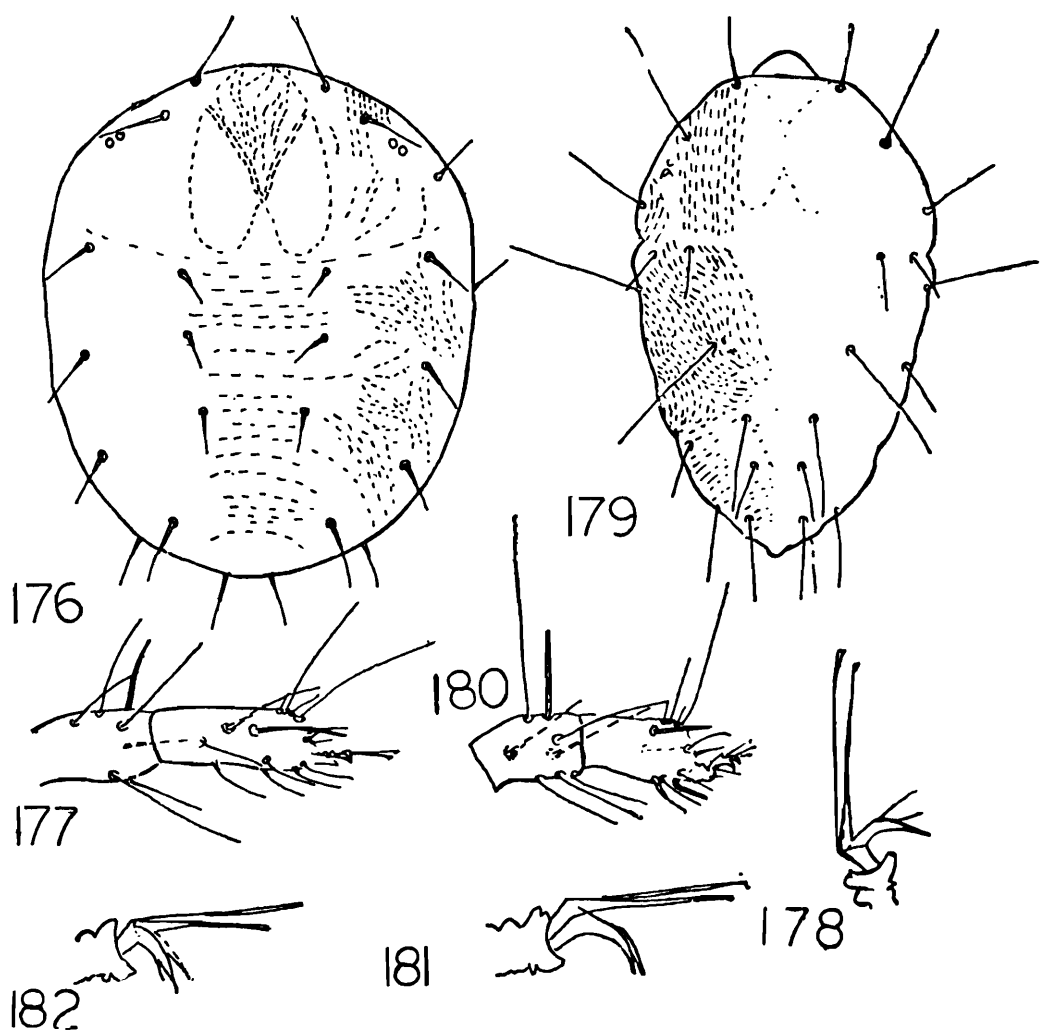
Distribution : INDIA : Gujarat ; outside India : U. S. A.

Nature of damage : It causes no appreciable damage to its host in India.

Bionomics : Nothing is known from India.

Genus **Schizotetranychus** Trägårdh
(Figs. 179-182)

Schizotetranychus Trägårdh, 1915, *Meddn. CentAnst. FörsVäs Jordbr Områd Stockh.*,
54 : 277.



Figs. 176-178 : *Platytetranychus* sp. : 176. Dorsum, 177. Tibia and tarsus I (Female), 178. Terminal portion of tarsus I (Female).
Figs. 179-182 : *Schizotetranychus* sp. : 179. Dorsum, 180. Tibia and tarsus I (Female), 181. Distal end of tarsus I (Female), 182. Distal end of tarsus I (Male).

Key to the Species of Schizotetranychus

1. Dorsal idiosomal setae longer than the distance between their longitudinal intervals	...	2
— Dorsal idiosomal setae as long as the interval between their longitudinal bases		7
2. Dorsal idiosomal setae serrate		3
— Dorsal idiosomal setae not serrate		5

3. Dorsal idiosomal setae slightly serrate	...	...	4
— Dorsal idiosomal setae less serrate	...	...	<i>fluvialis</i>
4. Tarsus I with 1 sensory and 4 tactile setae	...	...	<i>tephrosiae</i>
— Tarsus I with 1 sensory and 3 tactile setae	...	...	<i>cajani</i>
5. Dorsal idiosomal setae minutely pubescent and lanceolate, broad proximally and tapering distally	...	...	<i>andropogoni</i>
— Dorsal idiosomal setae simple	...	...	6
6. Aedeagus turns dorsad, distally without posterior angulation	...	...	<i>hindustanicus</i>
— Aedeagus turns dorsad, distally with posterior angulation	...	...	<i>spireaefolia</i>
7. Peritreme at the distal end 'U' shaped	...	...	<i>baltazari</i>
— Peritreme at the distal end bulb shaped	...	...	<i>mansoni</i>

*The record of the species *undulatus* from India is doubtful and hence omitted from key.

60. *Schizotetranychus andropogoni* (Hirst)

Tetranychus (*Schizotetranychus*) *andropogoni* Hirst, 1926, *Proc. Zool. Soc. Lond.*, 829.

Schizotetranychus andropogoni, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 248-249.

Diagnosis : Dorsal body setae as long as intervals between their bases. Aedeagus of male forms a dorsally directed sigmoid curve that is not acutely angulated. Propodosomal striae longitudinal, hysterosomal striae transverse. In male, tibia I with 2 sensory and 7 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 2 sensory and 3 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 4 tactile setae, tarsus II with 2 tactile setae proximal to duplex setae.

Hosts : *Andropogon annulatus*, *Chloris incomplata*, grass, *Saccharum officinarum*, *S. spontaneum*, paddy, *Dicanthium annulatum*.

Nature of damage : It is essentially a serious pest of sugarcane in north India. Recently, in eastern India this mite has been seen to cause damage on paddy crops also. Thousands of mites will be seen on the undersurface of leaves making small oval colonies covered with thin webs and are arranged irregularly on either sides of mid rib. All the stages of mites in varying numbers (5-117) may be seen in the

colonies numbering 1300-1500 per leaf. The feeding on leaves causes the appearance of white blotches. Later, the webs turn brown and finally are blown off. The affected leaves look sickly and gradually dry up. Infestation is more on ratoon crops than on newly planted crops. Almost similar type of damage symptoms are produced on paddy and jowar. Its population was found to be maximum on NC 918 variety of paddy and minimum on Satika variety, while IR8 was completely free from mites (Gupta, 1975a).

Bionomics : The density of this pest was not significantly different from one variety to another though the distribution of webs on the entire affected leaf varied significantly from variety to variety (Khanna & Butani, 1954). Its biology has been studied by Kalra & Chaudhary (1965). The population of this mite on paddy is more during August-September, dwindles during October and becomes scarce at the end of November (Gupta, 1975a).

Control : Several attempts were made to find out a suitable control measure against this mite (Prasad & Prasad, 1958 ; Lal *et al.*, 1960 ; Lal *et al.*, 1963 ; Kalra & Chaudhary, 1965 ; Gupta *et al.*, 1972a ; Prakash *et al.*, 1979). A fairly good method for the control of this mite is the application of miscible spray containing chlorobenside and malathion @ 0.2% and 1 kg/ha, respectively which has been reported to give 84% reduction of population within 8-12 days after spraying (Kalra & Chaudhary, 1965). The pesticides, viz. dicofol (0.05%), Plictran (0.05% W.P.), monocrotophos (0.75%), carbophenothion (0.05%) (Gupta *et al.*, 1972a), Chlormevinphos (0.05%) (Varma *et al.*, 1978) are also promising.

Distribution : INDIA : Bihar, Punjab, West Bengal, Tamil Nadu, Delhi, Orissa ; outside India : Pakistan, Thailand, Mexico.

61. *Schizotetranychus baltazari* Rimando

Schizotetranychus baltazari Rimando, 1962, *Philip. Agr.*, 45 : 534-535.

Schizotetranychus baltazari, Manson, 1963, *Acarologia*, 5 : 360-362.

Diagnosis : Peritreme hooked, propodosomal striae longitudinal and continue posteriorly upto first dorsocentral hysterosomals. Two types of dorsal body setae, one with broadened basal third and tapers rapidly while the other is longer, stiffer and more evenly tapering. The lateral propodosomal, humeral, outer sacral, are of this type. In female, tarsus I with 10 tactile and 1 sensory setae ; tarsus II with 9

tactile and 1 sensory setae, in addition to duplex setae ; tibia II with 5 tactile setae. In male, aedeagus bends dorsal at right angle with shaft and with shorter sigmoidal distal curve. Tibia I with 4 sensory and 7 tactile setae ; tibia II with 5 tactile setae.

Hosts : *Murraya koenigii*, orange.

Nature of damage : So far it has not been reported to cause much damage to its host but in Taiwan it has been reported to produce greenish spots on leaves and fruits of citrus (in Jeppson *et al.*, 1975).

Bionomics : The average duration of different stages of this mite is as follows : egg : 3.4 days, larva : 6.6 days, protonymph : 5.4 days, deutonymph : 5.2 days and preoviposition period : 3.2 days. Oviposition continues for 20 days during which the female lays 31.6 eggs (Lo & Hisa, 1968).

Control : No information is available from India.

Distribution : INDIA : Assam, Karnataka ; outside India : Burma, Hong Kong, Thailand, Taiwan.

62. *Schizotetranychus cajani* Gupta

Schizotetranychus cajani Gupta, 1976, *Oriental Ins.*, 10 : 336-337.

Diagnosis : Palpus with terminal sensillum large, much larger than broad. Petiotreme slightly enlarged distally. Dorsocentral hysterosomals $1\frac{1}{2}$ times as long as their longitudinal distances. Aedeagus with shaft broad and long, gradually narrowing, the distal part angulate with tip directed forward. In male, tibia I with 9 tactile and 4 sensory setae, tarsus I with 2 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, tibia I with 2 sensory and 3 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 4 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae.

Host : pigeon-pea.

Distribution : INDIA : West Bengal.

Remarks : It causes no damage to its host. No work has been done on the bionomics of this species.

63. *Schizotetranychus fluvialis* McGregor

Schizotetranychus fluvialis McGregor, 1928, *Proc. Ent. Soc. Wash.*, 30 : 13.

Schizotetranychus fluvialis, Gupta, 1976, *Oriental Ins.*, 10 : 337.

Diagnosis : Dorsal body setae slender, much shorter than longitudinal interval between them, finely pubescent. Distal end of aedeagus forms a dorsally directed sigmoid curve.

Host : Pigeon pea.

Distribution : INDIA : Punjab ; outside India : North America.

Remarks : It is of no known economic importance.

64. *Schizotetranychus hindustanicus* (Hirst)

Tetranychus (*Schizotetranychus*) *hindustanicus* Hirst, 1924, *Ann. Mag. Nat. Hist.*, (9) 14 : 525.

Schizotetranychus hindustanicus, Pritchard & Baker, 1955, *Pacific Coast Ent. Soc. Mem. Ser.*, 2 : 266-267.

Diagnosis : Body setae fine, set on triangular sockets, about 2/3 as long as distance between their bases. Distal portion of aedeagus turns dorsal to form a sigmoidal distal end, tip slightly hooked. Empodial claw simple.

Hosts : Citrus, *Melia azedarach*, jowar, *Azadirachta indica*.

Nature of damage : It is a pest of citrus in south India causing white stipplings on leaves. Puttarudriah & ChannaBasavanna (1959) reported this mite to be more prevalent on orange inducing pale sickly appearance on leaves.

Distribution : INDIA : Tamil Nadu, Kerala.

Remarks : No work has been done on its bionomics.

65. *Schizotetranychus masoni* Gupta

Schizotetranychus masoni Gupta, 1980, *Rec. Zool. Surv. India*, 77 : 113-114.

Diagnosis : In male, the terminal sensillum 3 times as long as wide, dorsal sensillum slender. Tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory setae proximal to duplex setae. Dorsal idiosomal setae slightly longer than longitudinal interval between their bases. In female, tibia I with 1 sensory and 8 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 5 tactile setae, tarsus II with 1 sensory and 1 tactile setae.

Host : Paddy.

Distribution : INDIA : Andaman Isl.

Remarks : It is not known to cause any damage to its host.

66. *Schizotetranychus spireafolia* Garman

Schizotetranychus spireafolia Garman, 1940, *Bull. Conn. Agr. Exp. Stn.*, 431 : 74.

Schizotetranychus spireafolia, Gupta & Dhooria, 1974, *Proc. Indian Sci. Congr.*, 61 : 69.

Diagnosis : Dorsal setae much shorter than the interval between their bases. Setae minutely pubescent, widened near base, tapering to a slender acute tip. Aedeagus bends upwards at less than right angle to form slender sigmoid acuminate tip.

Hosts : Pigeon-pea, sugarcane.

Nature of damage : It is of no known economic importance.

Distribution : INDIA : West Bengal, Punjab ; outside India : U.S.A.

67. *Schizotetranychus tephrosiae* Gutierrez

Schizotetranychus tephrosiae Gutierrez, 1968, *Acarologia*, 10 (1) : 24-28.

Schizotetranychus tephrosiae, Nassar & Ghai, *Oriental Ins.*, 15 (4) : 353.

Diagnosis : Dorsal body setae linear, lanceolate, serrate and longer than the intervals between the bases of the following setae. Propodosoma with longitudinal striae and hysterosoma with transverse striae ; dorsal lobes tiny, narrow, sharply pointed towards tip. Tarsus I with 4 tactile setae and 1 sensory setae proximal to duplex setae. Shaft of aedeagus long, straight and curves dorsad, anterior projection of knob very small with posterior projection relatively longer and directed dorsad.

Host : *Eriobotrya japonica*.

Nature of damage : It is of no known economic importance in India.

Distribution : INDIA : Delhi ; outside India : Malagasy.

68. *Schizotetranychus undulatus* (Beer & Lang)

Neotetranychus undulatus Beer & Lang, 1958, *Univ. Kansas Sci. Bull.*, 38 (2) : 1239.

Schizotetranychus undulatus, Tuttle, Baker & Ahbatiello, 1976, *Internat. J. Acarol.*, 2 (2) : 69.

Schizotetranychus undulatus, Sadana, Chhabra, & Kumari, 1981, *Entomon*, 6 (4) : 325-327.

Diagnosis : Dorsal setae as long as distance between their bases ; aedeagus ventrally directed and sigmoid.

Hosts : *Acacia arabica*, *Jasminum grandiflorum*.

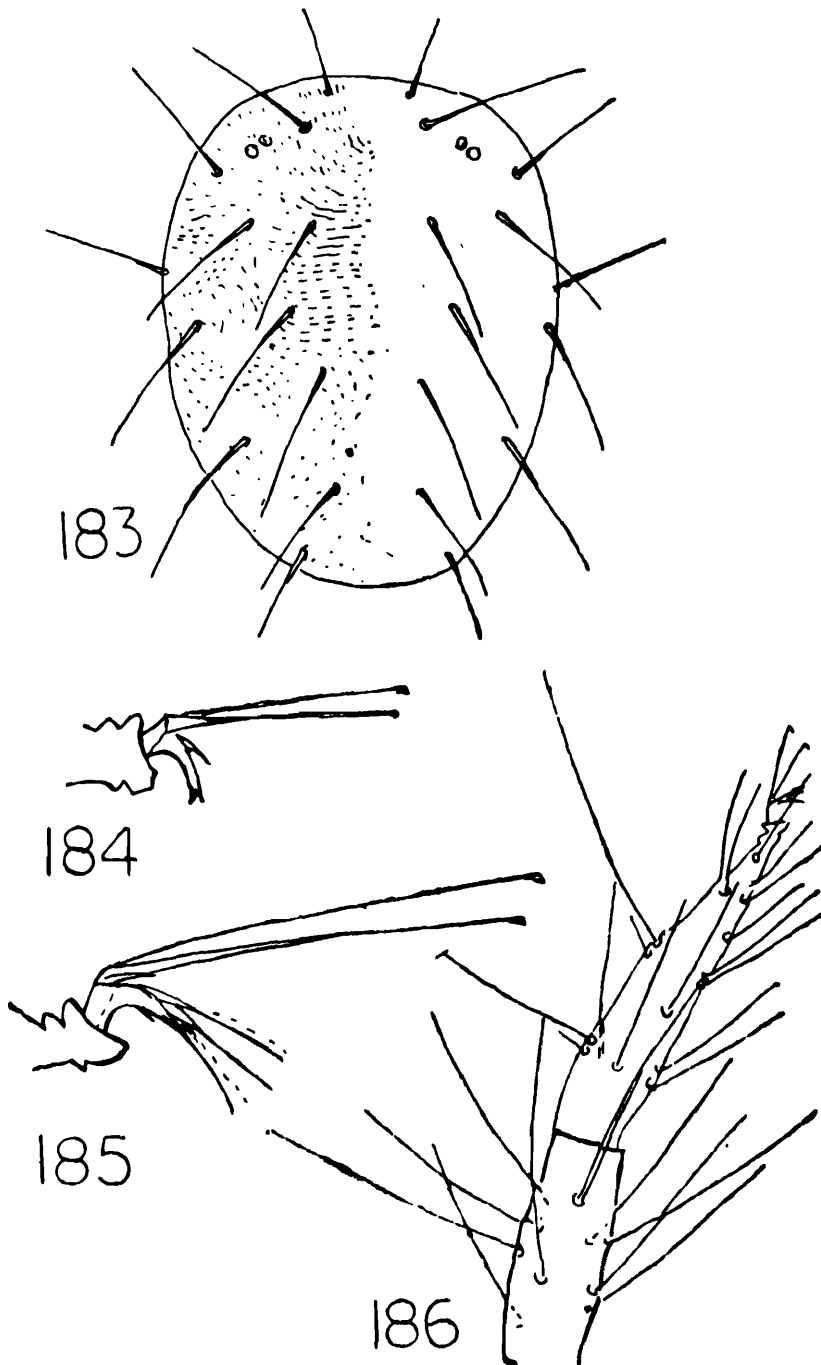
Nature of damage : It is of no known economic importance in India.

Distribution : INDIA : Punjab ; outside India : U. S. A.

Genus *Tetranychus* Dufour

(Figs. 183-186)

Tetranychus Dufour, 1832, *Annl. Sci. nat.*, 25 : 276.



Figs. 183-186 : *Tetranychus* sp. : 183. Dorsum, 184. Distal end of tarsus I (Male), 185. Distal end of tarsus I (Female), 186. Tibia and tarsus I (Female).

Key to the Species of Tetranychus

1. Proximal duplex setae on tarsus I of female placed distal to tactile setae	...	...	2
— Proximal duplex setae on tarsus I of female more or less in line with tactile setae	...	...	3
2. Aedeagus with a knob distally	...	...	4
— Aedeagus very long, slender, tapering distally	...		<i>fijiensis</i>
3. Aedeagus knob provided with very small anterior and posterior projections ; empodium II of male with proximoventral tridigitate spurs	...	...	<i>macfarlanei</i>
— Aedeagal knob with anterior acute projection while posterior projection absent ; empodium II of male with 3 pairs of proximoventral hairs and a small distinct mediodorsal spur	...	...	<i>ludeni</i>
4. Aedeagus with tiny knob	...	...	<i>hypogaeae</i>
— Aedeagus with distinct knob	...	...	5
5. Female with longitudinal to irregular longitudinal striae between 3rd pair of dorsocentral hysterosomals and longitudinal between 4th pair of dorsocentrals	...	...	6
— Female with transverse to irregular longitudinal striae between third pair of dorsocentral hysterosomals and longitudinal between 4th pair of dorsocentrals	...	...	<i>angloensis</i>
6. Female hysterosoma with longitudinal striae between 4th pair of dorsocentral hysterosomals forming a more or less diamond shaped figure between 3rd and 4th pair of dorsocentral hysterosomals	...	...	7
— Female hysterosoma with irregular longitudinal striae between 4th pair of dorsocentral hysterosomals not forming diamond shape	...	...	<i>afrindicus</i>
7. Female hysterosoma with longitudinal striae between 3rd pair of dorsocentrals	...	...	8
— Female hysterosoma with irregular longitudinal striae between 3rd pair of dorsocentral setae	...	...	<i>sayedii</i>
8. Upper surface of aedeagus knob straight or rounded with some kind of projections	...	...	9
— Upper surface of aedeagus knob concave with anterior and posterior rounded projections like berry-shaped	...	...	<i>neocaledonicus</i>

9. Aedeagus knob with anterior projection rounded	...	...	10
— Aedeagus with anterior projection acute	...	...	12
10. Terminal sensillum of male about 3-4 times as long as broad ; aedeagal knob about 0.2-0.25 length of dorsal margin of shaft	...	...	11
— Terminal sensillum of male about 3 times as long as broad, aedeagal knob about 0.33 the length of dorsal margin of shaft	...	...	<i>kanzawai</i>
11. Empodium I of male with strong mediodorsal spur, female carmine in colour	...	...	<i>cinnabarinus</i>
— Empodium I of male with minute mediodorsal spur, female dark red in colour with dark spot on either sides of body	...	...	<i>lombardinii</i>
12. Anterior and posterior projection of aedeagal knob not similar.	...	...	13
— Anterior and posterior projection of aedeagal knob similar, females greenish or yellowish in colour with large spots on either sides of body	...	...	<i>urticae</i>
13. Anterior and posterior projection of aedeagal knob acuminate and similar, axis of knob parallel to axis of shaft ; upper surface of aedeagal knob rounded	...	...	<i>zaheri</i>
— Anterior projection of aedeagal knob strongly acuminate and curved ventrad, axis of knob not parallel to axis of shaft ; upper surface of aedeagal knob straight	...	...	<i>papayae</i>

69. *Tetranychus angloensis* Meyer

Tetranychus angloensis Meyer, 1974, *Ent. Mem. Dept. Agr. Tech. Serv. Repub. S. Afr.*, 36 : 219-220.

Tetranychus angloensis, Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 367.

Diagnosis : Dorsum with slender serrate setae, longer than distance between the bases of the following setae. The striae between 3rd pair of dorsocentral hysterosomals transverse to irregular while those between the 4th pair of dorsocentrals longitudinal ; area between 3rd and 4th pairs of dorsocentral hysterosomals bear transverse striae. The shaft of aedeagus narrows distally and curves dorsad forming a knob with an angulate anterior projection ; the axis of knob forms an acute angle with axis of shaft.

Host : *Cucurbita maxima*.

Nature of damage : It is of no known economic importance in India.

Distribution : INDIA ; Delhi ; outside India : Angola.

70. *Tetranychus afrindicus* Nassar & Ghai

Tetranychus afrindicus Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 367-369.

Diagnosis : Dorsal setae 13 pairs, all long, slender, serrate and pointed, setae longer than distance between their bases ; first pair of dorsolateral setae located anterior to first pair of dorsocentral and humeral setae. Propodosoma bearing longitudinal striae between third pair of dorsocentrals and irregularly longitudinal striae between 4th pair of dorsocentrals. Tarsus I bears 4 tactile setae and 1 sensory setae proximal to duplex setae. Shaft of aedeagus narrowed distally and turned slightly dorsad forming a knob with an acute anterior and posterior projection. Aedeagal knob without neck.

Host : *Phaseolus* sp.

Nature of damage : Nothing is known.

Distribution : INDIA : Delhi.

71. *Tetranychus sayedi* Baker & Pritchard

Tetranychus sayedi Baker & Pritchard, 1960, *Hilgardia*, 29 (1) : 543-545.

Tetranychus sayedi, Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 369.

Diagnosis : Dorsal body setae of female long, slender and setose, striae on dorsum with semicircular lobes ; striae irregular between 3rd pair of dorsocentral hysterosomals but longitudinal between 4th pair of dorsocentrals. Tibia I with 9 tactile and 1 sensory setae, tarsus I with 4 tactile setae proximal to duplex setae. Aedeagus bends dorsad at a right angle forming a small knob while the anterior and posterior angulations small and acute.

Host : *Solanum melongena*.

Distribution : INDIA : Delhi (?) ; outside India : Zaire.

72. *Tetranychus kanzawai* Kishida

Tetranychus kanzawai Kishida, 1927, *Zool. Mag.*, 39 : 105.

Tetranychus kanzawai, Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 371.

Diagnosis : Dorsal body setae of female longer than intervals between their bases. The hysterosoma provided with longitudinal

striae between 3rd pair of dorsocentrals and between 4th pair of dorsocentrals, a diamond shaped figure is formed between these two pairs of setae. The leg chaetotaxy similar to that of *T. lombardinii*. Knob of aedeagus of male about $1/3$ the length of the margin of shaft ; anterior rounded portion of knob is about as wide as the base of the acute posterior projection ; axis of knob is parallel to that of shaft.

Host : *Morus* sp.

Distribution : INDIA : Delhi ; outside India : Japan, Philippines.

73. *Tetranychus zaheri* Nassar & Ghai

Tetranychus zaheri Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 373-375.

Diagnosis : Dorsal body setae 13 pairs, all long, slender, pointed and longer than the distance between their bases. Propodosoma bearing longitudinal striae, hysterosomal striae mostly transverse except longitudinal striae between 3rd and 4th pairs of dorsocentral hysterosomals forming a diamond shaped figure in the area between these two pairs of setae. Tarsus I with 4 tactile setae proximal to duplex setae. Shaft of aedeagus short, broad and curving dorsad to form a large knob which is provided with an acute anterior and posterior projections.

Host : *Phaseolus vulgaris*.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : Delhi.

74. *Tetranychus papayae* Nassar & Ghai

Tetranychus papayae Nassar & Ghai, 1981, *Oriental Ins.*, 15 (4) : 375-377.

Diagnosis : Dorsal body setae 13 pairs, long, slender, serrate and pointed, all longer than distance between their bases. Propodosoma bearing longitudinal striae, striae between 3rd and 4th pairs of dorsocentral hysterosomal setae longitudinal and forming a diamond shaped figure between these two pairs of setae. Tarsus I with 4 tactile setae proximal to duplex setae. Shaft of aedeagus bent dorsad forming distally knob which is 0.33 the length of dorsal margin of shaft and its axis not parallel to axis of shaft.

Host : *Carica papaya*.

Nature of damage : No economic importance of this species is known.

Distribution : INDIA : Delhi.

75. *Tetranychus cinnabarinus* (Boisd.)

Acarus cinnabarinus Boisd., 1867, *Ent. Hort.*, 88.

Tetranychus biomaculatus Harvey, Wood-Mason, 1884, pp. 1-20.

Tetranychus telarius Linn., Cherian, 1931, *J. Asiat. Soc. Beng.*, 27 : 141-147.

Tetranychus cinnabarinus, Prasad, 1974 : A catalogue of mites of India, pp. 122-124.

Diagnosis : Carmine mite with longitudinal striae between 3rd pair of dorsocentral hysterosomals. Empodial spur tiny. Axis of aedeagal knob forming a strong angle with axis of shaft, posterior angulation being equal to anterior angulation. In male, tibia I with 4 sensory and 7 tactile setae, tarsus I with 3 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae. In female, palpus with terminal sensillum 2 times as long as broad ; tibia I with 1 sensory and 9 tactile setae, tarsus I with 1 sensory and 3 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae.

Hosts : *Ageratum conyzoides*, apple, American cotton, beans, lady's finger, bitter gourd, black gram, *Lagenaria vulgaris*, *Luffa cylindrica*, *Brassica kaber*, brinjal, cabbage, *Canabis sativa*, carnation, castor, celery, *Chenopodium album*, *C. murole*, chrysanthemum, 'Chulai', *Citrus*, *Coriandrum sativum*, cowpea, cucumber, cucurbits, dalhia, *Luffa aegyptica*, *Erigeron linifolius*, *Phaseolus aureus*, grape vines, green gram, ground nut, guava, hollyhock, *Cleome viscosa*, jute, *Cichorium intybus*, *Lantana camara*, lima bean, *Phaseolus lunatus*, *Medicago sativa*, *Rhynchosia capitata*, mandarin, marigold, *Melilotus indica*, moth bean, muskmelon, onion, papaya, pea, Petha, Petunia, potato, pumpkin, rose, round gourd, safflower, *Brassica campestris*, *Solanum nigrum*, *Sonchus arvensis*, soybean, spinach, spong gourd, sugar beet, sunflower, sunn-hemp, sweet orange, *Eruca sativa*, tea, tomato, *Tridax procumbens*, *Heliotropium eichwaldi*, watermelon, *Withania somnifera*, *Indigofera tinctoria*, *Crotalaria angyroides*, tapioca, *Raphanus sativus*, *Mentha*. sp., *Prunus persica*, *Musa paradisica*.

Nature of damage : The attack of this mite on pulse crops makes the leaves yellowish, resulting in crumpling, curling and twisting of leaves. In addition, the leaves are covered with heavy webs which affect the photosynthesis of plants. Eventually, the leaves dry up and fall off. Similar damage symptoms are produced on a wide range of vegetables. Growth, flowering and fruit formation are severely affected. In Jammu & Kashmir, this mite severely infests apple causing yellowing of leaves and premature leaf fall. In case of tea, the leaves

become pinkish and purplish. In Gujarat and Punjab, it is known to infest cotton while in eastern India it infests jute as well. In both the cases the leaves become crinkled, crumpled and malformed. All those leaves ultimately dry up and fall off. American variety of cotton is more susceptible to the attack of this mite than the local variety. In Kerala, the mite poses a problem on tapioca specially during summer months. It attacks castor almost all over India.

Bionomics : Its life history has been studied by Janjua (1942) ; Gupta, Dhooria & Sidhu (In press) and Srivastava & Mathur (1962). According to the latter report, the life cycle (egg-adult) takes an average of 14.3 days during January. The duration of other stages are : egg : 5-8 days, protonymph : 3-4 days, deutonymph : 3-5 days. Longevity of adult male : 1-4 days, female : 8-14 days. Almost similar results were obtained by Basu & Pramanik (1968). Its seasonal occurrence has been studied by Basu & Pramanik (1968), Singh & Saini (1971) and Gupta, Dhooria & Sidhu (1976). As per reports of the latter workers, the high temperature and high R. H. proved detrimental for mite population while moderate temperature and R. H. proved congenial for its multiplication. Population was positively correlated with R. H. and negatively correlated with temperature. The population starts developing during October-December, peak is attained during January to March, starts declining during April and becomes negligible during March-September. Rainfall in August drastically reduces the population. According to Pande & Sharma (1979), the peak is attained during May and low during October-January. On the other hand Lall *et al.* (1965) stated that it remained active in the field throughout the year. This mite prefers those varieties of lady's finger having low carbohydrate/nitrogen ratio. It prefers high concentration of carbohydrate and low concentration of nitrogen. The high percentage of aspergin, aspartic acid and glutamic acid enhances egg production. The varieties having high concentration of auxin are also preferred as it accelerates the rate of multiplication. Low potassium content is also preferred by this mite (Planisamy *et al.*, 1976). Contrary to it, Fotedar (1979) experimentally proved that population growth was rapid in those parts having high nitrogen content. The population of this mite on *Cassava* appeared to be absent or low during June-December and the peak was during January-April (Lal, 1982).

Control : Several researchers performed a number of trials for the control of this mite and found the following chemicals to be very promising : Rahman (1939)—Lime sulphur ; Puttarudriah

(1947)—Finely powdered sulphur-wood ash (1 : 4) ; Singh & Saini (1956)—chlorobenzilate (1 : 400) ; Sen (1958)—Aramite (0.02%) ; Lall & Dutta (1959)—malathion 0.02% ; Pauer & Rathore (1959)—ethyl parathion (0.02%) ; Singh & Singh (1960)—diazinon (0.02%) or ethyl parathion (0.02%) ; Singh & Guram (1960)—diazinon or parathion (0.02-0.03% E. C.) ; Bindra & Goyal (1966)—malathion (0.05%) or dicofol (0.025%) ; Goyal & Bath (1967)—methyl demeton ; Basu & Pramanik (1969)—carbophenothion (0.023%) Patel & Patel (1968)—dimethoate (0.09%) ; Srivastava & Mathur (1962)—thiometon (0.1% E. C.) ; Gupta *et al.* (1969)—thiometon (0.05%) ; Sidhu *et al.* (1970)—monocrotophos ; Bindra *et al.* (1970)—aldicarb/phorate/disulfoton (1.25 kg each) or dimethoate and methyl demeton (2.5 L each) ; Prem Sagar (1978)—binapacryl (0.05%) ; Palanisamy & Subramaniam (1977)—dicofol ; Fotedar & Singh (1980)—carbofuran (500 ppm.) ; Rote, Shah & Mehta (1981)—dicofol (0.3%) or sulphur dust or wettable sulphur dust (0.2%) and carbaryl (0.2%).

Natural enemies : A number of natural enemies as below are known to feed upon this mite. *Adalia decimpunctata*, *Chrysopa* sp. (Janjua, 1942) ; *Stethorus punctillum* (Kapur, 1948) ; *Somantium oviformes*, *Stethorus sexmaculatus*, *Stethorus* sp. (Puttarudriah & ChannaBasavanna, (1953, 1955), *Amblyseius* (E.) *alstoniae*, *A* (P.) *multidentatus* (Gupta *et al.*, 1971) ; *Stethorus gilvifrons* (Mathur, 1979).

Distribution : INDIA, Gujarat, Haryana, Kerala, Bihar, Karnataka, Meghalaya, Punjab, Rajasthan, Tamil Nadu, Orissa ; outside India : Worldwide.

76. *Tetranychus fijiensis* Hirst

Tetranychus fijiensis Hirst, 1924, *Ann. Mag. Nat. Hist.*, (9) 14 : 523.

Diagnosis : In female, empodium with 2 pairs of empodial hairs ; dorsal pair being shorter than ventral pair. Aedeagus much elongate, bends upwards and tapers gradually. In male, tibia I with 3 sensory and 9 tactile setae, tarsus I with 2 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae. In female, palpus with terminal sensillum 2 times as long as broad. Tibia I with 3 sensory and 9 tactile setae, tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae.

Hosts : Coconut, orange, papaya, *Dieffenbachia* sp., *Seakerthia*, palm, *Areca catechu*.

Nature of damage : This is a pest of coconut specially in south India and Andaman Nicobar Islands (Cherian, 1931, 1938 ; Gupta, 1976). Feeding causes the appearance of whitish spots on the leaves. Later, the spots turn brown and coalesce to give brownish patches on the leaves. Kumar & Prasad (1979) reported this mite as pest of mandarin.

Bionomics : No information on bionomics of this species is available.

Control : No work on control of this mite is known from India.

Distribution : INDIA : Assam, Karnataka, Tamil Nadu, Kerala, Nicobar Isl. ; outside India : Nakuoro Isl., Fiji, Thailand, Liki Isl.,

77. *Tetranychus lombardinii* Baker & Pritchard

Tetranychus lombardinii Baker & Pritchard, 1960, *Hilgardia*, 29 : 551-552.

Tetranychus lombardinii, Banerjee, 1965, *Two & Bud*, 12 : 4-7.

Diagnosis : Females resemble *T. cinnabarinus* but in this case the lobes of the dorsal striae of idiosoma smaller and more widely spaced. Males also resemble *T. cinnabarinus* but the anterior development of terminal knob is more broadly obtuse. Tarsus I and II with minute empodial spurs.

Hosts : *Indigofera tinctoria*. Meyer (1974) reported it to occur on a number of hosts.

Nature of damage : Though it is a pest of a wide range of hosts like cotton, banana, cucurbits, tomato, spinach, etc. in many parts of the world but in India it has been casually recorded without doing any damage to its hosts.

Bionomics : No information is available on the bionomics of this species.

Distribution : INDIA : Assam, ; outside India : Africa.

78. *Tetranychus macfarlanei* Baker & Pritchard

Tetranychus macfarlanei Baker & Pritchard, 1960, *Hilgardia*, 29 : 537.

Tetranychus macfarlanei, Bindra & Kittur, 1960, *Indian J. Ent.*, 23 : 71.

Diagnosis : Aedeagal knob tiny with anterior and posterior angulation. Tibia I of male with 4 sensory and 9 tactile setae, tarsus I with 4 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 5 tactile setae proximal to duplex setae. In female, tibia I with 1 sensory and 9 tactile setae, tarsus I with 4 tactile setae in line with proximal pair of duplex setae ; tibia II with

1 sensory and 6 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae. Idiosomal setae long and pubescent.

Hosts : *Dolichos lablab*, bottle gourd, cucumber, smooth gourd, pumpkin, lady's finger, *Solanum melongena* ; outside India : *Hibiscus*, beans, (Moutia, 1958 ; Meyer, 1974).

Nature of damage : This mite builds up small colonies on the under-surface of leaves. The sucking on plant juice by all the stages cause yellowing of leaves. The infested leaves dry up. The infestation is more on mature crops than on the young ones. It disappears with rains.

Bionomics : Nothing is known in this regard.

Natural enemies : In Mauritius, *Stethorus*, *Oligota* and *Feltiella* were reported as predators on this mite (Moutia, 1958).

Distribution : INDIA : M. P., Delhi, Nicobar Isl. ; outside India : Mauritius.

79. *Tetranychus ludeni* Zacher

Tetranychus ludeni Zacher, 1913, *Mitt. Kais. Biol. Anst. Land. U. Forstw.*, 14 : 40.

Tetranychus ludeni, Puttarudriah & ChannaBasavanna, 1959, *Proc. 1st All India Congr. Zool.*, 530.

Diagnosis : Aedeagal knob very small with no posterior angulation. In male, tibia I with 2 sensory and 10 tactile setae, tarsus I with 2 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 4 tactile setae proximal to duplex setae. In female, palpus with terminal sensillum $1\frac{1}{2}$ times as long as broad. Tibia I with 1 sensory and 9 tactile setae, tarsus I with 1 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 2 sensory and 5 tactile setae, tarsus II with 2 sensory and 4 tactile setae proximal to duplex setae.

Hosts : French bean, dalhia, *Dolichos lablab*, *Lantana*, *Cosmos*, *Citrus* sp, *Brassica* sp. *Convolvulus*, *Cucurbita maxima*, *Solanum melongena*, *Ricinus communis*, *Citrullus lanatus*, *Lablab niger* var. *lignosus*, *L. niger* var. *typicus*, *Abelmoschus esculentus*, *Cucumis sativus*, *Lycopersicon esculentus*, *Luffa acutangula*, *Glycine max*, *Vigna radiata*, *Dolichos biflorus*, *Vigna unguiculata*, *Cajanus cajan*, *Coccinea indica*, *Spinacea oleracea*, *Sechium edule* (Puttaswamy & ChannaBasavanna, 1980a).

Nature of damage : Like other tetranychid mites, it also causes yellowing of leaves. Because of feeding, the leaves first turn yellow, then necrotic patches encompass the leaves and then those leaves dry up.

This is the only tetranychid mite in India known to be vector of plant viral disease, viz. Dolichos Enation Mosaic Virus (DEMV) (Rajagopalan, 1974).

Bionomics : The effect of temperature and relative humidity on the development and oviposition was studied by Puttaswamy & Channa-Basavanna (1980). Among the five temperatures, ($20 \pm 1^\circ$, $24 \pm 1^\circ$, $27 \pm 1^\circ$, $30 \pm 1^\circ$ and $32 \pm 1^\circ\text{C}$) and five R. H. ($55 \pm 3\%$, $65 \pm 3\%$, $75 \pm 3\%$, $85 \pm 3\%$ and $95 \pm 3\%$), the optimum condition for development and maximum survival of eggs were found between $32 \pm 1^\circ$ and $35 \pm 1^\circ\text{C}$ and $65 \pm 3\%$ and $75 \pm 3\%$ R. H. The optimum condition for development of immatures were $30 \pm 1^\circ$ to $35 \pm 1^\circ\text{C}$. The lowest number of eggs were laid at $20 \pm 1^\circ\text{C}$. High humidity ($95 \pm 3\%$ R. H.) reduced egg production capacity of adults irrespective of temperature ranges. In their another study (Puttaswamy & ChannaBasavanna, 1980a) they found that females took 12.48 ± 0.16 days and males took 11.96 ± 0.38 days to complete the life cycle. Mated and unmated females had oviposition period as : 1.54 ± 0.30 days and 1.43 ± 0.11 days, respectively and laid on an average 165.88 ± 47.04 eggs and 132.00 ± 28.54 eggs during their ovipositional periods of 22.83 ± 4.56 days and 27.41 ± 4.75 days. The longevity of mated and unmated females were 27.98 ± 4.50 days and 32.14 ± 4.08 days, respectively. This species influenced the population of *Tetranychus neocaledonicus* as it significantly suppressed the population of the latter (Puttaswamy & ChannaBasavanna, 1980b). When the hosts and non-hosts were grown together in different ratios or alternated in multiple cropping sequence, the spread of infestation was completed almost in all the ratios except 1 : 2 and 1 : 3 in which cases the infestation was low (Puttaswamy & ChannaBasavanna, 1979b). Nitrogen fertilizer was found to increase the population of this mite (ChannaBasavanna, 1981 ; Puttaswamy & ChannaBasavanna, 1982). Eggs receiving 0.1% and 0.01% of juvenile hormone (ZR 856) failed to develop normally (Jagadish, 1979). Further studies in this regard (Jagadish, 1982) indicate that this hormone at the concentration of 100 and 10 ppm has no effect on hatching and at 100 ppm the eggs did not hatch. Puttaswamy & ChannaBasavanna (1981) reported that population occurred throughout the year. It started building during April and peak was seen during May-July. Increase was associated with less rainfall and low R. H. and high mean temperature. Puttaswamy & ChannaBasavanna (1981a) studied the effect of host plants on the development and longevity of this species.

Control : Best results were obtained in the field by spraying dicofol

(0.02-0.01%) and sulphur (0.05-0.015%) (ChannaBasavanna, 1981). Sannaveerappanavar & ChannaBasavanna (1983) reported that DDT and carbaril had a strong irritative effect causing dispersal of mites. Jagadish & ChannaBasavanna (1983) reported dicofol (0.025%) giving the maximum mortality while carbaryl (0.025%) provided the minimum mortality after 12 hours. After 24 hours, dicofol and endosulfan recorded cent percent mortality. However, after 48 hours dicofol was at par with others like sulphur, endosulfan and malathion.

Natural enemies : Release of a phytoseiid mite, *Amblyseius (Typhlodromips) tetranychivorus* (Gupta) was found to be very effective (Puttaswamy, 1978 ; Puttaswamy & ChannaBasavanna, 1979a ; ChannaBasavanna, 1981). Infestation of *Calosporium*, a fungus, also caused 90% mortality within 4 days (Godse & Patil, 1977). Predators like *Scolothrips sexmaculatus*, *Stethorus pauperculus* and *Oligota oviformes* and rain-fall appeared to be regulatory factors (Puttaswamy & ChannaBasavanna, 1981). Reddy & Jagadish (1977) also reported *Scolothrips indicus* as predator of this mite.

Distribution : INDIA : Karnataka, Delhi ; outside India : South Africa, U. S. A., Austria, South America, Salvador, New Zealand and Europe.

80. *Tetranychus hypogaeae* Gupta

Tetranychus hypogaeae Gupta, 1976, *Oriental Ins.*, 10 : 347-348.

Diagnosis : Idiosomal setae simple, not on tubercles. In male, tibia I with 4 sensory and 9 tactile setae, tarsus I with 1 sensory and 5 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. In female, palpus with terminal sensillum $1\frac{1}{2}$ times as long as broad. Tibia I with 1 sensory and 9 tactile setae, tarsus I with 2 sensory and 2 tactile setae proximal to duplex setae ; tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae. Aedeagus in male bends dorsad, posterior angulation absent.

Host : *Arachis hypogaeae*.

Nature of damage : This mite was seen to damage ground nut crop in West Bengal. All the infested leaves were heavily covered with webs and all those later turn yellow. The infested plants look sickly and growth is adversely affected. Some of the very infested plants dry up at later stages of development.

Distribution : INDIA : West Bengal.

Remarks : No work has been done on the bionomics and control of this species.

81. *Tetranychus neocaledonicus* André

Tetranychus neocaledonicus André, 1933, *Bull. Mus. natn. Hist. nat., Paris*, (2) 5 : 302.

Tetranychus cucurbitae Rahman & Sapra, 1940, *Proc. Indian Acad. Sci.*, 11B : 179.

Tetranychus equatorius, Khot & Patel, 1956, *Indian J. Ent.*, 18 : 149.

Tetranychus neocaledonicus, Prasad, 1974, A catalogue of mites of India, pp. 125-126.

Diagnosis : Aedeagal knob in male berry like and the anterior rounded projection is better developed than the rounded posterior projection. In male, tibia I with 3 sensory and 8 tactile setae, tarsus I with 2 sensory and 4 tactile setae proximal to duplex setae ; tibia II with 7 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae ; In female, tibia I with 1 sensory and 7 tactile setae, tarsus I with 2 sensory and 3 tactile setae proximal to duplex setae, tibia II with 1 sensory and 6 tactile setae, tarsus II with 1 sensory and 3 tactile setae proximal to duplex setae.

Hosts : *Pennisetum typhoideum*, beans, *Bidens pilosa*, brinjal, cabbage, *Solanum melongena*, *S. tuberosum*, *Coriandrum*, cotton, cowpea, *Crossandra undulaefolia*, *Croton* sp., *Cucumis sativus*, *C. pepo*, *Cyperus* sp., *Tagetes erecta*, *Dodonaea viscosa*, *Dolichos lanulatus*, *Cragrostis* sp., *Euphorbia geniculata*, *E. hirta*, fig, french bean, *Geranium*, *Gladiolus* sp., grape vines, Hollyhock, *Ipomoea*, jasmine, Jowar, cucumber, 'Kulthi', lemon, lima bean, lucern, mango, tapioca, papaya, pea, pumpkin, potato, *Quamoclit vulgaris*, *Quisqualis indica*, radish, *Brassica juncea*, *Luffa aegyptica*, rose, sandal wood, *Brassica campestris*, *Melilotus parviflora*, soybean, mulberry, sugarbeet, sunnhemp, *Eruca sativa*, tomato, *Occimum sanctum*, castor, *Parthenium hysterophorus*, *Solanum nigrum*, lady's finger, cardamom. Meyer (1974) recorded it on a large number of hosts from S. Africa. Population of this mite was recorded on more than 110 plants (Jeppson *et al.*, 1975).

Nature of damage : It is one of the most serious pests of vegetables in India. The mites in all stages remain confined on the undersurface of leaves covered with thin webs where dust particles get entangled. The continuous sucking from leaves make those spots yellowish and ultimately those turn brownish. All such leaves gradually wither. The plants lose vitality which affects on the yield. The infested leaves also sometimes become crinkled, crumpled and fall off.

Bionomics : According to Khot & Patel (1956), the duration of different stages are : incubation : 3-9 days, larva : 2-5 days, protonymph : 3-4 days, deutonymph : 2-5 days, egg-adult : 13-19 days, preoviposition : 1-2 days, postoviposition : 1-3 days, longevity of female : 6-28 days, and that of male : 8-12 days. According to Rahman & Sapra (1945), the longevity of males and females are : 5-8 days and 10-12 days, respectively, while the fecundity of fertilized and unfertilized females are 61-93 and 33-59 eggs, respectively. Its biology was studied by Puttaswamy & Reddy (1980). Studies on the effect of food and temperature were made and that indicated 30°C was the most favoured temperature and musk melon was the most favoured food (Gupta *et al.*, 1972a). Gupta *et al.* (1975) evaluated various methods to determine the population density of this mite. In another study they (Gupta *et al.*, 1975a) developed sampling technique for estimating population density of *T. neocaledonicus*. They found no significant difference in population on the basal, middle and distal $\frac{1}{3}$ portions of the same leaf and the population on the leaf was contiguous. It was proved statistically that plucking of 53 leaves at random from anywhere of basal, middle or distal portion of the plant and counting population from anywhere of basal, middle or distal part of the leaf from 1 sq. cm area can give true estimation of the population. Population of this species was low during January and the peak was attained in May (Sharma & Pande, 1979). Population was absent or very low during June-December and thereafter increase was sudden. Peak infestation was during January to April. Population increase was significantly controlled with decrease of humidity and nonsignificantly controlled with increase in maximum temperature. Maximum temperature and rainfall exhibited non-significant negative relationship (Lal, 1983). The duration of development time from egg to adult was significantly longer on tapioca than on castor, amaranthus and mulberry (Puttaswamy & ChannaBasavanna, 1982a).

Control : Among the various chemicals tried for the control of this mite, methyl parathion (0.05%), dimethoate (0.05%), phosphamidon (0.025%), malathion (0.08%), chlorophenamidin (0.05%) and dicofol (0.05%) are quite promising (Atwal *et al.*, 1969 ; Sidhu & Singh, 1971 ; Gupta *et al.*, 1972 ; Jagan Mohan & Krishnaiah, 1979). The other promising pesticides are : cyhexatin (0.05%) (Pande & Sharma, 1979) ; phosphamidon (0.03%) (Ray & Lallan Rai, 1979).

Natural enemies : A few natural enemies are known to feed upon this mite, of those, mention may be made of *A. (E.) alstoniae* (Gupta

et al., 1971). Besides, *Stethorus* sp. is also known to feed on all stages (Singh & Ray, 1977).

Distribution : INDIA : Assam, Karnataka, Maharashtra, Punjab, Delhi, Kerala, Gujarat, Haryana, Orissa, Meghalaya, U. P., Bihar, Rajasthan ; outside India : Hawaii, Fiji, Bahamas, Venezuela, Puerto Rico, U. S. A., Africa.

82. *Tetranychus urticae* Koch

Tetranychus urticae Koch, 1836, Deu. Crust. Myr. Arach., Fasc. 1 : 10.

Tetranychus urticae, Lal & Mukharji, 1977, *Sci. & Cult.*, 43 : 313-316.

Diagnosis : Greenish or yellowish mite with large spots on either sides of body. Axis of the aedeagal knob parallel with axis of shaft. Striae in female bears dorsal lobes, which are large, rounded and some being oblong.

Hosts : *Acalphya* sp., brinjal, some medicinal plants, *Citrullus vulgaris*, etc. ; from outside India a number of other hosts are known (Meyer, 1974).

Nature of damage : This mite has been reported to attack brinjal in West Bengal producing similar symptoms as done by *T. neo-caledonicus*. On grape vines and roses, this mite turns the leaves pale and cause the appearance of spots. Later those turn yellowish bronze. Grapes also become under-developed and wrinkled. Vines may be also killed (Mali *et al.*, 1983a). The population dropped with the pruning during April and October.

Control : Mali *et al.* (1983) found RH-0994 (0.04%) and tetradifon (0.04%) were most effective against this mite on grape vines.

Distribution : INDIA : West Bengal, Uttar Pradesh ; outside India : North America, South America, Europe, Israel, Japan.

Remarks : This mite is commonly called 2-spotted spider mite or red-mite and, in fact, the common name refers to a complex of species involving about 59 synonyms each described from different hosts or areas. The mites of this species complex have been recorded in over 150 hosts. Many of these species from this complex were later given specific status because of the differences in morphology, biology, distribution and cross breeding results (Jeppson *et al.*, 1975).

Family Tuckerellidae Baker & Pritchard

Tuckerellidae Baker & Pritchard, 1953, *Ann. Ent. Soc. Amer.*, 46(2) : 243-258.

History : Baker & Pritchard (1953) erected this family with a

single genus. Since then several workers from different parts of the world described species under this genus. Ehara (1975) provided a key for the world species known till then. Altogether 16 species are known from the world, of those, 3 are represented from India.

Diagnosis : Body oval to elongate, with two pairs of eyes. Chelicera not styliiform as in *Tenuipalpus*. Palpus 4-segmented, tibia with strong claws, tarsus cylindrical with 4 long pointed setae and a rod. Dorsum smooth or reticulate, distinguished into propodosoma and opisthosoma. Setae fan like and caudally with a row of variable number of long flagellate setae. Legs short, pretarsus with strong claws, each provided with 2 tenent hairs ; empodium splits into 2 fine claw like processes.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Body semi-oval, truncate posteriorly, dorsal integument strongly reticulate, divided into gnathosoma and idiosoma.

Gnathosoma : It consists of a pair of chelicerae and a pedipalp. Chelicerae styliiform, pedipalp 5-segmented, 6th segment developed into distinct thumb with stout terminal setae, in addition to three setae ; palp tibial claw well developed.

Idiosoma (Fig. 186A). It consists of propodosoma and hysterosoma. The former bears 4 pairs of palmate setae and the latter with 18 pairs of fan-shaped setae which are of unequal shape ; besides, variable number of caudal setae both flagellate and palmate are also present (Fig. 186A).

Venter : Venter with striations and variable number of setae in genitoanal region.

Legs : Legs short and stout ; all of nearly same length ; a fan like seta present on tibia, genu and femur ; tarsus I-II each with sensory rod, tibia I also with sensory rod.

Genus *Tuckerella* Womersley (Fig. 186A)

Tuckerella Womersley, 1940, *Trans. R. Soc. S. Aust.*, 64(2) : 233-265.

Key to the species of *Tuckerella*

1. Five pairs of posterior filamentous setae	...	...	<i>kumaonensis</i>
— Four pairs of posterior filamentous setae	...	...	<i>delhiensis</i>

[* *T. indica* Prasad, is not included in this key since known from male only.]

83. *Tuckerella indica* Prasad

Tuckerella indica Prasad, 1973, *Acarologia* 15 : 237-239.

Diagnosis (Male) : Body elongated, oval, reddish ; with six pairs of long filamentous setae on caudam. Outer pair of the last four hysterosomal setae palmate, subequal to and in a transverse line with inner pair. Tarsi of legs III and IV each with dorsal sensory rod (solenidion). Distal sensory rod on tarsus of leg I shorter than the proximal sensory rod. Hysterosoma with 18 pairs of dorsal palmate setae borne on lightly sclerotized plates.

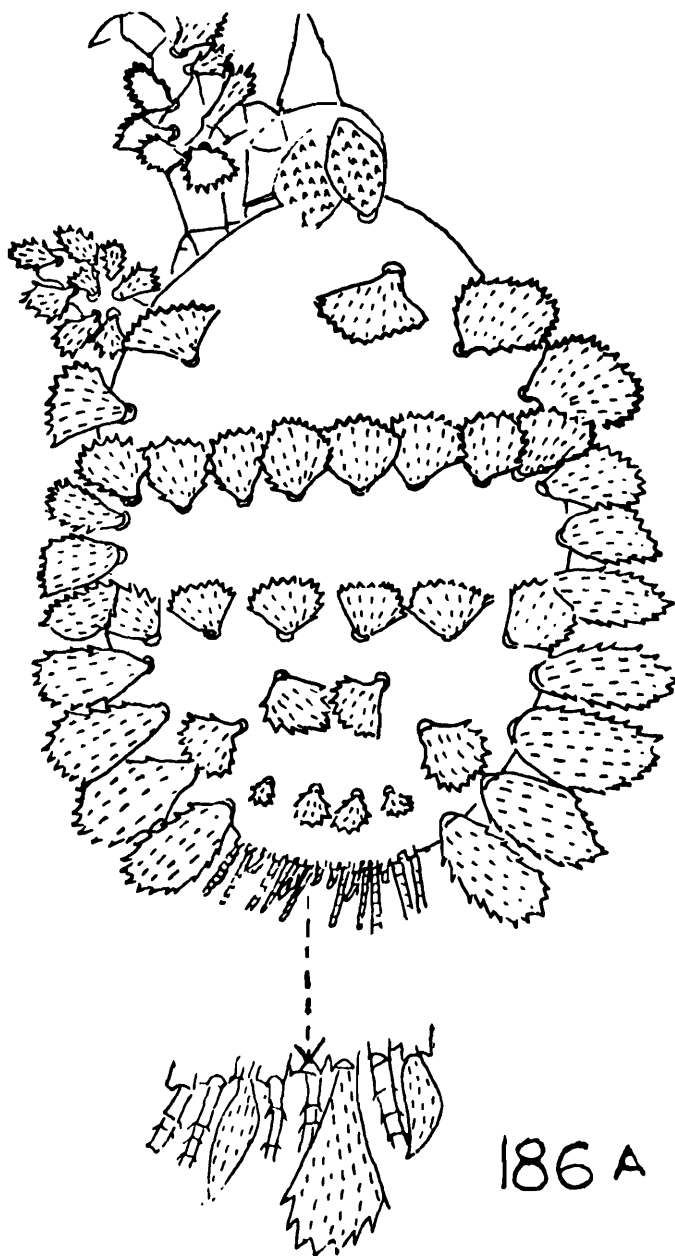


Fig. 186A : Dorsal surface of a tuckerellid mite showing types of setae along with enlargement of posterior portion.

Host : Casuarina.

Nature of damage : No damage is known to be caused by this mite.

Distribution : INDIA : Tamil Nadu.

84. *Tuckerella delhiensis* Ghai & Maninder

Tuckerella delhiensis Ghai & Maninder, 1976, *Oriental Ins.*, **10** : 169-172.

Diagnosis : Four pairs of very long caudal filamentous setae, posterior row of fan-like dorsal setae in transverse row. First pair of dorsal propodosomal setae leaf-like and irregularly reticulate.

Host : Terminalia tomentosa.

Nature of damage : No damage is caused.

Distribution : INDIA : Delhi.

85. *Tuckerella kumaonensis* Gupta

Tuckerella kumaonensis Gupta, 1979, *Oriental Ins.*, **13** : 229-230.

Diagnosis : Five pairs of flagellate setae and 3 pairs of foliaceous setae on caudam, propodosoma with 4 pairs of palmate setae ; anterior pair irregularly reticulate, more elongate than outer pairs. Hysterosoma with 18 pairs of palmate setae. Out of four pairs of fan-like setae set on opisthosoma, the inner pair noticeably larger than outer pair and placed posterior to outer pair.

Host : Pine cone.

Nature of damage : No damage is caused by this mite.

Distribution : INDIA : U. P.

Family TENUIPALPIDAE Berlese

Tenuipalpidae Berlese, 1913, *Acarotheca Italica Firenze*, Tipografica di M. Ricci p. 17.

History : Berlese (1913) erected this family. Some good comprehensive publications are available in this family, of those, mention may be made of Baker (1949a), McGregor (1949), Pritchard & Baker (1951, 1958), Baker & Tuttle (1964), Baker *et al.* (1975), DeLeon (1956-1965), Chaudhri (1971-1974), Mitrofanov (1973, 1973a), Meyer (1979) and over 300 species in 21 genera are known from the world.

Diagnosis : Chelicera stylet like, recurved and arises from eversible stylophore ; palpus simple lacking claw on penultimate segment. Propodosoma bears 3 pairs of setae ; hysterosoma bears 1-3 pairs of

dorsocentrals, 1 pair of humeral, 5-7 pairs of dorsolaterals ; there may be 1-4 pairs of dorsosublateral hysterosomals or those may be lacking. Ventral metapodosoma with 2 pairs of setae but their numbers may vary. There may or may not be a distinct ventral and genital plates. Dorsum is provided with ornamentation in the form of striations, reticulations and rarely it is smooth. The tenent hairs on empodium present on tarsal claws.

These mites are flat, pear shaped, mostly bright coloured, slow moving and are normally found on the under-surface of leaves, near veins, twigs, fruits etc. Sometimes they are also found inside the galls and some feed on barks. Popularly these mites are called false-spider mites as they look like spiders but unlike those they do not spin webs. Majority of the species are of insignificant economic importance but some species are of great economic importance.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

These mites are 200-350 microns long, 100-150 microns wide. The body is differentiated into Gnathosoma and Idiosoma and the latter is further distinguishable into Propodosoma and Hysterosoma (Fig. 200).

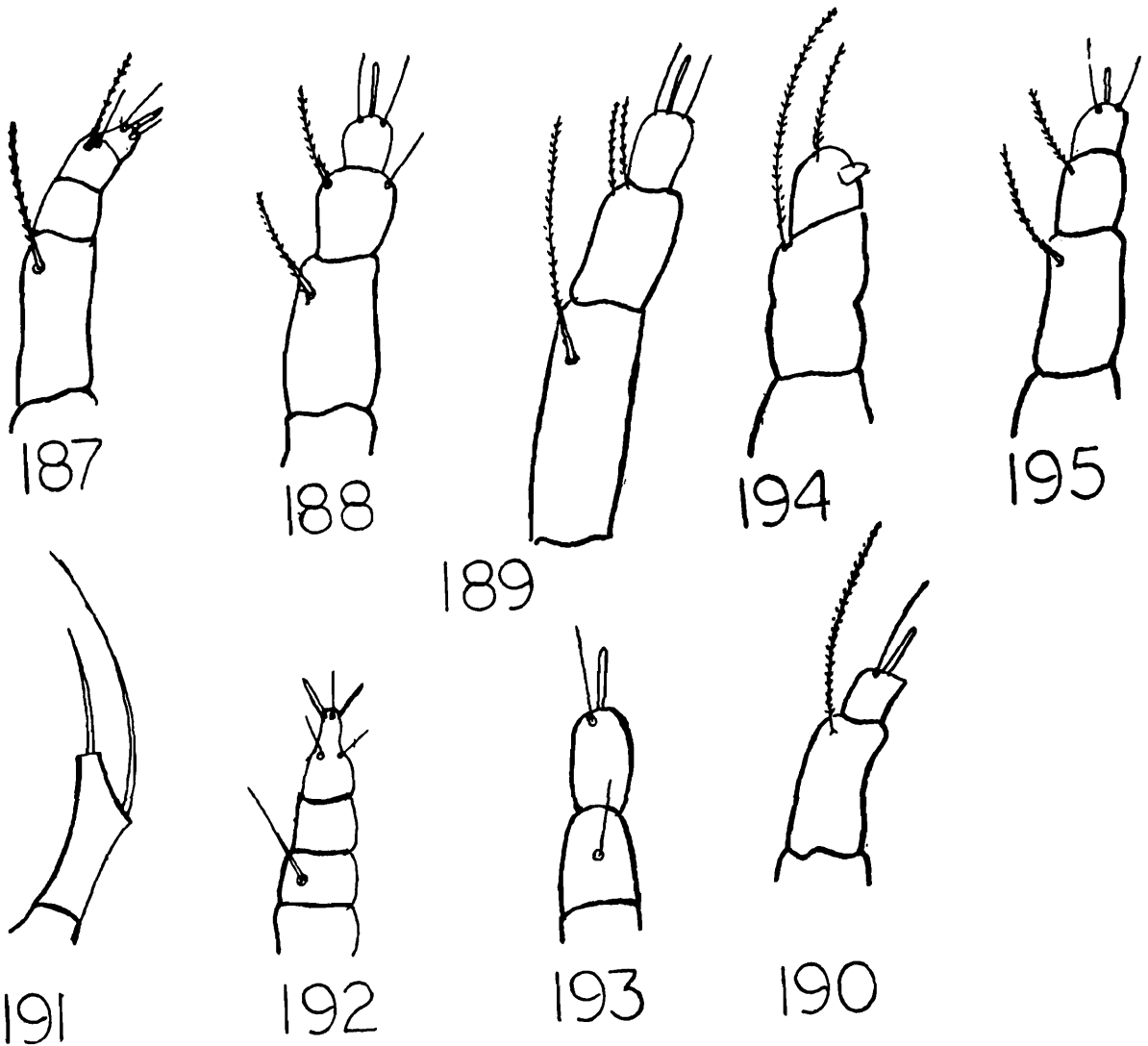
Gnathosoma : It bears a pair of chelicerae and a pair of pedipalpi, besides the mouth opening.

Chelicerae : It is paired, the bases are fused to form the stylophore. The chelicerae are modified into stylets and are curved proximally.

Pedipalpi : The palpi are also paired, segmented (1-5 segments), simple and without any claw. The terminal segment of palpus, with a sensory rod, besides 1 or 2 setae are also present. The type of pedipalp is an important character for separation of genera (Figs. 187-195).

Idiosoma : The idiosoma is furnished with ornamentation in the form of striations or reticulations (Figs. 200). Only in a few cases it is smooth. It is differentiated into rostral shield, propodosoma and hysterosoma. The rostral shield is on the anterior part of propodosoma in the form of lobed projection. It is variable in shape and serves as a character of generic importance (Figs. 196-199). The propodosoma bears 3 pairs of setae and 2 pairs of eyes (Fig. 200). The hysterosoma is demarcated from propodosoma by a distinct suture. Hysterosoma bears 9-13 pairs of setae (1-3 pairs of dorso-central; 1-4 pairs of sublateral, 5-7 pairs of dorsolateral and 1 pair of humeral), Sublateral setae may be absent as in *Brevipalpus*.

Venter : The ventral side (Fig. 201) is provided with striations or reticulations or may be smooth. It bears 3 pairs of setae, viz. 1 pair of medioventral propodosomal, anterior and posterior medioventral metapodosomals. Ventral plate may be smooth, striated or reticulated with 2 pairs of setae, 1-2 pairs of setae present on genital plate and 1-3 pairs of setae present on anal plate. In males, the venter of opisthosoma bears 1 pair of medioventral setae and 3-4 pairs along genito-anal opening.



Figs. 187-195 : Palpi in different genera in Tenuipalpidae :

187. *Aegyptobia*, 188-189. *Brevipalpus*, 190-191. *Tenuipalpus*,
 192. *Phytoptipalpus*, 193. *Dolichotetranychus*, 194. *Raoiella*,
 195. *Pentamerismus*.

Legs : Adults with 4 pairs of short legs, segmented and with constant setal pattern. The number of seta on genu I-IV helps in separating the species. A single sensory rod is always present on distal

end of tarsi I and II but sometimes 2 sensory rods may also be present on one or both tarsi. The claw bears several pairs of long outer tenent hairs. The distal hook of claw may be strongly developed, reduced or lacking. Empodium consists of an elongate pad bearing 2 rows of tenent hairs below.

Key to the genera of Tenuipalpidae

1. Hysterosoma with not more than 1 pair of dorsosublateral setae or without dorsosublaterals	...	...	2
— Hysterosoma with 2 or more pairs of dorsosublaterals	...	...	7
2. Adults and nymphs with 3 pairs of legs, palpus 1 segmented	...	...	<i>Larvacarus</i>
— Adults and nymphs with 4 pairs of legs	...	...	3
3. Propodosoma with rostral shield antero-medially	...	...	4
— Propodosoma without rostral shield antero-medially	...	...	6
4. Hysterosoma with dorsocentral and 1 pair or without dorsosublateral setae ; first and second dorsocentral setae simple	...	...	5
— Hysterosoma with 1 pair or without dorsocentral and dorsosublateral setae	...	...	<i>Terminalichus</i>
5. Hysterosoma normally with penultimate pair of dorsolateral setae flagelliform	...	...	<i>Tenuipalpus</i>
— Hysterosoma normally with penultimate pair of dorsolateral setae of normal length	...	...	<i>Brevipalpus</i>
6. Palpus 3 segmented	...	...	<i>Dolichotetranychus</i>
— Palpus 1 segmented	...	...	<i>Obuloides</i>
7. Female with 3 pairs of legs, male with 4 pairs of legs	...	...	<i>Phytoptipalpus</i>
— Female and male with 4 pairs of legs	...	...	7
8. Palpus with 2 segments	...	...	<i>Raoiella</i>
— Palpus with more than 2 segments	...	...	8
9. Hysterosoma with 4 pairs of dorsosublaterals	...	...	<i>Aegyptobia</i>
— Hysterosoma with less than 4 pairs of dorsosublaterals	...	...	<i>Pentamerismus</i>

Genus *Aegyptobia* Sayed
(Fig. 202)

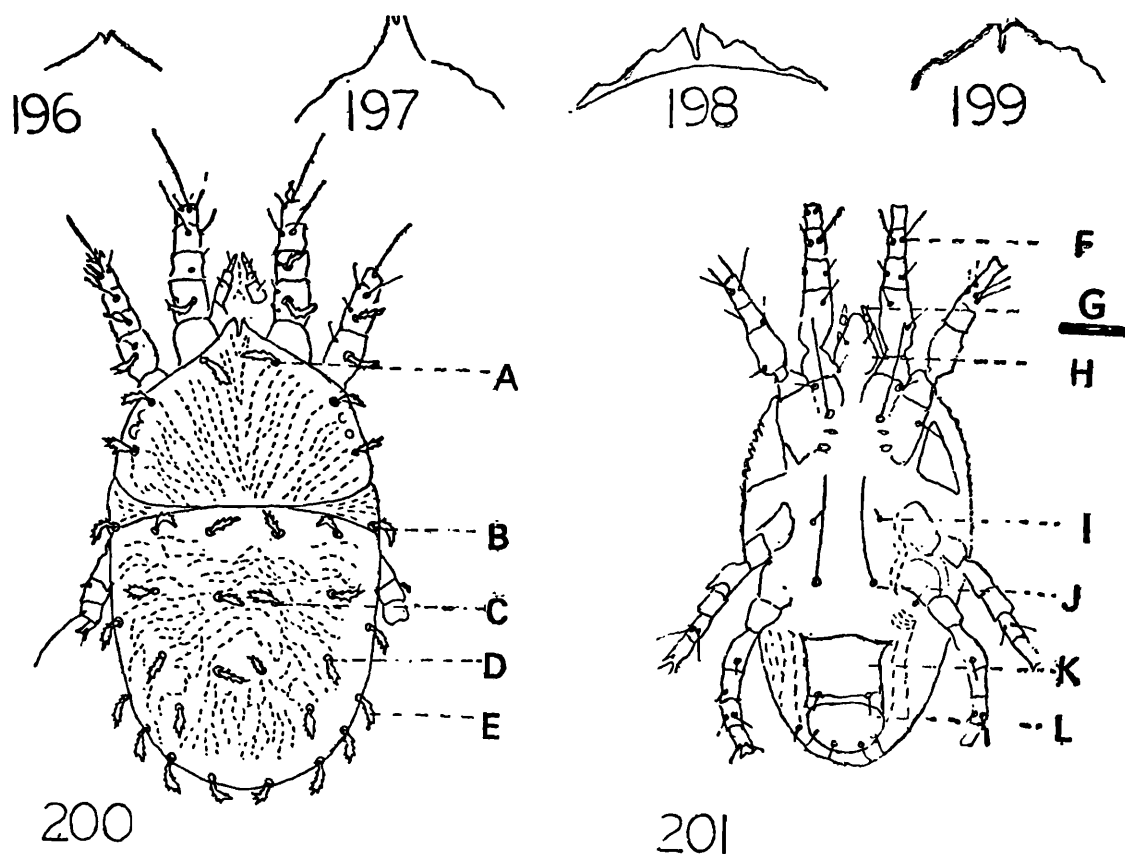
Aegyptobia Sayed, 1950, *Proc. 8th Int. Congr. Ent.*, p. 1018,

86. *Aegyptobia mumulus* Chaudhri

Aegyptobia mumulus Chaudhri, 1972, *Pak. J. Sci.*, 24(1-2) : 21-24.

Aegyptobia mumulus, Sadana & Chhabra, 1980, *Sci. & Cult.*, 46 : 369-370.

Diagnosis : Female with short and broad rostrum reaching upto genu I. Palpus 5-segmented ; terminal segmentation with 2 setae and a rod ; 2 pairs of eyes present. Propodosoma with longitudinal striation with 3 pairs of minute serrate setae. Hysterosoma with transverse striations mediodorsally, lateral striations directed marginally, striations longitudinal in the posterior part of hysterosoma ; hysterosomal setae minutely serrate. Ventral propodosomal part with transverse striations and margins with longitudinal striations.



Figs. 196-199 : Rostral shields in different tenuipalpid genera : 196. *Aegyptobia*, 197. *Tenuipalpus*. 198-199. *Brevipalpus*.

Fig. 200 : Dorsal surface of a tenuipalpid mite : A. Propodosomal seta, B. Humeral seta, C. Dorsocentral hysterosomal seta, D. Sublateral hysterosomal seta, E. Dorsolateral hysterosomal seta.

Fig. 201 : Ventral surface of a tenuipalpid mite : F. Leg I, G. Palp, H. Rostrum, I. Anterior medioventral metapodosomal, J. Posterior medioventral metapodosomal, K. Ventral shield, L. Anal shield.

Hosts : *Thuja orientalis* (Sadana & Chhabra, 1980) ; *Cupressus* sp. (Sadana *et al.*, 1981) ; outside India : *Cupressus sempervirens*, *Dodonaea viscosa*.

Nature of damage : No damage is caused by this mite.

Bionomics : Nothing is known.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Genus *Brevipalpus* Donnadieu

(Figs. 203-204)

Brevipalpus Donnadieu, 1875, Recherches pour servir a l'histoire des Tetranyques, pp. 143-145.

Key to the Species of *Brevipalpus*

1. Hysterosoma without dorsosublateral setae ...	...	2
— Hysterosoma with dorsosublateral setae ...	...	<i>pulchur</i>
2. Hysterosoma with 6 dorsolaterals ...	...	3
— Hysterosoma with 5 dorsolaterals ...	...	6
3. Tarsus II with a single sensory rod ...	...	4
— Tarsus II with 2 sensory rods ...	...	<i>californicus</i>
4. Hysterosoma with reticulations ...	...	5
— Hysterosoma with transverse striations ...	...	<i>lewisi</i>
5. Hysterosoma with reticulate pattern in the middle, and broad cells in the sides ...	...	<i>cucurbitae</i>
— Hysterosoma with reticulations evenly distributed along dorsomedian ridge ...	...	<i>essigi</i>
6. Tarsus II with a single sensory rod ...	...	7
— Tarsus II with 2 sensory rods ...	...	9
7. Dorsal setae on femora I and II longer than the width of the segment, dim reticulations on the propodosoma ...	...	<i>karachiensis</i>
— Dorsal setae on femora I and II not longer than width of segment ; dim reticulations on midportion of propodosoma ...	...	8
8. Propodosoma without reticulations on dorso-medial region ...	...	<i>phoenicis</i>
— Propodosoma with irregular broken striations ...	...	<i>rugulosus</i>
9. Propodosoma with rather even reticulations mediodorsally ...	...	10
— Propodosoma with longitudinal striae, or very slender reticulations mediodorsally ...	...	<i>deleon</i>

10. Propodosoma evenly reticulate mediodorsally ... 11
 — Propodosoma without reticulations medio-
 dorsally *obovatus*

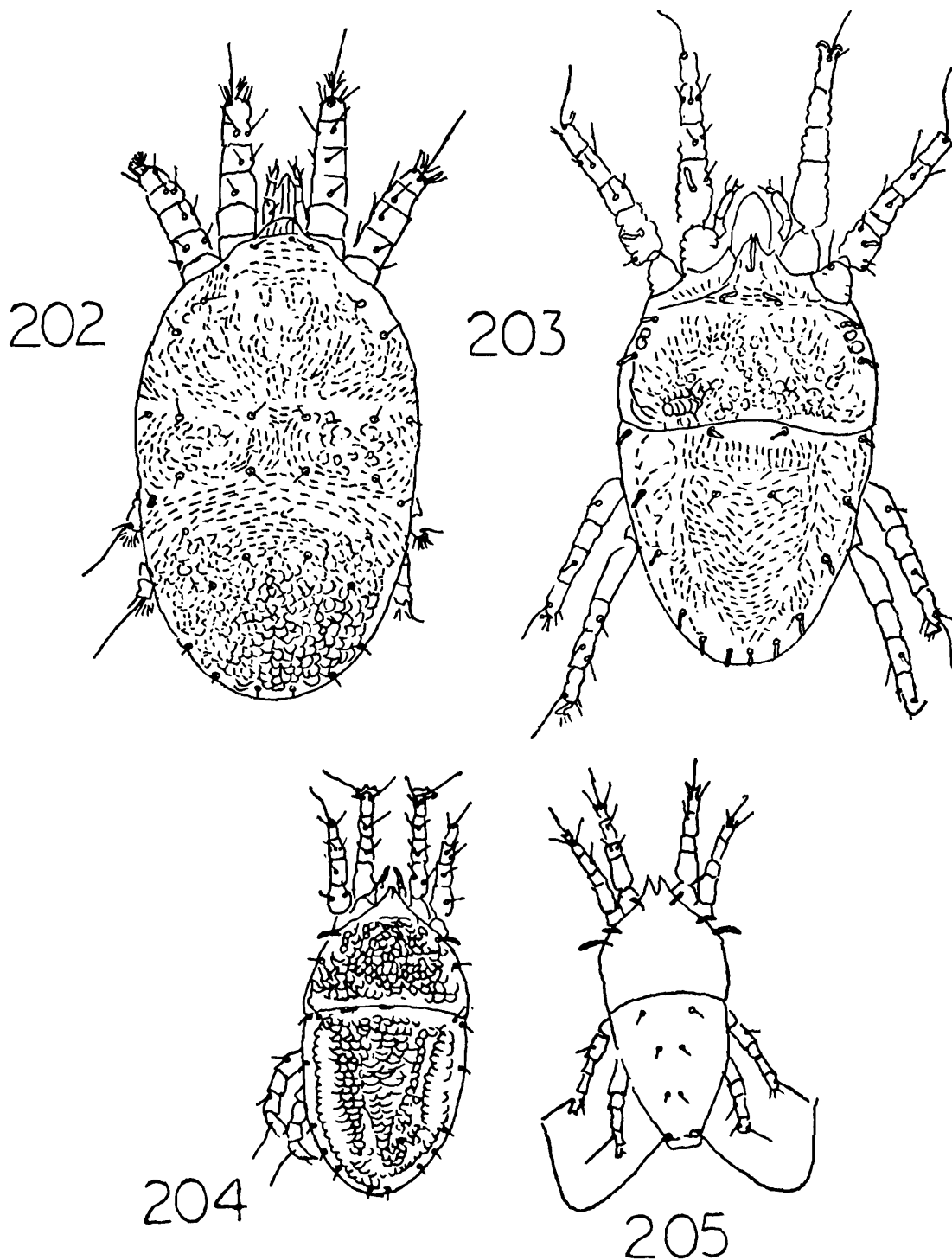


Fig. 202 : *Aegyptobia* sp.

Figs. 203-204 : *Brevipalpus* sp.

Fig. 205 : *Tenuipalpus* sp.

11. Propodosoma with reticulation in the middle,
broad cells on the sides *euphorbiae*
- Propodosoma with only even reticulation on
the middle *chiliensis*

87. *Brevipalpus californicus* (Banks)

Tenuipalpus californicus Banks, 1904, *J. New York Ent. Soc.*, 12 : 55.

Brevipalpus australis, Ananthakrishnan, 1963, *Rep. Unit. Plant. Ass. S. India Sci.*, pp. 55-58.

Brevipalpus californicus, Gupta, Sidhu & Singh, 1971a, *Indian J. Ent.*, 33 : 30-33.

Diagnosis : Body pear shaped, flat with regular mediolateral reticulations on propodosoma ; hysterosoma with 5 dorsolaterals. Tarsus II with 2 distal solenidia, reticulation pattern usually covers the entire propodosoma.

Hosts : Maize, lady's finger, brinjal, potato, bitter-gourd, snake-gourd, *Luffa aegyptica*, *Solanum nigrum*, *Amaranthus viridis*, *Citrus* sp., papaya, mango, guava, pomegranate, sapota, loquat, black-berry, *Brassica* spp., *Bauhinia variegata*, *Bougainvillea spectabilis*, *Cestrum nocturnum*, *Erythrina indica*, *Helianthus annuus*, *Hibiscus rosa-sinensis*, *Jasminum sambac*, *J. grandiflorum*, *Lagestroemia indica*, *Murraya exotica*, *Tabernaemontana coronaria*, *Cassia fistula*, *Rosa indica*, *Callistemon lanceolatus*, *Holmskioldia sanguinea*, *Thevetia nucifolia*, *Nerium odorum*, *Ticome* sp., *Mucuna prurita*, *Dalbergia sissoo*, *Atylosia* sp., *Barleria cristata*, *Brassica campestris*, *Bougainvillea glabra*, *Chenopodium album*, *Citrus aurantium*, *C. decumna*, *C. jambhiri*, *C. sinensis*, *C. unshiu*, *C. lima-ttioides*, *C. tengirina*, *Colocasia* sp., *Cucurbita maxima*, *Eucalyptus* sp., *Gossypium herbaceum*, *Heliotropium eichwaldi*, *Solanum xanthocarpum*, *Vitis vinifera* (Sadana & Joshi, 1976) ; *Vitis vinifera*, *Citrullus vulgaris*, *Phaseolus vulgaris* ; outside India : *Acer*, *Acineta*, *Anguloa*, *Anthurium*, *Antidesma*, *Aphelandra*, *Bletia*, *Brassica*, *Callicarpa*, *Catasetum*, *Citrus*, *Claucena*, *Clerodendron*, *Cocos*, *Crescentia*, *Croton*, *Dendrobium*, *Dodonaea*, *Dolichos*, *Epidendrum*, *Ficus*, *Flacourtia*, *Flaveria*, *Gardenia*, *Gongor*, *Hibiscus*, *Houletia*, *Lycaste*, *Malus*, *Melia*, *Odontoglossum*, *Peristeria*, *Persea*, *Pilea*, *Poinsettia*, *Sida*, *Solanum*, *Stanhopea*, *Thea*, *Thunbergia*, *Trevesia*, *Trichophila*, *Vitis* (Pritchard & Baker, 1958).

Nature of damage : It is a serious pest of a number of crops in India, of those, citrus is the most important one. Usually these mites are seen on the under surface of leaves near the midrib but when the infestation is serious they may migrate on the twigs and fruits as well.

The feeding of the mites causes the appearance of yellow spots on the leaves. Later, those spots turn brown and coalesce to form brown patches. The petiolar attachment becomes so weak that all the leaves fall off prematurely. Fruits also suffer premature fall. Similar symptoms are also produced on guava and pomegranate. The infested leaves look sickly and growth and vigour are adversely affected. In *Brassica*, the attack causes yellowing of leaves. This mite is known to cause leprosis of citrus in some parts of the world.

Bionomics : It remains in the field throughout the year. Out of 85 plants tested for its hosts, 55 were found to be suitable for feeding, oviposition and breeding ; 3 were unsuitable for breeding although mites fed on them and 27 were unsuitable for both feeding and breeding (Sadana & Joshi, 1976). Low temperature and low humidity were the most optimum conditions required for population build up. Population was maximum during December-March and declined thereafter (Lakshman Lal & Mukharji, 1980).

Control : *Binapacryl* (0.025%) is highly effective against this mite as it has quick knockdown effect and high residual effect also. (Gupta, Sidhu & Singh, 1971).

Distribution : INDIA : West Bengal, Assam, Karnataka, Punjab, Delhi ; outside India : Africa, Pacific Isls., North, Central and South America, West Indies, U. S. S. R., Australia.

88. *Brevipalpus chilensis* Baker

Brevipalpus chilensis Baker, 1949, *Amer. Midl. Nat.*, 44(2) : 358.

Brevipalpus chilensis, Nagesha Chandra & Channa Basavanna; 1974, *IV Int. Congr. Acar., Austria*.

Diagnosis : Body flat, propodosoma evenly reticulate, mediolateral dorsal setae of body much shorter than intervals between their longitudinal bases ; tarsus II with a single sensory rod. Hysterosoma with 5 dorsolaterals.

Hosts : *Garcinia* sp., *Jasminum angustifolium*, *Strongylodon macrobotrya* ; outside India : *Vitis*.

Nature of damage : In Chile, it is a destructive pest but in India it is of no economic value.

Bionomics : Information in this respect is not available from India.

Distribution : INDIA : Karnataka ; outside India : Chile, Africa.

89. *Brevipalpus cucurbitae* Mohansundaram

Brevipalpus cucurbitae Mohansundaram, 1982, *Entomon*, 7(4) : 427.

Diagnosis : Red mite ; rostrum reaching more than 1/2 the length of femur I. Palpus 4 segmented. Rostral shield bifurcate, shield tip blunt reaching base of femur I. Propodosoma with polygonal reticulation ; 3 pairs of dorsal propodosomal present. Hysterosoma with a reticulate pattern in the middle and broader cells in the sides ; 3 pairs of dorsocentrals, 1 pair of humerals, 6 pairs of dorsolaterals, all being lanceolate and serrate. Ventrally, propodosoma with a pair of short anterior and a pair of long posterior medioventral setae, one pair of medioventral setae on ventral plate.

Host : *Cucurbita maxima*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

90. *Brevipalpus euphorbiae* Mohansundaram

Brevipalpus euphorbiae Mohansundaram, 1982, *Entomon*, 7(4) : 427-429.

Diagnosis : Red mite, rostrum extending beyond the middle of femur I. Palpus 4-segmented. Rostral shield bifurcate with further cleft on the either sides. Hysterosoma with a reticulate pattern in the middle and broad cells on the sides ; 5 pairs of dorsolaterals, 1 pair of humerals, 3 pairs of dorsocentrals present, all being lanceolate and serrate. Venter with a pair of medioventral propodosomals ; anterior medioventral metapodosomals and posterior medioventral metapodosomals present.

Host : *Croton*.

Distribution : INDIA : Tamil Nadu.

Remarks : The economic importance of this species is not known.

91. *Brevipalpus deleoni* Pritchard & Baker

Brevipalpus deleoni Pritchard & Baker, 1958, *Univ. Calif. Pub. Ent.*, 14(3) : 234-235.

Brevipalpus deleoni, Gupta, 1970, *Sci. & Cult.*, 36 : 99.

Diagnosis : Tarsus II with a single sensory rod, dorsal body setae much shorter than the longitudinal intervals between their bases. Propodosoma with longitudinal striae or very slender irregular reticulations mediolaterally, hysterosoma with a narrow mediolateral groove.

Hosts : *Dalhia*, *Nyctanthes arborescens*, *Mardinia tenacissima*, *Cassia tora*, grape fruit, guava, *Citrus* spp., *Bidens biternata*, *Cassia spectabilis*, *Eletaria cardamomum*, *Gerbera* sp., *Indigofera* sp., *Morus indica*, *Vitex negundo* ; outside India : *Petrea* sp. (Pritchard & Baker, 1958).

Nature of damage : The damage symptoms produced by this mite are almost of similar nature as are produced by *B. californicus*. However, in this case the Infested leaves do not fall off so quickly. Further, rarely this mite appears as a pest in India and, hence, in majority of the cases it is of insignificant importance.

Bionomics : Nothing in this regard is known from India.

Distribution : INDIA : Punjab, West Bengal ; outside India : U.S.A.

92. *Brevipalpus essigi* Baker

Brevipalpus essigi Baker, 1949, *Amer. Midl. Nat.*, **42** : 367.

Brevipalpus essigi, Gupta & Ghosh, 1979, *Rec. Zool. Surv. India*, **77** : 199.

Diagnosis : Hysterosoma with 6 dorsolateral setae. Pedipalp with 2 setae and a sensory peg at distal end. Tarsus II with 1 sensory rod. Rostrum reaching not more than distal end of femur I. Propodosoma with anterior medioventrals greatly shorter than posterior pair. Dorso-central hysterosomals setiform, hysterosoma with reticulation evenly distributed along dorsomedian ridge.

Hosts : *Undet.* plant ; outside India : *Aucuba*, *Ficus*, *Fuchsia*, *Kentia*, *Pittosporum*, *Salvia*, *Veronica*, *Buddleia*, orchid (Pritchard & Baker, 1958).

Distribution : INDIA : Car Nicobar Isl. ; outside India : California, Mexico.

Remarks : Since this mite has no known economic importance, no work has been done on the bionomics and control.

93. *Brevipalpus lewisi* McGregor

Brevipalpus lewisi McGregor, 1949, *Mem. S. Calif. Acad. Sci.*, **3**(2) : 17.

Brevipalpus lewisi, Lakshman Lal & Mukharji, 1977, *Sci. & Cult.*, **43**(7) : 313-316.

Diagnosis : Hysterosoma with 6 pairs of dorsolateral setae in addition to humeral setae ; Tarsus II with 1 solenidion, 3 setae present on distal segment of palpus. Reticulation pattern does not meet dorsally on propodosoma.

Hosts : *Sida* sp. ; outside India : *Citrus*, *Eugenia*, *Parthenocissus*, *Rhododendron*, *Actinider*, *Alnus*, *Vitis*, *Juglans*.

Nature of damage : Though it is ranked as a major pest of fruit trees and ornamental plants in other parts of the world, but in India it is of minor importance. It rarely causes any damage to its host.

Distribution : INDIA : U. P. ; outside India : California, Bulgaria, Arizona, Maryland, North Carolina, Egypt, Lebanon, Australia.

Remarks : Nothing is known about bionomics and control of this mite from India.

94. *Brevipalpus obovatus* Donnadieu

Brevipalpus obovatus Donnadieu, 1875, *Recherches pour servir a l'histoire des Tetranyques*, p. 116.

Brevipalpus obovatus, Christison, 1893, *Darjeeling News*, p. 116.

Diagnosis : Tarsus II with a single sensory rod. Propodosoma without reticulations mediodorsally. Hysterosoma with 6 dorsolaterals. Distal segment of palpus with 3 setae. Body striae irregular.

Hosts : Tea, *Mentha* sp., *Solanum melongena*, *Raphanus sativus*, *Calotropis procera*, *Bauhinia variegata*, *Ficus carica*, *Zizyphus* sp., *Punica granatum*, *Psidium guajava*, *Hibiscus esculentus* ; outside India : *Capsicum pseudocapsicum*, *Hedera halex*, *Dicliptera acanthaceae*, *Lamium* sp., *Physalis* sp., *Ocimum basilicum*, *Melia azedarach*, *Fern* sp., *Mentha* sp., *Oenothera rosea*, *Otostegia limbata*, *Verbascum thapsus*, *Paspalum distichyum*, *Helianthus annuus*, *Cupressus sempervirens*, *Fragaria vesca*, *Plantago major*, *Potentilla* sp., *Canabis sativa*, *Anisomeles ovata*, *Malvastrum* sp., *Sespedeza sericea*, *Blumea* sp., *Polygonum glabrum*, *Silbum marianum*, *Cichorium intybus*, *Eriobotrya japonica*, *Jasminum arborescens*, *Anemone* sp., *Artemisia scoparia*, *Datura metel*, *Polygonum aviculare*, *Sietgus orientalis*, *Verbena officinalis*, *Periploca aphylla*, *Pyrus malus*, *Buddleia asiatica*, *Cynoglossum* sp., *Solidago* sp., *Dryopteris* sp., *Echinopus echinatus*, *Lippia nodiflora*, *Nerium indicum*, (Chaudhri et al., 1974). Several other hosts are also known (Pritchard & Baker, 1958 ; Meyer, 1974).

Nature of damage : Attack of this mite causes the appearance of light brown to dark brown spots on the leaves at the points of feeding. In case of severe infestations, the leaves turn pale yellow. It is not a pest of much importance in northeast India.

Bionomics : From India, nothing is known but works done abroad indicate that the life cycle is completed in 11-26 days and longevity

of adult varied between 3-26 days depending upon the temperature (in Jeppson *et al.*, 1975).

Distribution : INDIA : Himachal Pradesh, West Bengal, Punjab, Delhi ; outside India : Hawaii, U. S. A., Venezuela, Argentina, Canada, France, Spain, Cyprus, Israel, Iran, Egypt, Canada, Pakistan, South Africa, Sri Lanka, Australia, Japan.

95. *Brevipalpus phoenicis* (Geij.)

Tenuipalpus phoenicis Geij., 1939, *Meded Landb. Hoogesch. Wageningen*, 42 : 230.

Brevipalpus phoenicis, Das, 1961, *Two & Bud*, 8 : 3-4.

Diagnosis : Scarlet mite, hysterosoma with 5 dorsolateral. Tarsus II with 2 sensory rods. Hysterosomal pores present. Dorsocentral area of propodosoma covered with a scallop pattern and the dorso-central area of the hysterosoma with irregular striae.

Hosts : *Abutilon* sp., *Artocarpus heterophyllus*, *Cucurbita* sp., *Acalypha hispida*, *Alpinia* sp., *Althea rosea*, *Anona squamosa*, *Aralia* sp., *Artocarpus altilis*, *Barleria cristata*, *B. cuspidata*, *B. biternata*, *Cassia spectabilis*, *Cestrum diurnum*, *Cerebera odollam*, *Citrus aurantium*, *Pheseolus vulgaris*, *Citrus decumna*, *C. medica*, *Clerodendron* sp., *Cocos nucifera*, *Coffea arabica*, *Cosmos* sp., *Crescentia cujeta*, *Dahlia* sp., *Eranthemum* sp., *Geranium* sp., *Gerbera* sp., *Helianthus annuus*, *Hibiscus rosa-sinensis*, *Nerium odorum*, *Nyctanthes arbortristis*, *Plumeria alba*, *Plumeria* sp., *Psidium guajava*, *Rosa* sp., *Sida* sp., *Solanum melongena*, *Theobroma cacao*, *Thunbergia alata*, *Vitex negundo*, *Thea sinensis*, *Punica granatum*, *Bignonia venusta*, grape vines, *Oroxylum indicum*, *Punica granatum*, *Zinia* sp., *Sesamum indicum* (Nagesha Chandra & Channa Basavanna, 1976). *Eryobotrya japonica*, *Musa paradisica*, *Ficus carica*, *Prunus persica*, *Morus* sp. Pritchard & Baker (1958) and Meyer (1979) recorded some other hosts from other parts of the world.

Nature of damage : This is an important pest of a number of fruit trees, ornamental plants, tea, etc. In India, a large population of this mite is seen on the under-surface of leaves specially along the midrib and when the infestation is severe those may occur on the fruits as well. The infested leaves turn pale yellow and at the later stages those turn into brownish patches. Such leaves drop off prematurely. Brownish patches also appear on infested fruits and in some cases those split. In sesamum, due to infestation of this mite, the leaves become twisted and become longitudinally folded. Raised gall like swellings also appear on leaves (Gupta, 1974). Unlike *B. californicus*, it is not

known to cause leprosis of citrus though the saliva injected by this mite causes severe injury to citrus.

Bionomics : Nothing has been done in this regard in India. Jeppson *et al.* (1975) pointed out that its biology is very similar to that of *B. obovatus* and *B. californicus*. It occurs in the field throughout the year on one or the other host. Banerjee (1976) studied the development of this mite on coffee and tea in Africa. Navarajan *et al.* (1976) studied the relative susceptibility of this mite on different varieties of guava.

Control : Mukherjea (1968) reported that carbophenothion was as effective as ethion, binapacryl and dicofol.

Distribution : INDIA : Assam, Bihar, Himachal Pradesh, Karnataka, Maharashtra, Meghalaya, Punjab, Delhi, Orissa, Tamil Nadu ; outside India : Hawaii, Columbia, California, Texas, Florida, Trinidad, Argentina, Brazil, Venezuela, Holland, Spain, Portugal, Syria, Sicily, Italy, Kenya, Tanganyika, Ethiopia, Mauritius, Malay, Taiwan, Okinawa Isl., Philippines, Australia.

96. *Brevipalpus karachiensis* Chaudhri, Akbar & Rasool

Brevipalpus karachiensis Chaudhri *et al.*, 1974, pp. 43-44.

Brevipalpus karachiensis, Sadana & Chhabra, 1980, *Sci. & Cult.*, 46 : 369-370.

Diagnosis : Rostral shield with narrow deep notch, 1 median and 3 lateral lobes on each side ; propodosoma with reticulations medio-laterally, dim reticulations in the middle. Hysterosoma with longitudinal irregular striations, lateral striations divided marginally. Dorsal setae on femora I and II longer than width of segment. Ventral propodosoma with striations along the margin, transverse broken striations between apodemes of coxae II.

Hosts : *Solanum melongena*, *Raphanus sativus*, *Mentha* sp., *Ficus religiosa*, *Calotropis procera*, *Bauhinia variegata*, *Lagestroemia indica*, *Anthocephalus cadamba*, *Zinia* sp., *Callistemon lanceolatus* ; outside India : *Convolvulus*, *Kickxia ramosissima*, *Periploca aphylla*, *Verbena bonariensis*, *Ocimum basilicum*, *Tagetes tenuifolia* (Chaudhri *et al.*, 1974).

Nature of damage : It is of no known economic importance.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Remarks : Since it is not of any economic importance, no work has been done on bionomics and control of this mite.

97. *Brevipalpus rugulosus* Chaudhri, Akbar & Rasool

Brevipalpus rugulosus Chaudhri, Akbar & Rasool, 1974, pp. 45-48.

Brevipalpus rugulosus, Sadana & Chhabra, 1980, *Sci. & Cult.*, 46 : 369-370.

Diagnosis : Female rostrum reaching upto middle of femur I. Palptarsus with 1 sensory rod and 2 setae ; Rostral shield with deep, narrow notch having longitudinal broken striations ; tarsus II with 2 sensory rods. Propodosoma with mediolateral reticulations. Dorsal setae on femur II and I equal to the width of the segment ; reticulation absent on midportion of propodosoma, absence of transverse broken striations between apodemes of coxae II.

Hosts : *Luffa aegyptica*, *Canna indica*, *Zinia* sp., *Cannabis sativa*, *Polyalthia longifolia*, *Tabernaemontana divaricata*, *Tagetes erecta*, *Acacia arabica*, *Solidago canadensis*, *Solanum nigrum*, *Campsis grandiflora*, *Acalypha wilkesmina*, *Colocasia* sp., *Citrus lemon*, *Cosmos* sp., *Rosa indica*, *Plumeria acutifolia*, *Ricinus communis*, *Valaris solanacea*, *Datura alba*.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Remarks : No information on bionomics and control is available.

98. *Brevipalpus pulchur* (C. & F.)

Caligonus pulchur Canestrini & Fanzago, 1876, *Atti Acc. Sci. ven. trent. -istr.*, 5 : 134.

Cenopalpus pulchur, Pritchard & Baker, 1958, *Univ. Calif. Pub. Ent.*, 14(3) : 194.

Cenopalpus pulchur, Menon *et. al.*, 1971, *Indian J. Ent.*, 33 : 469-470.

Diagnosis : Propodosoma with large polygonal reticulations dorsally ; gnathosoma not reaching end of femur I. Hysterosoma with 6 pairs of dorsolateral setae. Dorsal body setae tapering and setiform.

Hosts : *Pyrus malus*, *Helicteres isora*, *Butea monosperma* ; outside India : *Malax*, *Salix*, *Juglans*, *Prunus*, *Pyrus*, *Eriobotrya* (Pritchard & Baker, 1958).

Nature of damage : In India, it is not known to cause any damage to its hosts but in other parts of the world (European countries) it is a cosmopolitan pest of neglected orchard.

Distribution : INDIA : Delhi ; outside India : England, Denmark, Holland, Portugal, Austria, Bulgaria, Libya, Iran, Syria, Germany, Italy, Sicily, Cyprus, Lebanon, Algeria, Egypt, Israel, Turkey, Afghanistan, Georgian S.S.R., Crimea, Transcaucasia, Soviet Central, Ankara.

Remarks : Information on bionomics and control of this mite from India is not available.

Genus *Dolichotetranychus* Sayed
(Fig. 206)

Dolichotetranychus Sayed, 1938, *Bull. Mus. natn. hist. nat. Paris*, (2) 10(6) : 606.

99. *Dolichotetranychus floridamus* (Banks)

Stigmaeus floridanus Banks, 1900, *U. S. Dept. Agr., Div. Ent. Tech. Ser.*, 8 : 77.

Dolichotetranychus floridanus, Sayed, 1938, *Bull. Mus. natn. hist. Nat. Paris*, (2) 10(6) : 606.

Dolichotetranychus floridanus, Siddappaji & Reddy, 1971, *3rd. Int. Symp. Trop. Sub. Trop. Hort., Bangalore*, p. 74.

Diagnosis : It is bright red, slender mite, hysterosoma with 2 pairs of dorsocentrals, one pair of dorsosublateral and 5 pairs of dorsolaterals ; short dorsal setae present on femur II. Striation on the genital plate of female smooth and without lobes.

Hosts : Cardamom ; outside India : *Annaas* (Pritchard & Baker, 1958).

Nature of damage : In India, this mite is not known to cause any significant damage to its host. However, elsewhere, it is known to feed on the tender white tissues at the base of pineapple plants. Bud rots start at the points of injuries because of the growth of the fungi and bacteria.

Distribution : INDIA : Karnataka ; outside India : Florida, Cuba, Puerto Rico, Panama, Honduras, Mexico, Central America, Hawaii, Africa, Egypt, Philippines, Japan, Okinawa Isl., Java.

Genus *Larvacarus* Baker & Pritchard
(Fig. 207)

Larvacarus Baker & Pritchard, 1952, *Proc. Ent. Soc. Wash.*, 24 : 108.

100. *Larvacarus transtitans* (Ewing)

Phytoptipalpus transtitanus Ewing, 1922, *Proc. Ent. Soc. Wash.*, 24 : 108.

Phytoptipalpus transtitans, Hirst, 1926, *Proc. Zool. Soc. Lond.*, 825-841.

Larvacarus transtitans, Baker & Pritchard, 1952, *Proc. Ent. Soc. Wash.*, 54 : 132.

Diagnosis : Adults with 3 pairs of legs. Pedipalp rudimentary.

Host ; *Zizyphus jujuba*.

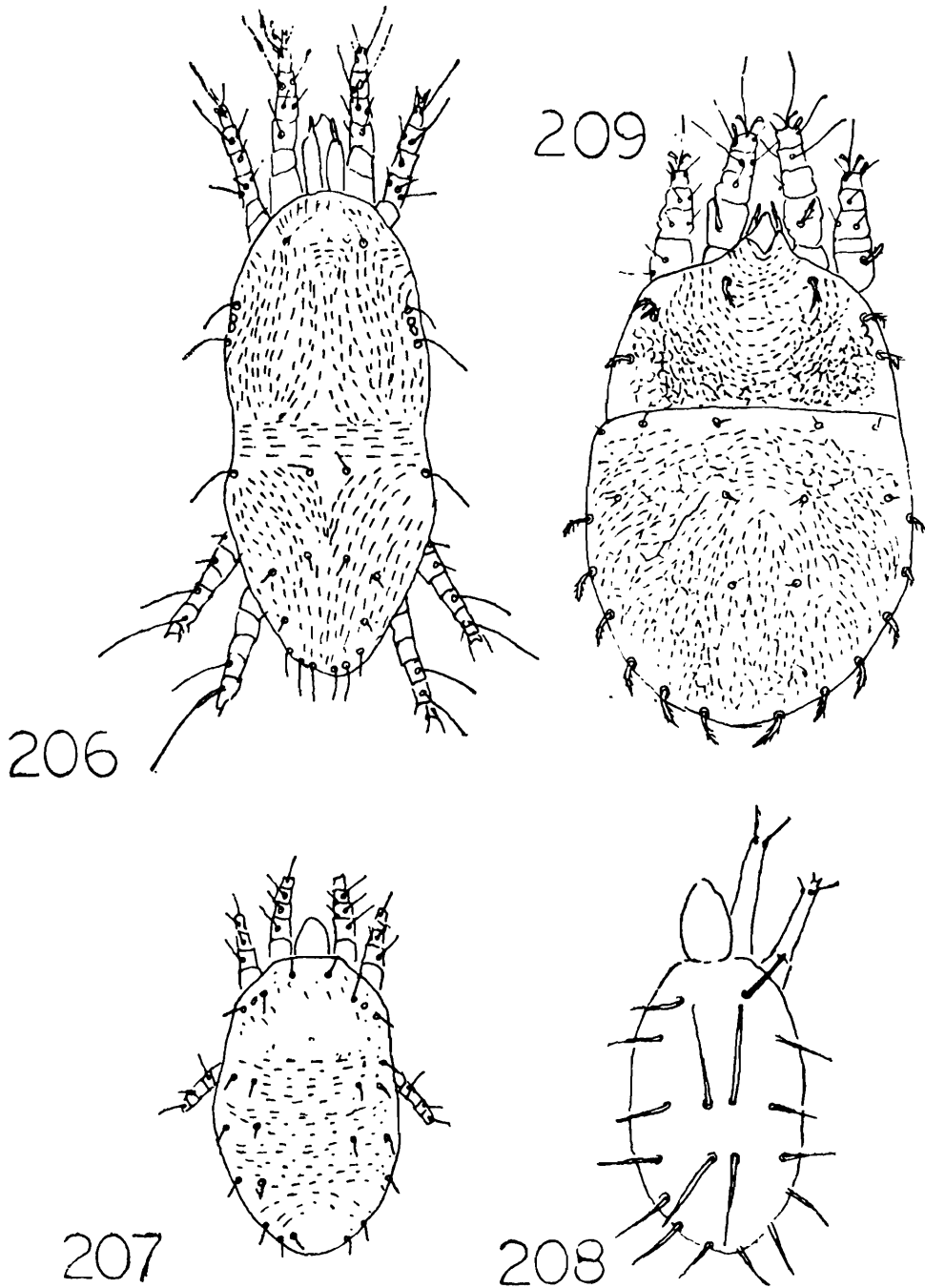
Nature of damage : It occurs inside the galls. However, it is not known how far it is responsible to produce the galls.

Distribution : INDIA : Bihar.

Remarks : No information is available on bionomics of this species.

Genus *Obuloides* Baker & Tuttle

(Fig. 208)

Obuloides Baker & Tuttle, 1975, *U. S. Dep. agric. Coop. Econ. Inst. Rept.*, 25(22) : 453.101. *Obuloides rajamohani* Baker & Tuttle*Obuloides rajamohani* Baker & Tuttle, 1975, *U. S. Dep. agric. Coop. Econ. Ins. Rept.*, 25(22) : 453-454.Fig. 206 : *Dolichotetranychus* sp.Fig. 207 : *Larvacarus* sp.Fig. 208 : *Obuloides* sp.Fig. 209 : *Pentamerismus* sp.

Diagnosis : Pelpi completely reduced, consisting of a slight indentation on each side of the rostrum, each bearing a solenidion and a seta. Dorsal body setae long, strong and serrate except for anterior pair of minute propodosomal setae. Hysterosomals with 5 pairs of dorsolaterals ; dorsal striae on hysterosoma with strong lobes. Tarsi I and II each with a long rod like seta.

Host : *Hibiscus* sp.

Distribution : INDIA : Tamil Nadu.

Remarks : This mite has no known economic importance.

Genus *Pentamerismus* McGregor
(Fig. 209)

Pentamerismus McGregor, 1949, *Mem. S. Calif. Acad. Sci.*, 3(2) : 23.

102. *Pentamerismus oregonensis* McGregor

Pentamerismus oregonensis McGregor, 1949, *Mem. S. Calif. Acad. Sci.*, 3(2) : 27.

Pentamerismus oregonensis, Nagesha Chandra & ChannaBasavanna, *IV. Int. Congr. Acar.*, Austria.

Diagnosis : Hysterosoma with 6 dorsolaterals, all narrowly lanceolate and serrate ; 2 dorsosublateral hysterosomal setae present.

Hosts : *Cupressus funebris*, *Cupressus* sp., *Juniperus* sp.

Distribution : INDIA : Karnataka ; outside India : Japan, U. S. A.

Remarks : The economic importance of this species is unknown.

Genus *Phytoptipalpus* Trägårdh
(Fig. 210)

Poytoptipalpus Trägårdh, 1904, *Acariden aus Egypten und dem Sudan. I. Results of the Sweedish Zoological Expedition to Egypt and the White Nile, 1901*, 20 : 9.

103. *Phytoptipalpus albizziae* Pritchard & Baker

Phytoptipalpus albizziae Pritchard & Baker, 1958, *Univ. Calif. Pub. Ent.*, 14(3) : 189-190.

Diagnosis : Females with 3 pairs of legs, males with 4 pairs of legs. Idiosoma with dorsal setae setiform, minutely serrate ; 5 pairs of dorsolateral hysterosomals, dorsal integument closely striate, mostly transverse.

Host : *Albizzia procera*.

Distribution : INDIA : Assam.

Remarks : No economic importance of this species is known.

Genus **Raoiella** Hirst

(Fig. 211)

Raoiella Hirst, 1924, *Ann. Mag. Nat. Hist.*, (9)14 (83) : 522.

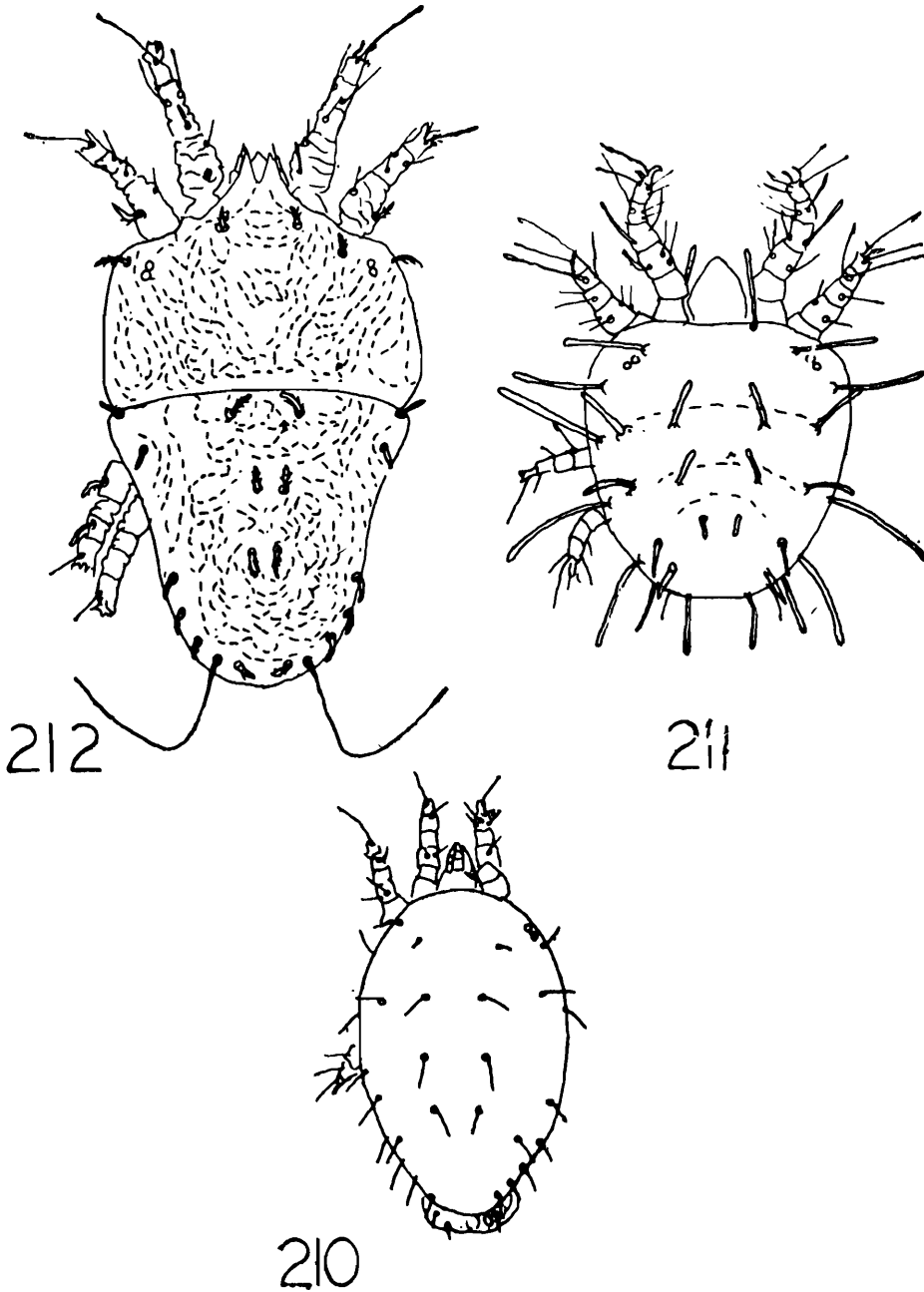


Fig. 210 : *Phytoptipalpus* sp.

Fig. 211 : *Raoiella* sp.

Fig. 212 : *Tenuipalpus* sp.

Key to the Species of Raoiella

1. Fourth dorsosublateral hysterosomal much longer than first three	...	...	<i>macfarlanei</i>
— Fourth dorsosublateral hysterosomal shorter than first	...	...	<i>indica</i>

104. *Raoiella indica* Hirst

Raoiella indica Hirst, 1924, *Ann. Mag. Nat. Hist.*, (9) 14 : 522.

Diagnosis : Reddish mite. Idiosoma with dorsum smooth. Hysterosoma with first pair of dorsocentral longer than others ; 4th pair of dorsocentral setae shorter than others. All dorsal body setae slightly clubbed and serrate.

Hosts : Coconut, arecanut, *Phoenix*, cotton.

Nature of damage : It is an important pest of coconut and arecanut in India. The infestations occur on the under-surface of leaves in both young and adult plants. The infestation results in the appearance of reddish spots on the leaves. The colonies remain covered with thin silken webs.

Bionomics : Nothing in this regard is known from India. However, information, as available from abroad, indicates that the average duration of different life stages are : egg—6.5 days, larva—9.5 days, protonymph—6.5 days, deutonymph—10.5 days. Average time required to complete the life cycle was 33 days. Females lay in average 2 eggs/day (Jeppson *et al.*, 1975). In Mauritius, this mite is abundant during September-March except during rainy season in November-January.

Control : Thiometon, rogor and parathion are quite effective against adults while dicofol is quite effective against eggs (Kanta *et al.*, 1963a). Parathion and malathion (0.03%) are also known to register 80% mortality (Ponnuwami, 1967).

Natural enemies : Puttarudriah & ChannaBasavanna (1956) reported *Stethorus tetranychii* Kapur, *S. parcepunctatus* Kapur and *Jauravia* sp., feeding on this mite. *Amblyseius* (*Typhlodromips*) *tetranychivorus* (Gupta) has also been seen to feed upon this mite (Jagadish & Nagesha Chandra, 1979).

Distribution : INDIA : Karnataka, Tamil Nadu, Punjab ; outside India : Mauritius.

105. *Raoiella macfarlanei* Pritchard & Baker

Raoiella macfarlanei Pritchard & Baker, 1958, *Univ. Calif. Pub. Ent.*, 14(3) : 257.

Raoiella macfarlanei, Nagesha Chandra & ChannaBasavanna, 1974, IV Int. Congr. Acar., Austria.

Diagnosis : Dorsum of idiosoma smooth. Fourth dorsosublateral hysterosomal very long and longer than first three dorsosublateral. Hysterosoma with dorsocentrals clavate about as long as longitudinal intervals between them.

Hosts : *Jambosa vulgaris*, golden dew drops, mango ; outside India : olive.

Distribution : INDIA : Karnataka, Kerala, Gujarat ; outside India : Rasel Hila, Cyrenaica.

Remarks : No economic importance of this species is known.

Genus *Tenuipalpus* Donnadieu

(Figs. 205, 212)

Tenuipalpus Donnadieu, 1875, *Recherches pour servir a l'histoire des Tetranyques*, pp. 139-145.

Key to the Species of Tenuipalpus

1. Hysterosoma without a flagellate dorso-lateral seta. ...	...	<i>quadrisetosus</i>
— Hysterosoma with a flagellate dorsolateral seta. ...	...	2
2. Hysterosoma with 3 pairs of nonflagellate caudal seta. ...	...	3
— Hysterosoma with 4 pairs of nonflagellate caudal seta. ...	...	6
3. One pair of posterior medioventral seta. ...	...	4
— Three to four pairs of posterior medio-ventral seta. ...	...	<i>crassus</i>
4. Third pair of dorsocentral hysterosomal widened. ...	...	<i>tetrazygae</i>
— Third pair of dorsocentral hysterosomal not widened. ...	...	5
5. Dorsolateral hysterosomal very long. ...	...	<i>lalbaghensis</i>
— Dorsolateral hysterosomals much shorter. ...	...	<i>punjabensis</i>
6. Hysterosoma with a differentiated expansion anterior to coxae III. ...	...	7

— Hysterosoma without a differentiated expansion anterior to coxae III.	...	...	8
7. Anterior expansion of hysterosoma broad and subquadrangulate.	...	...	<i>micheli</i>
— Anterior expansion of hysterosoma conical.	...	...	<i>hastaligni</i>
8. Gnathosoma without a ventral seta.	...	...	9
— Gnathosoma with 1 or 2 pairs of ventral setae.	...	...	11
9. Dorsum with a few thin reticulations.	...	...	<i>aboharensis</i>
— Dorsum with strong reticulations or striations.	...	...	10
— Dorsum without reticulations.	...	...	<i>yousefi</i>
10. Dorsum with strong reticulations.	...	...	<i>punicue</i>
— Dorsum with thick reticulations but middle of propodosoma with thin reticulations.	...	...	<i>caudatus</i>
11. Dorsocentral setae 1 pair.	...	...	<i>granati</i>
— Dorsocentral setae 3 pairs.	...	...	12
12. Gnathosoma with 1 pair of ventral setae.	...	...	17
— Gnathosoma with 2 pairs of ventral setae.	...	...	13
13. All setae on dorsum laminate except penultimate one.	...	...	<i>laminasetae</i>
— All setae on dorsum laminate and serrate except penultimate one.	...	...	14
14. Rostrum reaching more than half of femur I.	...	...	<i>ghail</i>
— Rostrum reaching basal 1/3 portion of femur I.	...	...	15
15. Hysterosoma with reticulate pattern in middle and elongated wavy lines on sides.	...	...	<i>tectonae</i>
— Hysterosoma not like above.	...	...	16
16. Propodosoma with wavy cross line in middle and clear areas on sides.	...	...	<i>malligat</i>
— Propodosoma with clear areas in middle and wavy lines on either sides.	...	...	<i>coimbatorensis</i>
17. Anterior medioventral metapodosomal setae 2 pairs.	...	...	18
— Anterior medioventral metapodosomal setae 1 pair.	...	...	19
18. Setae on femora IV 4-4-2-1.	...	...	<i>pernicis</i>
— Setae on femora IV 5-5-2-2.	...	...	<i>ciissampelosa</i>
19. Posterior medioventral metapodosomal seta 1 pair ; dorsum with transverse striations.	...	...	<i>mustus</i>

—	Posterior medioventral metapodosomal seta 2 pairs ; dorsum with or without polygonal reticulations.	...	...	20
20.	Dorsum with polygonal reticulations.	...	...	21
—	Dorsum without polygonal reticulations.	...	...	24
21.	Second dorsolateral hysterosomal pair reaching upto the base of 3rd dorsolateral pair.	...	...	<i>dimensus</i>
—	Second dorsolateral hysterosomal pair not reaching upto the base of 3rd dorsolateral pair.	...	...	22
22.	Rostral shield reaching upto the anterior end of trochanter I.	...	...	<i>pyrusae</i>
—	Rostral shield reaching upto the middle of femur I.	...	...	23
23.	Setae on trochanter I-IV 1-1-2-1, on tibia 5-5-3-3 ;	...	...	<i>ludhianaensis</i>
—	Setae on trochanter I-IV 1-1-2-2 ; on tibia 4-4-3-3.	...	...	<i>pruni</i>
24.	Dorsal body setae lanceolate.	...	...	25
—	Dorsal body setae not lanceolate,	...	...	26
25.	Dorsum with broad ridges and furrows.	...	...	<i>ixorae</i>
—	Dorsum with simple but prominent ridges...	...	...	<i>fici</i>
26.	Second palpal segment as long as broad	...	...	27
—	Second palpal segment considerably longer than broad	...	...	28
27.	Rostral shield extending beyond the middle of femur I	...	...	<i>faresianus</i>
—	Rostral shield extending slightly above the anterior end of trochanter	...	...	<i>acacii</i>
28.	Second palpal segment with false segments ; propodosoma with semicircular linings in the middle	...	...	<i>indicus</i>
—	Second palpal segment with false segmenta- tions ; propodosoma with irregular pattern of transverse and longitudinal reticulations	...	...	<i>amygdalusae</i>

106. *Tenuipalpus aboharensis* Sadana & Chhabra

Tenuipalpus aboharensis Sadana & Chhabra, 1980, *Entomon*, 5(2) : 151-152.

Diagnosis : Hysterosoma with flagellate dorsolateral setae, 4 pairs of nonflagellate caudal setae without a differentiated expansion anterior

to coxae III. Gnathosoma with a ventral seta. Dorsum with a few thin reticulations. Propodosomal setae 3 pairs, I and II minute, III lanceolate. Lateral setae 6 pairs, II and III shorter than the distance between II and III and III and IV, respectively, IV longer than distance between IV and V. Ventral propodosomal portion without striations. Ventral and genital plates without striations.

Host : *Punica granatum*.

Distribution : INDIA : Punjab.

Remarks : No economic importance of this species is known.

107. *Tenuipalpus acacii* Maninder & Ghai

Tenuipalpus acacii Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 245.

Diagnosis : Rostral shield bifurcate and remaining below the middle of femur I ; hysterosoma with transverse broken lines in medio-posterior portion and longitudinal line laterally all along its length ; hysterosoma with 6 pairs of dorsolaterals and 3 pairs of dorsocentrals, all setae on dorsum serrate.

Host : *Acacia arabica*.

Distribution : INDIA : Delhi.

Remarks : This species is not known to have any economic importance.

108. *Tenuipalpus amygdalusae* Maninder & Ghai

Tenuipalpus amygdalusae Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 245.

Diagnosis : Propodosoma with irregular pattern of longitudinal and transverse ornamentation ; hysterosoma with similar type of ornamentation as in propodosoma ; 6 pairs of dorsolaterals and 3 pairs of dorsocentral hysterosomals present. All setae on dorsum narrowly lanceolate, serrate.

Host : *Amygdalus communis*.

Distribution : INDIA : Maharashtra.

Remarks : No economic importance of this mite is known.

109. *Tenuipalpus crassus* André

Tenuipalpus orchidarum crassum André, 1953, *Bull. Mus. Hist. Nat. Paris, Sér. 2*, 25(5) : 466.

Tenuipalpus crassus, Nagesha Chandra & ChannaBasavanna, 1974, *IV Int. Congr. Acar.*, Austria.

Diagnosis : Hysterosoma with 3 pairs of non-flagellate setae caudally. Podosoma with 3 or 4 pairs of posterior medioventrals.

Host : *Garcinia* sp.

Distribution : INDIA : Karnataka ; outside India : California, Oregon.

110. *Tenuipalpus cissampelosa* Maninder & Ghai

Tenuipalpus cissampelosa Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 249-251.

Diagnosis : Propodosoma having irregular, broken, longitudinal and transverse striae ; hysterosoma with longitudinal striations medially in metapodosomal region. Six pairs of dorsolaterals and 3 pairs of dorsocentrals ; all setae on dorsum slightly lanceolate and serrate.

Host : *Cissampelosa parvira*.

Distribution : INDIA : Delhi.

Remarks : It is not known to have any economic importance.

111. *Tenuipalpus dimensus* Chaudhri

Tenuipalpus dimensus Chaudhri, 1971, *Pakistan J. Zool.*, 3(2) : 205-207.

Tenuipalpus dimensus, Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 251.

Diagnosis : Propodosoma with reticulations thick walled, polygonal cells having membranous integument covering majority of propodosoma ; thick transverse striations laterally ; hysterosoma reticulate with thick walled polygonal cells in the middle whereas they become elongated marginally and caudally. A few striations present laterally ; 6 pairs of dorsolateral hysterosomals and 3 pairs of dorsocentral hysterosomals present.

Hosts : *Pyrus malus*, *P. persica*.

Distribution : INDIA : Delhi ; outside India : Pakistan.

112. *Tenuipalpus faresianus* Maninder & Ghai

Tenuipalpus faresianus Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 251-253.

Diagnosis : Propodosoma with transverse broken striations in posteromedian and anteromedian regions and longitudinal broken

striations on the outer portion. Hysterosoma with prominent longitudinal, broken striations in the anteromedian and all along its lateral sides ; transverse broken striations at posteromedian region. Six pairs of dorsolateral hysterosomals and 3 pairs of dorsocentral hysterosomals present.

Host : *Acacia farnesiana*.

Distribution : INDIA : Delhi.

Remarks : This mite is not known to cause any damage to its host. No work has been done on its bionomics.

113. *Tenuipalpus fici* Maninder & Ghai

Tenuipalpus fici Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 253.

Diagnosis : Propodosoma with some prominent broken lateral lines, a few transverse lines towards anterior end ; hysterosoma with some prominent lateral longitudinal lines along its length. Six pairs of dorsolateral hysterosomals and 3 pairs of dorsocentrals present, all setae on dorsum broadly lanceolate and serrate.

Host : *Ficus carica*.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

114. *Tenuipalpus granati* Sayed

Tenuipalpus orchidarum Sayed, 1942, *Bull. Soc. Fouad 1er Ent.*, 26 : 96.

Tenuipalpus granati Sayed, 1946, *Ibid.*, 30 : 100.

Tenuipalpus granati, Menon, Ghai & Katiyar, 1971, *Indian J. Ent.*, 33 : 469-470.

Diagnosis : Dorsal body striations consist of a few longitudinal markings. Propodosoma with 2 pairs of posterior medioventrals ; hysterosoma with 1 pair of dorsocentrals.

Hosts : Pomegranate, *Plumbago zeylanica* ; outside India : *Vitis*, *Punica*.

Distribution : INDIA : Delhi ; outside India : Egypt, Greece, Georgian S. S. R.

Remarks : It has been recorded casually without doing any damage to its host.

115. *Tenuipalpus hastaligni* DeLeon

Tenuipalpus hastaligni DeLeon, 1956, *Florida Ent.*, 39(2) : 57.

Tenuipalpus hastaligni, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 200.

Diagnosis : Hysterosoma with dorsocentrals minute and setiform. Opisthosoma with medioventral and genital setae nude ; hysterosoma with differentiated expansion anterior to coxae III ; anterior expansion of hysterosoma conical ; hysterosoma with II dorsolateral longer than distance between II and III dorsolaterals ; III dorsal propodosomals very attenuate and about 1/2 as long as distance between its base and posterior margin of propodosoma.

Host : Undet. plant.

Distribution : INDIA : Andaman Nicobar Isl. ; outside India : Florida.

Remarks : This mite is of no known economic importance.

116. *Tenuipalpus indicus* Maninder & Ghai

Tenuipalpus indicus Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 253-254.

Diagnosis : Propodosoma with transverse, broken striations giving semicirculate appearance at anteromedian end, longitudinal broken striations laterally below eyes ; hysterosoma with transverse dorso-median and lateral longitudinal broken lines, all setae on dorsum serrate ; 3 pairs of medio-ventrals.

Host : *Acacia farnesiana*.

Distribution : INDIA : Haryana.

Remarks : It has not been reported to cause any damage to its host.

117. *Tenuipalpus ixorae* Maninder & Ghai

Tenuipalpus ixorae Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 254-255.

Diagnosis : Propodosoma with transverse ridges and furrows at anterior and posteromedian position and longitudinal ridges and furrows on rest of regions. Hysterosoma with prominent ridges and furrows. All setae on dorsum broadly lanceolate and serrate ; 3 pairs of medioventrals.

Host : *Ixora parviflora*.

Distribution : INDIA : U. P.

Remarks : So far this mite is not known to have any economic importance.

118. *Tenuipalpas lalbaghensis* ChannaBasavanna & Lakkundi

Tenuipalpus lalbaghensis ChannaBasavanna & Lakkundi, 1977, *Indian J. Acar.*, 1 : 19-22.

Diagnosis : Hysterosoma with 1 pair of flagellate and 3 pairs of non-flagellate dorsolateral setae ; single pair of posterior medioventral setae ; 3 pairs of tuberculate and serrate dorsocentral hysterosomals, gradually reducing in length from first to third.

Host : *Artocarpus integrifolia*.

Nature of damage : The feeding induces yellowing of leaves.

Bionomics : The population is fairly high during October (Channa-Basavanna & Lakkundi, 1977).

Distribution : INDIA : Karnataka.

119. *Tenuipalpus caudatus* (Dugés)

Tenuipalpus caudatus Dugés, 1834, *Ann. Sci. Nat. Paris*, (2) 1 : 29.

Tenuipalpus caudatus, Sadana & Chhabra, 1980, *Sci. & Cult.*, 46 : 369-370.

Diagnosis : In female, hysterosoma with penultimate dorsolateral seta flagellate, hysterosoma with 4 pairs of non-flagellate setae caudally ; propodosoma with 1 pair of anterior medioventral and 1 pair of posterior medioventrals ; dorsocentral hysterosomals well developed except 3rd pair which is minute.

Hosts : *Acacia arabica* ; outside India : *Viburnum* sp.

Distribution : INDIA : Punjab ; outside India : Europe.

Remarks : No economic importance of this species is known.

120. *Tenuipalpus ludhianaensis* Sadana & Chhabra

Tenuipalpus ludhianaensis Sadana & Chhabra, 1980, *Entomon*, 5 : 152-153.

Diagnosis : Hysterosoma with flagellate dorsolateral setae and 4 pairs of nonflagellate caudal setae ; gnathosoma with a pair of ventral setae. Dorsocentral hysterosomals 3 pairs, anterior medioventral metapodosomal setae 1 pair ; posterior medioventral metapodosomal setae 2 pairs. Dorsum with polygonal reticulations. Second dorso-lateral hysterosomal pair not reaching upto the base of 3rd dorsocentral

pair. Rostral shield reaching upto middle of femur I. Setae on trochanters I-IV 1-1-2-1. ; on tibia 5-5-3-3.

Hosts : *Pyrus communis*, *Melia azedarach*.

Distribution : INDIA : Punjab.

Remarks : Economic importance of this species is not known.

121. *Tenuipalpus mustus* Chaudhri

Tenuipalpus mustus Chaudhri, 1972, *S. U. Res. J. (Sci. Ser.)*, 9 : 17-21.

Tenuipalpus mustus, Sadana & Chhabra, 1980, *Entomon*, 5 : 153.

Diagnosis : Hysterosoma with flagellate dorsolateral seta and 4 pairs of nonflagellate caudal setae ; hysterosoma without differentiated expansion anterior to coxae III. Gnathosoma with a pair of ventral setae. Dorsocentral hysterosomal setae 3 pairs, anterior medioventral metapodosomal setae 1 pair. Posterior medioventral metapodosomal setae 1 pair. Dorsum with transverse striations.

Hosts : *Xanthium* sp., *Tagetes erecta*, *Melia azedarach*.

Distribution : INDIA : Punjab ; outside India : Pakistan.

122. *Tenuipalpus micheli* Lawrence

Tenuipalpus micheli Lawrence, 1940, *J. Ent. Soc. S. Afr.*, 3 : 111.

Tenuipalpus micheli, Nagesha Chandra & ChannaBasavanna, 1974, *IV Int. Congr. Acar.*, Austria.

Diagnosis : Hysterosoma with penultimate dorsolateral setae flagellate, and with 4 pairs of nonflagellate setae caudally ; propodosoma with 1 pair of anterior medioventrals and 1 pair of posterior medioventrals. Hysterosoma with dorsocentrals minute and setiform ; opisthosoma with medioventral and genital setae nude ; hysterosoma with a differentiated expansion anterior to coxae III.

Hosts : *Syzygium* sp. ; outside India : *Chaetacme* sp.

Distribution : INDIA : Karnataka, Andaman Isl. ; outside India : Natal.

Remarks : It is of no economic importance.

123. *Tenuipalpus pernicious* Chaudhri, Akbar & Rasool

Tenuipalpus pernicious Chaudhri *et al.*, 1974, p. 85.

Tenuipalpus pernicious, Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 255.

Diagnosis : Three pairs of dorsocentral setae ; posterior medioventral metapodosomal setae 1 pair ; 2 pairs of anterior medioventral

metapodosomal setae ; dorsal setae setiform, serrate ; rostral shield with lobes on each sides ; lateral setae VI broadly lanceolate.

Hosts : *Trianthema microphila*, *Calotropis procera*.

Distribution : INDIA : Delhi ; outside India : Pakistan.

Remarks : No economic importance of this species has been reported and no work has been done on its bionomics.

124. *Tenuipalpus pruni* Maninder & Ghai

Tenuipalpus pruni Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 255-257.

Diagnosis : Hysterosoma with 4 pairs of nonflagellate caudal setae ; gnathosoma with a pair of ventral setae ; 3 pairs of dorsocentral hysterosomal setae ; anterior medioventral metapodosomal setae 1 pair. Dorsum with polygonal reticulations, II dorsolateral hysterosomals not reaching upto base of III dorsolateral pair. Rostral shield reaching upto middle of femur I.

Host : *Prunus persica*.

Distribution : INDIA : Himachal Pradesh.

Remarks : This species has so far no known economic importance.

125. *Tenuipalpus punicae* Pritchard & Baker

Tenuipalpus punicae Pritchard & Baker, 1958, *Univ. Calif. Pub. Ent.*, 14(3) : 240-242.

Tenuipalpus punicae, Dhooria & Sandhu, 1973, *Curr. Sci.*, 42 : 179-180.

Diagnosis : Hysterosoma with the penultimate dorsolateral seta flagellate and 4 pairs of nonflagellate setae caudally. Propodosoma with 1 pair of posterior medioventrals and 1 pair of anterior medioventrals. Hysterosoma with dorsocentrals minute and setiform ; opisthothorax with medioventral and genital setae nude ; hysterosoma without a differentiated expansion anterior to coxae III ; propodosoma rugose mediodorsally. Genu II and I each with a seta on outer face.

Hosts : *Punica granatum*, *Psidium guajava*, *Prunus* sp. *Tecoma stans*.

Nature of damage : This mite occurs on the under-surface of leaves as well as on twigs. The small colonies are usually seen near the midrib. The feeding on the leaves causes the appearance of brownish patches. Such leaves ultimately fall off.

Bionomics & Control : No information in these regards are available.

Distribution : INDIA : Punjab, Meghalaya, Delhi ; outside India : Spain, Palestine.

126. *Tenuipalpus pyrusae* Maninder & Ghai

Tenuipalpus pyrusae Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 257-258.

Diagnosis : Hysterosoma with 4 pairs of nonflagellate setae caudally, gnathosoma with a pair of ventral setae, 3 pairs of dorsocentral hysterosomals setae, anterior medioventral metapodosomal setae 1 pair. Dorsum with polygonal reticulations. Second dorsolateral hysterosomal pair not reaching upto the base of 3rd dorsolateral pair. Rostral shield reaching upto anterior end of trochanter I.

Hosts : *Pyrus malus*, *Pyrus communis*.

Distribution : INDIA : Delhi.

Remarks : This mite is of no known economic importance.

127. *Tenuipalpus quadrisetosus* Lawrence

Tenuipalpus quadrisetosus Lawrence, 1940, *J. Ent. Soc. S. Afr.*, 3 : 114.

Tenuipalpus quadrisetosus, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 200.

Diagnosis : Hysterosoma without a flagellate dorsolateral seta. Dorsocentral hysterosomals well developed.

Host : Undet. plant.

Distribution : INDIA : Andaman Isl. ; outside India : Africa.

Remarks : No economic importance of this species is known.

128. *Tenuipalpus tetrazygae* DeLeon

Tenuipalpus tetrazygae DeLeon, 1956, *Florida Ent.*, 39 (2) : 55.

Tenuipalpus tetrazygae, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 201.

Diagnosis : Hysterosoma with penultimate dorsolateral seta flagellate and with 4 pairs of nonflagellate caudal setae. Podosoma with 1 pair of anterior medioventrals and 1 pair of posterior medioventrals. Hysterosoma with dorsocentrals well developed, narrowly lanceolate and third pair being widened.

Hosts : Undet. plant ; outside India ; *Tetrazygia*.

Distribution : INDIA : Andaman Isl. ; outside India : Florida.

Remarks : This mite causes no damage to its host. No work has been done on its bionomics.

129. *Tenuipalpus coimbatorensis* Mohansundaram

Tenuipalpus coimbatorensis Mohansundaram, 1981, *Oriental Ins.*, **15** : 401.

Diagnosis : Rostrum reaching upto half the length of femur I. Palpus 3 segmented. Propodosoma with a few wavy lines on either side with a clear area in the middle ; 3 pairs of dorsal propodosomal setae. Hysterosoma with longitudinal lines and a few cross lines with 3 pairs of dorsocentrals, 1 pair of humeral, 6 pairs of dorsolaterals, penultimate setae flagellate, all setae on dorsum lanceolate and serrate. Venter with a pair of medioventral propodosomals ; 2 pairs of anterior medioventral propodosomals, a pair of pregenitals on ventral plate, 1 pair of genitals and 2 pairs of anal setae.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

130. *Tenuipalpus ghaii* Mohansundaram

Tenuipalpus ghaii Mohansundaram, 1981, *Oriental Ins.*, **15** : 403-406.

Diagnosis : Rostrum reaching upto more than 1/2 the length of femur I. Palpus 3 segmented. Rostral shield bifurcate reaching upto basal 0.3 of femur I. Propodosoma with a reticulate pattern in the middle and diagonal lines in posterior corners. Hysterosoma with 3 pairs of dorsocentral hysterosomals, 1 pair of humerals ; 6 pairs of dorsolaterals, penultimate setae flagellate, all setae lanceolate and serrate.

Host : Undet. plant.

Distribution : Tamil Nadu.

Remarks : No economic importance of this species is known.

131. *Tenuipalpus laminasetae* Mohansundaram

Tenuipalpus laminasetae Mohansundaram, 1981, *Oriental Ins.*, **15** : 401-403.

Diagnosis : Rostrum reaching more than 1/2 the length of femur I. Palpus 3 segmented. Rostral shield bifurcate reaching more than 1/2 the length of femur I, with 3 pairs of dorsal propodosomal setae, laminate with spine like protuberances. Hysterosoma with wavy lines forming a characteristic pattern of cross lines, 3 pairs of dorsocentral, 1 pair of humerals, 6 pairs of dorsolaterals, all laminate with spines except

the penultimate dorsolaterals. Venter with a pair of medioventral propodosomals, a pair of anterior medioventral metapodosomals, a pair of posterior medioventral metapodosomals.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

132. *Tenuipalpus malligai* Mohansundaram

Tenuipalpus malligai Mohansundaram, 1981, *Oriental Ins.*, 15 : 399.

Diagnosis : Rostrum reaching upto half the length of femur I. Palpus 3 segmented. Rostral shield bifurcate reaching upto the basal portion of femur I. Propodosoma with wavy cross lines in the middle. Hysterosoma with 3 pairs of dorsocentrals, 1 pair of humerals, 6 pairs of dorsolaterals ; penultimate setae flagellate, all setae on dorsum lanceolate and serrate. Venter with a pair of medioventral propodosomals, a pair of anterior medioventral metapodosomals, a pair of paragenital setae, genitoventral plate with transverse striae.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

133. *Tenuipalpus punjabensis* (Maninder & Ghai)

Colopalpus punjabensis Maninder & Ghai, 1978, *Oriental Ins.*, 12 : 111-113.

Diagnosis : Propodosoma with transverse ornamentation medially and longitudinal laterally. Hysterosoma with transverse and longitudinal ornamentations ; 5 pairs of dorsolaterals, of these, penultimate pair flagellate, all setae on dorsum lanceolate and serrate, rostral shield with lateral angular extension.

Host : *Nerium indicum*.

Distribution : INDIA : Punjab.

Remarks : No economic importance of this species is known.

134. *Tenuipalpus tectonae* Mohansundaram

Tenuipalpus tectonae Mohansundaram, 1981, *Oriental Ins.*, 15 : 397-399.

Diagnosis : Reddish mite ; rostrum reaching upto basal 0.3 length of femur I, palpus 3 segmented. Rostral shield bifurcate reaching just

below the basal 0.3 length of femur I. Hysterosoma with reticulate pattern in middle and elongated wavy lines on sides, 3 pairs of dorso-centrals, 1 pair of humerals, 6 pairs of dorsolaterals ; penultimate setae flagellate and coarse, all setae on dorsum lanceolate and serrate. Venter with 2 pairs of medioventral propodosomals, a pair of anterior medioventral metapodosomals, 2 pairs of posterior medioventral metapodosomals between coxae IV, a pair of pregenital setae on ventral plate. Genitoventral plate with transverse striae.

Host : *Tectona grandis*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

135. *Tenuipalpus yousefi* Nassar & Ghai

Tenuipalpus yousefi Nassar & Ghai, 1981, *Oriental Ins.*, 15 : 384-385.

Diagnosis : . Rostral shield notched reaching beyond the base of trochanter I, propodosoma with transverse thick line, striations on the middle, longitudinal, broken striation laterally below eyes ; hysterosoma with transverse striations dorsomedian and longitudinal broken lines laterally. Dorsal body setae minute and setiform. Propodosoma with 3 pairs of setae ; hysterosoma with 1 pair of humerals and 5 pairs of dorsolateral setae. Gnathosoma with 1 pair of minute setae. Venter provided with a pair of short anterior medioventral metapodosomals, a pair of posterior medioventral metapodosomals, in addition, 1 pair of ventral, 2 pairs of genitals and 2 pairs of anal setae present.

Host : *Psidium guajava*.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

Genus *Terminalichus* Anwarullah & Khan

Terminalichus Anwarullah & Khan, 1973, *Prot. Acta Biol. (Ser. B.)*, 12(1-4) : 5.

Key to the Species of Terminalichus

1. Anterior pair of dorsocentral setae present....	...	<i>panajiensis</i>
— Dorsocentral setae absent.		2
2. Hysterosoma with prominent furrow.		3
— Hysterosoma without furrow.		<i>karachiensis</i>

3. Second pair of prodoposomal setae more than 3 times as long as third pair of propodosomal setae. ... *serratus*
- Second pair of propodosomal setae less than 2 times as long as third pair of propodosomal setae. ... *delhiensis*

136. *Terminalichus delhiensis* Maninder & Ghai

Terminalichus delhiensis Maninder & Ghai, 1978, *Indian J. Ent.*, 40 : 218.

Diagnosis : Rostrum long, reaching to the distal end of femur I, palpus 3 segmented, basal segment very small, second longest with a serrate seta, third short. Rostral shield bifurcate not reaching middle of femur I, propodosoma with few longitudinal broken lines and 3 pairs of setae. Hysterosoma with irregular lateral furrow all along its length, a pair of humerals and 4 pairs of dorsolaterals, dorsocentrals absent. Venter with a pair of medioventral propodosomals, a pair of anterior medioventral metapodosomals ; 2 pairs of genitals and 2 pairs of anal setae present.

Host : *Terminalia arjuna*.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

137. *Terminalichus karachiensis* Anwarullah & Khan

Terminalichus karachiensis Anwarullah & Khan, 1973, *Prot. Acta. Biol. (Ser. B.)*, 12 (1-4) : 5.

Terminalichus karachiensis, Maninder & Ghai, 1978, *Indian J. Ent.*, 40 : 219.

Hosts : *Terminalia arjuna*, *Psidium guajava* ; outside India : *Terminalia catappa*.

Remarks : No economic importance of this species is known.

Distribution : INDIA : Delhi ; outside India : Pakistan.

138. *Terminalichus panajiensis* Maninder & Ghai

Terminalichus panajiensis Maninder & Ghai, 1978, *Indian J. Ent.*, 40 : 217.

Diagnosis : Rostrum long reaching to the distal end of femur I, palpus 3 segmented, basal segment very small, second longest with a serrate seta anteriorly and the third short nearly 1/3 of second with a spine like terminal seta. Rostral shield bifurcate reaching to the middle

of femur I. Propodopsoma with broken longitudinal lines, 3 pairs of dorsal setae. Hysterosoma with irregular lateral furrow along its length, a pair of humeral, 4 pairs of dorsolaterals, one pair of dorsocentrals ; a pair of dorsal scale-like markings at posteromedian position. Venter with a pair of medioventral propodosomal, a pair of anteromedioventral metapodosomal, a pair of posteromedioventral metapodosomal ; 2 pairs of genitals and 2 pairs of anal setae.

Host : *Terminalia* sp.

Distribution : INDIA : Goa.

Remarks : No economic importance of this species is known.

139. *Terminalichus serratus* Nassar & Ghai

Terminalichus serratus Nassar & Ghai, 1981, *Oriental Ins.*, 15 : 380-381.

Diagnosis : Rostrum reaching to the distal end of femur I, rostral shield bifurcate, not reaching upto middle of femur I. Propodosoma without any striae, while hysterosoma with a regular lateral furrow. Dorsal setae slender strongly serrate ; propodosoma with 3 pairs of setae ; second about 2 times the length of first pair and 3 times as long as 3rd. Hysterosoma with 1 pair of humerals, 4 pairs of dorsolaterals and no dorsocentrals. Palpus 3 segmented. Venter with a few broken transverse striae at the position of anterior medioventral setae. Ventrogenital plate extending behind the posterior margin of coxae IV.

Host : *Psidium guajava*.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

Sup. family : ERIOPHYOIDEA NALEPA

History : Murray (1877) erected the family Phytoptidae based on the genus *Phytoptus* Dujardin (1851). Nalepa (1898) adopted the name Eriophyidae based on *Eriophyes* Siebold (1850). The important contributions in this family came from Nalepa (1891, 1918), Keifer (1938-1966), Jeppson *et al.* (1975), etc. The other taxonomic literatures have been excellently reviewed by ChannaBasavanna (1966) and the interested workers may refer to the same for further information.

Diagnosis : Minute, elongate, worm like mites, having only 2 pairs of legs in immature and adults, placed near the anterior end. Body divided into short cephalothorax, covered over dorsally and on the

sides by the cephalothorasic shield and a longer tapering abdomen with annulation which may or may not show dorsoventral differentiation. Rostrum anteriorly projecting or downcurved with needle like or lancet like chelicerae. Genital opening transverse. Body setation is reduced to minimum.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Body is differentiated into cephalothorax and abdomen.

Cephalothorax : It consists of rostrum and 2 pairs of legs. It is covered over dorsally and laterally by a shield (Figs. 213, 214) and the structure and nature of shield design are of taxonomic importance. In a typical case, the shield bears a median longitudinal line (Fig. 217) dividing the shield into right and left halves, two admedian lines, one on either side of the median line and one or more submedian lines on each side. These lines may be complete extending from anterior to rear margin of shield or may be incomplete. The lines may be simple, sinuate, branched and so on. In addition, there may be lines on the side of the shield. The shield bears 2-4 tubercles each with a seta, in some they may be absent. The number of setiferous tubercles serves as important taxonomic character. The rostrum is characteristic and beak like and it also forms an important character. Chelicerae needle like (Figs. 213, 214), straight or evenly curved. The first segment of palpi fused to form pharyngeal pump. The pump is held by two arms called 'Pump braces' and from the upper anterior end of pump arises a curved stylet called 'Oral stylet' which extends anteriorly. The chelicerale stylets lie within a membranous structure called 'Chelicerale sheath'. On the upper anterior edge of the proximal segment, there are two significant pairs of structures, a spine on each side curving centrally over the chelicerae, termed together 'Chelicerale retainer' and just below and outside each is a basal seta. Legs 6-segmented (Fig 221). Coxal surface may be smooth or ornamented with lines, stripes and granules and all these along with leg chaetotaxy serve as important taxonomic characters. Tarsus is provided with 2 subdorsal setae towards the proximal end called 'Claw' and 'Feather claw' and whether the latter is divided or simple is of generic importance and the number of rays on feather claw helps in species diagnosis.

Abdomen : It is elongate (Figs. 213, 214), tapering caudally, showing series of annulations, which may form complete ring or may be distinguished into tergites and sternites. The annular rings are

ornamented with tubercles, microtubercles, and this character is of specific importance. Abdominal setae exhibit a typical number and arrangement which consists of a pair of lateral, 3 pairs of ventral setae, a pair of long caudal setae, a pair of accessory setae and in some cases a pair of subdorsal setae. The relative length of setae have importance in recognition of species while the number of abdominal setae has generic significance.

Genitals : The female genital opening is transverse, located anteriorly and is covered with genital flap (Figs. 216, 222), which may bear externally longitudinal or crescentic ribs (Fig. 222) or stripes or granular or smooth. The coverflap design helps in generic diagnosis. Internally, there is a structure where the spermatheca appears to be attached and is called 'Internal genitalia' (Fig. 216) or 'Internal apodeme.' The length of stem and general shape are of generic significance. A pair of genital setae is present on posterior lateral border of genitalia. Their length is also of much importance.

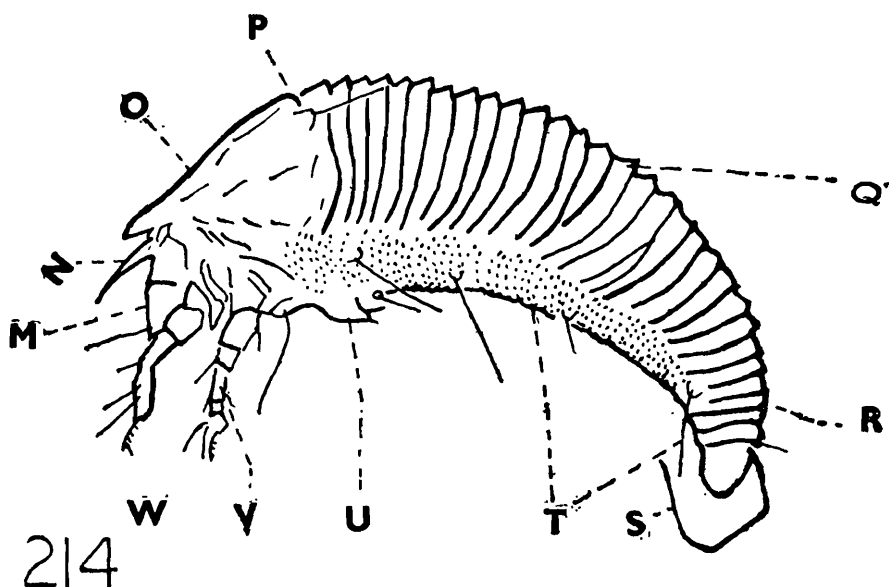
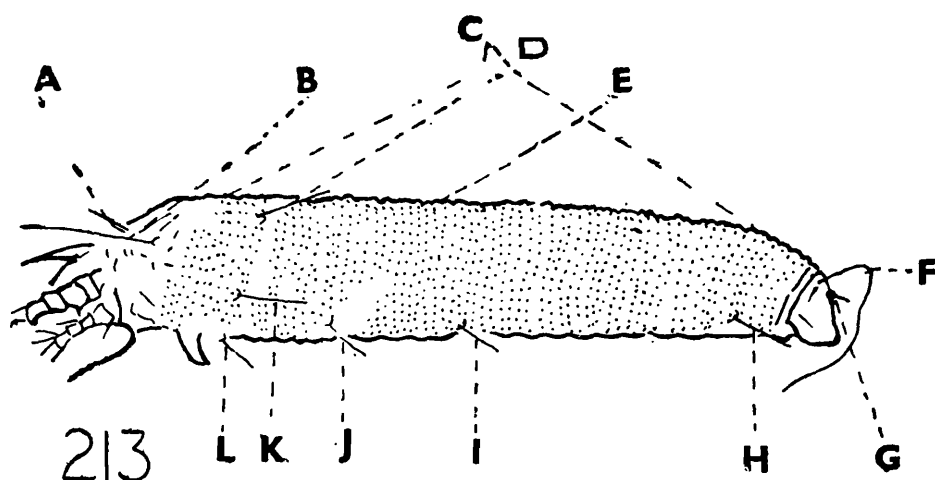
Key to the Families of Eriophyoidea (modified from Jeppson *et al.*, 1975)

1. Gnathosoma with 3 or 4 shield setae or rarely with dorsal seta pair minute or absent, all feather claws simple, female genital coverflap not ribbed ; no erineum is formed, may be vagrants	...	... Fam. NALEPELLIDAE
— Gnathosoma with 2 rear (dorsal) setae or none, feather claw simple or divided, female genital coverflap with ribs or smooth ; may cause erineum or vagrants	...	2
2. Rostrum of various sizes usually small in comparison to body size ; feather claw small, simple or divided. Female genital coverflap usually ribbed ; mostly gall makers or rust mites, cause considerable damage	...	... Fam. ERIOPHYIDAE
— Rostrum large in comparison to body ; feather claw often large, simple or deeply divided ; female genital coverflap smooth, less often ribbed ; mostly vagrants, rarely cause much damage to plants.	...	Fam. RHYNOPHYTOPTIDAE

Family NALEPELLIDAE Newkirk & Keifer

Nalepellidae Newkirk & Keifer, 1971, *Eriophyid Studies.*, U. S. Dep. Agr., C-5 : 4.

Diagnosis : Cephalothoracic shield with 3-4 shield setae, or rarely with dorsal pair seta minute or absent. Rostrum may be large or

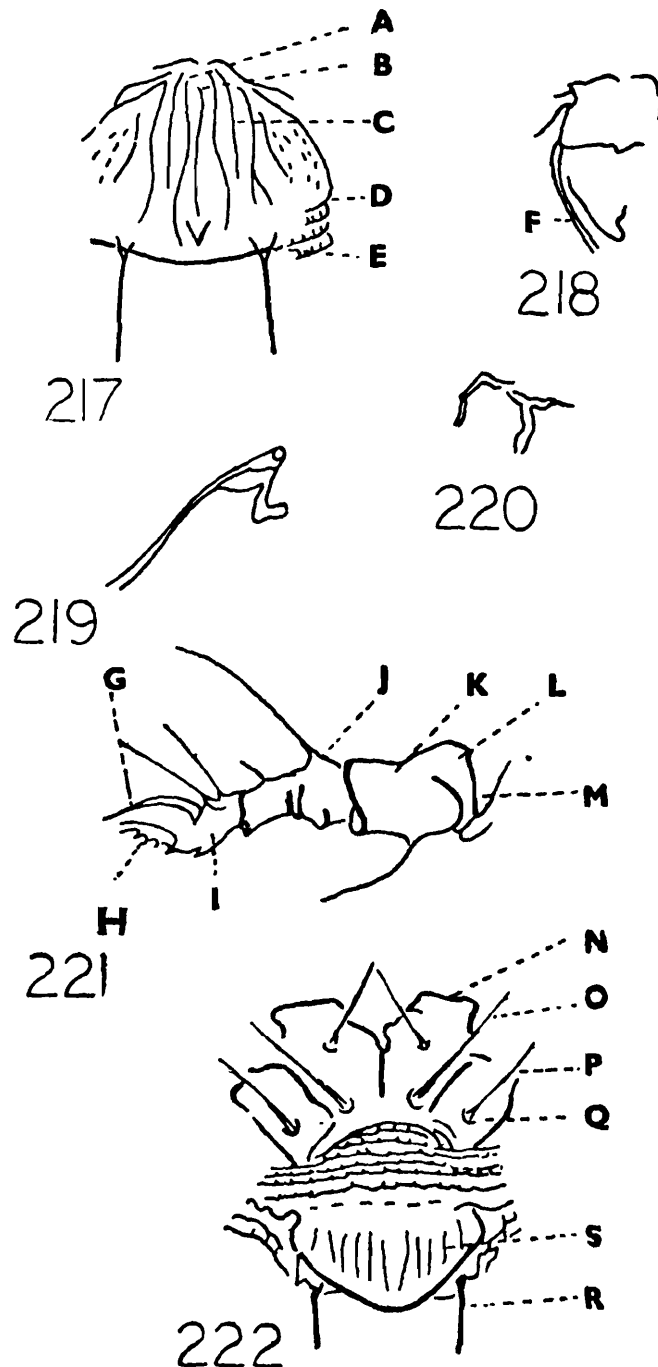


Figs. 213-214 : Diagram of Eriophyidae showing parts of taxonomic importance. A—Frontal shield, B—Dorsal seta, C—Thanosome, D—Subdorsal seta, E—Rings, F—Caudal seta, G—Accessory seta, H—3rd. Ventral seta, I—Second ventral seta, J—1st. ventral seta, K—Lateral seta, L—Genital seta, M—Rostrum, N—Chelicera, O—Shield, P—Dorsal tubercle, Q—Tergite, R—Telosoma, S—Telosomal seta, T—Sternites, U—Female genital coverflap, V—Tibia. W—Feather claw.

Fig. 215 : Crescentic scoring in eriophyid mite.

Fig. 216 : Internal female genital organ.

downcurved containing short form oral stylet. Legs with standard setae, often foretibial spur present. All feather claw simple. Abdomen with all standard setae. Female genital coverflap not known to be ribbed. Spermathecal tubes extending diagonally ahead from central rear attachment.



Figs. 217-222 : Different parts of Eriophyidae of taxonomic importance :
 A. Admedian line, B. Median line, C. Submedian line, D. Shield,
 E. Dorsal tubercle, F. Auxiliary stylet, G. Claw, H. Feather
 claw, I. Tarsus, J. Patella, K. Femur, L. Trochanter, M. Coxa,
 N. Precoxa, O. Seta II, P. Seta III, Q. Hind coxa, R. Female
 genital coverflap, S. Longitudinal scorings.

*Key to the Subfamilies of NALEPELLIDAE (modified from
JEPPSON et al., 1975)*

1. One central anterior shield seta ; dorsal pair present or absent ; internal spermathecal tubes 3-5 times longer than spermatheca ; bodies either worm-like and with subdorsal thanosomal seta present or lacking these, and usually more robust. ...	...	Subfam. NALEPELLINAE
— Four shield setae, rear pair rarely minute, spermathecal tubes short. ...	...	2
2. Body worm-like, with abdominal rings, subequal dorsoventrally, rear pair of shield setae pointing up, if short, ahead, if long ; subdorsal abdominal seta pair present. ...	...	Subfam. PHYTOCOPTELLINAE
— Body more fusiform and often flattened, abdominal rings with lateral tergal-sternal differentiation ; subdorsal anterior thanosomal seta pair present or absent. ...	...	Subfam. SIERRAPHYTOPTINAE

Subfamily NALEPELLINAE Roivanien

Nalepellinae Roivanien, 1953, *Ann. Ent. Fennica*, 19(2) : 86.

Genus **Neophantacrus** Mohansundaram
(Figs. 223-225)

Neophantacrus Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 89.

140. **Neophantacrus mallotus** Mohansundaram

Neophantacrus mallotus Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 91.

Diagnosis : Shield triangular, dorsal tubercles at rear shield margin. Shield with faint markings, median line represented at rear end ; admedians converging anteriorly ; submedians joined with admedians at the posterior 1/3 and extending forward, rest of the shield area clear. Abdomen with 28 tergites, anterior 3 tergites normal, followed by 7 upward projecting lobes intervened with one or two rings. Sternites 70, fine elongate, microtuberculate. Female genital coverflap with 10-12 faint longitudinal lines.

Host : *Mallotus philippinensis*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

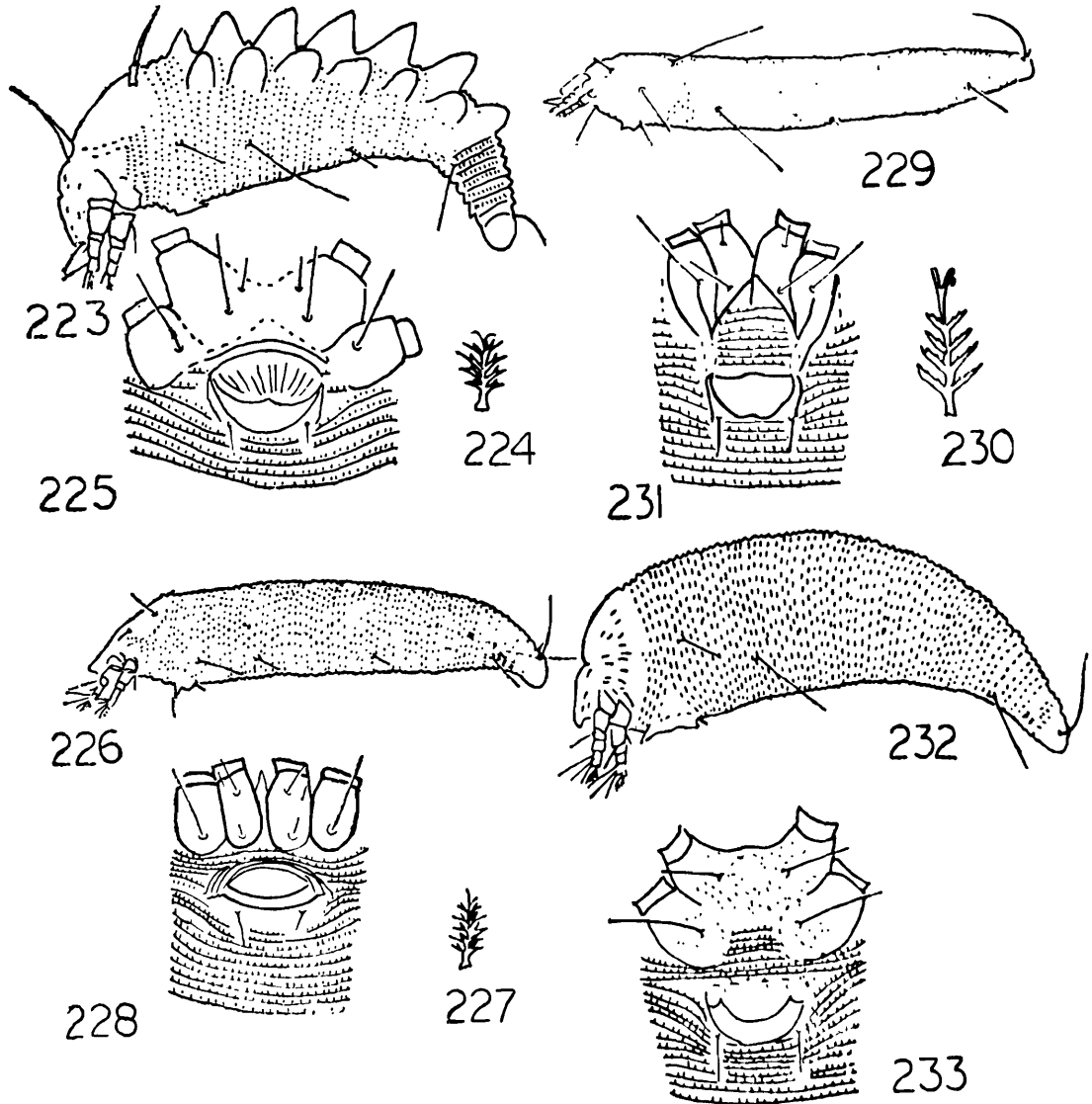
Subfamily SIERRAPHYTOPTINAE Keifer

Sierraphytoptinae Keifer, 1944, *Bull. Calif. Dep. Agr.*, 33(1) : 18.Genus *Mackiella* Keifer

(Figs. 226-228)

Mackiella Keifer, 1939, *Bull. Calif. Dep. Agr.*, 28 : 147.141. *Mackiella borasis* Mohansundaram*Mackiella borasis* Mohansundaram, 1981, *Bull. Ent.*, 22 : 12-14.

Diagnosis : Rostrum uniformly curved forward ; dorsal setae pointing upward and forward ; frontal setae pair present at the anterior

Figs. 223-225 : *Neophantacrus* sp.Figs. 226-228 : *Mackiella* sp.Figs. 229-231 : *Anchiphytoptus* sp.Figs. 232-233 : *Anthopoda* sp.

shield margin. Shield area clear except for the short incomplete admedians and one pair of submedians. Feather claw 5-6 rayed. Abdomen with about 65 rings uniformly microtuberculate. Female genital coverflap without lines.

Host : *Borassus flabellifer*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

Subfamily PHYTOCOPTELLINAE Newkirk & Keifer

Phytocoptellinae Newkirk & Keifer, 1971, *Eriophyid Studies U. S. Dep. Agr. C-5* : 5.

Genus *Anchiphytoptus* Keifer (Figs. 229-231)

Anchiphytoptus Keifer, 1952, *Bull. Calif. Dep. Agr.*, 41 : 31.

142. *Anchiphytoptus giganticus* Mohansundaram

Anchiphytoptus giganticus Mohansundaram, 1981, *Bull. Ent.*, 22 : 11-12.

Diagnosis. It measures 500 microns. Rostrum long, evenly projecting forward and downward. Shield area clear except for the faint representations of the median, admedians and one submedian in rear part of the shield. Dorsal seta pointing upward, dorsal tubercle just away from shield margin. Feather claw 5 rayed. Abdomen with about 88 rings, uniformly microtuberculate, microtubercles elongated.

Host : *Cyperus rotundus*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

Family ERIOPHYIDAE Nalepa

Eriophyidae Nalepa, 1898, *Das Tierreich*, 4 : 5.

Key to the subfamilies of Eriophyidae (after Jeppson *et al.*, 1975)

1. Tibiae reduced or completely fused with tarsi ; foretibiae never with seta.	...	...	2
— Tibiae always amply distinct from tarsi ; foretibial seta nearly always present except in a few genera.	...	...	3

2. Spatulate or shovel shaped projections present on either rostral termen or on tarsi ; legs when without spatulate appendages very stout, segments shortened or combined ; feather claws large. ... **ABEROPTINAE**
- Lacking spatulate projections for burrowing ; legs of average thickness ; forecoxae fused across centre line with sternal line faint or absent ; first setiferous coxal tubercle usually absent ; feather claws relatively small. ... **NOTHOPODINAE**
3. Genitalia, specially female genitalia noticably projecting from thanosomal venter, appressed to coxae, usually separating coxae more than normal ; anterior female internal apodeme bent up and appearing shortened ; usually present as heavy transverse line in ventral view ; ribs of female coverflap typically in two uneven ranks ; forecoxae usually connete at center line ; sternal line shortened ; coxae, specially forecoxae with curving lines outlining produced coxal setiferous tubercles. This is well distributed group that moved independently into various habitats on plants. This group included rust mites, bud mites, erineum mites and gall mites. ... **CECIDOPHYINAE**
- Genitalia lying more on level on thanosome venter, not appressed to coxae and coxae not usually spread apart ; sternal line most often of moderate length ; internal anterior female apodeme extending moderate distance forward ; coxae often ornamented with granules but curved lines when present, weak. Female genital coverflap variably embellished, ribs less often in two ranks ; dorsal setae rarely absent from shield. ... **4**
4. Body worm like, thanosomal ring subequal dorsoventrally, at least on anterior 1/2 or 2/3 ; shield typically lacking anterior lobe or with slight projection over rostrum bases, if anterior shield projection present over rostrum, then this extension narrow, basally flexible and combined with narrow thanosomal rings. ... **ERIOPHYINAE**
- Body fusiform and fitted for exterior living ; shield usually broad-based and rigid anterior lobe over rostrum ; thanosome typically divided laterally into broad and heavy dorsal tergites and narrow and soft sternites ; if no

anterior lobe present or only a slight one, then some form of tergal-sternal differentiation discernible, at least in larger dorsal microtubercles ; if no dorsoventral contrast present, then broad shield lobe present. ...

... PHYLLOCOPTINAE

Subfamily NOTHOPODINAE Keifer

Nothopodinae Keifer, 1956, *Bull. Calif. Dep. Agr.*, 44 : 163.

Key to the Genera of NOTHOPODINAE (modified from Jeppson *et al.*, 1975)

1. Blunt seta present near the claw of all legs. ...	...	<i>Neocosella</i>
— Blunt seta absent. ...	...	2
2. First setiferous coxal tubercle and seta present ; forecoxae weakly divided ; dorsal shield tubercles ahead of rear shield margin and directing setae up and centrad ; foretibiae completely fused with tarsi. ...	...	3
— First setiferous coxal tubercle and seta missing, forecoxae either separate or fused along mid-line. ...	...	4
3. Dorsal shield tubercle near the rear margin, tibial segment clear, tarsal seta absent ; abdomen with broader smooth tergites and narrower 3 times numerous microtuberculate sternites. ...		<i>Neocolopodacus</i>
— Not with above combination of characters. ...		<i>Colopodacus</i>
4. Dorsal tubercle and setae absent from shield, foretibiae distinct but short and without seta. ...		<i>Anthopoda</i>
— Dorsal setae present ; foretibiae either fused with tarsi or but slightly distinct. ...	...	5
5. No separate projection over rostrum base, dorsal tubercle set somewhat near shield margin, but either tubercle axes longitudinal to body or setae projecting up, foretibiae fused, forecoxae fused along mid-line. ...	...	<i>Nothopoda</i>
— Dorsal shield with short projection over rostrum. ...	...	6
6. Dorsal tubercles on rear shield margin, slightly produced, projecting setae divergently to rear ; forecoxae fused across along center line, foretibiae fused with tarsi. ...	...	<i>Floracarus</i>
— Dorsal tubercle ahead of rear shield margin, usually projecting dorsal setae up, anterior		

shield lobe short but with broad base and with transverse furrows, foretibiae slightly discernible on leg underside	...	...	7
7. Forecoxae separated by short or moderately long sternal line	...	...	<i>Disella</i>
— Forecoxae united with each other and more or less united with subdorsal plate, coxal surface granular or with minute spinules	...	...	<i>Cosella</i>

Genus Anthopoda Keifer
(Figs. 232-233)

Anthopoda Keifer, 1959, *Ann. Ent. Soc. Amer.*, 52 : 655.

Key to the Species of Anthopoda

1. Feather claw 4 rayed	...	...	2
— Feather claw 5 rayed.	...	...	<i>wightianae</i>
2. Genital coverflap with basal granulation and distally with crescentic scorings	...	...	<i>fici</i>
— Genital coverflap with basal granulation only.	...	...	<i>deviarensis</i>

143. *Anthopoda fici* Mohansundaram

Anthopoda fici Mohansundaram, 1982: *Oriental Ins.*, 16(4) : 419-421.

Diagnosis : Shield with clear pattern of lines. Median nearly complete except for the anterior tip, admedian complete with cross lines joining with medians at 3 points ; submedian forming network of cells on either sides, sides of shield with scorings. Dorsal tubercles and setae absent. Feather claw 4 rayed. Abdomen with about 68-70 rings, uniformly microtuberculate, microtubercles elongated dorsally and dot like ventrally. Female genital coverflap with basal granulations and distally with crescentic scorings.

Host : *Ficus* sp.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

144. *Anthopoda deviarensis* Mohansundaram

Anthopoda deviarensis Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 152-153.

Diagnosis : Shield with a clear pattern of lines, median represented in the rear half of the shield, forked anteriorly and joining the

admedians, admedians nearly complete, forked anteriorly with a cross line on the rear half joining with the median. Feather claw 4 rayed. Abdomen with about 64 rings with elongate microtubercles. Genital coverflap with basal granulations.

Host : Undet. plant..

Distribution : INDIA : Tamil Nadu.

145. *Anthopoda wightianae* Mohansundaram

Anthopoda wightianae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 154.

Diagnosis : Shield with clear pattern of lines ; median nearly complete, admedians wavy, with cross lines connecting with the median near the rear end, submedian wavy with forkings. Feather claw 5 rayed. Abdomen with 70 rings with elongated microtubercles. Genital coverflap with basal granulations and without lines.

Host : *Litsea wightiana*.

Distribution : INDIA : Tamil Nadu.

Genus *Colopodacus* Keifer (Figs. 234-235)

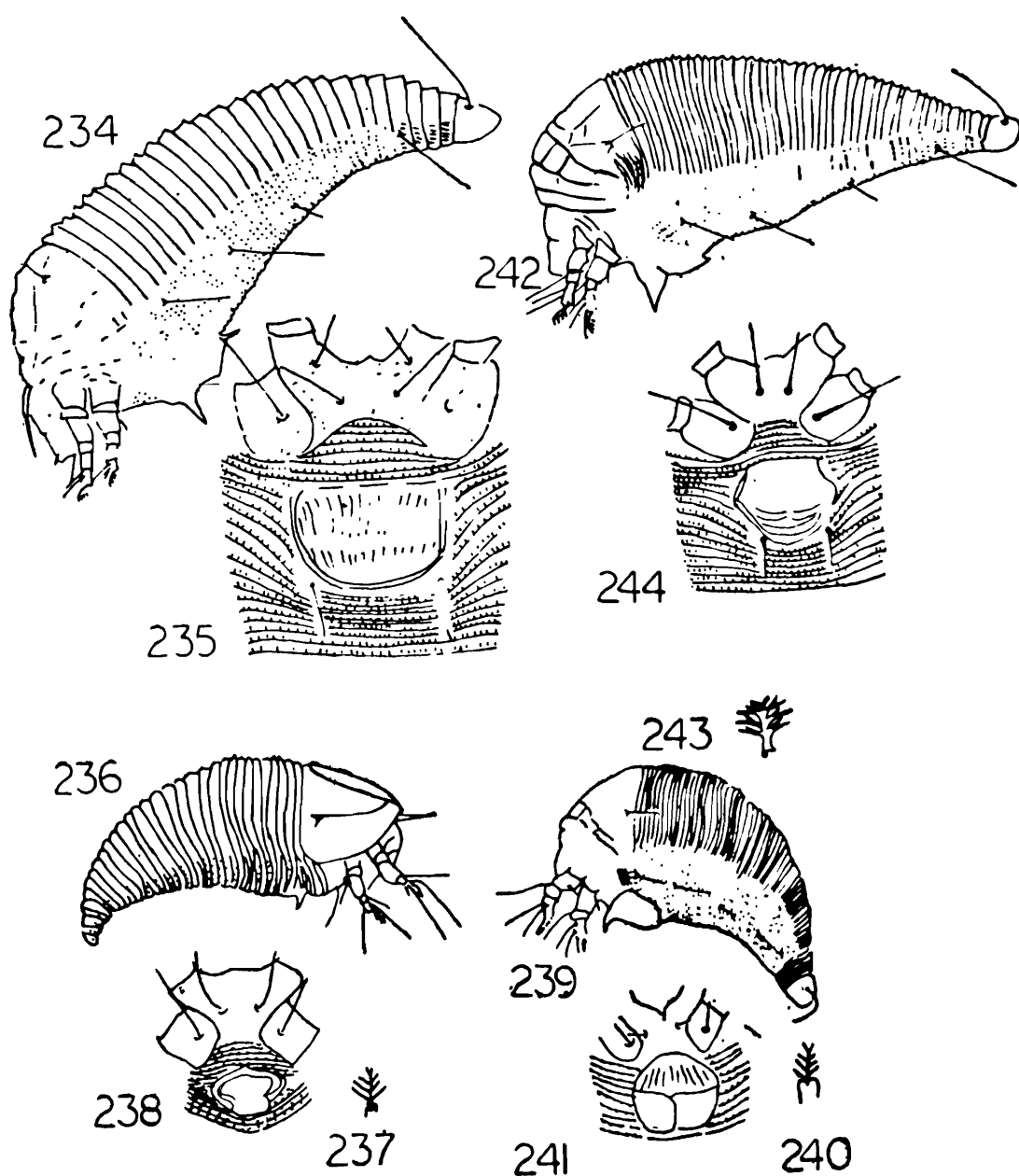
Colopodacus Keifer, 1960, *Eriophyid Studies*, Calif. Dep. Agr., B-1 : 16.

Key to the Species of *Colopodacus*

1. Feather claw 4 rayed.	...	...	2
— Feather claw more than 4 rayed.	...	...	4
2. Genital coverflap smooth	...	...	<i>combretus</i>
— Genital coverflap with lines or granular.	...	...	3
3. Genital coverflap with numerous lines in two rows.	...	...	<i>cinnamomae</i>
— Genital coverflap with basal half granular and distal half clear.	...	...	<i>walayarensis</i>
4. Feather claw 5 rayed.	...	...	5
— Feather claw 6 rayed.	...	...	<i>eugeniae</i>
5. Female genitalia enlarged, coverflap finely granular	...	...	<i>gynalaxtae</i>
— Female genitalia not enlarged, coverflap smooth	...	...	<i>bengalensis</i>

146. ***Colopodacus bengalensis* Mohansundaram***Colopodacus bengalensis* Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 145-147.

Diagnosis : Shield with a clear pattern of lines, median complete except for the anterior end, admedians complete nearly parallel to the median with cross lines connected with median at three points fairly equidistant along the length. Feather claw 5 rayed. Abdomen with 50-55 smooth tergites and an equal number of microtuberculate

Figs. 234-235 : *Colopodacus* sp.Figs. 236-238 : *Cosella* sp.Figs. 239-241 : *Disella* sp.Figs. 242-244 : *Floracarus* sp.

sternites, microtubercles elongated and placed along the posterior border of each ring: Genital coverflap smooth.

Host : *Ficus bengalensis*.

Distribution : INDIA : Tamil Nadu.

147. *Colopodacus cinnamomae* Mohansundaram

Colopodacus cinnamomae Mohansundaram, 1980, *Mysore J. Agric. Sci.*, **14** : 526-528.

Diagnosis : Shield with admedians represented with wavy lines, complete submedians forming the border of the shield. Dorsal tubercle away from shield margin. Feather claw 4 rayed. Coxae broadly joined, all three setiferous tubercles present. Abdomen with 30 smooth tergites and 55 microtuberculate sternites, microtubercles minute and elongated. Female genital coverflap with numerous fine lines in two rows.

Host : *Cinnamomum* sp.

Distribution : INDIA : Tamil Nadu (?), Tengumarada.

148. *Colopodacus combretus* Ghosh & Chakrabarti

Colopodacus combretus Ghosh & Chakrabarti, 1982, *Entomon*, **7**(4) : 435--437.

Diagnosis : Shield semicircular, without distinct anterior lobe, median line complete ; admedian lines sinuate arising from anterior margin of shield, admedian lines meet the median line by three oblique lines on the middle of shield ; submedian lines two. Feather claw 4 rayed. Patella with setae. Genital coverflap smooth.

Host : *Combretum decandrum*.

Distribution : INDIA : West Bengal.

149. *Colopodacus eugeniae* Mohansundaram

Colopodacus eugeniae Mohansundaram, 1981, *Oriental Ins.*, **15**(2) : 147.

Diagnosis : Shield with median line represented as a short line at midpoint of shield, admedian short, joined on the rear end, anteriorly a curved line, sides of shield clear, dorsal tubercle at rear margin of shield. Feather claw 6 rayed. Abdomen with 35 tergites, 65 microtuberculate sternites. Genital coverflap with 6-8 curved lines at the tip.

Host : *Eugenia* sp.

Distribution : INDIA : Tamil Nadu.

150. *Colopodacus gynalaxtae* Mohansundaram*Colopodacus gynalaxtae* Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 147-149.

Diagnosis : Shield with small lobes over the rostrum base, median nearly complete, admedians complete, submedians represented by sharp forked lines at about the midregion, anterior shield margin with 3 cells on either sides of abdomen. Feather claw 5 rayed. Abdomen with 35 tergites and 50 sternites, tergites with elongate microtubercles on the lateral sides, sternites with elongate microtubercles in the midregion. Female genitalia closely appressed to coxal base, genital coverflap fairly granular.

Host : Undet. plant.**Distribution :** INDIA : Tamil Nadu.**151. *Colopodacus walayarensis* Mohansundaram***Colopodacus walayarensis* Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 149-152.

Diagnosis : Shield oval to semicircular, with a clear pattern ; median represented in the posterior 0.67 with cross bars at about middle and anterior end connected with admedians ; admedians wavy, complete, converging with a cross bar anteriorly ; sides of shield with short wavy strokes and striations and granular. Feather claw 4 rayed. Abdomen with about 47 rings, tergites and sternites well differentiated, tergites smooth, sternites microtuberculate. Genital coverflap with basal half granular and distal half clear.

Host : Undet. plant.**Distribution :** INDIA : Tamil Nadu.

Genus *Cosella* Newkirk & Keifer
(Figs. 236-238)

Cosella Newkirk & Keifer, 1975, *Mites injurious to economic plants*, p. 570.***Key to the Species of Cosella***

1. Dorsal setae directed up and lateral, genital coverflap with irregular furrow.	...	...	<i>ichnocarpasia</i>
— Dorsal setae directed up and inward, coverflap with granules.	...	...	<i>fleschneri</i>

152. **Cosella fleschneri** (Keifer)

Floracarus fleschneri Keifer, 1959, *Bull. Calif. Dep. Agr. Occ. Pap.*, 2 : 12-13.

Diagnosis : Forecoxae fused which lack the first setiferous tubercles. Shield has slight anterior lobe and ornamented with open network of lines. Dorsal tubercle placed little ahead of rear shield margin and direct the setae up and inward. Feather claw 4 rayed. Abdominal rings moderately wide with fine elongate microtubercles. Forecoxae with fine granules extending upto suboral plate.

Host : Citrus.

Distribution : INDIA : Meghalaya.

153. **Cosella ichnocarpasia** Mondal & Chakrabarti

Cosella ichnocarpasia Mondal & Chakrabarti, 1981, *Oriental Ins.*, 15 (3) : 315-317.

Diagnosis : Shield semielliptical in dorsal view, with short anterior lobe. Shield design presents longitudinal line which are faint on middle portion of shield, median line almost absent or faintly present on anterior half, admedians distinct on anterior half ; median and admedian connected by two oblique lines. Feather claw 4 rayed. Abdomen with 29-31 tergites, 47-50 sternites. Genital coverflap with few irregular furrows.

Host : *Ichnocarpus frutescens*.

Distribution : INDIA : West Bengal.

Genus **Disella** Newkirk & Keifer
(Figs. 239-241)

Disella Newkirk & Keifer, 1975, Mites injurious to economic plants, p, 569.

154. **Disella tectona** Das & Chakrabarti

Disella tectona Das & Chakrabarti, 1982, *Entomon*, 7 (3) : 299-300.

Diagnosis : Shield smooth, subtriangular, anterior blunt without distinct anterior lobe ; eight large cells occupy the anterior margin, median line complete, arises from the junction of two median cells and touches the rear shield margin. Feather claw 4 rayed. Abdomen with 75-90 tergites, 80-100 sternites ; sternites all microtuberculate and tergites less so. Genital coverflap with 8-10 longitudinal scorings.

Host : *Tectona* sp.

Distribution : INDIA : Bihar.

Genus **Floracarus** Keifer
(Figs. 242-244)

Floracarus Keifer, 1953, *Bull. Calif. Dep. Agr.*, **41** : 69.

Key to the Species of Floracarus

1. Feather claw 5 rayed	...	...	<i>eugenifoliae</i>
— Feather claw 4 rayed	...	...	2
2. Dorsal tubercle near rear shield margin	...	...	3
— Dorsal tubercle away from shield margin	...	...	4
3. Dorsal setae minute (8 microns) pointing backward	...		<i>salvifoliae</i>
— Dorsal seta longer (17 microns) pointing backward and outward	...	...	<i>sivakumarii</i>
4. Dorsal setae minute (10 microns) pointing upward and inward	...	...	<i>siruvaniensis</i>
— Dorsal setae longer (18 microns) pointing upward and outward	...	...	<i>pollachiensis</i>

155. **Floracarus eugenifoliae** Mohansundaram

Floracarus eugenifoliae Mohansundaram, 1981, *Oriental Ins.*, **15**(2) : 158.

Diagnosis : Shield with a clear pattern of lines, median represented in anterior half of shield, admedians complete with a cross line at the base of the median and joined posteriorly forming a circle. Feather claw 5 rayed. Abdomen with 85 rings, tergites smooth to faintly microtuberculate ; sternites with microtubercles. Genital coverflap without lines and with basal granulations.

Host : *Eugenia* sp.

Distribution : INDIA : Tamil Nadu.

156. **Floracarus pollachiensis** Mohansundaram

Floracarus pollachiensis Mohansundaram, 1980, *Indian J. Acar.*, **4**(1) : 4-6.

Diagnosis : Female 165-170 long, shield broadly rounded anteriorly with a very short broad lobe over rostrum base. Medians and admedians complete with 3 cross lines connecting them ; 1st, 2nd and

3rd submedians forming a network on the sides ; sides of shield with fine scorings. Feather claw 4 rayed. Abdomen with 55 smooth tergites and 60 finely microtuberculate sternites.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

157. *Floracarus salvifoliae* Mohansundaram

Floracarus salvifoliae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 160.

Diagnosis : Shield blunt at front with a characteristic spiny protuberance over rostrum base, median complete, admedians slightly curved, complete two cross lines across the median line connecting the admedians. Feather claw 4 rayed. Abdomen with 40 smooth tergites, 50 finely microtuberculate sternites. Genital coverflap with basal granulations.

Host : *Alangium salvifolium*.

Distribution : INDIA : Tamil Nadu.

158. *Floracarus siruvaniensis* Mohansundaram

Floracarus siruvaniensis Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 160-162.

Diagnosis : Shield with clear pattern of lines, median, admedians complete, with 3 cross lines in between them ; submedians represented in the anterior region forming cells. Feather claw 4-rayed. Abdomen with 55-60 rings ; tergites smooth, sternites microtuberculate. Genital coverflap with two crescentic lines and granulations.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

159. *Floracarus sivakumarii* Mohansudaram

Floracarus sivakumarii Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 162.

Diagnosis : Shield with a clear pattern of lines, median, admedian, submedian all present forming a network of cells, sides of shield granular. Abdomen with 60 rings uniformly microtuberculate. Genital coverflap granular.

Host : Undet. plant.

Distribution : INDIA ; Tamil Nadu.

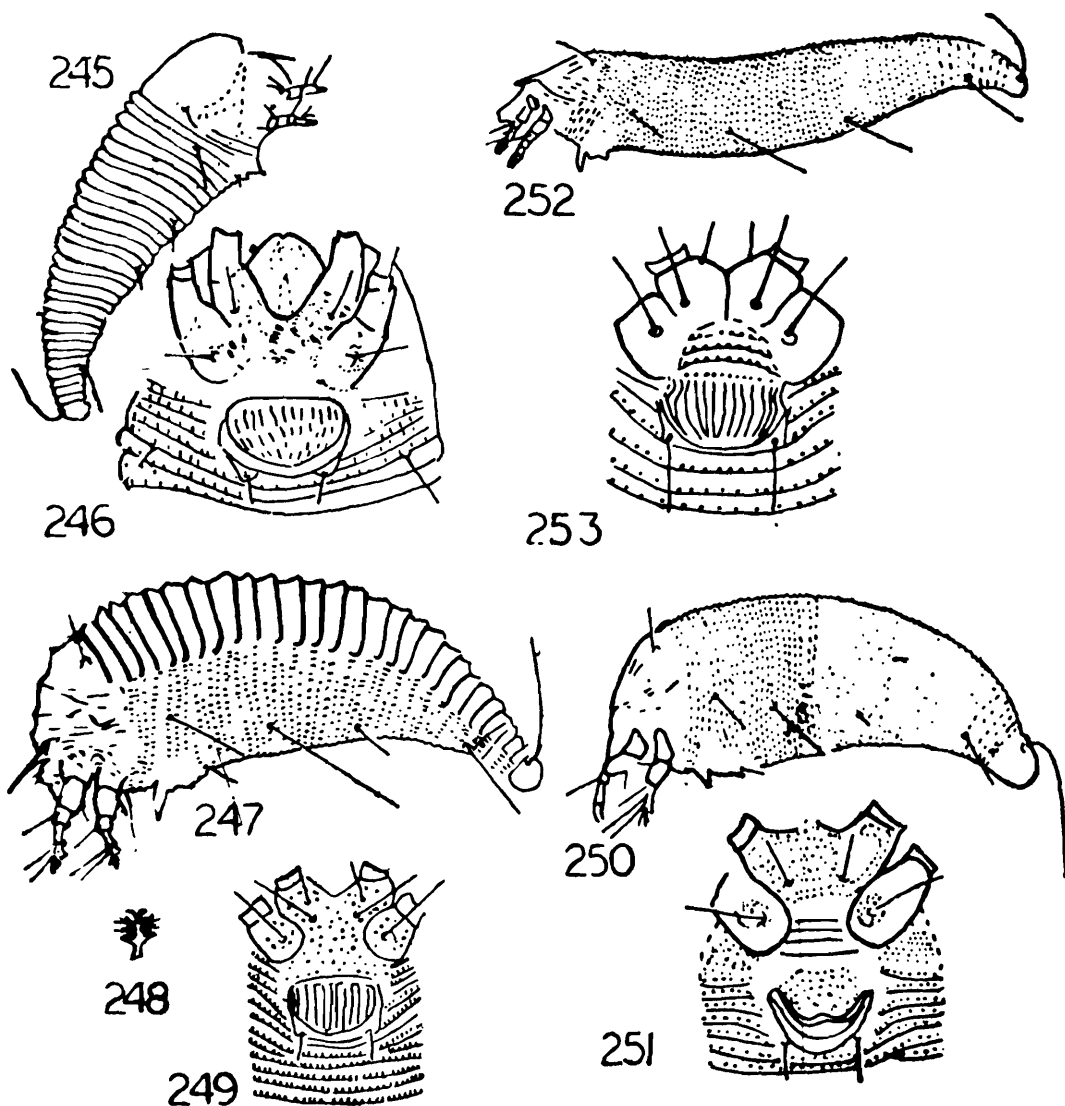
Genus **Neocosella** Mohansundram
(Figs. 245-246)

Neocosella Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 162-164.

160. **Neocosella ichnocarpae** Mohansundaram

Neocosella ichnocarpae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 164-166.

Diagnosis : Shield with light 'U' shaped marking, otherwise clear; shield projecting over rostral base. Feather claw 4 rayed, characteristic bent seta present near feather claw. Abdomen with 28-30 smooth tergites, 35-37 microtuberculate sternites, microtubercles



Figs. 245-246 : *Neocosella* sp.
Figs. 247-249 : *Necolopodacus* sp.
Figs. 250-251 : *Nothopoda* sp.
Figs. 252-253 : *Ectomerus* sp.

elongate and widely placed. Genital coverflap with numerous wavy striations.

Host : *Ichnocarpus frutescens*.

Distribution : INDIA : Karnataka.

Genus *Neocolopodacus* Mohansundaram
(Figs. 247-249)

Neocolopodacus Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 524.

161. *Neocolopodacus mitragynae* Mohansundaram

Neocolopodacus mitragynae Mohansundaram, 1981, *Mysore J. Agric. Sci.*, 14 : 524-525.

Diagnosis : Shield overhanging rostral base. shield with clear pattern of lines, median absent, admedians nearly complete, first submedian represented at the central area of the shield diagonally, second submedian represented near dorsal tubercles, third submedian at shield margin with cross lines connecting first and second submedians. Feather claw 4 rayed. Abdomen with about 25 smooth tergites and 60 sternites with elongated microtubercles. Female genital coverflap basally granular, distally with about 16 lines.

Host : *Mitragyna tubulosa*.

Distribution : INDIA : Tamil Nadu (?)

Genus *Nothopoda* Keifer
(Figs. 250-251)

Nothopoda Keifer, 1951, *Bull. Calif. Dep. Agr.*, 40 : 96.

162. *Nothopoda kallarensis* Mohansundaram

Nothopoda kallarensis Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 154-158.

Diagnosis : Shield with median line thin, wavy, admedian thick, and wavy, seen from whole length of shield ; submedians represented by faint line only at shield base, sides of shield with wavy lines formed by short thick strokes. Feather claw 4 rayed. Abdomen with 50-60 rings, uniformly microtuberculate. Female genital coverflap without any longitudinal ribs but with one or two crescentic furrows.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Subfamily CECIDOPHYINAE Keifer

Cecidophyinae Keifer, 1966, *Eriophyid Studies*, Calif. Dep. Agr., B-20 : 15.

Key to the Genera of Cecidophyinae

1. Dorsal seta absent	...	...	2
— Dorsal seta present	...	...	3
2. Dorsal tubercle placed far ahead of rear shield margin.	...	...	<i>Epicecidophyes</i>
— Dorsal tubercle elongate pointing backward with subapical arista like dorsal seta	...	...	<i>Neocecidophyes</i>
3. Body robust fusiform and strongly tapering, shield with broad-based anterior basally flexible lobe ; dorsal setae projecting to rear.	...	...	<i>Gammaphytoptus</i>
— Body worm like, if anterior shield projection present, it is narrow and basally flexible ; thanosomal ring subequal dorsoventrally.	...	...	4
4. Shield with narrow basally flexible anterior projection over rostrum.	...	...	<i>Ectomerus</i>
— Shield lacking anterior projection over rostrum.	...	...	<i>Colomerus</i>

Genus *Colomerus* Newkirk & Keifer

Colomerus Newkirk & Keifer, 1971, *Eriophyid Studies U. S. Dep. Agr.*, C-5 : 6.

163. *Colomurus vitis* (Pgst.)

Eriophyes vitis Pgst., 1857, *Verh. Natur. Med. Ver. Hidelberg*, 1 : 46-53.

Eriophyes vitis, Gupta & Dhooria, 1972, *Curr. Sci.*, 41 : 824-825.

Diagnosis : Light yellowish mite. Shield with numerous longitudinal lines ; admedian lines complete and sinuate ; several submedian longitudinal lines present. Dorsal tubercle set a little ahead of rear shield margin. Feather claw 5 rayed. First setiferous coxal tubercle on the forecoxae set slightly ahead of the anterior end of the sternal line. Female genital coverflap strongly ribbed.

Host : Grape vine.

Nature of damage : This mite is known to infest axillary buds of grape vines in Punjab during January-February. However, no significant damage has been noticed.

Distribution : INDIA : Punjab.

Remarks : Gupta & Dhooria (1972) reported *Pronematus elongatus* in association with this mite.

Genus **Ectomerus** Newkirk & Keifer
(Figs. 252-253)

Ectomerus Newkirk & Keifer, 1975, *Mites injurious to economic plants*, p. 571.

164. **Ectomerus chebulae** Mohansundaram

Ectomerus chebulae Mohansundaram, 1980, *Indian J. Acar.*, 4 : 3-4.

Diagnosis : Shield with a thin projection over the rostrum base and a clear pattern of lines. Medians and submedians broken near the rear end of the shield ; first submedian covered and rarely complete ; rest of the submedians short ; sides of the shield with fine scorings. Coxae with all three setiferous tubercles ; coxal area smooth. Abdomen with about 65 uniformly microtuberculate rings. Feather claw 6 rayed.

Host : *Terminalia chebula*.

Distribution : INDIA : Tamil Nadu.

Genus **Epicecidophyes** Mondal & Chakrabarti
(Figs. 254-256)

Epicecidophyes Mondal & Chakrabarti 1981, *Oriental Ins.*, 15(3) : 318-319.

Key to the Species of Epicecidophyes

1. Feather claw 6 rayed.	...	...	<i>indica</i>
— Feather claw 5 rayed.	...	...	<i>clerodendris</i>

165. **Epicecidophyes clerodendris** Mondal & Chakrabarti

Epicecidophyes clerodendris Mondal & Chakrabarti, 1981, *Oriental Ins.*, 15(3) : 318-319.

Diagnosis : Shield subtriangular, with broad anterior lobe, shield design obscure, present only a number of longitudinal lines, median line absent, admedian lines sinuate, faint, arises from the base of the anterior lobe and ends posteriorly just in front of rear shield margin where it is connected with other admedians by transverse lines. Feather claw 5 rayed. Abdomen with 25-27 smooth tergites and 58-63 microtuberculate sternites. Genital coverflap with 10-12 longitudinal stripes.

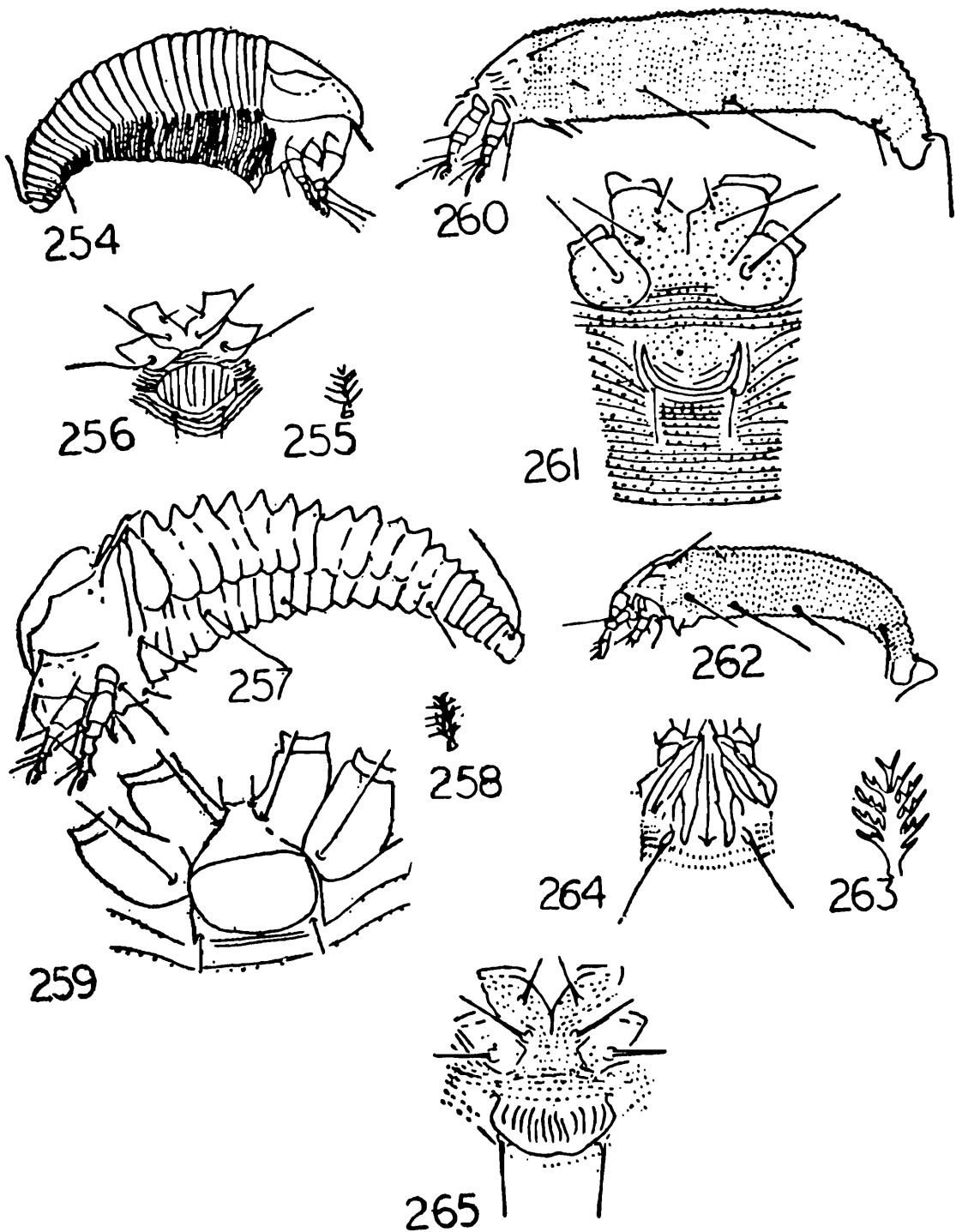
Host : *Clerodendron viscosum*.

Distribution : INDIA : West Bengal.

166. ***Epicecidophyes indica*** Mondal, Ghosh & Chakrabarti

Epicecidophyes indica Mondal, Ghosh & Chakrabarti, 1982, *Oriental Ins.*, 16(3) : 308-309.

Diagnosis : Shield subtriangular with prominent anterior lobe,



Figs. 254-256 : *Epicecidophyes* sp.

Figs. 257-259 : *Neocecidophyes* sp.

Figs. 260-261 : *Acalitus* sp.

Figs. 262-265 : *Aceria* sp.

shield design not clearly discernible, median line complete, admedian line faintly present only on anterior half, submedian lines 3-4 in number. Dorsal tubercle ahead of rear shield margin. Feather claw 6 rayed. Abdomen with 23-25 smooth tergites and 28-31 microtuberculate sternites, without any ridge or process. Genital coverflap with longitudinal scorings.

Host : *Clerodendron viscosum*.

Distribution : INDIA : West Bengal.

Genus *Gammaphytoptus* Keifer

Gammaphytoptus Keifer, 1939, *Bull. Calif. Dep. Agr.*, 27 : 148.

167. *Gammaphytoptus litseasis* Mondal, Ghosh & Chakrabarti

Gammaphytoptus litseasis Mondal, Ghosh & Chakrabarti, 1982, *Indian J. Acar.*, 6 : 20-22.

Diagnosis : Shield triangular with flexible anterior lobe over rostrum ; shield design present a number of longitudinal lines, median line distinctly present throughout shield length, admedian lines complete running parallel to median line, submedian 4-6 number. Dorsal tubercle placed on rear shield margin and projecting over first tergite ; dorsal seta directed caudad. Feather claw 5 rayed. Abdomen with 34-36 tergites and 47-50 sternites, the former wider than latter. Genital coverflap with longitudinal scorings in two uneven ranks.

Host : *Litsea* sp.

Distribution : INDIA : West Bengal.

Genus *Neocecidophyes* Mohansundaram

(Figs. 257-259)

Neocecidophyes Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 521.

168. *Neocecidophyes mallotivagrans* Mohansundaram

Neocecidophyes mallotivagrans Mohansundaram, 1980, *Mysore J. Agric. Sci.*, 14 : 523-524.

Diagnosis : Shield area and sides of shield clear. Dorsal tubercle projecting backward and outward with a subapical arista like dorsal seta. All three setiferous coxal tubercles present. Feather claw 5 rayed. Abdomen with about 21-25 broad rings, not much differentiated into

tergites and sternites, thanosomal rings with dorsal projections and lateral lobes and ventrally with faint tubercles along with the anterior ring border. Female genital coverflap smooth.

Host : *Mallotus* sp.

Distribution : INDIA : Tamil Nadu.

Subfamily ERIOPHYINAE Nalepa

Eriophyinae Nalepa, 1898, *Das Tierreich*, 4 : 5.

Key to the Genera of Eriophyinae

1. A pair of short blunt spines at the anterior end of triangular shield	...	...	<i>Keiferophyes</i>
— Not as above	...	...	2
2. Dorsal tubercle more or less ahead of rear shield margin and projecting dorsal setae ahead of some degree or tip ; dorsal tubercles which are close to rear margin incline ahead, or have longitudinal axes	...	...	3
— Dorsal tubercle on or very near shield margin with transverse basal axes, directing setae to rear, usually divergently	...	...	4
3. A blunt lobe of shield overhang rostrum	...	...	<i>Neophytoptus</i>
— Not as above	...	...	<i>Phytoptus</i>
4. Foretibiae setae present	...	...	5
— Foretibiae setae absent	...	...	<i>Acalitus</i>
5. Rear part of thanosome with rings subequal dorsoventrally and divided into tergites and sternites	...	...	6
— Rear $\frac{1}{2}$ to $\frac{1}{3}$ of thanosome with rings divided into border tergites and narrower sternites	...	...	<i>Paraphytoptus</i>
6. Dorsal shield setae situated on tubercles or usually ahead of rear shield margin, pointing up necessarily anteriorly	...	...	<i>Eriophyes</i>
— Dorsal shield setae situated on tubercles on rear shield pointing backward over rostrum	...	...	<i>Aceria</i>

Genus *Acalitus* Keifer

(Figs. 260-261)

Acalitus Keifer, 1965, *Eriophyid Studies*, Calif. Dep. Agr., B-14 : 1-2.

Key to the Species of *Acalitus*

1. Shield without lines	...	...	<i>schefflerae</i>
— Shield with lines	...	...	2
2. Feather claw 5 rayed	...	...	3
— Feather claw 4 rayed	...	...	4
3. Genital coverflap smooth without longitudinal scorings, setae on femora absent	...	...	<i>hibisci</i>
— Genital coverflap with basal granulations and with one or two crescentic scorings in the distal end, setae on femora absent	...	...	<i>meleosmae</i>
4. Median line strong	...	...	<i>gossypii</i>
— Median line faint	...	...	<i>reticulatae</i>

169. *Acalitus gossypii* (Banks)

Eriophyes gossypii Banks, 1904, *J. New York Ent. Soc.*, 12 : 56.

Eriophyes gossypii, Misra, 1920, *Proc. 3rd. Ent. Met. Pusa*, 547-561.

Diagnosis : Body whitish, cylindrical. Shield characterised by a transverse sinuate line near rear margin extending just behind of dorsal tubercles ; feather claw 4 rayed.

Host : Cotton.

Nature of damage : This mite produces whitish spots on cotton leaves which increase with subsequent curling of leaves. In some cases the plants fail to recoup its vitality. The infested bolls shrivel and fall off. Damage may be to the extent of 50% (Misra, 1920). Since the cotton leaves turn ashy, the disease has been called 'Chhasia' (Jhaveri, 1921). Thaker & Desai (1929) reported the wide spread infestation of this disease in Western India reducing as much as 30% yield of seed cotton. Also in America and West Indies, this species is a serious pest of cotton.

Bionomics : No information in this regard is available from India. This mite is available throughout the year and is known to have short life cycle.

Control : Jhaveri (1921) got excellent control by steeping the seeds in mercuric per chloride solution before sowing. Thaker & Desai (1929) reported the harmful effects of the application of sulphur on plants causing shedding of leaves. Planting mite-resistant variety of cotton will help in eliminating the possibility of the attack of this mite,

Distribution : INDIA : Tamil Nadu, Gujarat ; outside India : U. S. A., West Indies.

170. ***Acalitus hibisci*** Mondal & Chakrabarti

Acalitus hibisci Mondal & Chakrabarti, 1982, *Entomon*, 7(3) : 361-363.

Diagnosis : Shield subtriangular, with smaller anterior lobe. Shield design represents some longitudinal lines, median line distinct, present throughout the shield length, admedians sinuate, submedian lines two. Patella without seta. Feather claw simple, 5 rayed. Abdomen with 65 long tergites and almost equal number of sternites, tergites and sternites uniformly microtuberculate. Genital coverflap smooth without longitudinal scorings.

Host : *Hibiscus vitifolius*.

Distribution : INDIA : West Bengal.

Remarks : It causes capitate galls on both surfaces of leaves. Cavity of galls are filled with hairy outgrowths.

171. ***Acalitus meliosmae*** Mohansundaram

Acalitus meliosmae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 22-23.

Diagnosis : Shield with a clear pattern of lines, median line represented by a series of broken lines flanked on either sides with a few scorings, admedians clear and complete. Feather claw 5 rayed. Dorsal tubercle at shield margin. Abdomen with 60 rings, uniformly microtuberculate. Female genital coverflap with basal granulations and with one or two crescentic scorings in the distal end.

Host : *Meliosma simplicifolia*.

Distribution : INDIA : Tamil Nadu.

172. ***Acalitus reticulatae*** Mohansundaram

Acalitus reticulatae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 23-25.

Diagnosis : Shield clear except for short faint median line and faint admedian lines, sides of shield granular. Dorsal tubercles little ahead of shield margin. Feather claw 4 rayed. Abdomen with 55-60 rings, uniformly microtuberculate. Female genital coverflap with crescentic scorings and coarse punctations.

Host : *Leptadenia reticulata*.

Distribution : INDIA : Tamil Nadu.

173. *Acalitus schefflerae* Mohansundaram

Acalitus schefflerae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 25-26.

Diagnosis : Shield without any line, sides of shield granular. Dorsal tubercle at rear shield margin. Feather claw 6 rayed. Abdomen with about 70 rings, uniformly microtuberculate dorsoventrally. Female genital coverflap clear with heavily granular basal area.

Host : *Schefflera* sp.

Distribution : INDIA : Tamil Nadu.

Genus *Aceria* Keifer

(Figs. 262-265)

Aceria Keifer, 1944, *Bull. Calif. Dep. Agr.*, 33 : 22.

There is a good deal of confusion regarding the status of the genera *Aceria*, *Eriophyes* and *Phytoptus* mostly because of the fixation of their types. The genus *Eriophyes* was originally erected without nominal species and Keifer (1938) designated *Phytoptus vitis* Pag., 1857 as its type which was subsequently accepted. But Newkirk & Keifer (1971) discovered that the first nominal species referred to *Eriophyes* was *E. labilatiflorae* F. Thomas, 1872, described on the basis of Bremi Wolff's specimen of dried plant parts damaged by this mite and, consequently, that became the type species by subsequent monotype according to code 69(a) (ii) (2). *Phytoptus* Dujardin, 1851, was originally described without nominal species and Keifer (1938) designated *P. avellanae* Nal., 1889 as its type species. All the acarologists accepted this designation. However, Newkirk & Keifer (1971) discovered that Pagnstcher (1857) had referred four binomials to *Phytoptus* and, therefore, designated one of these, *P. tiliae* as the type species of this genus in accordance with article 69 (a) (ii) (3). On the basis of this, Newkirk & Keifer (1971) re-diagnosed *Eriophyes* and according to his re-diagnosis, *Aceria* becomes a synonym for *Eriophyes*; *P. vitis* Pgst., previously regarded as type of *Eriophyes*, was transferred to a new genus *Colomerus*, the definition of *Phytoptus* became the same as that of the recent usage of *Eriophyes* when *P. vitis* was type species and generic concept of *Phytoptus*, as based on *P. avellanae*, is without a name. The new generic name *Phytocoptella* was provided by Newkirk & Keifer (1971).

Though all the actions of Newkirk & Keifer (1971) were in accordance with code and are quite logical but most of the acarologists as Shevtchenko (1974), Lindquist (1975) and Boczek (1979) are of opinion that changing of names at this stage is against the principles of stability

of nomenclature and will lead to confusion to both taxonomists and applied level workers since all these generic names are in use for a pretty long time and changing names at this stage will cause serious difficulties to information storage and retrieval systems and in effective searching through bibliography and abstracting journals for information on specific taxa. Hence, they urged the International commission of Zoological Nomenclature to use its plenary powers to set aside all previous designations of type species for these *Eriophyes* Siebold, 1851 and *Phytoptus* Dujardin, 1851 made prior to the proposed rulling and having done so, to regard *P. vitis* Pgst., 1857 as type of *Eriophyes* Siebold, 1851 and *P. avellanae* Nal., 1889, as type of *Phytoptus* Dujardin, 1851. Manson (1977) also suggested to retain the names *Eriophyes*, *Aceria* and *Phytoptus* as known prior to Newkirk & Keifer (1971) as all these names are standard and all are well recognised genera. Considering this view, in the present work, the generic position prior to Newkirk & Keifer (1971) with regard to *Aceria*, *Eriophyes* and *Phytoptus* are retained.

Key to the Species of Aceria

1. Feather claw 8 rayed	...	...	<i>viddhagiriensis</i>
— Feather claw less than 8 rayed	...	...	2
2. Feather claw 7 rayed	...	...	3
— Feather claw less than 7 rayed	...	...	9
3. Second ventral seta on abdomen longer than third ventral seta	...	...	4
— Second ventral seta on abdomen shorter than third ventral seta	...	...	7
4. Female genital coverflap smooth, without lines	...	...	<i>dichrostachya</i>
— Female genital coverflap with lines	...	...	5
5. Dorsal shield seta as long or longer than rostrum length	...	...	6
— Dorsal shield seta shorter than rostrum length	...	...	<i>pongamiæ</i>
6. Female genital coverflap with 8-10 lines	...	...	<i>dactylonæ</i>
— Female genital coverflap with 10-12 lines	...	...	<i>saccharini</i> (= <i>sacchari</i>)
7. Forecoxae with longitudinal lines, female genital coverflap with not more than 6 longitudinal lines	...	...	8

— Forecoxae granulated, not with stripes ; female genital coverflap with more than 6 longitudinal lines	...	...	<i>tulipae</i>
8. Abdomen with 60 uniformly microtuberculate rings	...	...	<i>donacis</i>
— Abdomen with 65-70 microtuberculate rings	...	...	<i>bambusae</i>
9. Feather claw 6 rayed	...	...	10
— Feather claw less than 6 rayed	...	...	23
10. Abdomen with over 60 rings	...	...	11
— Abdomen with less than 60 rings	...	...	20
11. Female genital coverflap with over 10 lines	...	...	12
— Female genital coverflap with less than 10 lines	...	...	19
12. Female genital coverflap with 10-12 lines	...	...	13
— Female genital coverflap with over 12 lines	...	...	17
13. Genital seta over 30 microns	..	...	<i>trichocnemum</i>
— Genital seta less than 30 microns	...	...	14
14. First ventral and second ventral seta on abdomen equal	...	...	<i>setaceous</i>
— First ventral and second ventral seta on abdomen unequal	...	...	15
15. Second and third ventral seta on abdomen almost equal	...	...	<i>cajani</i>
— Second and third ventral seta on abdomen unequal	...	...	16
16. Second ventral seta $\frac{1}{3}$ of third ventral seta	...	...	<i>dichotomae</i>
— Second ventral seta $\frac{1}{2}$ of third ventral seta	...	...	<i>polygalae</i>
17. Second ventral seta slightly shorter than third	...	...	<i>sapindae</i>
— Second ventral seta more than $\frac{1}{2}$ of third ventral seta	...	...	18
18. Submedian represented at rear $\frac{3}{4}$ of shield	...	...	<i>delhiensis</i>
— Submedian represented uniformly on shield	...	...	<i>balanitis</i>
19. Lateral seta longer than or as long as first ventral seta	...	...	<i>eragrastae</i>
— Lateral seta much shorter than first ventral seta	...	...	<i>sorghii</i>
20. Female genital coverflap with longitudinal lines in two series	...	...	<i>mangiferae</i>
— Female genital coverflap with longitudinal lines in one series	...	...	21

21. Female genital coverflap with 8 longitudinal lines	...	...	<i>commelinae</i>
— Female genital coverflap with more than 8 longitudinal lines	...	...	22
22. Shield with prominent anterior shield lobe	...	...	<i>erythrensis</i>
— Shield truncated at apex	...	...	<i>erythrenae</i>
23. Feather claw 5 rayed	...	...	24
— Feather claw 4 rayed	...	...	33
24. Second ventral seta on abdomen longer than third ventral seta, shield lacking longitudinal wrinkles	...	...	<i>gastrotrichus</i>
— Second ventral seta on abdomen shorter than third ventral seta ; shield lacking longitudinal wrinkles	...	...	25
25. Abdominal microtubercles stronger below, sparsed on the dorsum	...	...	<i>medicaginis</i>
— Microtubercles more or less enveloped dorsally and ventrally	...	...	26
26. Shield design usually indistinct, when distinct the first and second submedian lines confluent ahead of dorsal tubercles	...	...	<i>sheldoni</i>
— Shield design, first and second submedian lines not confluent	...	...	27
27. Female genital seta longer than length of genitalia	...	...	28
— Female genital seta not longer than length of genitalia	...	...	29
28. Female genital coverflap smooth	...	...	<i>agallochae</i>
— Female genital coverflap with 8 longitudinal ribs	...	...	<i>infectoreae</i>
29. Coxae smooth	...	...	<i>mori</i>
— Coxae truncated or granulated	...	...	30
30. Coxae sparsely granulated	...	...	<i>ficus</i>
— Coxae strongly tuberculated	...	...	31
31. Second ventral seta $\frac{1}{2}$ of third ventral seta	...	...	<i>antidotatae</i>
— Second ventral seta nearly $\frac{1}{2}$ of third ventral seta	...	...	32
32. Median line almost complete with dart shaped mark near rear shield margin	...	...	<i>litchei</i>
— Median line on rear shield margin, without a dart shaped mark	...	...	<i>crotalariae</i>
33. Second coxal seta almost opposite anterior coxal approximation	...	...	34

—	Seond coxal seta well behind anterior coxal approximation	...	...	36
34.	Median, admedian and submedian all represented by complex pattern of lines	...	...	<i>litsea</i>
—	Not as above	...	...	35
35.	Median shield line faint but with a dart at rear shield margin, no diagonal line at shield sides	...	...	<i>holopteleae</i>
—	Median line on rear half of shield without a dart at posterior end, three diagonal lines anteriorly on shield sides	...	...	<i>fastigatus</i>
36.	Genital shield bare with no longitudinal line on midshield	...	...	37
—	Shield with one or more longitudinal lines on midshield	...	...	39
37.	Transverse line present near rear shield margin	...	...	38
—	Transverse line near shield margin absent	...	...	<i>jasmini</i>
38.	Transverse line sinuate, female genital seta very short, inconspicuous	...	...	<i>puttarudriahi</i>
—	Transverse line evenly arched, female genital seta conspicuous, as long as genitalia	...	...	<i>nerii</i>
39.	Median line indistinct	...	...	<i>boraginae</i>
—	Median line distinct	...	...	40
40.	Median line forking to form a trapezium on rear shield, female genital coverflap with indistinct longitudinal scorings only in the middle	...	...	<i>nandiensis</i>
—	Median line not forking to form a trapezium ; longitudinal scoring on coverflap evenly distributed over entire width	...	...	41
41.	Shield sides granulated or microtuberculated	...	...	42
—	Shield side not granulated	...	...	45
42.	Coxae granulated	...	...	44
—	Coxae smooth	...	...	43
43.	Abdomen with about 65 rings	...	...	<i>lycopersici</i>
—	Abdomen with about 75 rings	...	...	<i>malloticola</i>
44.	Median represented by a paired line at middle of shield area	...	...	<i>pustulatus</i>
—	Median line with a dart at rear shield margin	...	...	<i>granati</i>
45.	First coxal setae opposite anterior coxal junction and second coxal setae much ahead and close to first coxal seta	...	...	46

— Second coxal seta in the usual position and not close to first coxal seta	...	...	47
46. Median line on apical half, shield with admedian and submedian lines absent	...	...	<i>dalbargiae</i>
— Median line almost complete ; admedians and submedians present	...	...	<i>cordiae</i>
47. Admedian lines on shield complete	...	...	<i>barleriae</i>
— Admedian lines incomplete evident on midshield only	...	...	48
48. Abdomen with oblong, close set microtubercles not touching the ring margins, shield side with a wing like expansion near rear margin	...	...	<i>clerodendronis</i>
— Abdomen with more or less oval microtubercles touching rear ring margins, shield sides without wing like expansion	...	...	<i>ruelliae</i>

According to Mohansundaram (through personal communication) *sacchari* ChannaBasavanna is a synonym of *saccharini* Wang because of priority.

174. *Aceria antidotalae* (Mohansundaram)

Eriophyes antidotalae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 169-172.

Diagnosis : Shield with median nearly complete except for the anterior end, admedians complete, slightly converging anteriorly, first submedian complete, diverge on the posterior end ; second submedian represented in anterior half of shield, 3rd submedian represented at about middle of shield, sides of shield with strokes. Feather claw 5 rayed. Abdomen with about 58 rings uniformly microtuberculate, microtubercles elongate on posterior margin of each ring. Genital coverflap with 6 lines.

Host : *Panicum antidotale*.

Distribution : INDIA : Tamil Nadu.

Remarks : It causes witches' brooms effect.

175. *Aceria delhiensis* (Mohansundaram)

Eriophyes delhiensis Mohansundaram, 1982, *Entomon*, 7(4) : 431.

Diagnosis : Shield with median complete, admedians complete, submedian represented in the rear 3/4th, rest of the area and sides of shield clear. Dorsal seta at rear shield margin, pointed backwards.

Feather claw 6 rayed. Abdomen with 70 uniformly microtuberculate rings. Female genital coverflap with 14-16 lines.

Host : Undet. shrub.

Distribution : INDIA : Delhi.

176. *Aceria dichrostachya* (Tucker)

Eriophyes dichrostachya Tucker, 1926, *Union S. Afr. Dep. Agr. Dev. Ent. Nem.*, 5 : 2-15.

Aceria dichrostachya, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 422.

Diagnosis : Feather claw 7 rayed. Shield with median, admedian and submedian lines complete, sides of shield granular. Coxal area completely granular. Genital coverflap without any line.

Hosts : *Acacia pennata*, *Dichrostachys cinerea*.

Distribution : INDIA : Tamil Nadu ; outside India : S. Africa.

Remarks : The secondary rachis and leaflets of the compound leaves are thickened, united and gall like. The white mites are found inside the galls.

177. *Aceria erythrensis* (Chakrabarti & Ghosh)

Eriophyes erythrensis Chakrabarti & Ghosh, 1981, *Indian J. Acar.*, 5 : 29-31.

Diagnosis : Shield with prominent anterior shield lobe, median line absent, admedian complete, first submedian straight, second submedian gradually curve inwardly to meet the rear shield margin. Feather claw 6 rayed. Abdomen with 58-63 tergites and sternites, which are uniformly microtuberculate. Female genital coverflap with 12-14 longitudinal scorings on upper margin.

Host : *Erythrina sublobata*.

Distribution : INDIA : West Bengal.

178. *Aceria litsea* Keifer

Aceria litsea Keifer, 1972, *Eriophyid Studies*, U. S. Dep. Agr., C-6, pp. 24.

Aceria litsea, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 423.

Diagnosis : Feather claw 4 rayed. Shield with median, admedians and submedians represented by complex pattern of lines of granules, sides of shield granular. Coxal area granular with scorings. Genital coverflap with 10 longitudinal ribs.

Host : *Litsea wightiana*.

Distribution : INDIA : Tamil Nadu ; outside India : Singapore.

179. *Aceria trichocnemum* (Nalepa)

Eriophyes trichocnemum Nalepa, 1929, *Neur. Katalog der blister beschriebenen Gallmilben, ihrer Gallen und Wirtspflanzen*. Marcellia, 25 : 67-183.

Aceria trichocnemum, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 424.

Diagnosis : Feather claw 6 rayed, simple. Shield with median, admedians complete, submedians wavy ; sides of shield granular. Coxal area granular around the base of coxal setae. Female genital coverflap with 10-12 longitudinal scorings ; genital seta 32 long.

Host : *Indigofera viscosa*.

Distribution : INDIA : Tamil Nadu ; outside India : Java.

Remarks : Mites on leaflets cause light erineum.

180. *Aceria viddhagiriensis* (Mohansundaram)

Eriophyes viddhagiriensis Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 172-174.

Diagnosis : Shield area clear, sides of shield with few lines in anterior end, dorsal tubercle at rear shield margin. Feather claw 8 rayed. Abdomen with 55-58 uniformly microtuberculate rings, telosomal sternites with microstriations. Genital coverflap of female with 12-14 lines.

Host : *Acacia ferruginea*.

Remarks : It causes pin-head sized leaflet gall and the large sized inflorescens galls. A large number of mites including their eggs will be seen inside the galls.

Distribution : INDIA : Tamil Nadu.

181. *Aceria commelinae* (Mohansundaram)

Eriophyes commelinae Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 519-521.

Diagnosis : Shield with median represented in the posterior half, admedians complete, first submedian sigmoid, complete, converging anteriorly ; second submedian curved represented in the posterior half of shield, third submedian forming the border of the shield, sides of shield clear. Feather claw 6 rayed. Abdomen with 55 uniformly tuberculate rings, microtubercles at rear margin of each ring. Female genital coverflap with 8 lines.

Host : *Commelina jacobi*.

Distribution : INDIA : Tamil Nadu.

182. *Aceria boraginae* Mohansundaram

Aceria boraginae Mohansundaram, 1982, *Acarologia*, 23(3) : 249-251.

Diagnosis : Shield, broad, triangular, median line not distinct, admedian broken at base, mid part of shield clear, one clear submedian at border of shield and bent towards the anterior end, sides of shield with small broken lines. Dorsal tubercle at rear shield margin. Feather claw 4 rayed. Abdomen with 65 rings uniformly microtuberculate, telosoma with microstriations. Female genital coverflap with 10-12 lines.

Host : *Cordia* sp.

Distribution : INDIA : Tamil Nadu.

183. *Aceria polygalae* Mohansundaram

Aceria polygalae Mohansundaram, 1982, *Acarologia*, 23(3) : 251.

Diagnosis : Shield with clear pattern. Median line straight, admedians wavy, slightly converging anteriorly, first submedian and second submedian represented only at the anterior half of the shield with an oblique line joining both on either side at about the middle. Dorsal tubercle at rear shield margin. Feather claw 6 rayed. Abdomen with 70-75 rings, uniformly microtuberculate, microtubercles round and dot like at posterior 1/3 of each ring. Female genital coverflap with 10-12 lines.

Host : *Polygala chinensis*.

Distribution : INDIA : Tamil Nadu.

184. *Aceria dichotomae* Mohansundaram

Aceria dichotomae Mohansundaram, 1982, *Acarologia*, 23(3) : 251-254.

Diagnosis : Shield with intricate pattern of wavy lines. Median line at rear half of shield, broken anteriorly and fades away, admedians wavy and converge anteriorly, submedian bent at rear end and broken into short strokes anteriorly. Second submedians at sides of shield, wavy and converges anteriorly. Dorsal tubercle at rear shield margin. Feather claw 6 rayed. Abdomen with about 65-68 rings, uniformly microtuberculate, microtubercles spaced wider dorsally than ventrally. Genital coverflap with two rows of scorings, 14-16 in the anterior row and 10-12 in the posterior row.

Host : *Cordia dichotoma*.

Distribution : INDIA : Tamil Nadu.

185. *Aceria dactylonae* Mohansundaram

Aceria dactylonae Mohansundaram, 1983, *Acarologia*, 24(1) : 38.

Diagnosis : Shield with a clear pattern of lines. Median line complete, admedians complete, first submedian curved at the anterior end, forked in the middle, broken in the posterior end, second submedian represented in the mid part of the shield with a forking anterior end, third and fourth submedians represented by broken lines. Feather claw 7 rayed. Abdomen with about 75 rings, uniformly microtuberculate, microtubercles oval in shape at posterior ring margin. Female genital coverflap with 9-10 thick lines.

Host : *Cynodon dactylon*.

Distribution : INDIA : Tamil Nadu.

186. *Aceria donacis* Mohansundaram

Aceria donacis Mohansundaram, 1983, *Acarologia*, 24(1) : 38.

Diagnosis : Shield with clear pattern of lines. Median faint represented in the rear part of the shield, admedians thick, wavy, forked at rear end and anterior 1/3. Two short submedians on either sides in the posterior end of shield. Feather claw 7 rayed, simple. Abdomen with about 60 uniformly microtuberculate rings. Female genital coverflap with 4 lines.

Host : *Arundo donax*.

Distribution : INDIA : Tamil Nadu.

187. *Aceria eragrostae* Mohansundaram

Aceria eragrostae Mohansundaram, 1983, *Acarologia*, 24(1) : 41.

Diagnosis : Shield with a pattern of lines. Median complete, admedians complete curved towards the median in the rear shield margin ; first submedian curved and broken represented at posterior half of shield ; second submedian complete ; third submedian at border of shield with numerous scorings. Feather claw 6 rayed. Abdomen with about 60 rings, uniformly microtuberculate, microtubercles oval, prominent, sparsely placed dorsally and ventrally and closely placed laterally. Female genital coverflap with 6-8 lines.

Host : *Eragrostis tenella*.

Distribution : INDIA : Tamil Nadu.

188. *Aceria pustulatus* Mohansundaram

Aceria pustulatus Mohansundaram, 1983, *Acarologia*, 24(1) : 41-44.

Diagnosis : Shield triangular, median represented by a paired line at the middle of the shield area ; admedians short, represented near the rear margin only ; first submedian complete, curved ; second and third submedians complete ; 4th submedians form the border of the shield ; sides of shield with fine scorings. Feather claw 4 rayed. Abdomen with about 70 rings, uniformly microtuberculate ; microtubercles elongated dorsally and oval ventrally. Female genital coverflap with 6 lines.

Host : *Ficus* sp.

Distribution : INDIA : Tamil Nadu.

189. *Aceria balanites* (Masee)

Eriophyes balanites Masee, 1927 *Ann. Mag. Nat. Hist.*, (9) 20 : 372.

Aceria balanites, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 64-65.

Diagnosis : Feather claw 6 rayed ; female genital coverflap with longitudinal stripes in two series ; abdomen with microtubercles almost circular in outline ; last 10-12 rings with microtubercles obscure.

Host : *Balanites aegyptica*.

Distribution : INDIA : New Delhi.

Remarks : This species is not known to have any economic importance. No work on bionomics has been done.

190. *Aceria bambusae* ChannaBasavanna

Aceria bambusae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 58-59.

Diagnosis : Feather claw 7 rayed, second ventral seta on abdomen much shorter than third ventral seta ; forecoxae with longitudinal lines ; female genital coverflap with not more than 6 longitudinal stripes. Abdomen with 65-70 rings, microtuberculate ; microtubercles on dorsum of 3 rings just behind shield elongate ; those on rings beyond third ventral setae elongate ventrally and obscure dorsally ; remaining area with almost conical microtubercles nearer the rear margins and tend to form longitudinal rows.

Host : *Bambusa vulgaris*.

Nature of damages : These mites are found between stem and enveloping leaf-sheath on terminal shoots without causing an apparent injury (ChannaBasavanna, 1966).

Bionomics & Control : No information is available.

Distribution : INDIA : Karnataka, Tamil Nadu.

191. *Aceria barleriae* ChannaBasavanna

Aceria barleriae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 84-85.

Diagnosis : Feather claw 4 rayed ; second coxal seta well behind anterior coxal approximation ; shield with one or more longitudinal lines on midshield ; longitudinal scoring on coverflap evenly distributed over entire width ; shield sides not granulated ; second coxal setae well apart from first coxal setae ; abdominal lines on shield complete.

Host : *Barleria cristata*.

Nature of damage : These mites induce whitish erineum patches, which are slightly depressed, both on the under and upper surfaces of leaves (ChannaBasavanna, 1966).

Bionomics & Control : No information is available.

Distribution : INDIA : Karnataka.

192. *Aceria cajani* ChannaBasavanna

Aceria cajani ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 62-63.

Diagnosis : Feather claw 6 rayed ; female genital coverflap with longitudinal stripes in single series ; shield sides with close set, longitudinal fine lines. Abdomen with about 68 rings, uniformly microtuberculate excepting the dorsum of the rear 6-10 rings which is almost bare ; microtubercles sparsely distributed on dorsum and more close set on lateral and ventral sides.

Host : *Cajanus cajan*.

Nature of damage : Mitra (1931) reported the occurrence of the sterility disease on pigeon pea in Bihar. Capoor (1952) proved the virus nature of the disease by successfully transmitting the disease through grafting. Kundaswamy & Ramakrishnan (1960) reported that the disease was not sap transmissible one. Seth (1962) found that this mite acts as a vector. The mites could acquire the virus in 4 days from leaves and could produce symptoms in 3-5 weeks. Siddappaji *et al.* (1979) reported that this is a serious disease of red gram and observed that the shade of the tall growing crops appeared to favour multiplication of mites. They also studied the effect and spread of the virus diseases under different combination of crops and row-spacing.

Bionomics & Control : No information in these regards is available.

Distribution : INDIA : Karnataka, Maharashtra, Delhi.

193. *Aceria clerodendronis* Farkas

Aceria clerodendronis Farkas, 1960, *Ann. Hist. Nat. Mus. Nat. Hungarici*, 52 : 430-431.

Aceria clerodendronis, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 85-86.

Diagnosis : Abdomen with oblong, close set of microtubercles, not touching the ring margins ; shield side with a wing-link expansion near rear margin. Feather claw 4 rayed.

Hosts. *Clerodendron inerme*, *Clerodendron viscosum*.

Nature of damage : This mite causes the formation of hemispherical galls on leaves. It induces violet coloured warty patches, specially on upper surface of leaves. Mites live in all stages of development amidst closely packed papillae forming these warthy patches (ChannaBasavanna 1966).

Bionomics & Control : Information in this regard is not available.

Distribution : INDIA : Karnataka.

194. *Aceria cordiae* ChannaBasavanna

Aceria cordiae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 83-84.

Diagnosis : Whitish mite, shield broadly rounded in front, median line incomplete arising a little distance away from apex and at about 1/3 from rear shield margin.

Host : *Cordia myxa*.

Nature of damage : This mite induces white warty patches mostly on underside of leaves. These patches sometimes cover entire leaf surface (ChannaBasavanna, 1966).

Distribution : INDIA : Rajasthan, Karnataka, West Bengal, Bihar.

Bionomics & Control : Information in this regard is not available.

195. *Aceria crotalariae* ChannaBasavanna

Aceria crotalariae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 72-73.

Diagnosis : Feather claw 5 rayed, second ventral seta on abdomen shorter than third ventral seta ; shield lacking longitudinal wrinkles ; microtubercles more or less evenly developed dorsally and ventrally ; shield design distinct ; female genital setae shorter than length of genitalia ; coxae strongly tuberculated ; median line on rear half shield without a dart shaped mark.

Hosts : *Crotalaria juncea*, *C. biflora*, *C. retusa*, *Desmodicum triflorum*, *C. verrucosa*.

Nature of damage : This mite induces slight growth of erineum on tender shoots which show a slight stunting (ChannaBasavanna, 1966).

Distribution : INDIA : Karnataka, West Bengal, Tamil Nadu.

Remarks : No work has been done on bionomics of this species.

196. *Aceria dalbergiae* ChannaBasavanna

Aceria dalbergiae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 82-83.

Diagnosis : Body whitish, shield broadly rounded in front, shield design obscure ; median line on anterior half ; a faint sinuate line across rear shield margin bending forward in front and a little latered of dorsal tubercles, not reaching anterior margin, feather claw 4 rayed.

Host : *Dalbergia sissoo*.

Nature of damage : This mite causes pale green or whitish yellow warty patches on leaf surface ; these patches later turn brown (ChannaBasavanna, 1966).

Distribution : INDIA : Delhi, Tamil Nadu.

Remarks : No work on bionomics of this species has been done.

197. *Aceria erythrinae* ChannaBasavanna

Aceria erythrinae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 66-67.

Diagnosis : Feather claw 6 rayed ; female genital coverflap with longitudinal stripes in single series ; abdomen with microtubercles even dorsally and ventrally ; forecoxae with five wavy lines ; shield sides densely granulated ; first submedian short, on anterior half of shield, almost straight.

Host : *Erythrina indica*.

Nature of damage : No apparent damage is caused except the appearance of brownish spots on leaves.

Distribution : INDIA : Karnataka, Tamil Nadu.

Remarks : Information on bionomics of this species is not known

198. *Aceria ficus* (Cotte)

Eriophyes ficus Cotte, 1920, *Bull. Soc. Path. Veg.*, 7 : 26.

Aceria ficus, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 71-72.

Diagnosis : Whitish or light brownish mite, coxae sharply

granulated ; female genital setae not longer than length of female genitalia ; shield design distinct ; first and second submedian lines not confluent ; feather claw 5 rayed.

Host : Fig.

Nature of damage : Nagaich & Vashisth (1962) reported for the first time that fig mosaic may be transmitted by this mite in India. The infested fig plants show yellowish green spots scattered over the leaf lamina. In severe cases, the spots coalesce together and present a variable shape and size. The leaves may become mottled white and irregularly shaped. Such plants show stunted growth. This mite is capable of transmitting virus to *Ficus carica*, *F. palmata*, and *F. nemoralis*. Vashisth & Nagaich (1965) showed that the disease is also transmitted to *Morus alba* through grafting. Three mites/plant are sufficient to transmit the virus (Vashisth & Nagaich, 1968).

Bionomics : Nothing in this regard is known.

Control : Spraying with methyl demeton was found to be effective in killing these mites.

Distribution : INDIA : Delhi, Himachal Pradesh.

199. *Aceria gastrotrichus* (Nalepa)

Eriophyes gastrotrichus Nalepa, 1918, *Verh. Zool. Bot. Ges. Wien.*, 68 : 43-45.

Eriophyes gastrotrichus, Cherian, 1931, *J. Asiat. Soc. Beng.*, 27 : 141-147.

Diagnosis : Feather claw 5 rayed ; second ventral seta on abdomen longer than third ventral seta ; shield surface with close-set longitudinal fine wrinkles.

Host : *Ipomoea staphylina*.

Nature of damage : These mites form irregular galls on upper surfaces of leaves and stem. Severe defoliation may be caused in case of heavy infestation.

Distribution : INDIA : Karnataka, Tamil Nadu ; outside India : East Indies.

Remarks : No work on bionomics of this species has been done.

200. *Aceria granati* (Canestrini & Masalongo)

Phytoptus granati Canestrini & Masalongo, 1894, *Atti. Soc. Veneto Trent.*, 2(1) : 465.

Aceria granati, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 80.

Diagnosis : Coxae slightly tuberculated ; median line with dart at

rear shield margin ; shield with one or more longitudinal lines on mid-shield,

Host : Pomegranate.

Nature of damage : These eriophyid mites live in tight rolls at the edges of the leaves of pomegranate. The infested leaves become thinner and highly deformed. In severe cases, the leaves are very much deformed and narrowed acutely (Puttarudriah & ChannaBasavanna, 1959 ; ChannaBasavanna, 1966).

Bionomics : No work has been done.

Distribution : INDIA : Delhi, Karnataka, Tamil Nadu.

201. *Aceria holopteleae* ChannaBasavanna

Aceria holopteleae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 73-74.

Diagnosis : Feather claw 4 rayed ; second coxal seta almost opposite anterior coxal approximation ; median shield line faint but with a dart at rear shield margin.

Host : *Holoptelea integrifolia*.

Nature of damage : This mite induces irregular depressions lined with compact papillae. In severe cases of infestation the leaves become distorted.

Bionomics : No work has been done.

Distribution : INDIA : Tamil Nadu.

202. *Aceria infectoriae* ChannaBasavanna

Aceria infectoriae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 70-71.

Diagnosis : Feather claw 5 rayed, second ventral seta on abdomen shorter than third ventral seta ; shield lacking longitudinal wrinkles ; microtubercles more or less evenly developed dorsally and ventrally. Female genital setae not longer than length of genitalia.

Host : *Ficus infectoria*.

Nature of damage : This mite lives underneath bud scales. The infested branches of plants show reduced or malformed leaves (Channa-Basavanna, 1966).

Distribution : INDIA ; Delhi, West Bengal, Tamil Nadu.

Remarks : Nothing about its bionomics is known.

203. *Aceria jasmini* ChannaBasavanna

Aceria jasmini ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 75-76.

Diagnosis : Body cylindrical, feather claw 4 rayed ; shield design obscure, only short longitudinal line on rear shield just in front and latered of dorsal tubercles ; shield strongly granulated.

Host : Jasmine.

Nature of damage : This mite causes felt-like white hairy outgrowth on the leaves, tender stems and flower buds. The affected plants show stunted growth (Subramaniam, 1936). Medium-cum-pointed bud varieties are highly resistant while long-cum-pointed bud varieties are highly susceptible (Sundaraj *et al.*, 1967).

Bionomics : According to Letchoumanane (1979) the life cycle takes 2-3 weeks while the duration of eggs and nymphal periods are respectively 3-5 and 8-11 days. Mite population is abundant during April-October and declines thereafter until February. High temperature and low R.H. favoured the build up of population.

Control : Aldicarb (2kg toxicant/ha) provided good control over this mite.

Distribution : INDIA : Karnataka, Maharashtra, Tamil Nadu.

204. *Aceria justiciae* ChannaBasavanna

Aceria justiciae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 74-75.

Diagnosis : Feather claw 4 rayed ; second coxal setae almost opposite anterior coxal approximation ; median line on rear half shield without a dart at posterior end ; three diagonal lines anteriorly on shield sides.

Hosts : *Justicia betonica*, *Justicia glabra*, *Achyranthus aspera*.

Nature of damage : These mites produce patches of dense hairy outgrowths on upper surface of leaves and stems (ChannaBasavanna, 1966).

Distribution : INDIA : Tamil Nadu.

Remarks : No information on bionomics of this species is available.

205. *Aceria litchii* (Keifer)

Eriophyes litchii Keifer, 1943, *Bull. Calif. Dep. Agr.*, 32 : 212.

Aceria litchii, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 72.

Diagnosis : Brownish mite, feather claw 5 rayed, median line almost

complete with a dart shaped mark near rear shield margin ; coxae strongly tuberculated.

Host : Litchi.

Nature of damage : These mites normally infest the leaves. Its feeding causes deformations as well as twisting and appearance of chocolate brown erineum on the lower surface of leaves (Misra, 1912 ; Puttarudriah & ChannaBasavanna, 1959 ; Gupta, 1980). The erineum is whitish brown at the initial stage and later turns into chocolate brown. Sometimes fruits are also damaged (Mathur, 1972).

Bionomics : The population of this mite is seen in the field throughout the year. Its population is more during May-June, declines with the onset of monsoon, reappears in late September and is maintained at low level upto December. Thereafter, it becomes negligible (Gupta, 1980).

Control : Sparyings of Akar 338, phosphamidon, thiometon, dimethoate or docofol at 10 days intervals were found to be quite effective (Mathur, 1972). Prasad & Singh (1972) found, 1. pruning of infested twigs continuously for three years, 2. pruning twice during June-August for 2 years and spraying with Mico Wet sulphur (0.04%) to be quite effective.

Distribution : INDIA : Karnataka, Bihar, West Bengal, Tripura ; outside India : Pakistan, Hawaii.

206. *Aceria lycopersici* (Wolff.)

Phytoptus lycopersici Wolff., 1879, *Monatschr. Gartenb.*, 22 : 424.

Aceria lycopersici, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 80-82.

Diagnosis : Feather claw 4 rayed ; shield with indistinct median line, admedian complete ; shield sides with prominent punctations intermingled with short wavy lines. Abdomen with 58-68 rings, microtuberculate, tubercles sparser on the dorsum, oval. Genital coverflap with 10-12 longitudinal ribs.

Hosts : Brinjal, tomato.

Nature of damage : This mite lives on the under surface of leaves causing the appearance of abnormal growth of hairs both on stems and leaves. The affected plants turn greyish white.

Bionomics : It is seen throughout the year but more common during June-November.

Control : Gupta, Sidhu & Singh (1975) reported that carbopheno-

thion, carbofuran, dicrotophos, fenitrothion, fenthion, monocrotophos, phosalone and vamidothion all at 0.015% could bring effective control of the pest and cause mortality as much as 90%.

Distribution : INDIA : Punjab, Karnataka, Delhi, Tamil Nadu, West Bengal ; outside India : World wide.

207. *Aceria malloticola* (Mohansundaram)

Eriophyes malloticola Mohansundaram, 1980, *Indian J. Acar.*, 4(1) : 1-2.

Diagnosis : Shield with a pattern of lines ; median and admedians complete ; first submedian represented in the anterior $3/4$; second submedians in the shield borders ; sides of the shield with fine scorrings. Feather claw 4 rayed. Coxae with a clear sternal line, coxal area fairly clear. Abdomen with about 75 rings, uniformly microtuberculate.

Host : *Mallotus philippinensis*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

208. *Aceria mangiferae* Sayed

Aceria mangiferae Sayed, 1946, *Bull. Soc. Fouad 1er Ent. Egypte*, 30 : 7-10.

Aceria mangiferae, Narasimhan, 1954, *Curr. Sci.*, 23 : 297-298.

Diagnosis : Shield broad, rounded at the apex, median line almost complete, admedian lines complete ; first submedian bulging in semicircle finally curving to meet the rear ends of the admedian lines. Forecoxae with few indistinct longitudinal lines. Abdomen with 55 rings, uniformly microtuberculate. Female genital coverflap with 2 series of longitudinal scorings.

Host : Mango.

Nature of damage : This is a serious pest of mango in India and in the other mango growing areas of the world. It causes two types of malformations, viz. vegetative malformation and floral malformation. In case of the former, the bracts become much elongated and floral parts become rudimentary. There is a swelling of several buds at a place and small shootlet crowded with leaf rudiments appear giving the shape of bunchy top on the shoot. In floral malformation, the phyllotaxy of inflorescence is similar to normal panicles. The floral parts look like normal flowers but are thicker, stouter and enlarged. In normal panicle, the development and growth come to

an end after fertilization but in the malformed ones the panicles continue to grow even after fertilization. Thus, they remain fresh for a long time. The association of this mite with mango malformation was first reported by Narasimhan (1954). Constant association of this mite with diseased panicles prompted the bud-mite toxin theory (Puttarudriah & ChannaBasavanna, 1961; Nariani & Seth, 1962). However, Satter (1946) considered this disease either of virus origin or because of physiological disorders. Through a series of experiments, Bindra & Bakhetia (1971) disproved: 1. that the malformation is due to imbalance in nutrition (NPK), 2. that the malformation is due to injection of toxins by bud-mite and 3. that the mite acted as a vector. According to them, it was due to some graft transmissible pathogene. According to the present knowledge, this disease is most probably caused by a fungus called *Fusarium monilliforme*, the spores of which are borne externally by the mite (Summanwar *et al.*, 1966; Summanwar, 1967; Summanwar & Roychaudhuri, 1968).

Bionomics: Population dynamics of this mite was studied in Punjab by Bindra & Bakhetia (1969). They also studied the inter-varietal variation of mite population in different varieties of mango. No variety was found to have real resistance against this mite. No correlation between mite population and incidence of malformation could be established. It was also found that bud-mite population was not significantly higher in malformed buds than in apparently healthy buds.

Control: Various recommendations are known for the control of this mite. Those are: pruning (Narasimhan, 1959; Singh, 1956; Puttarudriah & ChannaBasavanna, 1961; Prasad & Singh, 1972a); spraying of pesticides before bursting of buds (Prasad *et al.*, 1965); diazinon and phorate as 0.03% EC @ 25 L/acre (Rai *et al.*, 1966); dimethoate, methyl demeton or phosphamidon as 0.01% EC (Yadav & Varma, 1969); methyl bromide fumigation (Seth & Nariani, 1966), aldicarb 0.05 gm/plant (Varma & Yadav, 1970); diazinon, monocrotophos or phosphamidon as 0.1% EC (Srivastava, 1974) and diazinon 0.01% (Butani & Srivastava, 1979). While comparing three methods of pesticidal applications, *viz.* bark application, trunk application and foliar spray, the bark application of dicrotophos as 11 ml ai/100 cm. of circumference and 1 mt. above ground level was found to be most effective while foliar application of dimethoate and phorate as 0.1-0.2% EC in the summer months was also very effective (Bindra & Bakhetia, 1971a).

Natural enemies : Gupta *et al.* (1971) reported *T. eharai* and *Cheyletus fortis* feeding upon this mite.

Distribution : INDIA : Punjab, Haryana, Delhi, Bihar, Karnataka, Tamil Nadu, West Bengal ; outside India : Egypt, Southern Asia, Brazil.

209. *Aceria medicaginis* (Keifer)

Eriophyes medicaginis Keifer, 1941, *Bull. Calif. Dep. Agr.*, 30 : 206.

Aceria medicaginis, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 69-70.

Diagnosis : Feather claw 5 rayed ; second ventral seta on abdomen shorter than third ventral seta ; shield lacking longitudinal wrinkles ; abdominal microtubercles stronger below, suppressed on the dorsum.

Host : *Medicago sativa*.

Distribution : INDIA : Karnataka, Tamil Nadu.

Remarks : No economic importance of this species is known.

210. *Aceria mori* (Keifer)

Eriophyes mori Keifer, 1939, *Bull. Calif. Dep. Agr.*, 28 : 485.

Aceria mori, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 71.

Diagnosis : Light creamish mite, feather claw 5 rayed ; microtubercles more or less evenly developed dorsally and ventrally ; shield design distinct ; first and second submedian lines not confluent ; female genital setae not longer than length of genitalia ; coxae smooth.

Host : Mulberry.

Distribution : INDIA : Punjab, Delhi.

Remarks : The economic importance of this mite is unknown.

211. *Aceria nandiensis* ChannaBasavanna

Aceria nandiensis ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 79-80.

Diagnosis : Feather claw 4 rayed, second coxal setae well behind anterior coxal approximation ; shield with one or more longitudinal lines on mid-shield ; median line forking to form a trapezium on rear half shield ; female genital coverflap with indistinct longitudinal scoring only in the middle.

Host : *Strobilanthus* sp.

Nature of damage : This mite induces whitish erineum patches on both surfaces of leaves (ChannaBasavanna, 1966).

Bionomics : Nothing is known.

Distribution : INDIA : Karnataka.

212. *Aceria nerii* ChannaBasavanna

Aceria nerii ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 78-79.

Diagnosis : Pale yellow mite, shield obsolete, ending laterally in front of dorsal tubercles ; dorsal tubercles at rear shield margin elongate ; feather claw 4 rayed.

Hosts : *Nerium odorum*, *N. indicum*.

Distribution : INDIA : Karnataka, Punjab, Delhi, West Bengal, Tamil Nadu.

Remarks : No economic importance of this species is known.

213. *Aceria pongamiae* ChannaBasavanna

Aceria pongamiae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 57-58.

Diagnosis : Body cylindrical, whitish or creamy, feather claw 7 rayed ; shield design narrowly truncated in front ; median line not clear ; admedian lines close to one another, complete, meet at rear shield margin, second submedian stopping short $\frac{1}{3}$ from rear margin to meet first submedians and admedian. Abdomen with about 70 rings uniformly microtuberculate.

Hosts : *Pongamia glabra*, *Pongamia pinnata*.

Nature of damage : This mite produces elongated pouch shaped galls on tender leaves opening on upper surface. Mites live amidst hairy outgrowths lining the inner surface of galls (ChannaBasavanna, 1966).

Distribution : INDIA : Karnataka, West Bengal, Tamil Nadu.

Remarks : Work on bionomics of this species has not been done.

214. *Aceria puttardriahi* ChannaBasavanna

Aceria puttardriahi ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 77-78.

Diagnosis : Body cylindrical, whitish or light creamish ; shield characterised by a transverse sinuate line near rear margin extending just latered of dorsal tubercles where it joins a longitudinal line from the margin ; remaining shield bare ; feather claw 4 rayed.

Host : Cotton.

Nature of damage : This mite produces felt-like outgrowths of white hairs on tender shoots including squares, leaves etc. As a result, the plants are stunted and boll formation is affected (ChannaBasavanna, 1966).

Bionomics : Nothing is known in this regard.

Distribution : INDIA : Karnataka, Tamil Nadu.

215. *Aceria ruelliae* ChannaBasavanna

Aceria ruelliae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 86-87.

Diagnosis : Feather claw 4 rayed ; second coxal seta well behind anterior coxal approximation ; shield with one or more longitudinal lines on mid-shield ; longitudinal scorings on coverflap evenly distributed over entire width ; shield sides not granulated ; second coxal seta away from first coxal seta, abdominal lines incomplete, evident on mid-shield only ; abdomen with about 65 rings with more or less uniformly microtubercles, touching rear ring margins.

Host : *Ruellia patula*.

Nature of damage : This mite induces whitish erineum patches on stem and leaf surfaces of tender shoots.

Bionomics : Nothing is known.

Distribution : INDIA : Tamil Nadu.

216. *Aceria saccharini* Wang

Aceria saccharini Wang, 1964, *Rept. Taiwan Sug. Exp. Sta.*, 33 : 83-94.

Aceria sacchari ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 55-57.

Diagnosis : Body creamish ; shield truncated at apex, median line almost complete, very gently sinuate but broken up in short length more specially on rear half ; sides of shield granular, intermingled with short strokes and slightly longer lines ; rear of shield between dorsal tubercles also with sparse short strokes. Feather claw 7 rayed.

Host : Sugarcane.

Nature of damage : The formation of erineum by this mite on sugarcane was first reported from south India (Muthukrishnan, 1956). These mites form gall like pustules. Those are firstly light green and later become rusty red. Some saprophytic fungi like *Alternaria* sp., *Fusarium* sp., etc. may also establish in some cases. According to some workers, the formation of erineum is because of injection of certain toxins and excretion of nitrogenous wastes and these affect the

epidermal layer causing disruption of tissues (Agarwal & Kandasami, 1959). Subsequently, this disease was reported from different other parts of India (Puttarudriah & Usman, 1957 ; Puttarudriah, 1960 ; Puttarudriah & ChannaBasavanna, 1961a ; Agarwal & Bhatia, 1965 ; Singh, 1966). The content of phosphorus, potassium and nitrogen are higher in the infested regions while the content of total sugar is increased insignificantly. Though no change takes place at the level of sodium but the level of silica, calcium and magnesium are marginally reduced in the infested regions (Sithanantham *et al.*, 1975). The colonisation of mite in different sugarcane varieties depended not only on the physico-chemical differences of varieties but also on the anatomical characters of leaf sheath (Sithanantham & Velayuthan, 1979). The association of streak virus disease with the mite infestation has also been shown in the recent years (Sithanantham, 1979).

Bionomics : The eggs are laid singly or in groups of 6-7 in pustules where the entire life cycle is spent within it. The life cycle takes 15 days at 71-84°F. Overlapping of several generations in a year also takes place.

Control : No information in this regard is available.

Distribution : INDIA : Karnataka, Punjab, Tamil Nadu, Andhra Pradesh.

217. *Aceria sapindi* ChannaBasavanna

Aceria sapindi ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 67-68.

Diagnosis : Feather claw 6 rayed ; female genital coverflap with longitudinal stripes in single series ; abdomen with microtubercles even dorsally and ventrally ; forecoxae with longitudinal wavy lines ; shield sides very sparsely granulated ; first submedian recurving out in front of dorsal tubercles.

Hosts : Soap-nut (*Sapindus saponaria*), *Sapindus emerginatus*.

Distribution : INDIA : Karnataka, Tamil Nadu.

Remarks : This mite is of no known economic importance.

218. *Aceria sheldoni* (Ewing)

Eriophyes sheldoni Ewing, 1937, *Proc. Ent. Soc. Wash.*, 29 : 193.

Aceria sheldoni, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 70.

Diagnosis : Shield design indistinct or may be distinct. It has

5 rayed feather claw. The coxae are granular and there is short sternal line between the forecoxae. Abdominal microtubercles elliptical in some mites, the microtubercles tend to be pointed over the telosomal ring margins. The female genital coverflap has 10-12 longitudinal ribs.

Host : Citrus.

Nature of damage : No significant damage is caused by this mite in India. However, elsewhere, it infests all stages of buds and causes their withering. The feeding is also known to cause multiple budding in infested twigs. Leaves from such buds are of curious shapes.

Bionomics : The time required to complete egg to egg stage is 12-33 days (Jeppson *et al.*, 1975). The biology has been studied by Sternlicht (1970).

Distribution : INDIA : Karnataka, Punjab.

219. *Aceria sorghi* ChannaBasavanna

Aceria sorghi ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 63-64.

Diagnosis : Feather claw 6 rayed ; female genital coverflap with longitudinal stripes in single series ; abdomen with elongate close-set microtubercles on dorsum, remaining surface with sparser less elongate microtubercles.

Host : *Sorghum vulgare*.

Distribution : INDIA : Delhi, Tamil Nadu.

Remarks : No economic importance of this mite is known.

220. *Aceria tulipae* (Keifer)

Eriophyes tulipae Keifer, 1938, *Bull. Calif. Dep. Agr.*, 27 : 185.

Aceria tulipae, Puttarudriah & ChannaBasavanna, 1958, *FAO Pl. Prot. Bull.*, 6 : 123-126.

Diagnosis : Forecoxae granulated, not with stripes ; female genital coverflap with more than 6 longitudinal stripes ; second ventral seta on abdomen much shorter than third ventral seta ; feather claw 7 rayed.

Host : Garlic.

Distribution : INDIA : Karnataka ; outside India : U.S.A.

Nature of damage : It causes significant damage to garlic in Mysore (Puttarudriah & ChannaBasavanna, 1958). The infestation causes checking the growth of the plants. The younger leaves become arched

and their tips touch the next old leaf in a characteristic way. Such leaves never unfurl properly and sizes of bulbs become reduced (Puttarudriah & ChannaBasavanna, 1959). It is known to transmit wheat streak mosaic virus in different parts of the world (Oldfield, 1970) including India (Jeppson *et al.*, 1975). A linear relationship exists between length of acquisition-feeding period and percentage of plants that become infested. The virus persists in this species at least for 6 days even through the moult. It also serves as a vector for wheat spot mosaic virus.

Bionomics & Control : Nothing is known in this regard.

Distribution : INDIA : Karnataka ; outside India : Europe, Canada, U.S.A.

221. *Aceria agallochae* Mohansundaram

Aceria agallochae Mohansundaram, 1983, *Acarologia*, 24(1) : 44.

Diagnosis : Shield area fairly clear except for the faint representation of admedians in the anterior part of shield and a pair of fork like markings below shield tubercles ; sides of shield with fine scorings. Feather claw 5 rayed. Abdomen with 55 rings uniformly microtuberculate except for the telosomal tergites. Female genital coverflap smooth.

Host : *Excoecaria agallocha*.

Distribution : INDIA : Tamil Nadu.

222. *Aceria setaceus* Mohansundaram

Aceria setaceus Mohansundaram, 1983, *Acarologia*, 24(1) : 44-48.

Diagnosis : Shield with median line represented in the posterior 1/3 of the shield, admedians complete ; first submedian complete, second submedian complete and converge anteriorly, an inverted 'V' shaped fork on either side in line with the dorsal tubercles between first and second submedians ; third submedians form the border of the shield, sides of shield with fine scorings. Feather claw 6 rayed. Abdomen with about 75 rings, uniformly microtuberculate, microtubercles reduced in the telosomal dorsum. Female genital coverflap with 10 lines.

Host : *Aristida setaceae*.

Distribution : INDIA : Tamil Nadu.

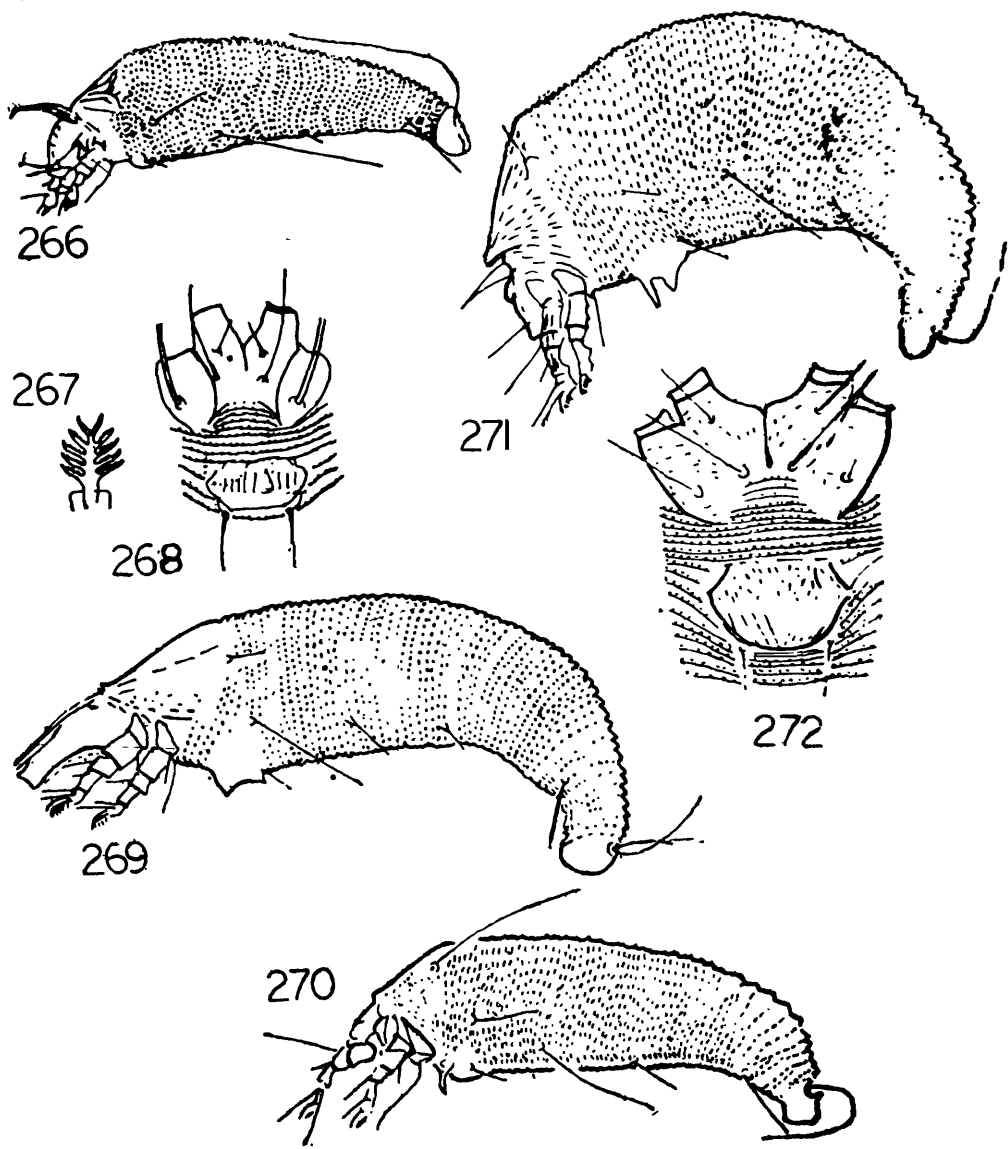
Genus **Eriophyes** von Siebold

(Figs. 266-268)

Eriophyes von Siebold, 1851, *Schles. Ges.*, 28 : 89.

Key to the Species of Eriophyes

1. Feather claw 4 rayed	...	...	<i>ladakhensis</i>
— Feather claw more than 4 rayed	...	...	2
2. Feather claw 5 rayed	...	...	<i>acaciae</i>
— Feather claw more than 5 rayed	...	...	3



Figs. 266-268 : *Eriophyes* sp.
Fig. 269 : *Keiferophyes* sp.
Fig. 270 : *Paraphytoptus* sp.
Figs. 271-272 : *Neophytoptus* sp.

3. Feather claw 6 rayed	...	...	4
— Feather claw more than 6 rayed	...	...	5
4. Shield with median line represented in the posterior $\frac{3}{4}$ either continuously or as short broken lines ; dorsal tubercle at posterior margin of shield ; abdomen with 80-85 rings, female genital coverflap with 10-14 lines	...	...	<i>cymbopogonis</i>
— Shield with median line complete with very prominent dart at rear shield margin, dorsal tubercle ahead of rear shield margin ; abdomen with 75 rings ; female genital coverflap with longitudinal lines	...	...	<i>casuarinae</i>
5. Feather claw 7 rayed	...	...	<i>prosopidis</i>
— Feather claw 8 rayed	...	...	<i>cheriani</i>

** The species *cernuus* could not be included in key for lack of adequate description and also the original description was not available to the author.

223. *Eriophyes acaciae* Mohansundaram

Eriophyes acaciae Mohansundaram, 1981, *Oriental Ins.*, 14(3) : 375-377.

Diagnosis : Shield triangular, median line complete at posterior half, admedians complete, wavy ; first submedian broken forming border of shield, shield area granular, sides with fine striations. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 70 uniformly microtuberculate rings. Genital coverflap of female with 6 lines.

Host. *Acacia* sp.

Distribution : INDIA : Tamil Nadu.

Remarks : This mite causes reddish pink leaflet galls. The compound leaf turns into elongated gall without any trace of leaflet. Inside of galls are hairy where all stages of mites are seen.

224. *Eriophyes alangii* Nalepa

Eriophyes alangii Nalepa, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 422.

Hosts : *Alangium salvifolium*, *Gyrocarpus* sp.

Distribution : INDIA : Tamil Nadu.

Remarks : These mites are found in the erineum patches resulting in gall like depressions on the lower sides of the leaves.

225. Eriophyes casuarinae ChannaBasavanna

Eriophyes casuarinae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 46-47.

Diagnosis : Feather claw 6 rayed, median line ending in a prominent dart at rear shield margin ; abdomen with about 75 rings, uniformly microtuberculate ; microtubercles oval in outline, close set occupying about 3/4 width from rear ring margins.

Host : *Casuarina equisetifolia*.

Distribution : INDIA : Karnataka.

226. Eriophyes cernuus Masee

Eriophyes cernuus Masee, 1933, *Ann. Mag. Nat. Hist.*, (10) 11 : 201-203.

Eriophyes cernuus, Cherian, 1931, *J. Asiat. Soc. Beng.*, 27 : 141-147.

Diagnosis : Brownish mite found within ber galls.

Host : *Zizyphus jujuba*.

Remarks : It is associated with galls in *Z. jujuba*. No definite information on its etiology is available. Population is maximum on young galls.

Distribution : INDIA : Tamil Nadu, Karnataka, Punjab.

227. Eriophyes cheriani Masee

Eriophyes cheriani Masee, 1933, *Ann. Mag. Nat. Hist.*, (10) 11 : 201-203.

Eriophyes cheriani, Mani, 1933, *Ann. Mag. Nat. Hist.*, 12 : 138-139.

Diagnosis : Body cylindrical, narrowly tapering at caudal end. Shield ornamented with longitudinal furrows in middle marking at sides of shield not so conspicuous, short and curved. Rostrum strongly curved. Feather claw 8 rayed. Abdomen narrowly ringed, about 80 rings. Dorsum and venter strongly punctate. Genital coverflap conspicuous and marked with pronounced longitudinal lines.

Host : *Pongamia glabra*.

Nature of damage : Mani (1933) reported this mite associated with the formation of cephalic galls on the leaves of *Pongamia glabra*. The galls are of 1/2 inch and are seen on the upper surface of leaves and occasionally on the lower surface of leaves as well. The galls are green in colour.

Distribution : INDIA : Tamil Nadu, Himachal Pradesh, Punjab.

228. *Eriophyes cymbopogonis* Mohansundaram & Subramaniam

Eriophyes cymbopogonis Mohansundaram & Subramaniam, 1978, *Indian J. Acar.*, 2 : 39-41.

Diagnosis : Feather claw 6 rayed, presence of wavy crosslines connecting the admedians with the base of the submedians on either sides ; shield pattern clear, sides of shield with short wavy lines and granulations. Abdomen with 80-85 rings, uniformly microtuberculate, microtubercles elongate situated at the posterior margin of each ring.

Host : *Cymbopogon martini*.

Nature of damage : This mite causes the twisting of emerging leaves. The affected plants are paler in colour and normal leaves are not developed (Mohansundaram & Subramaniam, 1978).

Distribution : INDIA : Tamil Nadu.

229. *Eriophyes ladakhensis* Rishi & Rather

Eriophyes ladakhensis Rishi & Rather, 1982, *Indian J. Acar.*, 6 : 14-16.

Diagnosis : Shield lack markings. Dorsal setae project backward. Feather claw 4 rayed. Abdomen with 65-70 rings, uniformly microtuberculate ; microtubercles triangular in outline. Female genital coverflap with 10-12 longitudinal ribs.

Hosts : *Indigofera heterantha*, *Setaria italica*, *Bougainvillea* sp.

Distribution : INDIA : Jammu & Kashmir.

230. *Eriophyes prosopidis* Saxena

Eriophyes prosopidis Saxena, 1942, *Indian J. Ent.*, 4 : 215.

Diagnosis : Body reddish, cylindrical narrow posteriorly. Feather claw 7 rayed, third coxal setae long, second short, first longer than second. Abdominal rings about 80 in numbers.

Host : *Prosopis spicigera*.

Nature of damage : The development of the normal floral parts in *Prosopis spicigera* is checked due to the activities of this mite.

The mites attack young buds and produce irregular globose agglomerated semisolid galls.

Distribution : INDIA : Delhi.

Genus **Keiferophyes** Mohansundaram

(Fig. 269)

Keiferophyes Mohansundaram, 1983, *Acarologia*, 24(1) : 48.231. **Keiferophyes avicenniae** Mohansundaram*Keiferophyes avicenniae* Mohansundaram, 1983, *Acarologia*, 24(1) : 48.

Diagnosis : Shield with median line absent, admedians complete, submedians represented in the anterior half, rest of shield area and sides of shield granular. Dorsal tubercle at shield margin. Feather claw 5 rayed. Abdomen with about 65 rings, uniformly microtuberculate. Female genital coverflap granular and without lines.

Host : *Avicennia officinalis*.

Distribution : INDIA : Tamil Nadu.

Genus **Paraphytoptus** Nalepa

(Fig. 270)

Paraphytoptus Nalepa, 1896, *Anz. Akad. Wiss. Wien.*, 33 : 55.232. **Paraphytoptus chrysanthemi** Keifer*Paraphytoptus chrysanthemi* Keifer, 1940, *Bull. Calif. Dep. Agr.*, 29 : 27.*Paraphytoptus chrysanthemi*, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 87-88.

Diagnosis : Feather claw 5 rayed. Shield with median line complete ending at the rear margin in a dart shaped mark ; admedians complete, gradually diverging ; first submedian runs back only half way, second submedian line forks twice in front of the dorsal tubercle. Dorsal setae quite long. Abdomen differentiated into tergites and sternites at about the rear 1/4, each of these tergites cover about two sternites. Female genital coverflap with 3 basal transverse lines of granules and about 16 longitudinal ribs.

Host : *Chrysanthemum*.

Nature of damage : Though in other parts of the world this mite is known to cause malformation of shoots and witches' brooms effects, but in India, no apparent injury is caused by it. Feeding of this mite causes stunting and backward curling of apical leaves. The infested leaves become reddish and brittle. It also causes flower phyllody (Jeppson *et al.*, 1975).

Distribution : INDIA : Karnataka, Delhi, Tamil Nadu.

Genus **Neophytoptus** Mohansundaram
(Figs. 271-272)

Neophytoptus Mohansundaram, 1981, *Indian J. Acar.*, 5 : 17.

233. **Neophytoptus ocimae** Mohansundaram

Neophytoptus ocimae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 17-18.

Diagnosis : Shield triangular, marked with thick, short broken lines dorsally and laterally. Dorsal tubercle a little ahead of rear shield margin. Feather claw 4 rayed. Abdomen with about 60 tergites and 82 sternites, microtuberculate. Female genital coverflap with basal irregular scorings and distal longitudinal lines.

Host : *Ocimum* sp.

Distribution : INDIA : Tamil Nadu.

Genus **Phytoptus** Dujardin
(Figs. 273-274)

Phytoptus Dujardin, 1851, *Ann. Sci. Nat. S. 3 Zool.*, 15 : 166.

Key to the Species of Phytoptus (after Mohansundaram, 1981)

1. Feather claw 4 rayed	...	...	2
— Feather claw more than 4 rayed	...	...	4
2. Fore and hind claw not equal in length	...	...	3
— Fore and hind claw equal in length, shield with a pattern of thin broken lines ; tibial setae very long	...	...	<i>lantanae</i>
3. Lateral seta longer than first ventral seta, coxae with long scorings ; shield with clear pattern of lines	...	...	<i>cypert</i>
— Lateral seta not longer than first ventral seta, coxal area smooth, shield with faint lines	...	...	<i>canthii</i>
4. Feather claw 5 rayed	...	...	5
— Feather claw 6 rayed	...	...	15
5. Coxal area granular or with scorings	...	...	6
— Coxal area smooth without any markings	...	...	7
6. Coxae granular, shield with bold lines	...	...	<i>ficivorus</i>
— Coxae with long scorings, shield with thin lines	...	...	<i>rubifoliae</i>

7. Tibial seta 7 microns long, fore and hind claw equal in length	...	...	<i>rosae</i>
— Tibial seta shorter, hind claw longer than fore claw	...	...	8
8. Second ventral seta very short ; shield with median as broken line, admedians complete, sides with scorings	...	...	<i>subbaraoi</i>
— Second ventral seta more than 5 microns long, shield otherwise	...	...	9
9. Hind claw more than twice the length of fore claw ; medians and admedians represented as broken lines	...	...	<i>karnatakaensis</i>
— Hind claw less than twice the length of fore claw	...	...	10
10. Shield pattern with longer lines	...	...	11
— Shield pattern represented with short broken lines	...	...	12
11. First and second ventral setae not equal in length	...	...	<i>eletariae</i>
— First and second ventral setae equal in length, tibial seta absent	...	...	<i>alangii</i>
12. Second ventral seta longer than first ventral seta ; all shield lines faintly represented	...	...	<i>terminaliae</i>
— Second ventral seta not longer than first ventral seta	...	...	13
13. Genital coverflap without any line	...	...	<i>morindae</i>
— Genital coverflap with lines	...	...	14
14. Genital coverflap with about 20 lines ; shield without any line in central area	...	...	<i>breyntiae</i>
— Genital coverflap with about 14 lines ; shield with all lines present	...	...	<i>carissae</i>
15. Coxal area smooth	...	...	16
— Coxal area with fine scorings, shield marked with short lines	...	...	<i>laurae</i>
16. Shield with median line broken, admedians complete, sides with scorings	...	...	<i>glycosmisae</i>
— Shield with all lines complete	...	...	<i>casuarinae</i>

234. *Phytoptus alangii* (Nalepa)

Eriophyes alangii Nalepa, 1929, *Marcellia*, 25 : 67-183.

Phytoptus alangii, Mohansundaram, 1981, *Indian J. Acar.*, 5 : 1.

Diagnosis : Feather claw 5 rayed, simple. Shield with all lines

represented by broken lines, sides of shield with lines. Coxal area smooth. Female genital coverflap with 14 longitudinal scorings.

Hosts : *Alangium salvifolium*, *Gyrocarpus* sp.

Distribution : INDIA : Tamil Nadu ; outside India : Java.

Remarks : This species appears to be same as *E. alangii* Nal.

235. *Phytoptus breyniae* Mohansundaram

Phytoptus breyniae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 2-3.

Diagnosis : Shield clear, sides of shield with numerous fine broken lines. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with about 50 uniformly microtuberculate rings, microtubercles round. Female genital coverflap with about 20 lines.

Host : *Breynia patens*.

Distribution : INDIA : Tamil Nadu.

236. *Phytoptus canthii* (ChannaBasavanna)

Eriophyes canthii ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 51-52.

Diagnosis : Feather claw 4 rayed ; coxae almost smooth ; third ventral a little shorter than lateral and much shorter than first ventral setae on abdomen. Abdomen with 48-54 rings, uniformly microtuberculate ; microtubercles oval in outline occupying the entire widths of ring from rear margins ; last 6-8 rings almost bare dorsally with elongate microtubercles ventrally.

Host : *Canthium parviflorum*.

Nature of damage : This mite produces gall-like pustules on both surfaces of leaves, each gall contains a number of mites in all stages of development.

Distribution : INDIA : Karnataka.

237. *Phytoptus carissae* Mohansundaram

Phytoptus carissae Mohansundaram, 1981, *India J. Acar.*, 5 : 3-5.

Diagnosis : Shield broadly rounded in front with very thick clear lines, median line complete except for short distance towards the apex, admedians slightly converging towards the apex. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 55 rings, with elongated microtubercles ventrally. Female genital coverflap with faint lines.

Host : *Carissa* sp.

Distribution : INDIA : Kerala.

238. Phytoptus cyperi (ChannaBasavanna)

Eriophyes cyperi ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 50-51.

Diagnosis : Feather claw 4 rayed ; coxae ornamented with short lines ; third ventral setae longer than lateral and other ventral setae on abdomen. Abdomen with 75 rings uniformly microtuberculate, microtubercles elongate, oval, occupying about $3/4$ width of rings and extending slightly beyond rear margins.

Hosts : *Cyperus pangorii*, *C. rotundus*.

Distribution : INDIA : Karnataka.

239. Phytoptus eletariae Mohansundaram

Phytoptus eletariae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 5-6.

Diagnosis : Shield with median, admedian and submedian lines represented as broken lines. Dorsal tubercle a little away from shield margin. Feather claw 5 rayed. Abdomen with about 68-70 rings, uniformly microtuberculate. Female genital coverflap with 12-14 lines.

Host : *Eletaria cardamomum*.

Distribution : INDIA : Tamil Nadu.

240. Phytoptus casuarinae (ChannaBasavanna)

Eriophyes casuarinae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 46-47.

Diagnosis : Feather claw 6 rayed, median line ending in a prominent dart at rear shield margin ; abdomen with about 75 rings, uniformly microtuberculate ; microtubercles oval in outline, close-set occupying about $3/4$ width from rear ring margins.

Host : *Casuarina equisetifolia*.

Distribution : INDIA : Karnataka.

241. Phytoptus ficivorus (ChannaBasavanna)

Eriophyes ficivorus ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 49-50.

Diagnosis : Body whitish ; shield with median line near $1/3$ only ; shield sides granulated.

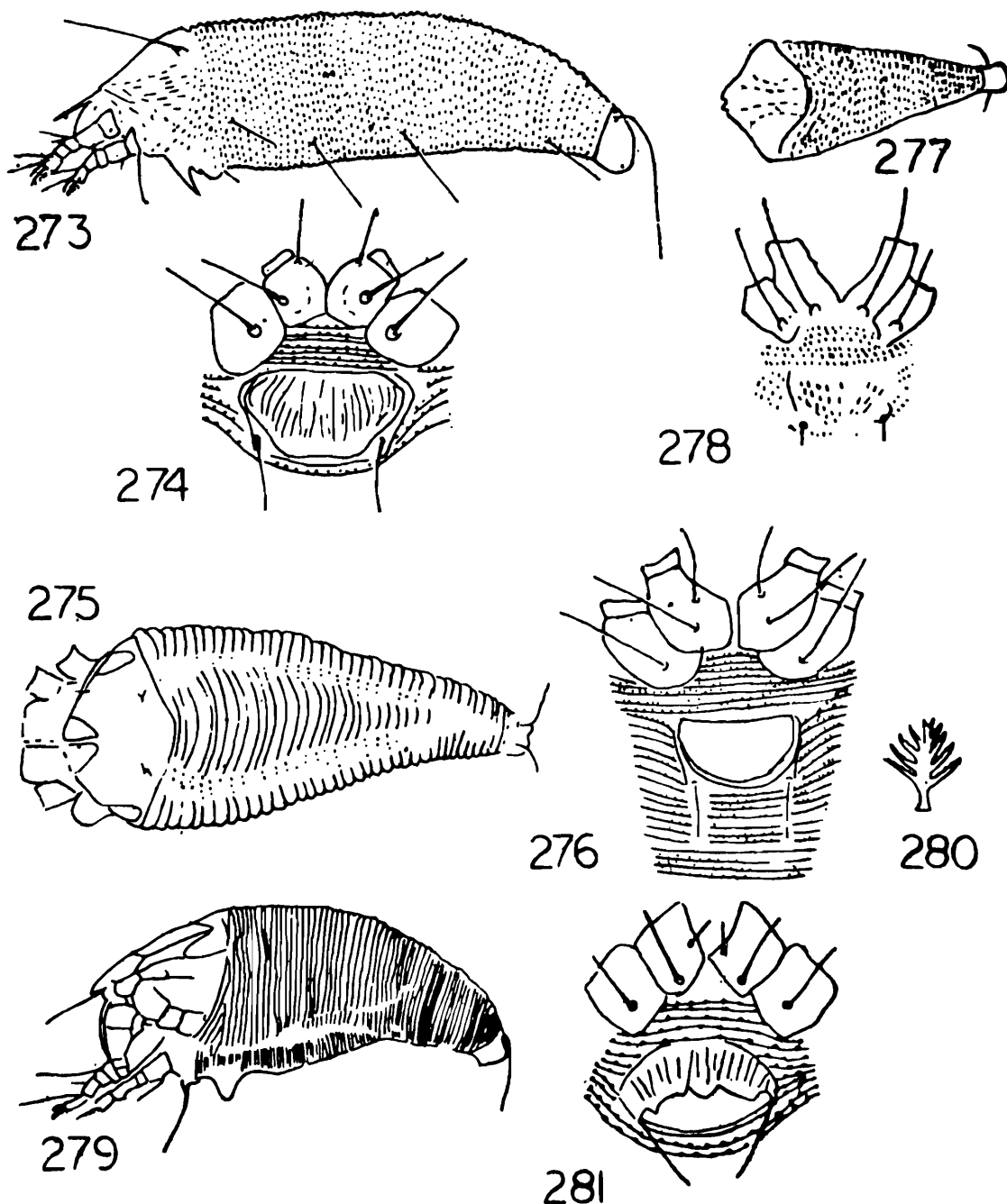
Host : *Ficus infectoria*.

Nature of damage : The infested leaves become paler and some become malformed.

Distribution : INDIA : Delhi.

242. *Phytoptus glycosmisae* Mohansundaram*Phytoptus glycosmisae* Mohansundaram, 1981, *Indian J. Acar.*, 5 : 6-7.

Diagnosis : Shield with a clear pattern of lines. Median faint, broken, represented in posterior half only ; admedians clear and complete, first submedian represented in the anterior half of shield ; second and third submedians represented in midportion of shield.

Figs. 273-274 : *Phytoptus* sp.Figs. 275-276 : *Paracaphylla* sp.Figs. 277-278 : *Acaphylla* sp.Figs. 279-281 : *Calacarus* sp.

Dorsal tubercle a little away from shield margin. Feather claw 6 rayed. Abdomen with 58-60 rings, uniformly microtuberculate. Genital coverflap with 16 lines.

Host : Glycosmis pentaphylla.

Distribution : INDIA : Tamil Nadu.

243. *Phytoptus lantanae* Mohansundaram

Phytoptus lantanae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 8-9.

Diagnosis : Shield with standard shield markings not discernible, shield with a series of wavy broken lines. Dorsal tubercle near rear shield margin. Feather claw 4 rayed. Abdomen with about 65 rings, uniformly microtuberculate. Genital coverflap with 14 lines.

Host : Lantana camera.

Distribution : INDIA : Tamil Nadu.

244. *Phytoptus laurae* Mohansundaram

Phytoptus laurae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 9-10.

Diagnosis : Shield area and sides of shield with series of short lines. Dorsal tubercle just away from rear shield margin. Feather claw 6 rayed. Abdomen with about 70-75 rings, uniformly microtuberculate. Genital coverflap with 12-18 lines.

Host : Litsea wightiana.

Distribution : INDIA : Tamil Nadu.

245. *Phytoptus morindae* Mohansundaram

Phytoptus morindae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 10-12.

Diagnosis : Shield broadly rounded at apex at dorsal view, median line absent, admedians and submedians faintly represented or nearly indistinct, sides of shield granular. Abdomen with 40-45 rings, uniformly microtuberculate. Female genital coverflap without lines.

Host : Morinda tinctoria.

Distribution : INDIA : Tamil Nadu.

246. *Phytoptus karnatakaensis* Mohansundaram

Phytoptus karnatakaensis Mohansundaram, 1981, *Indian J. Acar.*, 5 : 12.

Diagnosis : Shield with thin markings, median line represented clearly in the basal region and broken anteriorly ; admedians broken in

the centre ; submedian represented in the anterior half of shield margin. Feather claw 5 rayed. Abdomen with about 65 uniformly microtuberculate rings. Female genital coverflap with 10-12 lines.

Host : Undet. shrub.

Distribution : INDIA : Karnataka.

247. *Phytoptus rosae* Mohansundaram

Phytoptus rosae Mohansundaram, 1981, *Indian J. Acar.*, 5 : 13-15.

Diagnosis : Shield with median line broken, admedians complete ; 3 submedians represented as broken lines. Feather claw 5 rayed. Abdomen with about 95 uniformly microtuberculate rings. Female genital coverflap with 12 lines.

Host : *Rosa* sp.

Distribution : INDIA : Tamil Nadu.

248. *Phytoptus subbaraoi* Mohansundaram

Phytoptus subbaraoi Mohansundaram, 1981, *Indian J. Acar.*, 5 : 15-16.

Diagnosis : Shield with median line represented with broken lines in the posterior 3/4, admedian nearly complete, represented in posterior region. Feather claw 5 rayed. Abdomen with about 55 rings, uniformly microtuberculate. Female genital coverflap with 10-14 lines.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

249. *Phytoptus rubifoliae* (ChannaBasavanna)

Eriophyes rubifoliae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 48-49.

Diagnosis : Feather claw 5 rayed, second ventral setae on abdomen shorter than third ventral setae ; shield with median line complete ; sides ornamented with short strokes.

Host : *Rubus racemosus*.

Distribution : INDIA : Tamil Nadu.

250. *Phytoptus terminaliae* (ChannaBasavanna)

Eriophyes terminaliae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 47-48.

Diagnosis : Feather claw 5 rayed ; second ventrial seta on abdomen longer than third ventral seta. Coxae almost smooth.

Hosts : *Terminalia arjuna*, *Terminalia entappa*.

Nature of damage : These mites live in the tight rolls of the leaves. The edge rolls become rough and brittle externally and a little spongy inside.

Distribution : INDIA : Delhi, Punjab, West Bengal.

Subfamily PHYLLOCOPTINAE Nalepa

Phyllocoptinae Nalepa, 1898, *Das Tierreich*, 4 : 45.

Key to the Sections of Phyllocoptinae (after Jeppson et al., 1975)

1. Feather claw divided	...	...	<i>Sec. I</i>
— Feather claw simple with central stem undivided	...	...	2
2. No prominent dorsal shield setae, dorsal tubercles present, or absent, if present, with or without minute seta	...	...	<i>Sec. II</i>
— Dorsal tubercles and prominent shield setae present	...	...	3
3. Tergites laterally extended into lobes or pointed projections, either from each tergite or from part of them, or from lateral anterior abdominal expansion	...	...	<i>Sec. III</i>
— Tergites rather evenly downcurved over abdominal sides and lacking lateral extensions; thanosomal dorsum varying from evenly arched in cross sections, to flattened ridged or furrowed	...	...	4
4. Dorsal tubercles set more or less ahead of rear shield margin and directing setae ahead, up or diagonally centrad; if these tubercles are near rear margin, then they are subcylindrical and bent forward, or their axes longitudinal or diagonal to body	...	...	<i>Sec. IV</i>
— Dorsal tubercles on or very near rear shield margin, directing setae to rear, usually divergently; dorsal tubercles either subcylindrical or with axes at right angles to body	...	...	<i>Sec. V</i>

SECTION I

Key to the Genera of Section I

1. First setiferous coxal tubercles present	...	...	<i>Paracaphylla,</i> <i>Acaphyllisa</i>
— First setiferous coxal tubercles absent	...	...	<i>Acaphylla</i>

Genus **Paracaphylla** Mohansundaram

(Figs. 275-276)

Paracaphylla Mohansundaram, 1983, *Indian J. Acar.*, 7(2) : 54.

251. **Paracaphylla streblae** Mohansundaram

Paracaphylla streblae Mohansundaram, 1983, *Indian J. Acar.*, 7(2) : 54.

Diagnosis : Shield with the entire area clear. Dorsal tubercle away from rear shield margin, dorsal seta thick. Feather claw divided with 7-8 rays in each. Abdomen with tergal, sternal differentiation, with about 40 broad tergites with microtubercles on the ridges, and about 60 narrow finely microtuberculate sternites. Female genital coverflap with numerous fine scorings at the basal half and a clear distal end.

Host : *Streblus asper*.

Distribution : INDIA : Tamil Nadu.

Genus **Acaphyllisa** Keifer

Acaphyllisa Keifer, 1978, *Eriophyid Studies*, U. S. Dep. Agr., C-15 : 15.

252. **Acaphyllisa parindiae** Keifer

Acaphyllisa parindiae Keifer, 1976, *Eriophyid Studies*, U. S. Dep. Agr., C-15, pp. 24.

Acaphyllisa parindiae, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 425.

Diagnosis : Divided feather claw each with 3 rays. Shield with median absent, admedian wavy, submedians broken, sides of shield clear. Coxae with thin scorings. Female genital flap with basal granulations and two ranks of scorings, 12-14 lines in each.

Host : *Thea sinensis*.

Distribution : INDIA : Tamil Nadu.

Genus **Acaphylla** Keifer

(Figs. 277-278)

Acaphylla Keifer, 1943, *Bull. Calif. Dep. Agr.*, 32 : 214.

Key to the Species of Acaphylla

1. Feather claw 3-4 rayed	...	...	2
— Feather claw more than 3-4 rayed	...	...	3

2. Feather claw 3 rayed, dorsal tubercle small and ahead of rear margin ; female genital coverflap with numerous fine basal longitudinal lines with numerous granular ribs which are faint	...	...	<i>steinwedeni</i>
— Feather claw 3-4 rayed ; female genital coverflap with 10-12 slightly diagonal stripes	...	...	<i>syzygii</i>
Thanosome narrower than shield, first setiferous coxal tubercle present	...	...	<i>indiae</i>
— Thanosome bulges out wider, first setiferous coxal tubercle absent	...	...	<i>theae</i>

253. *Acaphylla indiae* Keifer

Acaphylla indiae Keifer, 1954, *Bull. Calif. Dep. Agr.*, 43 : 126.

Diagnosis : Flattened whitish mite with 8 rayed feather claw. Shield pattern is involved with admedian lines that branch 2-3 times, the caudal parts joining each other just in front of rear margin.

Host : *Thea sinensis*.

Nature of damage : The damage done on tea is not of much significance. It causes discolouration of leaves.

Distribution : INDIA : Assam.

254. *Acaphylla steinwedeni* Keifer

Acaphylla steinwedeni Keifer, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 424.

Diagnosis : Orange mite living on undersides of leaves. Thanosome narrower than shield. Feather claw bifurcate each with 3 rays. Admedian shield lines extend back from the notched anterior lobe. Dorsal tubercle short and well ahead of rear margin. Female genital coverflap with fine basal longitudinal lines with numerous granules.

Host : *Thea sinensis*.

Distribution : INDIA : Tamil Nadu ; outside India : U. S. A.

255. *Acaphylla syzygii* ChannaBasavanna

Acaphylla syzygii ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 90-91.

Diagnosis : Shield with wrinkles and roughened surface ; abdomen with distinct, short lateral ridges ; first coxal seta absent ; dorsal tubercles located on longitudinal carina, well ahead of rear shield margin ; forecoxae hardly meeting at base, elongate, granulate base and rest with faint longitudinal lines. Abdomen with 51 smooth narrow tergites and 74 microtuberculate sternites.

Host : *Syzygium operculatum*.

Nature of damage : It causes no damage to its host.

Distribution : INDIA : Delhi.

256. *Acaphylla theae* (Watt)

Phytoptus theae Watt, 1898, *Pests & Blights of Tea plant*, pp. 400-408.

Phytoptus theae, Das & Sengupta, 1958, *J. Zool. Soc. India*, 10 : 38-39.

Diagnosis : Orange in colour, sometimes with reddish tinges, spindle shaped, blunt anteriorly and progressively narrowed at posterior end. It can be distinguished from *A. indiae* as the thanosome on *theae* is narrower than the shield but bulges out wider in *indiae*. Further, *indiae* has the first forecoxal setiferous tubercles, but absent on *theae*.

Host : Tea.

Nature of damage : It infests both the surfaces of leaves, petioles and tender stems causing discolouration of leaves. The affected leaves become pale coloured, often leathery and veins and margins specially on the undersurface of leaves show pinkish discolourations. This is the reason why this mite is called the pink mite (Watt, 1898 ; Das & Sengupta, 1958 ; Das, 1965). The Assam variety is preferred over the Chinese variety. The extent of loss is sometimes very huge (Watt & Mann, 1903).

Bionomics : The average time to complete the life cycle is 8.4 days ranging from 8.0 to 8.7 days in March, 5.5 to 7.0 days in July-August and 12.0 to 19.5 days during December-January. Adult longevity is 8.16 days under laboratory conditions (Das & Sengupta, 1958). The population of this mite was negatively correlated with maximum temperature. The top portion of the bushes harboured 70.82% of the population. It was followed by middle portion (25.18%) and bottom portion (4%) (Muraleedharan & Chandrasekharan, 1981).

Control : Sulphur, lime sulphur and Akar are highly effective against this mite (Das & Sengupta, 1958). The other promising pesticides are dicofol (1 : 200) or ethion (1 : 200) by power spray @ 1 : 400 high volume spray.

Natural enemies : *Amblyseius* (*Amblyseius*) *rhabdus*, *A. (A.) herbicolus* and *Tydeus* sp. are known to feed upon this mite (Muraleedharan & Chandrasekharan, 1981).

Distribution : INDIA : Assam, Tamil Nadu ; Outside India : Southern Asia and East Indies.

SECTION II

Key to the Genera of Section II

1. Foretibial seta absent	...	...	<i>Procalacarus</i>
— Foretibial seta present	...	...	<i>Calacarus</i>

Genus *Calacarus* Keifer

(Figs. 279-281)

Calacarus Keifer, 1940, *Bull. Calif. Dep. Agr.*, 29(3) : 163.Key to the Species of *Calacarus*

1. Feather claw 4 rayed	...	...	2
— Feather claw more than 4 rayed	...	...	4
2. Genital coverflap smooth	...	...	<i>millingtoniae</i>
— Genital coverflap with lines or ribs	...	...	3
3. Median line absent ; genital coverflap with 10-12 faint lines	...	...	<i>polyalthiae</i>
— Median line distinct only on the lobe ; coverflap with few longitudinal ribs	...	...	<i>brionesae</i>
4. Feather claw 5 rayed	...	...	5
— Feather claw more than 5 rayed	...	...	8
5. Coverflap with 15-17 scorings arranged in a single row ; median line present only on posterior half of the shield ; granules present at the junction of tergites and sternites ; first coxae connate apically on <i>Jasminum sambac</i>	...	...	<i>jasmini</i>
— Coverflap with discontinuous lines or without lines	...	...	6
6. Coverflap with discontinuous lines in two ranks	...	...	7
— Coverflap without lines	...	...	<i>malvae</i>
7. Median line and submedian line apparently absent ; claws with large knob, rudiments of dorsal tubercles present, on <i>Thea sinensis</i>	...	...	<i>carinatus</i>
— Median line present, distinctly on anterior lobe and posterior half and faintly present on rest of middle part of shield ; only posterior coxae ornamented, number of tergites greater than sternites, on <i>Capsicum frutescens</i>	...	...	<i>capsica, citrifolii</i>
8. Lower tarsal setae absent, feather claw 8 rayed, median line confined to a short distance at the anterior end of shield ; on <i>Phyllanthus acidus</i>	...	...	<i>channabasavannae</i>

— Lower tarsal setae present, feather claw 6 or 7 rayed	...	...	9
9. Genital coverflap smooth	...	...	10
— Genital coverflap with distinct or indistinct lines	...	...	11
10. Median line absent	...	...	<i>microrostrus</i>
— Median line faint	...	...	<i>swietensis</i>
11. Median line distinctly present throughout the shield length, a cell present just behind the anterior lobe, on <i>Aralia</i> sp.	...	...	<i>araliae</i>
— Median line absent or partly present on shield	...	...	12
12. Foretibial seta absent, only two cells present behind the anterior lobe ; on <i>Clerodendron viscosum</i>	...	...	<i>keiferi</i>
— Foretibial seta present ; each apical cell by division form 4 cells ; on <i>Quisqualis indica</i>	...	...	<i>quisqualis</i>

257. *Calacarus araliae* Chakrabarti & Mondal

Calacarus araliae Chakrabarti & Mondal, 1980, *Acarologia*, 21 : 397-399.

Diagnosis : Shield subtriangular with a small blunt anterior lobe lacking dorsal tubercles and dorsal setae, network of cells represented. Median line present throughout the shield ; admedian and submedian sinuate, both connected with crosslines. Feather claw 6 rayed. Abdomen with 5 longitudinal wax bearing ridges. Sternites with microtubercles, tergites microtuberculate. Genital coverflap with 11 faint longitudinal lines.

Host : *Aralia* sp.

Distribution : INDIA : West Bengal.

258. *Calacarus carinatus* (Green)

Phytoptus carinatus Green, 1890, *Insect Pests of the Tea Plant, Colombo, Ceylon*, pp. 85.

Phytoptus carinatus, Green, 1890, *Agr. Liv. India*, 8 : 537-540.

Diagnosis : Purple coloured mite with 5 white ridges of waxy material running longitudinally on the dorsal side of the abdomen. Body spindle shaped.

Host : Tea.

Nature of damage : It is popularly known as purple mite of tea and is an important pest in north-east India. The affected leaves develop copperish-brown discolourations which later turn into purplish bronze.

The growth of the affected plants is checked and the leaves fall off prematurely (Das & Sengupta, 1963).

Bionomics : The life cycle is completed in 12.5 to 13.5 days in January, 8.5 to 9.3 days in March-April and 6.0 to 7.5 days in July-August. The incubation period is 6.5 to 8.0 days and the nymphal stage takes 3-6 days depending upon the period of the year. It occurs in the field throughout the year, however, the population dwindles during rainy season to reappear in October. The rate of multiplication is more during February to early March (Das & Sengupta, 1963). Population was positively correlated with maximum and minimum temperatures. Its population was more or less equal in top (45.85%) and middle (42.40%) portions of bushes while it was low (11.75%) at the bottom. The population of this mite was higher than that of *theae* in the Annamalais (Muraleedharan & Chandrasekharan, 1981).

Natural enemies : Muraleedharan & Chandrasekharan (1981) reported *A. (A.) herbicolus*, *A. (A.) rhabdus* and *Tydeus* sp. while Rao *et al.* (1969) reported *A. (E.) ovalis* as its natural enemy.

Distribution : INDIA : Assam, Himachal Pradesh, Tamil Nadu.

259. *Calacarus brionesae* Keifer

Calacarus brionesae Keifer, Mohansundaram, 1980, *Mysore J. agric. Sci.*, **14** : 518.

Diagnosis : Shield with short anterior lobe ; median line distinct only on the lobe. Admedian lines curve back from the sides of the anterior lobe ; admedians broadly convex outwardly to their rear 2/3 and abruptly recurve out at rear shield margin. The shield has series of enclosed cells. Thanosome with 5 ridges. Feather claw 4 rayed. Female genital coverflap with short dashes basally and longitudinal ribs apically.

Host : *Carica papaya*.

Distribution : INDIA : Tamil Nadu ; outside India : Philippines.

260. *Calacarus capsica* Chakrabarti & Mondal

Calacarus capsica Chakrabarti & Mondal, 1980, *Acarologia*, **21** : 399-400.

Diagnosis : Shield subtriangular with a distinct anterior lobe, lacking dorsal tubercles and dorsal setae, represent a network of characteristic pattern of cells. Feather claw 5 rayed. Abdomen with 5 longitudinal ridges gradually becoming narrower caudad. Sternites 79-87, microtuberculated except 6-7 thanosomal sternites which are

microstriate ; tergites about 75. Genital coverflap with many fine distinct longitudinal lines in two ranks.

Hosts : *Capsicum frutescens*, *Capsicum annuum*.

Distribution : INDIA : West Bengal, Tamil Nadu.

261. *Calacarus channabasavannae* Lakkundi

Calacarus channabasavannae Lakkundi, 1974, *Curr. Res.*, 3 : 70-71.

Host : *Phyllanthus acidus*.

Distribution : INDIA : Karnataka, Tamil Nadu.

262. *Calacarus citrifolii* Keifer

Calacarus citrifolii Keifer, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 425.

Diagnosis : Body fusiform, robust, with longitudinal white stripes of wax on the abdomen. Feather claw 5 rayed. Shield pattern shows network ; admedians do not have usual vertical dashes along them, median line present on anterior lobe ; submedian line with branches, form three large cells on outside of admedian. Female genital coverflap with numerous fine longitudinal lines in 2 ranks.

Hosts : *Hibiscus micranthus*, *Lantana camera*, *Crossandra undulataefolia*, *Priva leptostachya*, *Leptadenia reticulata*, *Brayenia* sp., *Capsicum annuum*, *Ipomoea* sp.

Distribution : INDIA : Tamil Nadu ; outside India : S. Africa.

263. *Calacarus jasmini* Chakrabarti & Mondal

Calacarus jasmini Chakrabarti & Mondal, 1979, *Indian J. Acar.*, 3 : 71-73.

Diagnosis : Body robust, fusiform, with white longitudinal waxy ridges. Sternal shield lacking dorsal tubercles and dorsal setae. Feather claw 5 rayed. Anterior coxae connate apically, gradually becoming narrowed caudad ; microtubercles small ; female genital coverflap with 15-17 longitudinal lines ; abdomen strongly sinuate and undulating arising from bases of anterior lobe.

Host : *Jasminum sambac*.

Nature of damage : This mite is normally a vagrant but heavy infestation may cause the appearance of whitish or yellowish patches on leaves (Chakrabarti & Mondal, 1979).

Distribution : INDIA : West Bengal, Tamil Nadu.

264. Calacarus keiferi Chakrabarti & Mondal

Calacarus keiferi Chakrabarti & Mondal, 1980, *Acarologia*, **21** : 401-402.

Diagnosis : Shield with short anterior lobe and lacking dorsal tubercles and dorsal setae with some curved lines and representing network. Median line present distinctly on anterior lobe and on posterior half of shield and absent on rear middle part of shield, admedians sinuate arising from sides of anterior lobe, submedian posteriorly connected with admedian. Feather claw 7 rayed. Abdomen with 5 longitudinal waxy ridges, 62 tergites, microtuberculated ; 87 sternites with fine microtubercles posteriorly except last 4-5 sternites which are microstriate. Coverflap with 24-26 indistinct longitudinal scorings.

Host : *Clerodendron viscosum*.

Distribution : INDIA : West Bengal.

265. Calacarus malvae Mohansundaram

Calacarus malvae Mohansundaram, 1983, *Acarologia*, **24**(1) : 14-17.

Diagnosis : Shield with median line faintly represented in midpart of shield, admedians wavy and bifurcate posteriorly and joining in the middle ; first submedian represented as curved line ; second and third submedians represented in the border of the shield, curved and wavy ; shield area and sides of shield with short scorings ; dorsal tubercle just away from shield margin. Feather claw 5 rayed. Abdomen with about 90 rings, uniformly microtuberculate. Female genital coverflap without lines.

Host : *Hibiscus vitifolius*.

Distribution : INDIA : Tamil Nadu.

266. Calacarus microrostrus Chakrabarti & Mondal

Calacarus microrostrus Chakrabarti & Mondal, 1981, *Indian J. Acar.*, **5** : 27-29.

Diagnosis : Body fusiform, shield subtriangular, anterior shield lobe absent, admedians complete, sinuate bifurcate. Dorsal tubercle and setae absent. Feather claw simple and 7 rayed. Abdomen with 70-74 tergites and 81-84 sternites ; tergites with 5 longitudinal waxy ridges which gradually become narrower caudad. Female genital coverflap smooth.

Host : *Pavetta* sp.

Distribution : INDIA : West Bengal.

267. *Calacarus millingtoniae* Mohansundaram

Calacarus millingtoniae Mohansundaram, 1982, *Entomon*, 7(1) : 23-24.

Diagnosis : Shield overhanging rostrum base, dorsal tubercle just away from rear shield margin. Anterior shield lobe with apical cells, sides of shield with 4 cells on each, median absent, admedians complete and wavy. Feather claw 4 rayed. Abdomen with about 80 rings, tergites smooth with wax bearing areas forming dorsal and two lateral lines ; sternites finely microtuberculate. Genital coverflap smooth.

Host : *Millingtonia hortensis*.

Distribution : INDIA : Tamil Nadu.

268. *Calacarus polyalthiae* Mohansundaram

Calacarus polyalthiae Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 518.

Diagnosis : Shield area highly granular, median line absent ; admedians curved, joined at both ends forming a trough like depression in the middle ; four cells on each side on the shield. Feather claw 4 rayed. Abdomen with 40 wavy wax bearing smooth tergites and 60 finely microtuberculate sternites. Female genital coverflap with 10-12 faint lines.

Host : *Polyalthia longifolia* var *pendula*.

Distribution : INDIA : Goa.

269. *Calacarus swietensis* Chakrabarti & Mondal

Calacarus swietensis Chakrabarti & Mondal, 1980, *Acarologia*, 21 : 404-406.

Diagnosis : Shield lacking dorsal tubercles and dorsal setae, represent network of characteristic pattern of cells, admedians bifurcate. Abdomen with 5 waxy ridges, the middle one is longest, 65 tergites and 73 sternites ; microtubercles absent on tergites. Female genital coverflap smooth.

Host : *Swietenia mahagoni*.

Distribution : INDIA : West Bengal.

270. *Calacarus quisqualis* Chakrabarti & Mondal

Calacarus quisqualis Chakrabarti & Mondal, 1980, *Acarologia*, 21 : 402-404.

Diagnosis : Shield subtriangular, lacking dorsal tubercles and dorsal setae represent a network of characteristic pattern of cells laterally, median line indistinct ; admedian and submedian lines sinuate and

connected with other by cross lines. Feather claw 6 rayed. Abdomen with 5 longitudinal white waxy ridges ; 66-77 tergites, 85-92 sternites, sternites microtuberculated except last few sternites which are microstriated. Female genital coverflap with a very short longitudinal scoring near the anterior coverflap margin.

Host : *Quisqualis indica*.

Distribution : INDIA : West Bengal, Tamil Nadu.

Genus *Procalacarus* Mohansundaram

(Figs. 282-283)

Procalacarus Mohansundaram, 1983, *Acarologia*, 24(1) : 14.

271. *Procalacarus aliyarensis* Mohansundaram

Procalacarus aliyarensis Mohansundaram, 1983, *Acarologia*, 24(1) : 14.

Diagnosis : Shield with a clear pattern of lines projecting over the rostrum ; median line absent ; admedians wavy with short projection on either side ; first submedian short and joins with the admedians in basal 1/3 length ; 2nd submedian curved and joins with admedians above the first submedian ; sides of shield with 5 cells on each side ; dorsal tubercle without seta. Feather claw 5 rayed. Abdomen with 66 smooth tergites and 80 microtuberculate sternites. Female genital coverflap with fine scoring on the anterior half.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

SECTION III

Key to the Genera of Section III

1. Anterior part of thanosome with broad lateral expansion and bearing 3 stiff lateral lines, rear of thanosome abruptly narrower ...	...	<i>Scolocenus</i>
— Thanosome tapering gradually to telosome, most thanosomal tergites with lateral lobes, either of even length or alternate length, lobes varying from rounded off to apically sharp ; femoral seta present ...	...	<i>Tegonotus</i>

Genus *Scolocenus* Keifer

Scolocenus Keifer, 1962, *Eriophyid Studies*, Calif. Dep. Agr., B-8 : 4.

272. *Scolocenus spiniferus* Keifer

Scolocenus spiniferus Keifer, 1962, *Burr. Ent. Calif. Dep. Agr.*, B-8 : 3.

Scolocenus spiniferus, Mondal, Ghosh & Chakrabarti, 1982, *Oriental Ins.*, 16(3) : 310.

Diagnosis : Shield broad ; immediately followed by broad expansion of the anterior part of thanosome ; from the side of thanosomal expansion 3 spines project. Forecoxae lack setiferous tubercle. Female genital coverflap completely covered with fine longitudinal lines.

Host : *Cocos nucifera*.

Distribution : INDIA : West Bengal ; outside India : Philippines.

Genus *Tegonotus* Nalepa

(Figs. 284-285)

Tegonotus Nalepa, 1890, *Anz. Akad. Wiss. Wien.*, 27 : 213.

Key to the Species of *Tegonotus*

1. Feather claw 3 rayed	...	...	<i>bassius</i>
— Feather claw more than 3 rayed	...	...	2
2. Feather claw 4 rayed	...	...	3
— Feather claw more than 4 rayed	...	...	5
3. Female genital coverflap smooth	...	...	<i>cardiavagrans</i>
— Female genital coverflap with lines	...	...	4
4. Female genital coverflap with clear segmentation between upper and lower rows	...	...	<i>coimbatorensis</i>
— Female genital coverflap with fine close set longitudinal scoring into two series.	...	...	<i>convolvulus</i>
5. Feather claw 5 rayed	...	...	6
— Feather claw 6 rayed	...	...	7
6. Female genital coverflap with wavy scorings in two ranks	...	...	<i>parviflorae</i>
— Female genital coverflap with longitudinal scorings	...	...	<i>bengalensis</i>
7. Two spine like structures present on anterior shield lobe	...	...	<i>jambolensis</i>
— Such character absent	...	...	<i>mangiferae</i>

273. *Tegonotus bassius* Das & Chakrabarti

Tegonotus bassius Das & Chakrabarti, 1982, *Entomon*, 7(3) : 300-301.

Diagnosis : Shield subtriangular, apical lobe prominent and present over the rostral base as a thick body. Shield design a complete network

of prominent cells, median, admedian and submedians not clearly discernible ; a large apical cell, a central cell and 3 lateral cells on upper half and lateral cells on lower half of the shield present. Feather claw 3 rayed. Abdomen gradually tapering to caudad, with 20-24 tergites, non-microtuberculate. Genital coverflap with 8-10 lingitudinal scorings.

Host : *Bassia* sp.

Distribution : INDIA : Bihar.

274. *Tegonotus bengalensis* Mandal & Chakrabarti

Tegonotus bengalensis Mondal & Chakrabarti, 1980, *Oriental Ins.*, 14(4) : 457-459.

Diagnosis : Body wide, elongate, wedge shaped, yellowish. Rostrum projecting obliquely down. Shield semicircular, with board anterior lobe ; admedian lines almost absent. Dorsal tubercle placed ahead of rear shield margin. Feather claw simple, 5 rayed. Anterior coxae connate apically. Abdomen with about 25 tergites and 49 sternites, tergites broad and produced laterally as broad bluntly rounded process over the sternites. Genital coverflap with about 8 longitudinal stripes.

Host : *Shorea robusta*.

Nature of damage : This mite is seen associated with small beaded galls on upper surface of leaves but it is not certain whether the galls are produced by this mite (Mondal & Chakrabarti, 1980) in view of the fact that another eriophyid mite is also associated with the same host.

Distribution : INDIA : West Bengal.

275. *Tegonotus cardiavagrans* Mohansundaram

Tegonotus cardiavagrans Mohansundaram, 1982, *Acarologia*, 23(3) : 254.

Diagnosis : Shield with an anterior lobe overhanging rostrum, shield clear except for the faint representations of admedians ; dorsal tubercle near rear shield margin. Coxae with all setiferous tubercles. Feather claw 4 rayed. Abdomen with about 20 broad tergites with elongate microtuberculation ; about 70 sternites with fine microtuberculations. Female genital coverflap without lines.

Host : *Cordia* sp.

Distribution : INDIA : Tamil Nadu.

276. *Tegonotus coimbatorensis* Mohansundaram

Tegonotus coimbatorensis Mohansundaram, 1983, *Acarologia*, 24(1) : 29-32.

Diagnosis : Shield projecting over rostrum, median absent, admedian complete, wavy and converge at both ends ; sides of shield granular ; shield area with fine faint irregular scoring. Feather claw 4 rayed. Abdomen with about 30 smooth tergites and about 60 finely microtuberculate sternites. Female genital coverflap with clear segmentation between upper and lower rows.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

277. *Tegonotus convolvuli* (ChannaBasavanna)

Oxypleurites convolvuli ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 94-95.

Diagnosis : Body elongate, fusiform, dorsoventrally flattened, yellow ; female genital coverflap having two series of longitudinal lines. Feather claw bent dorsally, just beyond the second ray giving it a divided appearance in ventral and dorsal view.

Hosts : *Ipomoea batatas*, *I. palmata*, *I. sepiaria*.

Nature of damage : David (1959, 1960) reported the occurrence of this eriophyid mite on sweet potato. The affected leaves become rolled up, look shiny and rusty in colour. The mites feed on both the surfaces of leaves. The infestation affects vigour of the plant, reduces yield and causes stunting of growth.

Bionomics & Control : It remains active in the field throughout the year. *Ipomoea batatas* serves as the alternate host. Eradication of weeds (*I. sepiaria*) helps in checking the pest. Spraying with parathion or Aramite can effectively control this mite.

Distribution : INDIA : Karnataka, Tamil Nadu.

278. *Tegonotus jambolensis* Mondal, Ghosh & Chakrabarti

Tegonotus jambolensis Mondal, Ghosh & Chakrabarti, 1982, *Oriental Ins.*, 16(3) : 310-312.

Diagnosis : Shield with a prominent anterior lobe which is tipped with 2 spines, shield design represents a number of longitudinal lines, median faintly present posteriorly, admedian line arising from base of anterior lobe extending backwards cover gently from distance and then divergently and again converge. Dorsal tubercle ahead of rear shield

margin, dorsal seta directed centrad. Feather claw 6 rayed. Abdomen with 20-22 smooth tergites and 45-48 microtuberculate narrow sternites. Genital coverflap with 13-15 longitudinal scorings.

- Host* : *Eugenia jambolana*.
- Distribution* : INDIA : West Bengal.
- Remarks* : It causes brownish patches on leaves.

279. *Tegonotus mangiferae* (Keifer)

Oxypleurites mangiferae Keifer, 1946, *Bull. Calif. Dep. Agr.*, 35(1) : 43.
Tegonotus mangiferae, Chakrabarti & Mondal, 1982, *Oriental Ins.*, 16(4) : 524-525.

- Diagnosis* : Feather claw 6 rayed. Shield rough and subtriangular. Middorsal thanosomal ridge present on thanosome.
- Host* : Mango.
- Distribution* : INDIA : West Bengal ; outside India : Hawaii.
- Remarks* : It causes rusting on the undersurface of leaves.

280. *Tegonotus parviflorae* Mohansundaram

- Tegonotus parviflorae* Mohansundaram, 1981, *Colemania*, 1 : 42.
- Diagnosis* : Feather claw 5 rayed, simple. Shield clear except for an 'U' shaped groove facing anteriorly. Coxae smooth. Female genital coverflap with fine irregular scorings in two ranks.
 - Host* : *Canthium parviflorum*.
 - Distribution* : INDIA : Tamil Nadu.

SECTION IV

Key to the Genera of Section IV (after Jeppson *et al.*, 1975)

1. Dorsal thanosome flat or furrowed or with longitudinal trough	...	...	3
— Dorsum of thanosome with central ridge	...	...	5
— Dorsum of thanosome evenly arched somewhat flattened in some genera	...	...	2
2. Dorsal tubercle usually ahead of rear shield margin, directing setae ahead or up and centrad ; if dorsal tubercle close to rear margin, then directing setae forward ; tubercles on rear margin with longitudinal axes and directing setae either centrad or convergently to rear	...	...	<i>Phyllocoptes</i>

— Dorsal tubercle on rear shield margin, the tubercle either having diagonal axes or directing setae up	...	...	<i>Vasates</i>
3. Patellar seta missing on second leg, elongate species with trough almost entire length of thanosome ; dorsal tubercle set ahead of rear shield margin but seta direction varies	...	...	<i>Notostrix</i>
— Patellar seta present on second leg, body not long attenuate	...	...	4
4. Trapezoidal species, widest across rear of shield, with central hump in start of dorsal longitudinal trough on thanosome ; dorsal tubercles on rear shield margin but with longitudinal axes and directing setae centrad	...	...	<i>Indonotalox</i>
— Dorsal tubercle set ahead of rear shield margin ; no appreciable hump just behind shield, more elongated species	...	...	<i>Phyllocoptruta</i>
5. Middorsal ridge ending in broad trough before the end of the subdorsal ridge	...	...	<i>Calepitrimerus</i>
— Middorsal ridge fading simultaneously with subdorsal or lateral ridges, the shallow sub-dorsal trough making the ridge often weak	...	...	<i>Epitrimerus</i>

Genus *Calepitrimerus* Keifer
(Figs. 286-288)

Calepitrimerus Keifer, 1938, *Bull. Calif. Dep. Agr.*, 27 : 310.

Key to the Species of Calepitrimerus

1. Feather claw 4 rayed	...	...	2
— Feather claw more than 4 rayed	...	...	3
2. Dorsal tubercle very close to rear shield margin ; abdomen with 27 smooth tergites and 40-60 microtuberculate sternites ; female genital coverflap with 14-16 longitudinal stripes	...	...	<i>azadirachtae</i>
— Dorsal tubercle at shield margin ; abdomen with 30 smooth tergites and 56 microtuberculate sternites ; female genital coverflap with 10-12 lines	...	...	<i>asperimae</i>
3. Feather claw 5 rayed	...	...	4
— Feather claw 6 rayed	...	...	<i>lucidis</i>
4. Shield design simple	...	...	5
— Shield design a complicated system of carinae	...	...	<i>mysorensis</i>

5. Median line lacking on anterior 0.25 and posterior 0.20 portions	...	...	5
— Median line lacking only anterior 0.45 portion	...	...	<i>massanjoris</i>
6. Female genital coverflap with prominent scorings in two tires ; abdomen with 60-67 sternites	...	...	<i>cordiae</i>
— Female genital coverflap with prominent scorings ; abdomen with 42-49 sternites	...	...	<i>antedesmae</i>

281. *Calepitrimerus antedesmae* Chakrabarti & Das

Calepitrimerus antedesmae Chakrabarti & Das, 1982, *Entomon*, 7(1) : 33-34.

Diagnosis : Shield smooth, subtriangular, with distinct anterior lobe, median line faint, not continuous, absent on anterior 0.33 part, admedian line jointed anteriorly just anterior to the median line and bifurcate just below the dorsal tubercle. Dorsal tubercles centrad, setae ahead of rear shield margin. Feather claw 5 rayed. Abdomen tapering conically at caudad end ; 24-28 tergites and 42-49 sternites, last 5-6 tergites not differentiated from sternites ; middorsal ridge absent on last 7-8 tergites giving a trough ; sternites with very fine microtubercles. Genital coverflap with fine granules present on lower margin.

Host : *Antedesma ghesembilla*.

Distribution : INDIA : West Bengal.

282. *Calepitrimerus asperrimae* Mohansundaram

Calepitrimerus asperrimae Mohansundaram, 1982, *Acarologia*, 23(3) : 257-260.

Diagnosis : Central area of shield with short scorings or lines, anterior margin granular, sides of shield granular. Dorsal tubercle at shield margin. Feather claw 4 rayed. Abdomen with about 30 smooth tergites, 56 microtuberculate sternites. Female genital coverflap with two rows of scorings.

Host : *Ficus asperrima*.

Distribution : INDIA : Tamil Nadu.

283. *Calepitrimerus azadirachtae* ChannaBasavanna

Calepitrimerus azadirachtae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 98-99.

Diagnosis : Body thick, wedge shaped, pinkish brown, shield design

a complicated system of cells and longitudinal lines. Median line almost complete, not extending to anterior lobe. Feather claw 4 rayed. Fore-coxae with longitudinal lines, hind coxae almost smooth. Abdomen with short tergites and microtuberculate sternites. Female genital cover-flap with longitudinal scoring, setae longer than length of genitalia.

Host : *Azadirachta indica*.

Distribution : INDIA : Karnataka, Tamil Nadu.

284. *Calepitrimerus cordiae* Chakrabarti & Das

Calepitrimerus cordiae Chakrabarti & Das, 1982, *Entomon*, 7(1) : 31-33.

Diagnosis : Shield subtriangular, more or less blunt anteriorly without distinct anterior lobe. Shield design simple, median line conspicuous lacking in 0.25 portion and posterior 0.40 portion, admedian line sinuate arising directly from shield margin, submedian lines two. Feather claw 5 rayed, simple. Thanosome with 25-28 tergites and 60-67 sternites, tergites with central ridge fading caudad and almost absent in last at least 5-6 tergites ; a subdorsal ridge also present. Genital coverflap with scorings in two tiers, upper one contains 16-24 and lower one contains 14-16 in number.

Host : *Cordia myxa*.

Distribution : INDIA : West Bengal.

285. *Calepitrimerus leucadis* ChannaBasavanna

Calepitrimerus leucadis ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 99-100.

Diagnosis : Second ventral seta on abdomen shorter than third ; feather claw 6 rayed ; female genital coverflap bare with seta shorter than the length of genitalia ; shield design without cells. Abdomen with 40 smooth tergites and about 75 microtuberculate sternites.

Host : *Leucas aspera*.

Distribution : INDIA : Karnataka.

286. *Calepitrimerus massanjoris* Das & Chakrabarti

Calepitrimerus massanjoris Das & Chakrabarti, 1982, *Entomon*, 7(3) : 297-298.

Diagnosis : Shield subtriangular, shield design simple, median line prominent from anterior 0.45 portion to rear shield margin ; admedians and submedians also present. Feather claw 5 rayed. Abdomen with 36-42 tergites and 55-56 sternites, thanosome with a middorsal and

2 subdorsal ridges fading caudad with a dorsal trough at rear end ; tergites and sternites well microtuberculated. Female genital coverflap with 15-16 scorings at lower half.

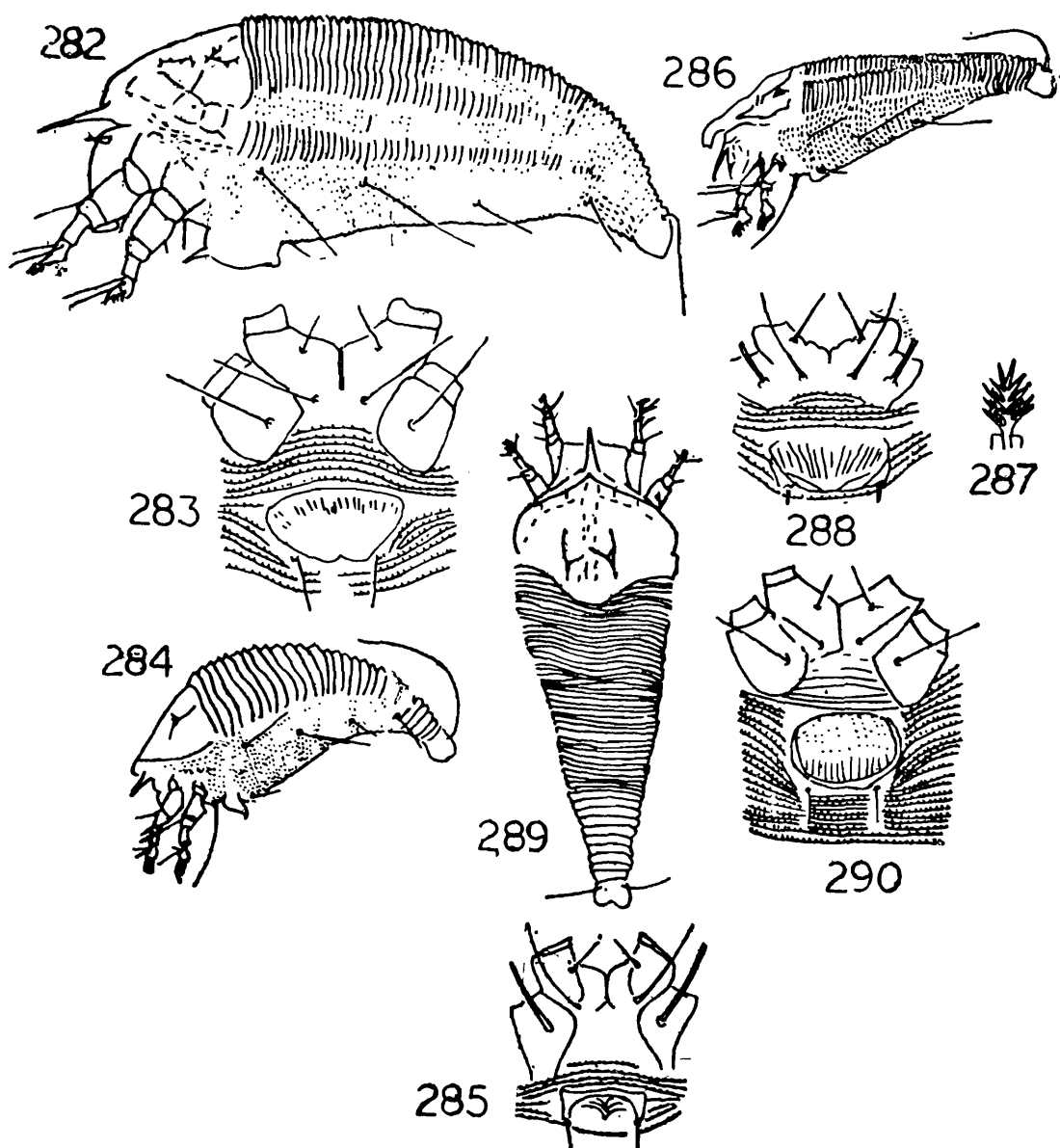
Host : *Tectonq* sp.

Distribution : INDIA : Bihar.

Remarks : This mite causes black spots on lower surface of leaves.

287. *Calepitrimerus mysorensis* ChannaBasavanna

Calepitrimerus mysorensis ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 97-98.



Figs. 282-283 : *Procalacarus* sp.

Figs. 284-285 : *Tegonotus* sp.

Figs. 286-288 : *Calepitrimerus* sp.

Figs. 289-290 : *Epitrimerus* sp.

Diagnosis : Body thick, fusiform, pale yellowish, 3 wax bearing ridges on abdomen. Shield subtriangular ; shield design a complicated system of carinae which bears wax band all along the margin ; median line indistinct ; admedian line arising on anterior lobe, gently diverging, then gently going straight back and finely converging on midshield to meet at base of median line. Feather claw 5 rayed. Forecoxae strongly diverging to front, moderately connate with faint close set lines. Abdomen with smooth tergites and microtuberculate sternites. Second ventral seta on abdomen longer than third.

Host : *Neolitsea zeylanica*.

Distribution : INDIA : Karnataka.

Genus **Epitrimerus** Nalepa

(Figs. 289-290)

Epitrimerus Nalepa, 1898, *Das Tierreich*, 4 : 61.

Key to the Species of Epitrimerus

1. Feather claw 4 rayed	...	...	<i>azimae</i>
— Feather claw 3 rayed	...	...	<i>chandramohani</i>

288. **Epitrimerus azimae** Mohansundaram

Epitrimerus azimae Mohansundaram, 1982, *Entomon*, 7(1) : 25-26.

Diagnosis : Shield with a broad lobe overhanging rostrum base. Shield area clear except for a pair of broken line in the anterior and a pair of submedians connected to dorsal tubercles. Dorsal tubercles diffuse, broadened longitudinally very characteristic. Feather claw 4 rayed. Abdomen with about 52-55 tergites with fine elongated microtubercles on the middle and side ridges, about 80 finely dot-like microtuberculate sternites. Female genital coverflap basally with fine scorings and distally with about 18 lines.

Host : *Azima tetracantha*.

Distribution : INDIA : Tamil Nadu.

289. **Epitrimerus chandramohani** Mohansundaram

Epitrimerus chandramohani Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 518-519.

Diagnosis : Shield with a faint pattern of thin lines in the middle and anterior border. The thin lines are wavy and broken and could

not be differentiated as median, submedians and admedians. Feather claw 3 rayed. Abdomen with about 50 smooth tergites and 75 microtuberculate sternites. Female genital coverflap with about 16 lines distally and basally with minute striations.

Host : *Undet. plant.*

Distribution : INDIA : Maharashtra.

Genus *Indonotalox* Ghosh & Chakrabarti

(Fig. 291)

Indonotalox Ghosh & Chakrabarti, 1982, *Entomon*, 7(4) : 437-438.

290. *Indonotalox sudarsani* Ghosh & Chakrabarti

Indonotalox sudarsani Ghosh & Chakrabarti, 1982, *Entomon*, 7(4) : 437-438.

Diagnosis : Shield more or less triangular with prominent anterior shield lobe over the rostral base and a horny projection from the rear shield end, median line present on posterior half of shield, admedian complete, dorsal tubercle and setae projecting up and divergent. Feather claw simple, 6 rayed. Abdomen with equal number of tergites and sternites. Female genital coverflap smooth.

Host : *Combretum decundrum*.

Distribution : INDIA : West Bengal.

Genus *Notostrix* Keifer

(Figs. 292-293)

Notostrix Keifer, 1963, *Eriophyid Studies*, Calif. Dep. Agr., B-9 : 7-8.

291. *Notostrix flabelliferae* Mohansundaram

Notostrix flabelliferae Mohansundaram, 1982, *Entomon*, 7(1) : 29-30.

Diagnosis : Shield area without lines but with uniformly placed dot like projections. Dorsal tubercles near rear shield margin, setae pointing backward and centrad. Feather claw 5 rayed. Abdomen with 35 broad smooth tergites with shallowed dorsal trough running for 3/4 length of abdomen, tergites with waxy fringes on the sides of each segment ; 85-90 sternites finely and uniformly microtuberculate. Female genital coverflap with 9 longitudinal lines.

Host : *Borassus flabellifer*.

Distribution : INDIA : Tamil Nadu.

Genus **Phyllocoptes** Nalepa

(Figs. 294-295)

Phyllocoptes Nalepa, 1889, SB Akad. Wiss. Wien., 98 : 116.

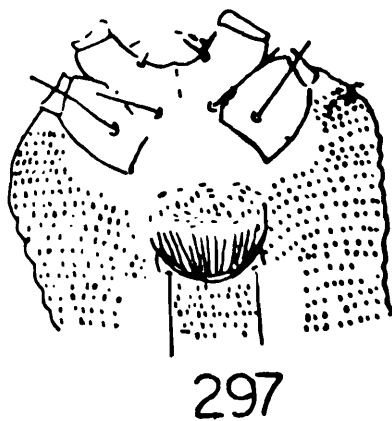
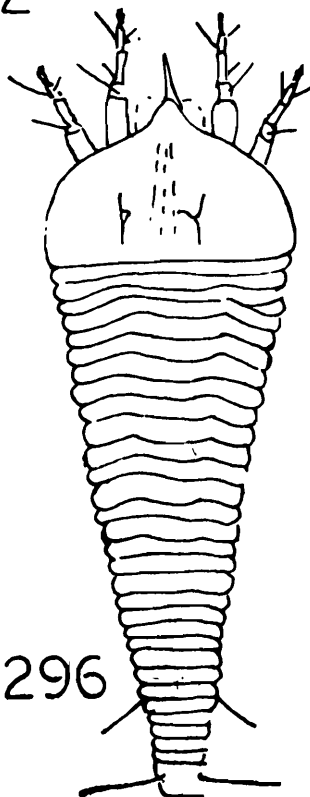
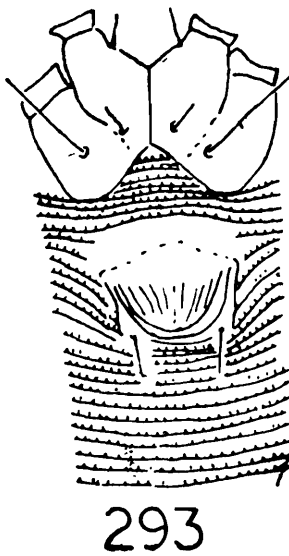
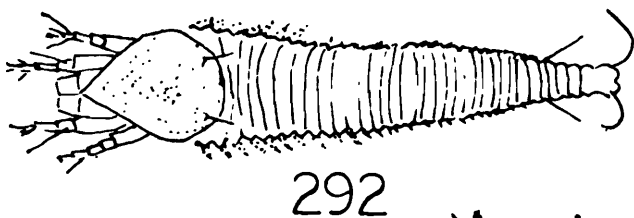
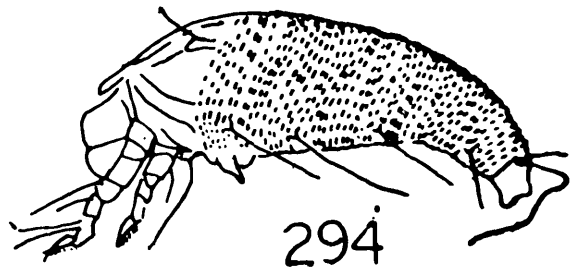
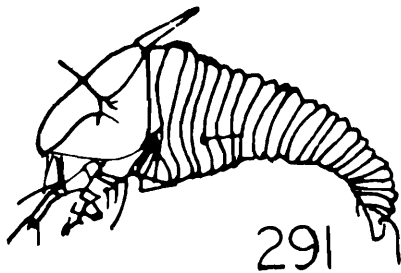


Fig. 291 : *Idonotalox* sp.

Figs. 292-293 : *Notostrix* sp.

Figs. 294-295 : *Phyllocoptes* sp.

Figs. 296-297 : *Phyllocoptruta* sp.

Key to the Species of *Phyllocoptes*

1. Feather claw 8 rayed	...	...	<i>immigrans</i>
— Feather claw less than 8 rayed	...	...	2
2. Feather claw 6 rayed	...	...	<i>simplicifoliae</i>
— Feather claw 5 rayed	...	...	3
3. Abdomen with 25-30 tergites	...	...	4
— Abdomen with over 25-30 tergites	...	...	6
4. Female genital coverflap with 10-14 lines	...	...	5
— Female genital coverflap with over 14 lines	...	...	<i>ficivagrans</i>
5. Female genitalia closely approximate to coxal base	...	...	<i>aliyamagarensis</i>
— Female genitalia away from coxal base	...	...	<i>asperaevagrans</i>
6. Genital coverflap with 10-12 lines	...	...	<i>indicae</i>
— Genital coverflap with 15 lines	...	...	<i>salmaliae</i>

292. *Phyllocoptes aliyamagarensis* Mohansundaram

Phyllocoptes aliyamagarensis Mohansundaram, 1981, *Entomon*, 6(3) : 253-254.

Diagnosis : Shield lobe overhanging rostrum base, median absent, admedians represented in the posterior half ; submedian curved, placed beyond the dorsal setae, sides of shield clear. Feather claw 5 rayed. Abdomen with about 25 broad smooth tergites, 60 microtuberculate sternites. Female genital coverflap with 10-12 lines.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

293. *Phyllocoptes ficivagrans* Mohansundaram

Phyllocoptes ficivagrans Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 426-427.

Diagnosis : Shield area clear except for the faint markings near the rear shield margin, dorsal tubercle just away from rear shield margin, dorsal setae pointing upward. Feather claw 5 rayed, appearing divided in dorsal view. Abdomen with broad smooth tergites and 72-75 microtuberculate sternites. Genital coverflap with 14-18 thin lines.

Host : *Ficus* sp.

Distribution : INDIA : Tamil Nadu.

294. *Phylloptes asperaevagrans* Mohansundaram

Phylloptes asperaevagrans Mohansundaram, 1981, *Entomon*, 6(3) : 257-258.

Diagnosis : Anterior portion of shield faintly granulate, rest of the area showing faint mosaic pattern, sides of shield heavily granular, median absent, admedians broken, represented in the posterior half. Feather claw 5 rayed. Abdomen with about 25 broad smooth tergites, 45 microtuberculate sternites. Female genital coverflap with 12-14 lines.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

295. *Phylloptes immigrans* Keifer

Phylloptes immigrans Keifer, 1940, *Eriophyid Studies*, VIII, *Bull. Calif. Dep. Agr.*, 29 : 29.

Phylloptes immigrans, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 428.

Diagnosis : Feather claw 8 rayed, simple. Shield clear without any lines. Coxal area smooth without lines or granules. Genital coverflap smooth, obtusely pointed, genital seta 50 microns long.

Host : *Tamarix plumosus*.

Distribution : INDIA : Tamil Nadu ; outside India : California.

296. *Phylloptes indicae* Mohansundaram

Phylloptes indicae Mohansundaram, 1981, *Entomon*, 6(3) : 254-257.

Diagnosis : Shield with a clear pattern of wavy lines, median represented in rear half, admedians complete, four submedians running diagonally and joining with the admedians. Dorsal tubercle a little ahead of rear shield margin. Feather claw 5 rayed. Abdomen with about 42 smooth wavy tergites, 65 microtuberculate sternites. Female genital coverflap with 10-12 lines.

Host : *Anisomeles indica*.

Distribution : INDIA : Tamil Nadu.

297. *Phylloptes salmaliae* Chakrabarti & Mondal

Phylloptes salmaliae Chakrabarti & Mondal, 1979, *Indian J. Acar.*, 3 : 73-76.

Diagnosis : Body fusiform, pink, with central longitudinal groove, rostrum projecting low, with subapical seta. Shield broadly triangular.

Median line arises from a cross line between the admedians, extend posteriorly and meet with the median at dorsal tubercle level to reach rear shield margin; admedian line sinuate, meet each other at cross line; foreleg claw knobbed, feather claw 5 rayed. Abdomen with middorsal groove from rear shield margin upto thanosome except last 4-6 tergites; thanosome with 35-53 tergites and 60-71 sternites. Genital coverflap with 15 longitudinal lines.

Host : Salmalia malabarica.

Distribution : INDIA : West Bengal.

Remarks : Infested leaves become yellow and brown.

298. *Phyllocoptes simplicifoliae* Mohansundaram

Phyllocoptes simplicifoliae Mohansundaram, 1981, *Entomon*, 6(3) : 258-259.

Diagnosis : Shield lobe projecting over rostrum base, admedians alone represented, dorsal tubercle away from shield margin. Feather claw 6 rayed. Abdomen with about 28 broad smooth tergites, 45 microtuberculate sternites. Female genital coverflap with 6 short lines.

Host : Miliosma simplicifolia.

Distribution : INDIA : Tamil Nadu.

Genus *Phyllocoptruta* Keifer (Figs. 296-297)

Phyllocoptruta Keifer, 1938, *Bull. Cali. Dep. Agr.*, 27(2) : 193.

Key to the Species of Phyllocoptruta

1. Feather claw 3 rayed	...	...	<i>odinae</i>
— Feather claw more than 3 rayed	...	...	2
2. Feather claw 4 rayed	...	...	<i>malligai</i>
— Feather claw more than 5 rayed	...	...	3
3. Genital coverflap with 10-12 lines, median line on shield absent, a thick 'V' shaped line between dorsal tubercles	...	...	<i>odayarae</i>
— Genital coverflap with 14-16 lines, 'V' shaped margin on shield absent	...	...	<i>oleivora</i>

299. *Phyllocoptruta malligai* Mohansundaram

Phyllocoptruta malligai Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 528.

Diagnosis : Shield area with very fine scorings, the median and admedians visible in a few specimens. Dorsal tubercle away from rear shield margin. Feather claw 4 rayed. Abdomen with well differentiated tergites and sternites. Female genital coverflap with 15-20 lines.

Host : *Ipomoea staphylina*.

Distribution : INDIA : Tamil Nadu.

300. *Phyllocoptruta odayarae* Mohansundaram

Phyllocoptruta odayarae Mohansundaram, 1980, *Oriental Ins.*, 14(3) : 377-378.

Diagnosis : Shield with an anterior lobe overhanging rostrum. Median absent, a thick 'V' shaped line between dorsal tubercles, admedians curved with a cross line at about the middle joining with a branch from the admedian. Sides of shield with wavy lines. Feather claw 5 rayed. Abdomen with about 34 broad tergites with a broad dorsal trough flanked on either sides with ridges. Female genital coverflap with 10-12 lines.

Host : *Odina wodier*.

Distribution : INDIA : Tamil Nadu.

301. *Phyllocoptruta odinae* Mohansundaram

Phyllocoptruta odinae Mohansundaram, 1983, *Acarologia*, 24(1) : 24-27.

Diagnosis : Shield triangular with a clear pattern. Median line represented at the basal half and at anterior end with a break in the middle. Admedians wavy forming cells along the anterior margin of the shield. Feather claw 3 rayed. Abdomen with broad tergites with faint elongate microtubercles, tergites 40, sternites 65. Female genital coverflap with 12 lines.

Host : *Odina wodier*.

Distribution : South India.

Remarks ; This mite causes slight rusting of leaves on both sides.

302. *Phyllocoptruta oleivora* (Ashmead)

Typhlodromus oleivorus Ashmead, 1879, *Can. Ent.*, **11** : 160.

Phyllocoptruta oleivorus, Keifer, 1938, *Bull. Calif. Dep. Agr.*, **27** : 192.

Phyllocoptruta oleivorus, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 92.

Diagnosis : Flattened fusiform mite, feather claw 5 rayed. The shield has moderately produced anterior lobe with a transverse furrow across the front edge. Admedian shield line arises from each side of the anterior lobe and curves out to the area just past the lobe base. The abdomen has the broad longitudinal trough and the microtubercles present only on sternites, each tergite covers 2-3 sternites. The basal area of the female genital coverflap is granulate with a median longitudinal line apically, coverflap has 14-16 longitudinal ribs.

Host : *Citrus*.

Nature of damage : This is a serious pest of citrus. It occurs on both the surfaces of leaves and also on fruit skin. The feeding causes the appearance of silvery skin which later turns reddish or blackish. In some cases the mites give shark skin appearance to the fruits. Rinds of silver fruits become thicker than undamaged fruits and loose water faster.

Bionomics : Though no study has been made in this country on the biology of this mite, but the information available in literature indicates that a complete life cycle takes 7-10 days in summer and 14 days in winter. Adult may live for as many as 20 days (Yothers & Mason, 1930). In another study (Swirski & Amitai, 1958) it was found that the theoretic threshold for egg and larva was 9.2°C. In summer, the development of these stages took 4-6 days and about 2 months in winter. Adult longevity was 36-37 days at 12-18°C, 24 days at 20-23°C and 20 days above these temperatures. Death rate was lowest at 16-18°C and highest at 12-13°C. They observed 28 or more generations at Rehovot in a year.

Distribution : INDIA : West Bengal, Tamil Nadu ; outside India : U. S. A., South Africa, Israel, Mauritius.

Genus *Vasates* Shimer

(Figs. 298-299)

Vasates Shimer, 1869, *Trans. Am. Ent. Soc.*, **2** : 319.

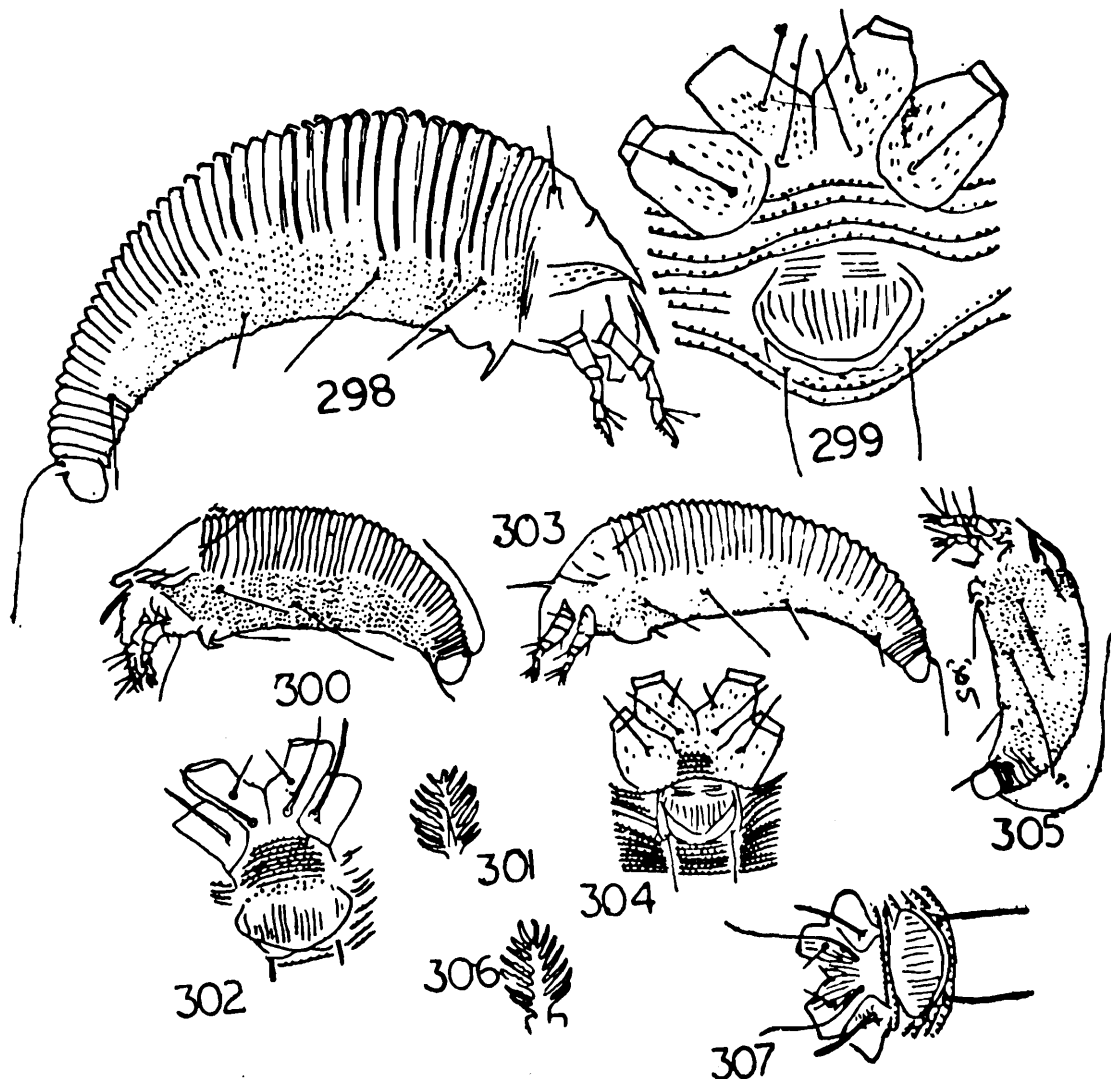
Key to the Species of Vasates

1. Feather claw 7 rayed	...	...	<i>cassiae</i>
— Feather claw 8 rayed	...	...	<i>dhodabettaensis</i>

303. *Vasates cassiae* Mohansundaram

Vasates cassiae Mohansundaram, 1982, *Acarologia*, 23(3) : 257.

Diagnosis : Shield with a clear pattern of lines. Median line complete and fairly straight, admedians converge towards the anterior end with cross lines connecting with the median at three points fairly equidistant from each other. First submedian broken and represented in the anterior and middle of shield ; second submedian curved, converge towards the anterior end and joins with first submedian ; third submedian forms the shield margin. Feather claw 7 rayed. Tergites with 42 rings with faint microtuberculation, sternites 65 with dot like clear microtuberculation. Female genital coverflap with 12-14 lines.



Figs. 298-299 : *Vasates* sp.

Figs. 300-302 : *Abacarus* sp.

Figs. 303-304 : *Aculops* sp.

Figs. 305-307 : *Aculus* sp.

Hosts : *Cassia auriculata*, *Ciba pentandra*.

Distribution : INDIA : Tamil Nadu.

304. *Vasates dhodabettaensis* Mohansundaram

Vasates dhodabettaensis Mohansundaram, 1983, *Acarologia*, 24(1) : 32-35.

Diagnosis : Shield with a pointed lobe overhanging the rostrum. Dorsal tubercle cylindrical at shield margin. Abdomen with 38 smooth tergites and 68 microtuberculate sternites. Female genital coverflap with 10 lines.

Host : *Alnus* sp.

Distribution : INDIA : Tamil Nadu.

SECTION V

Key to the Genera of Section V (after Jeppson et al., 1975)

1. Dorsum evenly arched transversely. ...	...	4
— Thanosome with middorsal longitudinal furrow or trough. ...	...	2
— Thanosome with central longitudinal ridge. ...	...	9
2. Anterior dorsal tergal plate present. ...	...	3
— Anterior dorsal tergal plate absent. ...	...	<i>Tetra, Paratetra</i>
3. First setiferous coxal tubercle missing. ...	...	<i>Neomesalox</i>
— First setiferous coxal tubercle present. ...	...	<i>Bakeriella</i>
4. First setiferous coxal tubercle and seta missing. ...	...	5
— First setiferous coxal tubercle present. ...	...	6
5. Dorsal tubercle away from rear shield margin and dorsal seta pointing upward and forward. ...	...	<i>Neometaculus</i>
— Not like above. ...	...	<i>Metaculus</i>
6. Anterior shield lobe over rostrum flanked on each side by lateral furrowed extension of shield, female genitalia unusually elongate and coverflap acuminate. ...	...	<i>Keiferana</i>
— No auxiliary anterior shield projection besides anterior shield lobe ; female genital coverflap bowl shaped, not acuminate. ...	...	7
7. Thanosomal tergites unusually broad and abruptly contrasting with narrower telosomal rings. ...	...	<i>Anthocoptes</i>

—	Thanosomal tergites narrowing to and blending with telosomal rings.	...	...	8
8.	Anterior shield rather broad and rounded off, with 2-4 small spines or spinules projecting forward from under front edge.	...	...	<i>Aculus</i>
—	Anterior shield lobe usually more acuminate frequently ending with a sharp center point ; never with spinules from under front edge.	...	...	<i>Aculops</i>
9.	Cephalothoracic shield with pit.	...	...	10
—	Cephalothoracic shield not with pit.	...	...	11
10.	With a pair of pits.	...	...	<i>Ditrymacus</i>
—	With a single pit.	...	...	<i>Monotrimacus</i>
11.	Central thanosomal ridges extra broad ; 4 anterior spinules on anterior shield lobe.	...	...	<i>Thamnacus</i>
—	Central longitudinal ridges narrower.	...	...	12
12.	Foretibial seta absent ; 5 longitudinal wax bearing ridges on dorsum separated by moderately broad furrows ; dorsal tubercle on rear shield margin.	...	...	<i>Neocalacarus</i>
—	Foretibial seta present, thanosomal dorsum with at most 3 ridges.	...	...	13
13.	Lateral ridges present or absent.	...	...	14
—	Lateral ridges absent.	...	...	<i>Indotegolophus</i>
14.	Middorsal ridge shorter than subdorsal ridges and ending in dorsal trough.	...	...	<i>Abacarus</i>
—	Middorsal ridge not ending before such lateral or subdorsal ridges as are present.	...	...	15
15.	Tergites on thanosome of various widths according to spines but all reaching same level in lateral view.	...	...	<i>Tegolophus</i>
—	Deep cleft between shield and thanosome, with first tergite projecting up further than those following.	...	...	16
16.	First tergite enlarged.	...	...	<i>Proneotegonotus</i>
—	First tergite not enlarged.	...	...	<i>Neotegonotus</i>

Genus *Abacarus* Keifer

(Figs. 300-302)

Abacarus Keifer, 1944, *Bull. Calif. Dep. Agr.*, 33(1) : 28.*Key to the Species of Abacarus*

1.	Feather claw 4 rayed.	...	...	<i>anacardiae</i>
—	Feather claw more than 4 rayed.	...	...	2

2. Feather claw 5 rayed.	...	...	3
— Feather claw more than 5 rayed.	..	...	4
3. Median line complete.	...	...	<i>arjunalis</i>
— Median line represented at rear of shield.	...	...	<i>gossypii</i>
4. Feather claw 6 rayed.	...	...	<i>asiaticae</i>
— Feather claw 7 rayed.	...	...	5
5. Shield with median line absent.	...	...	<i>sacchari</i>
— Shield with median line present.	...	...	6
6. Sternites as numerous as tergites.	...	...	<i>delhiensis</i>
— Sternites more in number than tergites.	...	...	<i>goaensis</i>

305. *Abacarus anacardiae* Mohansundaram

Abacarus anacardiae Mohansundaram, 1982, *Indian J. Acar.*, 6 : 9-11.

Diagnosis : Shield triangular, anterior tip overhanging the rostral base, with faint marking, medians and admedians represented as furrows in a faint manner. Dorsal tubercle a little away from shield margin. Feather claw 4 rayed. Abdomen with 58-62 distinct tergites and equal number of sternites.

Host : *Anacardium occidentale*.

Distribution : INDIA : Tamil Nadu.

306. *Abacarus arjunalis* Mondal, Ghosh & Chakrabarti

Abacarus arjunalis Mondal, Ghosh & Chakrabarti, *Oriental Ins.*, 16(3) : 305-307.

Diagnosis : Shield subtriangular with short and blunt anterior lobe, shield design presents a number of longitudinal lines, median line complete, admedians arise from anterior tip of shield lateral to median line ; submedian lines not clearly discernible. Dorsal tubercle placed near the rear shield margin, dorsal seta directed forward. Feather claw 5 rayed. Abdomen with 32-35 smooth tergites and 42-45 micro-tuberculate sternites. Dorsal thanosome with 3 distinct wax bearing ridges. Genital coverflap smooth.

Host : *Terminalia arjuna*.

Distribution : INDIA : West Bengal.

Remarks : It causes curling of leaf margins and ventral erineum.

307. *Abacarus asiaticae* Mohansundaram

Abacarus asiaticae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 167-169.

Diagnosis : Shield with median and admedians complete,

first submedian joining with admedian in the anterior 1/3 ; second submedian forming the border of the shield ; sides of shield, and areas between admedians and between first and second submedians granular. Feather claw 6 rayed. Abdomen with 65 rings, tergites smooth, sternites with microtuberculations. Genital coverflap with 12-16 lines.

Host : *Gmelia asiatica*.

Distribution : INDIA : Tamil Nadu.

308. *Abacarus delhiensis* ChannaBasavanna

Abacarus delhiensis ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 118-119.

Diagnosis : Flattish, elongate, whitish with two prominent subdorsal ridges of waxy processes. Feather claw 7 rayed. Forecoxae connate with longitudinal wavy lines. Admedian with middorsal ridge. Sternites about as numerous as tergites, microtubercles being beads along rear margins and those on sternites beyond third ventral seta microstriate, Female genital coverflap with 10 longitudinal stripes.

Host : *Saccharum spontaneum*.

Distribution : INDIA : Delhi, Tamil Nadu.

309. *Abacarus goaensis* Mohansundaram

Abacarus goaensis Mohansundaram, 1980, *Mysore J. agric. Sci.*, 14 : 515-517.

Diagnosis : Shield with median represented in the rear 3/4 ; admedians wavy and complete, first and second submedians curved and branched anteriorly. Dorsal tubercle at shield ; side of shield granular, abdomen with 40 tergites and 68 sternites. Female genital coverflap with 12 lines.

Host : Undet. plant.

Distribution : INDIA : Goa.

310. *Abacarus gossypii* Mohansundaram

Abacarus gossypii Mohansundaram, 1982, *Indian J. Acar.*, 6 : 11-12.

Diagnosis : Shield triangular, median line represented as short line at rear of shield, admedians short represented at the rear of shield and join the median at the point of bifurcation ; first and second submedians represented as short lines in the basal half of shield. Feather claw

5 rayed. Abdomen with tergites having microtuberculation at middorsal and lateral regions. Female genital coverflap with 2 rows of scorings.

Host : *Gossypium arboreum*.

Distribution : INDIA : Tamil Nadu.

311. *Abacarus sacchari* ChannaBasavanna

Abacarus sacchari ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 117-118.

Diagnosis : Yellow, pink body with white waxy covering and 3 longitudinal rows of waxy processes on dorsum including cephalothorax. Feather claw 7 rayed with a short projection. Abdomen with 38-42 tergites and 68-70 microtuberculate sternites.

Host : Sugarcane.

Distribution : INDIA : Karnataka, Tamil Nadu, Delhi, Bihar, West Bengal.

Genus *Aculops* Keifer

(Figs. 303-304)

Aculops Keifer, 1966, *Eriophyid Studies, Calif. Dep. Agr., B-21* : 9.

Key to the Species of *Aculops*

1. Feather claw 7 rayed	...	...	<i>extensae</i>
— Feather claw less than 7 rayed	...	...	2
2. Feather claw 6 rayed	...	...	<i>abutiloni</i>
— Feather claw less than 6 rayed	...	...	3
3. Feather claw 4 rayed	...	...	4
— Feather claw 5 rayed	...	...	5
4. Female genital coverflap with 6 lines	...	...	<i>acanthae</i>
— Female genital coverflap with 12-14 lines	...	...	<i>niphocladae</i>
5. Shield area clear	...	...	6
— Shield area with admedians and submedians	...	...	7
6. Genital coverflap with 10-12 lines	...	...	<i>kumari</i>
— Genital coverflap with 16 lines	...	...	<i>betonicae</i>
7. Shield area with admedian line alone	...	...	<i>leguminae</i>
— Shield with admedian and submedian lines	...	...	8
8. Genital coverflap with 12-14 lines	...	...	9
— Genital coverflap with 7-10 lines	...	...	<i>xanthocarpi</i>

9. Abdominal tergites smooth	...	...	10
— Abdominal tergites microtuberculate	...	...	11
10. Coxal area with scorings	...	...	<i>privae</i>
— Coxal area smooth and clear	...	...	<i>pittosporae</i>
11. Microtubercles prominent	...	...	<i>boerhaeviae</i>
— Microtubercles not prominent	...	...	<i>excoecaria</i>

312. *Aculops acanthae* Mohansundaram

Aculops acanthae Mohansundaram, 1982, *Indian J. Acar.*, 6 : 1-3.

Diagnosis : Shield clear, without any line, sides of shield granular, dorsal tubercle at shield margin. Feather claw 4 rayed. Abdomen with 23 tergites and 55 sternites. Tergites broad and smooth, without microtubercles. Female genital coverflap with 6 faint lines.

Host : Acanthaceae.

Distribution : INDIA : Karnataka.

313. *Aculops abutiloni* Mondal & Chakrabarti

Aculops abutiloni Mondal & Chakrabarti, 1981, *Oriental Ins.*, 14(4) : 453-455.

Diagnosis : Body wide, whitish or faint brownish. Shield subtriangular, shield design with longitudinal and curved lines forming a complete network, median line faint ; admedian lines sinuate. Dorsal tubercles at rear margin of shield, 38.25 apart from each other. Feather claw simple, 6 rayed. Anterior coxae broadly connate and with median suture, both coxae ornamented with a few longitudinal lines. Abdomen with 38-40 tergites and 71 sternites, the former microtuberculate. Genital coverflap with about 12-14 faint longitudinal scorings.

Host : *Abutilon indicum*.

Distribution : INDIA : West Bengal.

Remarks : It remains on the undersurface of leaves causing no appreciable damage to the plants.

314. *Aculops betonicae* Mohansundaram

Aculops betonicae Mohansundaram, 1981, *Oriental Ins.*, 15(2) : 169.

Diagnosis : Shield triangular without any markings ; dorsal tubercle at rear shield margin. Feather claw 6 rayed. Abdomen with 22 broad

smooth tergites and 65 finely microtuberculate sternites. Genital coverflap with 16 lines.

Host : Justicia betonica.

Distribution : INDIA : Tamil Nadu.

Remarks : Infestation causes the appearance of sunken spots on the lower sides of leaves. Light specklings also appear at feeding sides.

315. *Aculops boerhaeviae* Mohansundaram

Aculops boerhaeviae Mohansundaram, 1982, *Indian J. Acar.*, 6 : 3-4.

Diagnosis : Shield broadly rounded at apex ; median line represented only at base, first submedian short and thick, represented only at basal $1/4$; second submedian placed widely apart. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 44-48 tergites, 68-74 sternites, tergites with spine like tubercles ; sternites microtuberculate. Female genital coverflap with 11-14 lines.

Host : Boerhaavia diffusa.

Distribution : INDIA : Tamil Nadu.

316. *Aculops excoecaria* Mondal & Chakrabarti

Aculops excoecaria Mondal & Chakrabarti, 1982, *Indian J. Acar.*, 6 : 17-19.

Diagnosis : Shield subtriangular with prominent anterior lobe, median line prominent present throughout shield length, admedian sinuate, submedian one bifurcating on $1/3$ anteriorly. Feather claw 5 rayed. Abdomen with 38 tergites and 67 sternites ; tergites less prominently microtuberculate. Female genital coverflap with 12-14 longitudinal stripes.

Host : Excoecaria aquallocha.

Distribution : INDIA : West Bengal.

317. *Aculops extensae* Mohansundaram

Aculops extensae Mohansundaram, 1980, *Oriental Ins.*, 14(3) : 373.375.

Diagnosis : Shield including lobe overhanging rostrum base, median line on posterior half only, admedians wavy, complete ; first submedian represented at about the middle with posterior forking, second submedian on anterior part of shield. Dorsal tubercle at rear

shield margin. Feather claw 7 rayed. Coxae with clear sternal line, coxal area with fine scorings ; 3 setiferous coxal tubercles present. Abdomen with 58 smooth tergites and 75 sternites with fine microtuberculations. Genital coverflap with 12 lines.

Host : *Pergularia extensa*.

Distribution : INDIA : Tamil Nadu.

318. *Aculops kumari* Mohansundaram

Aculops kumari Mohansundaram, 1982, *Entomon*, 7(4) : 431-433.

Diagnosis : Shield without any line. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 40 tergites and 55 sternites. Tergites smooth, sternites uniformly microtuberculate along the hind margin of each ring. Coverflap with 10-12 thin lines.

Host : Undet. plant.

Distribution : INDIA : Delhi.

319. *Aculops leguminae* Mohansundaram

Aculops leguminae Mohansundaram, 1982, *Indian J. Acar.*, 6 : 5-6.

Diagnosis : Shield triangular, admedian alone faintly represented which are joined at the rear ; otherwise shield bare and sides of shield clear. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 40 smooth tergites and 65 microtuberculate sternites. Female genital coverflap with 10 lines.

Host : *Dolichos lablab*.

Distribution : INDIA : Tamil Nadu.

320. *Aculops niphocladae* Keifer

Aculops niphocladae Keifer, 1966, *State Bur. Ent, Calif. Dep. Agr.*, pp. 1-24.

Aculops niphocladae, Chakrabarti, Ghosh & Mondal, 1981, *Oriental Ins.*, 15(2) : 139.

Diagnosis : Feather claw simple, 4 rayed. Shield with a design of narrow lines bearing granules and short dashes forming a network of cells, sides of shield granular. Coxae with thick scorings. Female genital coverflap with 12-14 longitudinal ribs.

Host : *Salix niphocladae*.

Distribution : INDIA : Uttar Pradesh ; outside India : Canada.

321. *Aculops pittosporae* Mohansundaram

Aculops pittosporae Mohansundaram, 1982, *Indian J. Acar.*, 6 : 6-7.

Diagnosis : Shield with a clear pattern covered over with wax in uncleaned specimens. Median line absent ; admedian wavy with 3 cross lines ; submedian bent anteriorly and join with admedian. Dorsal tubercle present. Feather claw 5 rayed. Abdomen with 26 tergites, broad and smooth, 55 microtuberculate sternites. Female genital coverflap with 12-14 thin lines.

Host : *Pittosporum floribundum*.

Distribution : INDIA : Tamil Nadu.

322. *Aculops privae* Mohansundaram

Aculops privae Mohansundaram, 1980, *Oriental Ins.*, 14(3) : 371-373.

Diagnosis : Shield with a clear pattern of lines ; median line represented at rear half of shield with anterior bifurcation which joins the admedians. Abdomen bifurcated at rear margin of shield, wavy complete ; submedians forming curved lines on either side. Dorsal tubercle at rear shield margin. Feather claw 5 rayed. Abdomen with 42 broad tergites, 70 sternites with fine microtuberculations. Female genital coverflap with 12-14 lines.

Host : *Priva leptostachya*.

Distribution : INDIA : Tamil Nadu.

323. *Aculops xanthocarpi* Mondal & Chakrabarti

Aculops xanthocarpi Mondal & Chakrabarti, 1982, *Indian J. Acar.*, 6 : 19-20.

Diagnosis : Shield corrugated laterally, subtriangular shield design with a number of longitudinal lines ; median line distinct present throughout shield length, admedian line smooth. Dorsal tubercle placed on rear shield margin. Feather claw 5 rayed. Abdomen with equal number of tergites and sternites. Female genital coverflap with 9-10 longitudinal scorings.

Host : *Solanum xanthocarpum*.

Distribution : INDIA : West Bengal.

Genus *Aculus* Keifer

(Figs. 305-307)

Aculus Keifer, 1959, *Occ. Pap. Calif. Burr. Ent.*, 1 : 5.

Key to the Species of Aculus

1. Feather claw 4 rayed	...	...	3
— Feather claw 6 rayed	...	...	2
— Feather claw 7 rayed	...	...	7
2. Median line on shield absent	...	...	<i>yelagiriensis</i>
— Median line on shield complete	...	...	<i>cassiae</i>
3. Shield design obsolate	...	...	4
— Shield design distinct	...	...	5
4. Genital coverflap with 16 lines	...	...	<i>atturensis</i>
— Genital coverflap with 10 lines	...	...	<i>asperus</i>
5. Abdomen with 28-30 tergites	...	...	<i>kolengii</i>
— Abdomen with over 30 tergites	...	...	6
6. Dorsal shield setae much shorter than shield length of genitalia	...	...	<i>colei</i>
— Dorsal shield setae much longer than shield length	...	...	<i>indicus</i>
7. Abdomen phyllocoptiform with well differentiated tergites and sternites	...	...	<i>moringeae</i>
— Abdomen eriophyriform with sternites about as numerous as tergites	...	...	8
8. Second ventral seta on abdomen longer than or as long as third ventral seta ; dorsal shield setae almost as long as shield ; punctations present on rear mid shield	...	...	<i>mckenziei</i>
— Second ventral seta shorter than third ventral ; dorsal setae shorter than length of shield ; punctations on rear mid shield absent	...	...	<i>menoni</i>

324. *Aculus atturensis* Mohansundaram

Aculus atturensis Mohansundaram, 1980, *Indian J. Acar.*, 4 : 6.

Diagnosis : Body dorsoventrally flattened, shield rough with an inverted 'U' shaped marking in the centre ; no other line present. Feather claw 4 rayed. Abdomen with about 22 broad smooth tergites and 55 finely microtuberculate sternites.

Host : Acanthaceae (Mohansundaram, 1980).

Distribution : INDIA : Tamil Nadu.

325. *Aculus asperus* ChannaBasavanna

Aculus asperus ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 107-108.

Diagnosis : Abdomen with about 36-37 tergites and 62 sternites, last 5-6 tergites forming complete rings ; tergites almost smooth except for faint crescentic markings along with the middle of tergites ; sternites with rounded microtubercles set along the margin ; feather claw 4 rayed ; shield design obsolete.

Host : *Leucas aspera*.

Distribution : INDIA : Karnataka.

326. *Aculus colei* ChannaBasavanna

Aculus colei ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 108-109.

Diagnosis : Feather claw 4 rayed ; dorsal shield setae much shorter than shield length ; female genital seta shorter than length of genitalia ; shield design of a faint net work of small and large cells ; median line absent ; abdomen with 39-40 tergites inclusive of 6-7 complete rings and about 64 microtuberculate sternites.

Host : *Coleus amboinicus*.

Distribution : INDIA : Tamil Nadu.

327. *Aculus cassiae* Mondal & Chakrabarti

Aculus cassiae Mondal & Chakrabarti, 1981, *Oriental Ins.*, 14(4) : 455-457.

Diagnosis : Body elongate, fusiform, yellowish. Shield subtriangular with prominent anterior lobe with small spines at anterior tip, shield design represents network. Median line complete, admedian lines sinuate arising from tip of anterior lobe. Dorsal tubercles placed at rear margin. Feather claw 6 rayed. Abdomen with about 45-47 tergites and 64-70 sternites, all microtuberculate ; tergites smooth with hyaline areas. Genital coverflap with about 13 longitudinal scorings.

Hosts : *Casia sophora*, *Casia tora*.

Nature of damage : In case of heavy infestation, black erineum appears on the leaves. The maximum population is seen during July-October (Mondal & Chakrabarti, 1981).

Distribution : INDIA : West Bengal.

328. *Aculus indicus* ChannaBasavanna

Aculus indicus ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 109-110.

Diagnosis : Feather claw 4 rayed ; shield subtriangular, anterior lobe short, thin, acuminate ; shield design of conspicuous carinae ; median line on basal 1/3 ; abdomen with 49 tergites, possess minute crescentic microtubercles set on their margins and appearing as little thickenings of the margins and with about 61 microtuberculate sternites rising high upon the sides of the abdomen ; dorsal shield setae much longer than shield length ; female genital setae much longer than length of genitalia.

Host : *Celtis wightii*.

Distribution : INDIA : Karnataka.

Remarks : This mite is a vagrant on the leaf surface. No damage symptoms are produced except that certain brownish spots are produced on the infested leaves (ChannaBasavanna, 1966).

329. *Aculus mckenziei* (Keifer)

Vasates mckenziei Keifer, 1944, *Calif. Dep. Agr.*, 33 : 26.

Aculus mckenziei, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 111-112.

Diagnosis : Feather claw 7 rayed, abdomen eriophyriform with sternites about as numerous as tergites ; second ventral seta on abdomen longer than or as long as third ventral ; dorsal shield setae as long as shield ; punctations present on rear midshield.

Host : *Arundo donax*.

Distribution : INDIA : Karnataka.

Remarks : No economic importance of this species is known.

330. *Aculus menoni* ChannaBasavanna

Aculus menoni ChannaBasavanna, 1966, *Univ. Agri. Sci. Bull.*, pp. 112-113.

Diagnosis : Feather claw 7 rayed ; abdomen eriophyriform with sternites about as numerous as tergites ; second ventral seta shorter than third ventral ; dorsal setae shorter than length of shield ; punctations on rear midshield absent.

Hosts : *Moringa oleifera*, *Moringa pterygosperma*.

Nature of damage : These mites are vagrants on both the surfaces of leaves causing no apparent damage symptoms to its host.

Distribution : INDIA : Karnataka, Tamil Nadu.

331. *Aculus moringae* ChannaBasavanna

Aculus moringae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 110-111.

Diagnosis : Feather claw 7 rayed ; abdomen phyllocoptiform with well differentiated tergites and sternites.

Host : *Moringa oleifera*.

Distribution : INDIA : Karnataka.

Remarks : These mites are vagrants on leaf and stem showing no injury to its host.

332. *Aculus kolengii* Mohansundaram

Aculus kolengii Mohansundaram, 1981, *Colemania*, 1(1) : 39-42.

Diagnosis : Shield area fairly clear except for the presence in the rear half of a faint median line and fainter admedians converging and joining the median at about the middle of the shield. Dorsal tubercles at shield margin. Feather claw 4 rayed. Abdomen with about 28 broad smooth tergites and 75 microtuberculate sternites. Female genital coverflap with 10 longitudinal lines.

Host : Undet. creeper.

Distribution : INDIA : Tamil Nadu.

333. *Aculus yelagiriensis* Mohansundaram

Aculus yelagiriensis Mohansundaram, 1980, *Indian J. Acar.*, 4(1) : 6-9.

Diagnosis : Shield with distinct pattern of lines. Median line absent, admedian lines wavy and joined at the posterior shield margin ; submedian represents at the sides of the shield as curved lines ; sides of shield with fine lines and granules. Feather claw 6 rayed. Abdomen with about 24 broad smooth tergites and 67 narrow microtuberculate sternites.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Genus *Anthocoptes* Nalepa
(Figs. 308-310)

Anthocoptes Nalepa, 1892, *Anz. Akad. Wiss. Wien.*, 29(5) : 16.

Key to the Species of Anthocoptes

1. Feather claw 6 rayed	...	...	<i>ayyanari</i>
— Feather claw 4 rayed	...	...	2
2. Genital coverflap with 10-12 lines	...	...	3
— Genital coverflap with 8-10 lines	...	...	4
3. Shield with a clear pattern of lines, admedian wavy, complete, forked posteriorly and joining with submedians forming cells	...	...	<i>vitexae</i>
— Shield with median and admedian lines faintly represented at the rear shield margin and sometimes as short line on cell side	...	...	<i>pavoniae</i>
4. Abdomen with 20 or less tergites	...	...	5
— Abdomen with more than 30 tergites	...	...	6
5. Shield design obsolete	...	...	<i>adhatodae</i>
— Shield design with a number of longitudinal lines	...	...	<i>glycosmis</i>
6. Abdomen with 35 broad tergites and 60-70 narrow sternites ; tergites with faint elongated widely placed microtuberculation	...	...	<i>tectonae</i>
— Abdomen with 32-35 tergites and 62-65 sternites ; tergites smooth	...	...	<i>walayarensis</i>

334. *Anthocoptes adhatodae* ChannaBasavanna

Anthocoptes adhatodae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 105.

Diagnosis : Pale brown fusiform, slightly curved mite, shield strongly arched, anterior lobe over rostrum quite thick, shield design obsolete. Coxae almost smooth but for faint longitudinal lines ; abdomen with 18-19 smooth tergites pointing like broad rounded teeth dorsally and with about 70 sternites, microtuberculate, microtubercles bead like.

Host : *Adhatoda vasica*.

Distribution : INDIA : Delhi, Tamil Nadu.

335. Anthocoptes ayyanari Mohansundaram

Anthocoptes ayyanari Mohansundaram, 1981, *Entomon*, 6(4) : 343-344.

Diagnosis : Shield with short faintly represented admedians and submedians. Feather claw 6 rayed. Abdomen with 16-18 broad smooth tergites, 65 microtuberculate sternites. Female genital coverflap smooth without any lines.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

336. Anthocoptes glycosmis Mondal & Chakrabarti

Anthocoptes glycosmis Mondal & Chakrabarti, 1981, *Oriental Ins.*, 15(3) : 313-315.

Diagnosis : Shield subtriangular with a short anterior lobe ; shield design with a number of longitudinal lines ; median line present on anterior 1/3 only. Admedians sinuate and complete, submedian lines almost absent, lateral shield with a number of indistinct cells. Dorsal tubercles on rear shield margin. Feather claw 5 rayed. Abdomen with 19-20 usually wide tergites and 56-60 sternites, tergites with microtubercles in the form of longitudinal striations ; sternites with bead-like microtubercles. Genital coverflap with 10-12 longitudinal scorings.

Host : *Glycosmis pentaphylla*.

Distribution : INDIA : West Bengal.

337. Anthocoptes pavoniae Mohansundaram

Anthocoptes pavoniae Mohansundaram, 1981, *Entomon*, 6(4) : 344.

Diagnosis : Shield triangular, median and admedian lines faintly represented at rear shield margin and submedian as short line on either side, sides of shield with few oblique lines. Feather claw 4 rayed. Abdomen broad, 25-28 faint microtuberculate tergites and 57-60 finely microtuberculate sternites. Genital coverflap with 10-12 lines.

Host : *Pavonia* sp.

Distribution : INDIA : Tamil Nadu.

338. Anthocoptes tectonae Mohansundaram

Anthocoptes tectonae Mohansundaram, 1981, *Entomon*, 6(4) : 347.

Diagnosis : Shield triangular, median line straight ; admedians straight, slightly converging anteriorly, first submedian straight,

parallel to admedians, second submedian slightly curved with an abrupt bend near the rear shield margin. Dorsal tubercles at shield margin. Feather claw 4 rayed. Abdomen with 35 broad distinct tergites, 60-70 narrow sternites. Genital coverflap with 8-10 lines.

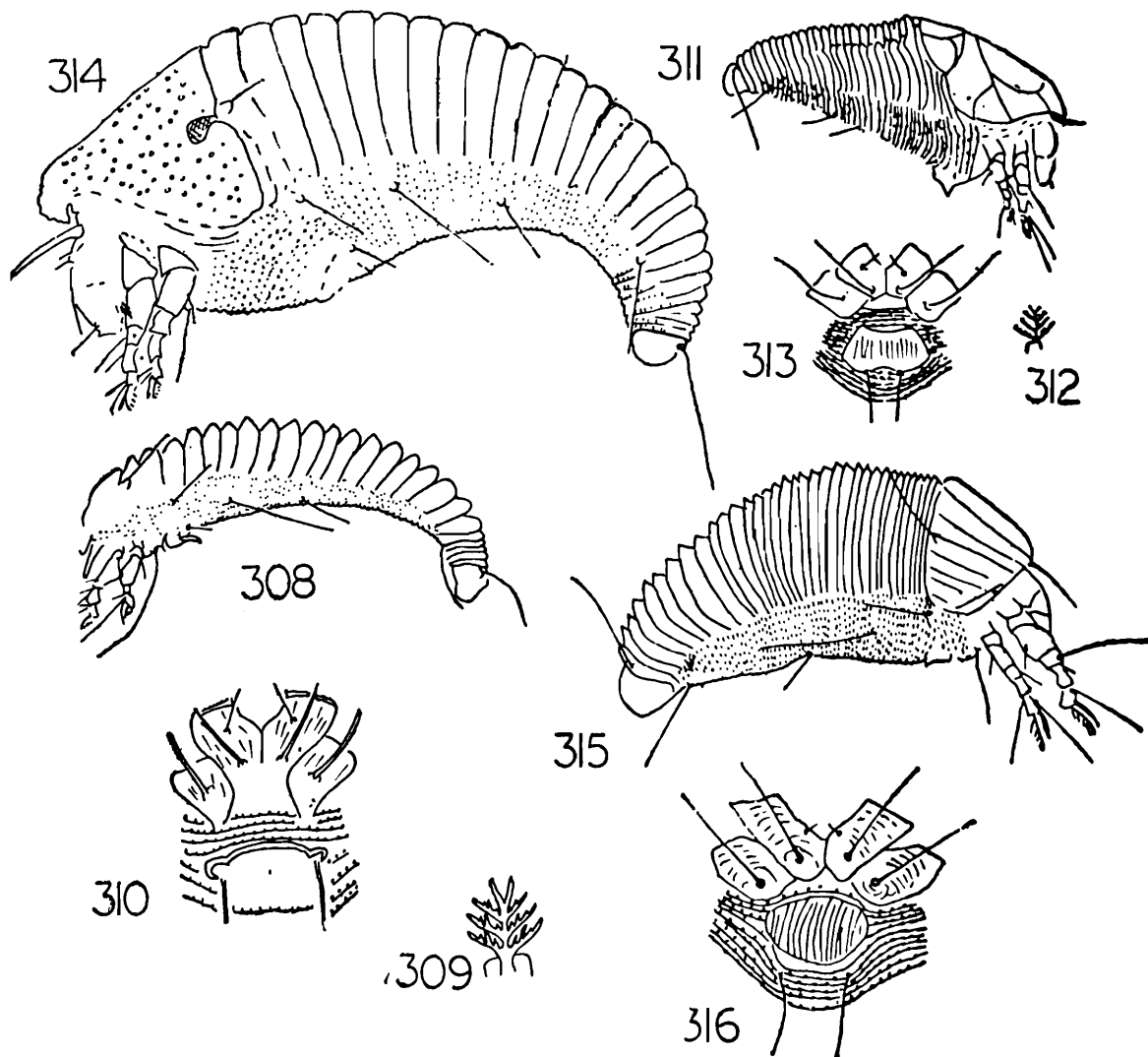
Host : *Tectona grandis*.

Distribution : INDIA : Tamil Nadu.

339. *Anthocoptes vitexae* Mohansundaram

Anthocoptes vitexae Mohansundaram, 1981, *Entomon*, 6(4) : 347-349.

Diagnosis : Shield with a clear pattern of lines. Median line represented at the basal 1/3, forked anteriorly joins the admedians ; admedians wavy, complete, first submedian wavy, forked posteriorly



Figs. 308-310 : *Anthocoptes* sp.

Figs. 311-313 : *Bakeriella* sp.

Fig. 314 : *Ditrymacus* sp.

Figs. 315-316 : *Indotegolophus* sp.

forming cells with admedians ; second submedian forms the border of the shield. Feather claw 4 rayed. Abdomen with 22-25 tergites and 60 sternites, the former without microtuberculations, latter with fine dot like microstriation at the posterior 1/3 of each ring dots. Genital coverflap with 10-12 lines.

Host : Vitex negundo.

Distribution : INDIA : Tamil Nadu.

340. *Anthocoptes walayarensis* Mohansundaram

Anthocoptes walayarensis Mohansundaram, 1981, *Entomon*, 6(4) : 349-350.

Diagnosis : Shield triangular without any markings, dorsally dorsal setae pointed caudad. Feather claw 4 rayed. Abdomen with 32-35 tergites and 62-65 sternites, the former broad, smooth ; the latter uniformly microtuberculate. Female genital coverflap with 8-10 lines.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Genus *Bakeriella* Chakrabarti & Mondal

(Figs. 311-313)

Bakeriella Chakrabarti & Mondal, 1982, *Oriental Ins.*, 16(4) : 519-521.

341. *Bakeriella ocimis* Chakrabarti & Mondal

Bakeriella ocimis Chakrabarti & Mondal, 1982, *Oriental Ins.*, 16(4) : 521-522.

Diagnosis : Shield semicircular with a short and blunt anterior lobe, shield design obscure, median line absent ; admedian lines sinuate, originate laterally from anterior shield margin, only one submedian line meeting obliquely at posterior end of admedians. Patella with patellar seta. Feather claw 4 rayed. Abdomen with 26-28 smooth tergites and 50-53 microtuberculate sternites. Female genital coverflap with 8-10 longitudinal lines.

Host : Ocimum basilicum.

Distribution : INDIA : West Bengal.

Genus *Ditrymacus* Keifer

(Fig. 314)

Ditrymacus Keifer, 1960, *Eriophyid Studies*, Calif. Dep. Agr., B-1 : 12.

Key to the Species of Ditrymacus

1. Dorsal pit on either side of shield near shield margin opening at base of dorsal tubercle ...	...	<i>keiferi</i>
— Dorsal pit near base of dorsal tubercle on either side of admedian line ...	...	<i>integrifoliae</i>

342. *Ditrymacus keiferi* Mohansundaram

Ditrymacus keiferi Mohansundaram, 1982, *Acarologia*, 23 : 260-262.

Diagnosis : Shield triangular, anterior lobe over rostrum prominent. Dorsal pits on either side of the shield near shield margin opening up at base of dorsal tubercles. Feather claw 4 rayed. Abdomen with 30 broad tergites and 70 sternites. Female genital coverflap with two ranks of scorings.

Host : *Undet. shrub.*

Distribution : INDIA : Tamil Nadu.

343. *Ditrymacus integrifoliae* Mohansundaram

Ditrymacus integrifoliae Mohansundaram, 1982, *Acarologia*, 23: 263.

Diagnosis : Dorsal tubercle at shield margin. Dorsal pits near base of dorsal tubercle on either side of admedian line which is represented at basal 2/3 length. Abdomen with 24 broad smooth tergites and 48 finely microtuberculate sternites. Female genital coverflap with 16 lines.

Host : *Artocarpus integrifolia.*

Distribution : INDIA : Tamil Nadu.

Genus *Indotegolophus* Chakrabarti & Mondal

(Figs. 315-316)

Indotegolophus Chakrabarti & Mondal, 1980, *Indian J. Acar.*, 4(2) : 55-56.

344. *Indotegolophus darjeelingensis* Mondal & Chakrabarti

Indotegolophus darjeelingensis Mondal & Chakrabarti, 1980, *Indian J. Acar.*, 4(2) : 56-58.

Diagnosis : Shield subtriangular, with or without very short anterior lobe ; shield design represents some longitudinal lines ; median line complete ; admedian line complete. Dorsal tubercles distinct

nearly on rear shield margin. Feather claw 6 rayed. Abdomen with 37-40 tergites and 80 sternites.

Host : *Symplocos* sp. (Chakrabarti & Mondal, 1980).

Distribution : INDIA : West Bengal.

Genus *Keiferana* ChannaBasavanna

(Figs. 317-318)

Keiferana ChannaBasavanna, 1967, *Mysore J. agric. Sci.*, 1(4): 264.

345. *Keiferana neolitseae* (ChannaBasavanna)

Keiferella neolitseae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 103-104.

Keiferana neolitseae, Jeppson *et. al.*, 1975, Mites injurious to economic plants, p. 582.

Diagnosis : Large phyllocoptine mite, having a large downcurved and recurved rostrum. Abdominal rings broad with slight differentiation into tergites and sternites. The triangular female genitalia with coverflap showing no particular design and the axillary stylets arising well above the base of the intermediate rostral segment ; feather claw 5 rayed.

Host ; *Neolitsea zeylanica*.

Distribution : INDIA ; Karnataka.

Genus *Metaculus* Keifer

(Figs. 319-320)

Metaculus Keifer, 1962, *Eriophyid Studies*, Calif. Dep. Agr., B-6 : 12.

Key to the Species of Metaculus

1. Feather claw 4 rayed	...	...	2
— Feather claw 5 rayed	...	...	3
2. Median line present on the rear 1/2 of shield	...	...	<i>mangiferae</i>
— Median line absent	...	...	<i>londaensis</i>
3. Admedians and submedians complete ; genital coverflap without lines	...	...	<i>foveolatae</i>
— Admedians and submedians represented as broken lines ; genital coverflap with 10-12 lines	...	...	<i>sapindiphagus</i>

346. *Metaculus londaensis* Mohansundaram

Metaculus londaensis Mohansundaram, 1980, *Mysore J. agric. Sci.*, **14** : 521.

Diagnosis : Shield with central area having fine striations. Dorsal tubercles at rear shield margin. Abdomen with 35 smooth tergites ; 50 finely microtuberculate sternites. Female genital coverflap smooth.

Host : Undet. tree.

Distribution : INDIA ; Maharashtra.

347. *Metaculus foveolatae* Mohansundaram

Metaculus foveolatae Mohansundaram, 1983, *Acarologia*, **24**(1) : 17.

Diagnosis : Shield with a prominent lobe overhanging rostral base. Median line absent, admedians complete ; submedian complete. Feather claw 5 rayed. Abdomen with about 34 smooth tergites ; 46 microtuberculate sternites. Female genital coverflap without lines.

Host : *Ficus foveolata*.

Distribution : INDIA : Kerala.

348. *Metaculus mangiferae* (Attiah)

Vasates mangiferae Attiah, 1955, *Bull. Soc. Found Ler Ent. Egypte*, **39** : 379-383.

Metaculus mangiferae, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 114.

Diagnosis : Shield design is characteristic comprising network of cells. Feather claw 4 rayed.

Host : Mango.

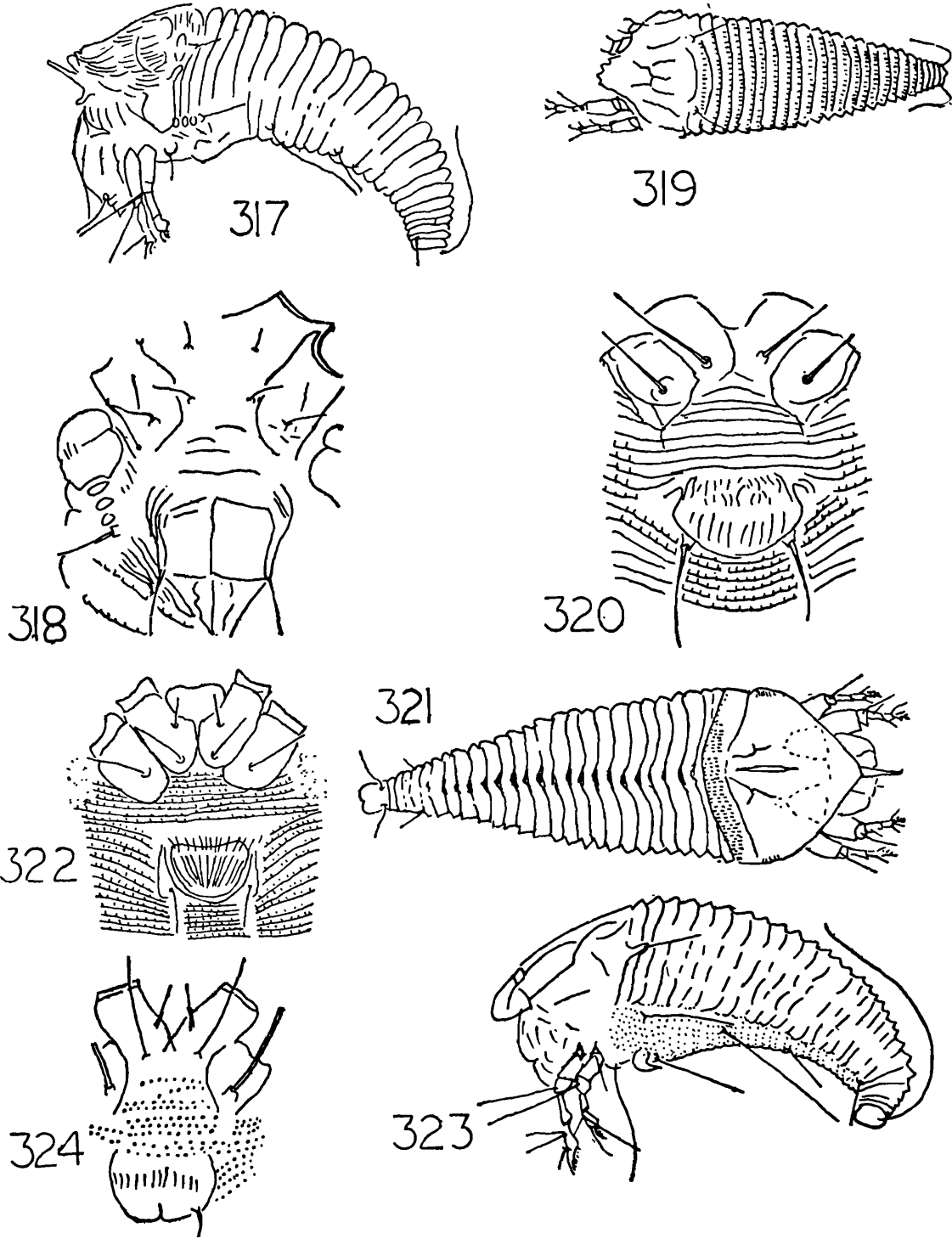
Nature of damage : This mite causes russetting of terminal leaves, buds and inflorescence. It also causes crowding of short shootlets to give the appearance of bunched top. Damage to inflorescence by the rust mite results in the compact mass of malformed flowers. Vegetative malformation may appear on seedling mango.

Distribution : INDIA : Karnataka, Tamil Nadu.

349. *Metaculus sapindiphagus* Mohansundaram

Metaculus sapindiphagus Mohansundaram, 1982, *Acarologia*, **23**(3) : 254-257.

Diagnosis : Shield with a prominent blunt lobe over rostrum base. Median absent, admedians and submedians represented as broken lines. Feather claw 5 rayed. Abdomen with 22 broad smooth tergites



Figs. 317-318.: *Keiferana* sp.
Figs. 319-320 : *Metaculus* sp.
Figs. 321-322 : *Monotrimacus* sp.
Figs. 323-324 : *Neocalacarus* sp.

and 60 finely microtuberculate sternites. Female genital coverflap with 10-12 lines.

Host : *Sapindus saponaria*.

Distribution : INDIA : Tamil Nadu.

Genus **Monotrimacus** Mohansundaram

(Figs. 321-322)

Monotrimacus Mohansundaram, 1982, *Entomon*, 7(1) : 26.

350. **Monotrimacus quadrangulari** Mohansundaram

Monotrimacus quadrangulari Mohansundaram, 1982, *Entomon*, 7(1) : 26-29.

Diagnosis : Shield area without lines but with light demarcations. A clear groove in middle of shield in the posterior 2/3. Dorsal tubercles away from rear shield margin. Dorsal setae pointing upward and backward. Sides of shield clear except for the posterior corners which are heavily granular. Feather claw 4 rayed. Abdomen with 25 tergites, 62-65 finely microtuberculate sternites, microtubercles elongated in posterior sternites. Genital coverflap with 12-14 lines in two ranks.

Host : *Cissus quadrangularis*.

Distribution : INDIA : Tamil Nadu.

Genus **Neocalacarus** ChannaBasavanna

(Figs. 323-324)

Neocalacarus ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 100.

351. **Neocalacarus mangiferae** ChannaBasavanna

Neocalacarus mangiferae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 101-102.

Diagnosis : Thick flattened, almost wedge shaped, pinkish mite with a pattern of wax on shield and with 5 longitudinal wax bearing ridges on abdomen. Shield triangular, shield design a network of wax bearing lines, median line absent ; admedian lines arising near apex of anterior lobe, sinuate, slightly diverging and stopping a little short of rear shield margin. Abdomen with 28 tergites and 56 microtuberculate sternites ; microtubercles like tiny beads set on rear margins excepting last 15 sternites on which they are microstriate.

Host : Mango:

Distribution : INDIA : Delhi, Karnataka, Tamil Nadu.

Genus *Neomesalox* Mohansundaram

(Fig. 325)

Neomesalox Mohansundaram, 1983, *Acarologia*, 24(1) : 19.

352. *Neomesalox kallarensis* Mohansundaram

Neomesalox kallarensis Mohansundaram, 1983, *Acarologia*, 24(1) : 21.

Diagnosis : Shield broadly triangular with a thick lobe, overhanging rostral base. Shield with median line represented at posterior half ; admedians complete, submedians complete running obliquely. Dorsal

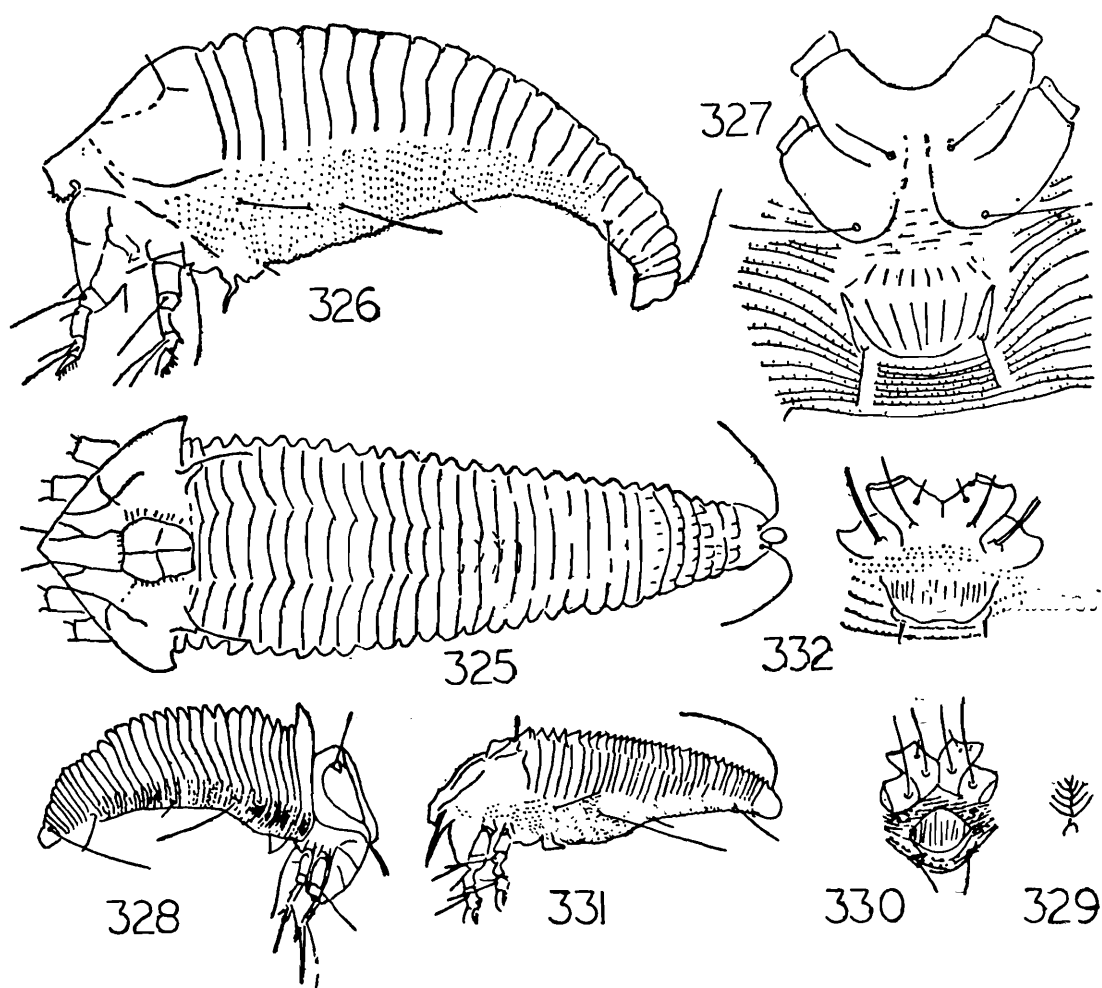


Fig. 325 : *Neomesalox* sp.

Figs. 326-327 : *Neometaculus* sp.

Figs. 328-330 : *Neotegonotus* sp.

Figs. 331-332 : *Paratetra* sp.

tubercles cylindrical. Feather claw 4 rayed. Abdomen with 30-32 tergites and equal number of broad sternites. Abdomen dorsum with trough flanked by ridges on either side. Female genital coverflap without lines.

Host : Undet. bush.

Distribution : INDIA : Tamil Nadu.

Genus *Neometaculus* Mohansundaram

(Figs. 326-327)

Neometaculus Mohansundaram, 1983, *Acarologia*, 24(1) : 17-19.

353. *Neometaculus bauhinae* Mohansundaram

Neometaculus bauhinae Mohansundaram, 1983, *Acarologia*, 24(1) : 19.

Diagnosis : Shield with a broad spiny lobe over rostral base. Shield with admedians alone represented, admedians joined at the rear end of shield. Dorsal tubercle about 1/3 distance away from rear shield margin. Feather claw 6 rayed. Abdomen with 25 broad smooth tergites and 65-70 microtuberculate sternites. Female genital coverflap with 10 thin lines.

Host : *Bauhinia* sp.

Distribution : INDIA : Karnataka.

Genus *Neotegonotus* Newkirk & Keifer

(Figs. 328-330)

Neotegonotus Newkirk & Keifer, 1971, *Eriophyid Studies*, U. S. Dep. Agr., C-5 : 8.

Key to the Species of Neotegonotus

1. Feather claw 5 rayed	...	...	<i>indicus</i>
— Feather claw 4 rayed	...	...	<i>fastigatus</i>

354. *Neotegonotus fastigatus* (Nalepa)

Tegonotus fastigatus Nalepa, 1890, *Anz. AK Wien.*, 27 : 213.

Neotegonotus fastigatus, Keifer, 1961, *Eriophyid Studies*, *Calif. Dep. Agr.*, B-2 : 20.

Neotegonotus fastigatus, Mohansundaram, 1982, *Oriental Ins.*, 16(4) : 428.

Diagnosis : Feather claw 4 rayed. Shield clear except for faint representation of submedians. Dorsal seta rough. First abdominal tergite enlarged and project above others and closely merged with the rear shield

margin. Coxal area smooth. Female genital coverflap with 6 longitudinal lines.

Host : Ficus bengalensis.

Distribution : INDIA : Tamil Nadu ; outside India : U.S.A.

355. *Neotegonotus indicus* Mondal & Chakrabarti

Neotegonotus indicus Mondal & Chakrabarti, 1982, *Entomon*, 7(3) : 363-364.

Diagnosis : Shield semicircular in anterior outline. Shield design not clearly discernible but with a number of faint longitudinal lines ; median line absent, admedian lines prominent on posterior 0.33 part and meet in a common point through two diagonal lines near the centre at rear margin ; submedian lines at least two. Feather claw 5 rayed. Abdomen with 32 tergites and 68-72 sternites. Female genital coverflap with 10 longitudinal scorings.

Host : Ficus bengalensis.

Distribution : INDIA : West Bengal.

Genus *Paratetra* ChannaBasavanna

(Figs. 331-332)

Paratetra ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 92.

Key to the Species of Paratetra

1. Feather claw 4 rayed	...	...	2
— Feather claw more than 4 rayed	...	...	3
2. Female genital coverflap with 8 faint lines and basal granulations	...	...	<i>integrifoliavagrans</i>
— Female genital coverflap with 12-14 longitudinal scorings	...	...	<i>himalayana</i>
3. Feather claw 5 rayed	...	...	4
— Feather claw 7 rayed	...	...	<i>albizziae</i>
4. Shield without lines but with a median longitudinal fold, flanked on either side by furrows and with faint marking of cells	...	...	<i>elephantae</i>
— Shield design with a pattern of ridges of carinae ; a 'V' shaped ridge between dorsal tubercles, median present, admedians arched	...	...	<i>murrayae</i>

356. *Paratetra albizziae* Mohansundaram

Paratetra albizziae Mohansundaram, 1983, *Acarologia*, 24(1) : 21-24.

Diagnosis : Median line on shield represented as a short posteriorly forking line in the anterior portion of shield ; admedians curved, sides of shield granular. Feather claw 7 rayed. Abdomen with about 35 tergites with elongate microtubercles on the lateral sides and 65 sternites with dot like microtubercles. Genital coverflap with 8 lines.

Host : *Albizzia lebbbeck*.

Distribution : INDIA : Tamil Nadu.

357. *Paratetra elephantae* Mohansundaram

Paratetra elephantae Mohansundaram, 1981, *Colemania*, 1 : 42.

Diagnosis : Shield area without lines but with median longitudinal fold in the central region flanked on either side by furrows and with faint marking of cells. Dorsal tubercles at shield margin. Feather claw 5 rayed. Abdomen with 26-28 smooth tergites except for first tergite which possesses longitudinal scorings, sternites 50, faintly microtuberculate. Female genital coverflap with about 12 longitudinal lines.

Host : *Feronia elephantum*.

Distribution : INDIA : Tamil Nadu.

358. *Paratetra integrifoliavagrans* Mohansundaram

Paratetra integrifoliavagrans Mohansundaram, 1983, *Acarologia*, 24(1) : 24.

Diagnosis : Shield with a blunt lobe over rostral base, sides of shield granular ; dorsal tubercles at shield margin. Feather claw 4 rayed. Abdomen with about 38 smooth tergites and 65 microtuberculate sternites. Female genital coverflap with 8 faint lines and basal granulations.

Host : *Holoptelia integrifolia*.

Distribution : INDIA : Tamil Nadu.

359. *Paratetra himalayana* Chakrabarti & Roy

Paratetra himalayana Chakrabarti & Roy, 1980, *Indian J. Acar.*, 4(2) : 58-60.

Diagnosis : Shield subtriangular with prominent anterior lobe, shield bears some dotted lines on anterior lateral margin ; median line absent ; admedian lines arising from tip of anterior lobe ; diverge

backward upto $1/3$ of shield and then converge and meet in transverse line connecting the two submedian lines in front of the dorsal tubercles. Feather claw 4 rayed. Abdomen with 17-19 broad, smooth tergites and about 67 microtuberculate sternites.

Host : *Potentilla* sp.

Distribution : INDIA : West Bengal.

360. *Paratetra murrayae* ChannaBasavanna

Paratetra murrayae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 93-94.

Diagnosis : Yellowish white fusiform mite, shield subtriangular, anterior lobe thick, prominent obliquely, curved down over base of rostrum with a thin short spiny projection from the lower margin in side view, rear margin of shield obscure. Feather claw 5 rayed.

Host : *Murraya koenigii*.

Distribution : INDIA : Karnataka, Uttar Pradesh.

Genus *Proneotegonotus* Mohansundaram

(Figs. 333-334)

Proneotegonotus Mohansundaram, 1983, *Acarologia*, 24(1) : 27.

361. *Proneotegonotus antiquorae* Mohansundaram

Proneotegonotus antiquorae Mohansundaram, 1983, *Acarologia*, 24(1) : 27-28.

Diagnosis : Body fusiform, dorsoventrally flattened. Shield with a pattern of faint longitudinal lines ; the admedians and the first submedians clear. Dorsal tubercles away from shield margin. Feather claw 5 rayed. Abdomen with 25 tergites and 45 sternites. Female genital coverflap with two rows of scorings.

Host : Not mentioned, probably on a xerophyte.

Distribution : INDIA : Tamil Nadu.

Genus *Tegolophus* Keifer

(Figs. 335-336)

Tegolophus Keifer, 1961, *Eriophyid Studies*, Calif. Dep. Agr., B-2 : 3.

Key to the Species of Tegolophus

1. Feather claw 4 rayed	...	...	2
— Feather claw more than 4 rayed	...	...	7
2. Abdomen with broad smooth tergites and narrow microtuberculate sternites	...	...	3
— Abdomen with narrow microtuberculate tergites and sternites	...		<i>calotropi</i>
3. Lateral shield partly or completely with granules or dotted lines	...	...	4
— Lateral shield without any granules or dotted lines	...	...	6
4. Dorsal tubercle conspicuous extend over tergites, dorsal seta very long (15-33 microns)	...	...	5
— Dorsal tubercle short not extending over tergites ; dorsal seta small (4-6 microns)	...	...	<i>ficusi</i>
5. Median line faint, submedian lines three, claw knobbed	...	...	<i>nerii</i>
— Median line prominent on posterior 0.33 portion of shield ; submedian line single, semicircular arched line divide the shield into outer and inner portions	...	...	<i>vitexis</i>
6. Shield with lateral and central disc, scorings on genital coverflap arranged in two ranks ; first ventral seta small (5-10 microns)	...	...	<i>indica</i>
— Shield without any disc, scorings on genital coverflap arranged in one rank ; shield design with longitudinal lines forming network, median line faint, first ventral seta long (50-57 microns)	...	...	<i>spondiallus</i>
7. Feather claw 5 rayed	...	...	8
— Feather claw more than 5 rayed	...	...	9
8. Shield design simple	...	...	<i>kalyanii</i>
— Shield design represents a complicated system of cells	...	...	<i>gelonis</i>
9. Feather claw 6 rayed	...	...	10
— Feather claw more than 6 rayed	...	...	11
10. Admedian line arises from apex to anterior lobe	...	...	<i>bambusae</i>
— Admedian line arises from lateral to apical lobe	...	...	<i>cordis</i>
11. Female genital coverflap with 8-10 lines	...	...	<i>gmelineae</i>
— Female genital coverflap with 14-16 lines	...	...	<i>gmelinus</i>

362. *Tegolophus bambusae* ChannaBasavanna

Tegolophus bambusae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 122-123.

Diagnosis : Fusiform, pale yellow mite, middorsal ridge on abdomen broad and faint ; shield subtriangular ; shield design with a pattern of longitudinal lines ; median line straight, almost complete except for a short distance at rear margin ; admedian lines starting from the apex of anterior lobe, gradually diverging and dividing into two near the rear margin. Abdomen with 54 tergites and with same number of sternites.

Host : *Bambusa vulgaris*.

Distribution : INDIA : Karnataka.

363. *Tegolophus calotropi* Chakrabarti & Mondal

Tegolophus calotropi Chakrabarti & Mondal, 1979, *Oriental Ins.*, 13(1-2) : 51-54.

Diagnosis : Shield with moderately developed anterior lobe. Anterior lobe provided with 2 spine like structures ventrally ; admedian line upto 0.33 portion from anterior lobe and then move outwardly ; median line present throughout shield length. Feather claw 5 rayed. Abdomen with 58-63 tergites and 65-68 sternites. Female genital coverflap with about 14 longitudinal lines.

Host : *Calotropis procera*.

Distribution : INDIA : West Bengal.

364. *Tegolophus cordis* Das & Chakrabarti

Tegolophus cordis Das & Chakrabarti, 1982, *Indian J. Acar.*, 7 : 26-28.

Diagnosis : Shield with apical lobe prominent, shield design a complex set of cells, median line present on posterior 0.45 part of the shield ; admedians arise lateral to apical lobe margin. Feather claw 6 rayed. Abdomen with 25-29 tergites and 55-60 sternites.

Host : *Cordia myxa*.

Distribution : INDIA : Bihar.

365. *Tegolophus gelonis* Mondal & Chakrabarti

Tegolophus gelonis Mondal & Chakrabarti, 1982, *Entomon*, 7(3) : 364-366.

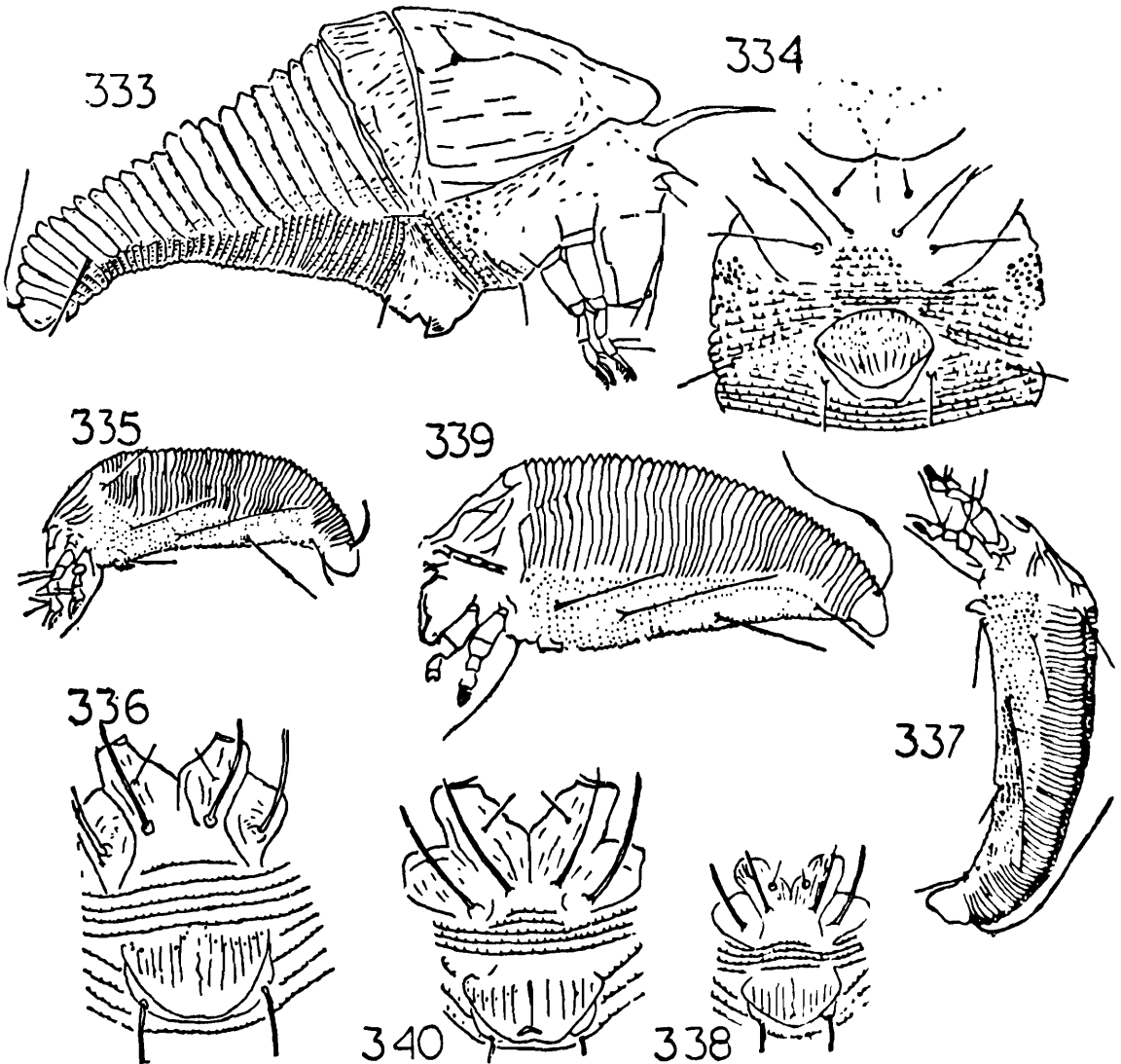
Diagnosis : Shield subtriangular with prominent anterior lobe. Shield design represents a complicated system of cells consisting of

longitudinal and transverse lines ; median line almost complete but not touches the rear margin of shield, little sinuate at middle : admedian and submedian lines present. Dorsal tubercles placed on rear shield margin, setae directed caudad. Feather claw 5 rayed. Patella and tibia without setae. Abdomen with 25-26 tergites and 57-60 sternites, tergites with conspicuous margin and 3 distinct ridges, sternites with less conspicuous margins and with minute beads at margins. Female genital coverflap with 12-14 longitudinal stripes.

Host : *Gelonium multiflorum*.

Distribution : INDIA : West Bengal.

Remarks : The heavy infestation causes wrinkling of leaves.



Figs. 333-334 : *Proneotegonotus* sp.

Figs. 335-336 : *Tegolophus* sp.

Figs. 337-338 : *Tetra* sp.

Figs. 339-340 : *Thamnacus* sp.

366. **Tegolophus gmelinae** Mohansundaram

Tegolophus gmelinae Mohansundaram, 1983, *Acarologia*, 24(1) : 29.

Diagnosis : Shield overhanging the rostral base. Dorsal tubercles towards the side. Shield surface smooth without any pattern. Feather claw 7 rayed. Abdomen with about 60 smooth tergites, 70 finely microtuberculate sternites. Female genital coverflap with 8-10 lines.

Host : *Gmelina asiatica*.

Distribution : INDIA : Karnataka.

367. **Tegolophus gmelinus** Das & Chakrabarti

Tegolophus gmelinus Das & Chakrabarti, 1982, *Indian J. Acar.*, 7 : 28.

Diagnosis : Anterior lobe of shield distinct, median line absent, admedian lines complete and sinuate, submedians three. Abdomen with 100-120 tergites and with more or less same number of sternites which are faintly microtuberculate. Female genital coverflap with 14-16 scorings on upper half.

Host : *Gmelina arborea*.

Distribution : INDIA : Bihar.

368. **Tegolophus ficusi** Mondal & Chakrabarti

Tegolophus ficusi Mondal & Chakrabarti, 1979, *Entomon*, 4 : 373-376.

Diagnosis : Body pale yellow, fusiform, rostrum projecting down, shield design with a pattern of longitudinal lines ; median line complete but faint on apical portion of shield just below the anterior lobe ; admedians sinuate originating from the sides of the median line ; submedian lines 6 in number, of those, the first and second are distinct. Dorsal tubercles present on rear shield margin. Feather claw 4 rayed. Abdomen with 28 tergites and 60 sternites ; tergites with more conspicuous margins. Female genital coverflap with 16-17 longitudinal stripes.

Host : *Ficus infectoria*.

Distribution : INDIA : West Bengal.

369. **Tegolophus indica** Chakrabarti & Mondal

Tegolophus indica Chakrabarti & Mondal, 1979, *Oriental Ins.*, 13(1-2) : 49-51.

Diagnosis : Shield with dorsal tubercle and seta, anterior lobe

distinct ; shield partly obscure, particularly on anterior half and laterally ; median and admedian lines absent ; submedian lines two pairs. Feather claw simple, 4 rayed. Abdomen with 21-23 tergites, 53 sternites ; tergites without microtubercles, sternites heavily microtuberculate. Female genital coverflap with about 14-15 longitudinal lines.

Host : *Artocarpus heterophyllus*.

Distribution : INDIA : West Bengal.

370. *Tegolophus kalyanii* Chakrabarti, Ghosh & Mondal

Tegolophus kalyanii Chakrabarti, Ghosh & Mondal, 1981, *Oriental Ins.*, 15(2) : 141-143.

Diagnosis : Body fusiform, greyish. Shield subtriangular with prominent anterior lobe ; shield design very simple only with two admedian lines. Dorsal tubercles situated on rear shield margin. Feather claw simple, 5 rayed. Abdomen with 24-25 tergites, 58 sternites, tergites with more conspicuous margins, three ridges, one middorsal and two lateral present ; microtubercles absent on tergites but present on rear ring margin of sternites as bead-like structures. Female genital cover-flap with 12 longitudinal scorings.

Host : *Trema orientalis*.

Distribution : INDIA : West Bengal.

371. *Tegolophus nerii* Mondal & Chakrabarti

Tegolophus nerii Mondal & Chakrabarti, 1979, *Entomon*, 4 : 376-377.

Diagnosis : Body fusiform, younger one pinkish, mature one yellowish pink. Shield subtriangular with longitudinal lines, median line straight, incomplete ; submedians three. Dorsal tubercles placed on rear shield margin ; dorsal seta thick, directed caudad. Feather claw 4 rayed. Coxae broadly contiguous with a distinct sternal suture. Abdomen with 32-34 tergites and 58 sternites. Female genital coverflap with 10 longitudinal scorings.

Host : *Nerium odorum*.

Distribution : INDIA : West Bengal.

372. *Tegolophus spondiallus* Mondal & Chakrabarti

Tegolophus spondiallus Mondal & Chakrabarti, 1981, *Acarologia*, 23 : 40-42.

Diagnosis : Shield subtriangular, smooth with well developed

anterior lobe, shield design with a pattern of longitudinal and oblique lines forming a network laterally ; median line faint, admedian lines originate from posterior lateral margin of the apical cell. Feather claw 4 rayed. Abdomen with 27-29 tergites and 75-78 sternites. Female genital coverflap with 14-16 longitudinal stripes.

Host : Spondias mangifera.

Distribution : INDIA : West Bengal.

373. *Tegolophus vitexis* Mondal & Chakrabarti

Tegolophus vitexis Mondal & Chakrabarti, 1981, *Acarologia*, 23 : 42-44.

Diagnosis : Shield subtriangular with prominent and blunt anterior lobe ; shield design with a pattern of longitudinal lines ; median line straight, present only on posterior 0.33 portion of shield and connected with the admedians of either side ; submedian line single arises from lateral 0.25 part of shield. Feather claw simple and 4 rayed. Abdomen with smooth tergites and microtuberculate sternites. Female genital coverflap with 13-15 longitudinal stripes.

Host : Vitex negundo.

Distribution : INDIA : West Bengal.

Genus *Tetra* Keifer
(Figs. 337-338) :

Tetra Keifer, 1944, *Bull. Calif. Dep. Agr.*, 33 : 27.

Key to the Species of Tetra

1. Feather claw 7 rayed	...	...	:	2
— Feather claw 5 rayed	...	...		<i>lanneansis</i>
2. Median line arising from about 'V' shaped line between the admedian lines ; abdomen with 52 tergites and 65 sternites	...	...		<i>bauhinae</i>
— Median line obscure ; abdomen with about 36 broad smooth tergites and 60 narrow microtuberculate sternites	...	...		<i>tephrosae</i>

374. *Tetra bauhinae* ChannaBasavanna

Tetra bauhinae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 115-116.

Diagnosis : Elongate wedge shaped pinkish mite. Shield sub-triangular, anterior lobe like a thin shelf in lateral view, acute, with tip

slightly curved down. Median line arising from about a 'V' shaped line between the admedian lines, stopping a little short of rear shield margin ; admedian lines almost complete arising from lateral margins of anterior lobe. Abdomen with 52 tergites and 65 sternites.

Host : *Bauhinia purpurea*.

Distribution : INDIA : Karnataka.

375. *Tetra lanneansis* Chakrabarti, Ghosh & Mondal :

Tetra lanneansis Chakrabarti, Ghosh & Mondal, 1981, *Oriental Ins.*, 15(2) : 143-144.

Diagnosis : Body dorsoventrally flattened, fusiform, light brown in colour, shield subtriangular, shield design with a number of sinuate longitudinal lines, median line absent, admedian lines sinuate arising from the apical tip of anterior lobe ; submedian lines two. Feather claw 5 rayed. Abdomen with 28 tergites and 61 sternites ; microtubercles present on sternites and round in structures. Female genital coverflap with 11 longitudinal scorings.

Host : *Lannea coromandelica*.

Distribution : INDIA : West Bengal.

376. *Tetra tephrosiae* Mohansundaram

Tetra tephrosiae Mohansundaram, 1983, *Acarologia*, 24(1) : 32.

Diagnosis : Shield flattened dorsoventrally. Median line obscure ; admedians complete, wavy ; submedian diagonal arising at rear corner of shield and joining with admedians in the anterior 1/3. Feather claw 7 rayed. Abdomen with about 36 broad tergites and 60 narrow microtuberculate sternites. Female genital coverflap with 10-12 lines.

Host : *Tephrosia purpuria*.

Distribution : INDIA : Karnataka.

Genus *Thamnacus* Keifer

(Figs. 339-340)

Thamnacus Keifer, 1944, *Bull. Calif. Dep. Agr.*, 33 : 27.

377. *Thamnacus euphorbiae* ChannaBasavanna

Thamnacus euphorbiae ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, pp. 120-121.

Diagnosis : Fusiform pale yellow mite, shield subtriangular, anterior lobe prominent, rather broad and blunt with 2 short blunt projections

at the anterior end in dorsal view. Shield design of complicated lines ; median line on rear half, arising from the apex of the acute 'V' between admedian lines and ending in an acute dart at rear shield margin ; admedian lines complete arising on projections on anterior lobe, diverging and meeting anterior ends of 'V' at about middle so as to form a diamond shaped mark. Abdomen with 42 smooth tergites and 70 microtuberculate sternites.

Host : *Breynia rhamnoides*.

Distribution : INDIA ; Karnataka.

Subfamily Aberoptinae Keifer

Aberoptinae Keifer, 1966, *Eriophyid Studies*, Calif. Dep. Agr., B-18 : 2.

Genus Cisaberoptus Keifer

Cisaberoptus Keifer, 1966, *Eriophyid Studies*, Calif. Dep. Agr., B-18 : 2.

378. *Cisaberoptus kenya* Keifer

Cisaberoptus kenya Keifer, 1966, *Eriophyid Studies*, Calif. Dep. Agr., B-18 : 12.

Cisaberoptus kenya, Mohansundaram, 1983, *Indian J. Acar.*, 7(2) : 56-57.

Diagnosis : Feather claw 17 rayed, broad. Shield broad in front, no design. Lateral lobe somewhat projecting. Short bilobed projection over chelicera base. Coxal area smooth. Genital coverflap wider than long with 14-16 ribs ; genital seta 4 long.

Host : Mango.

Distribution : INDIA : Tamil Nadu ; outside India : Kenya.

Remarks : This mite mines below the epidermis of mango leaf on the dorsal side giving a silvery appearance.

Family Rhyncaphyoptidae Keifer

Rhyncaphyoptidae Keifer, 1961, *Eriophyid Studies*, Calif. Dep. Agr., B-4 : 20.

Key to the Subfamilies of RHYNCAPHYOPTIDAE

1. Feather claw simple, ie. undivided	...	... RHYNCAPHYOPTINAE
— Feather claw divided, usually deeply so	...	... DIPTILOMIOPINAE

Subfamily RHYNCAPHYOPTINAE Roivainen

Rhyncaphyoptinae Roivainen, 1953, *Ann. Ent. Fennica*, 19(2) : 86.

Key to the Genera of Rhyncaphytoptinae

1. Mites produce a clear liquid globule while feeding on plants	...	...	<i>Hyboderus</i>
— Not like above	...	...	<i>Rhyncaphytoptus</i>

Genus *Hyboderus* (Fig. 341)**379. *Hyboderus globulus* Mohansundaram**

Hyboderus globulus Mohansundaram, 1981, *Colemania*, 1 : 42-45.

Diagnosis : Body spindle shaped. Shield semicircular with faint representation of admedians in middle, sides of shield granular. Dorsal tubercles away from shield margin. Feather claw 7 rayed, appearing to be divided in ventral view. Abdomen with about 55-58 tergites and 85 finely microtuberculate sternites. Female genital coverflap smooth, lobed laterally.

Host : Undet. plant.

Distribution : INDIA : Tamil Nadu.

Remarks : It secretes a clear liquid on its body while feeding on plants which forms a shining globule covering the whole body.

Genus *Rhyncaphytoptus* Keifer
(Figs. 342-343)

Rhyncaphytoptus Keifer, 1939, *Bull. Calif. Dep. Agr.*, 28 : 149.

Key to the Species of *Rhyncaphytoptus*

1. Feather claw 5 rayed	...	...	<i>shoreacola</i>
— Feather claw 6 rayed	...	...	<i>ficifoliae</i>

380. *Rhyncaphytoptus ficifoliae* Keifer

Rhyncaphytoptus ficifoliae Keifer, 1939, *Bull. Calif. Dep. Agr.*, 28 : 149.

Rhyncaphytoptus ficifoliae, ChannaBasavanna, 1966, *Univ. Agr. Sci. Bull.*, p. 123.

Diagnosis : Adults pinkish or brownish with white waxy coverings, fusiform. Feather claw 6 rayed. Body curved. Shield without design. Admedians indicated only as opposing areas towards rear. Thanosomal tergites much wider than sternites. Tergal microtubercles present only as fine lateral points on the margins. Narrow sternites have bead like microtubercle or ring granules. Female genital coverflap unarmed (Jeppson *et al.*, 1975).

Host : *Ficus carica*.
Distribution : INDIA : Delhi.

381. *Rhyncaphytoptus shoreacola* Mondal, Ghosh & Chakrabarti

Rhyncaphytoptus shoreacola Mondal, Ghosh & Chakrabarti, 1981, *Oriental Ins.*, 15(4) : 411-412.

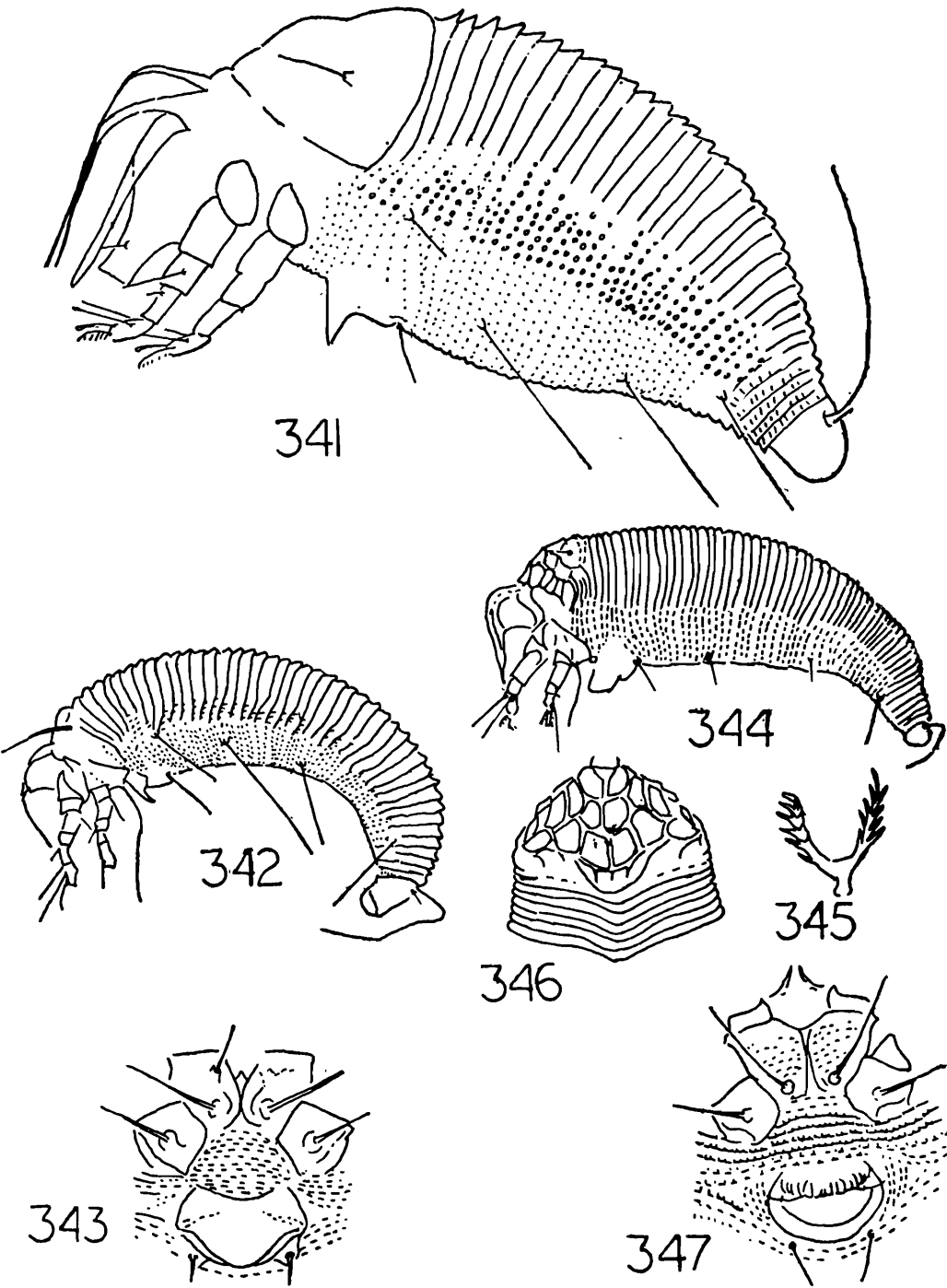


Fig. 341 : *Hyboderus* sp.
Figs. 342-343 : *Rhyncaphytoptus* sp.
Figs. 344-347. *Diptilomiopus* sp.

Diagnosis : Shield subtriangular, shield design with longitudinal and cross lines forming a network ; median line complete, admedian lines sinuate meet the median line by an oblique line on about 0.5 and by a cross line just ahead of rear shield margin ; submedian lines originate from anterior 0.12 of admedian, extend backward and meet with the admedians convergently just ahead of rear shield margin. Feather claw simple, 5 rayed. Abdomen with 33-35 smooth tergites and about 68-70 microtuberculate sternites. Female genital coverflap with a few discontinuous lines.

Host : *Shorea robusta*.

Distribution : INDIA : West Bengal.

Subfamily DIPTILOMIOPINAE Newkirk & Keifer

Diptilomiopinae Newkirk & Keifer, 1971, *Eriophyid Studies*, U. S. Dep. Agr., C-5 : 9.

Key to the Genera of Diptilomiopinae

1. Dorsal seta present	...	...	<i>Neorhynacus</i>
— Dorsal seta absent	...	...	2
2. Patella absent	...	...	<i>Diptilomiopus</i>
— Patella present	...	...	3
3. Dorsal tubercle missing	...	...	4
— Dorsal tubercle away from rear shield margin	...	...	<i>Neodiptilomiopus</i>
4. First ventral seta absent	...	...	<i>Diptilorhynacus</i>
— First ventral seta present	...	...	<i>Neodialox</i>

Sub family DIPTILOMIOPINAE Newkirk & Keifer

Diptilomiopinae Newkirk & Keifer, 1971, *Eriophyid Studies*, U. S. Dep. Agr., C-5 : 9.

Genus *Diptilomiopus* Nalepa
(Figs. 344-347)

Diptilomiopus Nalepa, 1917, *Vehr. Ges. Wien.*, 67 : 228.

Key to the Species of Diptilomiopus

1. Divided feather claw 5 rayed	...	...	2
— Divided feather claw more than 5 rayed	...	...	3
2. Shield with lines forming network of cells with 4 broad cells radiating from a central broader area	...	...	<i>Knorri</i>
— Not as above	...	...	3

3. Median line absent	...	...	<i>artocarpae</i>
— Median line present at base or rear	...	...	4
4. Median line present at base	...	...	<i>integrifoliae</i>
— Median line present at rear	...	...	<i>assamica</i>
5. Divided feather claw 6 rayed	...	...	6
— Divided feather claw 7 rayed	...	...	<i>cocculae</i>
6. Female genital coverflap smooth	...	...	<i>alangii</i>
— Female genital coverflap with distinct or indistinct lines	...	...	7
7. Female genital coverflap with short longitudinal lines at basal area	...	...	<i>jevremovici</i>
— Female genital coverflap without or indistinct longitudinal lines	...	...	8
8. Genital coverflap without lines, basal line with dot like granulations	...	...	<i>camerae</i>
— Genital coverflap with few indistinct longitudinal lines	...	...	<i>bengalensis</i>

382. *Diptilomiopus alangii* Mohansundaram

Diptilomiopus alangii Mohansundaram, 1982, *Indian J. Acar.*, 7(1): 34-36.

Diagnosis : Shield with a clear pattern of lines forming cells. Median and admedians represented at rear half of shield which join to form a central broad cell ; anteriorly shield lined with six elongate cells on either side of the midline. Divided feather claw 6 rayed. Abdomen with about 45 smooth tergites and about 65 microtuberculate sternites. Female genital coverflap smooth.

Host : *Alangium* sp.

Distribution : INDIA : Tamil Nadu.

383. *Diptilomiopus artocarpae* Mohansundaram

Diptilomiopus artocarpae Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 45-47.

Diagnosis : Shield broad anteriorly, with a clear pattern of lines. Median absent, admedians complete with characteristic bends ; dorsal setae absent. Feather claw divided and 5 rayed ; coxae with clear sternal line ; first setiferous coxal tubercle absent. Abdomen with about 55 tergites and 68 sternites, tergites smooth and sternites finely microtuberculate. Genital coverflap with basal granulations and distally with faint lines.

Host : *Artocarpus integrifolia*.

Distribution : INDIA : Tamil Nadu.

384. *Diptilomiopus assamica* Keifer

Diptilomiopus assamica Keifer, 1959, *Bull. Calif. Dep. Agr. Occ. Pap.*, 2 : 14-15.

Diagnosis : Elongate, fusiform mite. Shield design with more network of lines ; median line present only at the rear. Rudimentary dorsal tubercle present, but lack setae. Divided feather claw 5 rayed. Abdominal rings narrow, lack dorsal microtubercles. Female genital coverflap lack marks.

Host : *Citrus limonium*.

Distribution : INDIA : Assam.

385. *Diptilomiopus bengalensis* Chakrabarti & Mondal

Diptilomiopus bengalensis Chakrabarti & Mondal, 1979, *Oriental Ins.*, 13(1-2) : 47-49.

Diagnosis : Shield subtriangular, blunt anteriorly, shield design a network of cells ; median line present as low course ridge at anterior 0.4 portion of shield but absent in central cell and extends back from posterior middle part of central cell ending at 0.25 portion of shield from rear margin. Divided feather claw 6 rayed. Abdomen abruptly tapering, thanosoma with 50-53 tergites and 73 microtuberculate sternites. Female genital coverflap with few indistinct longitudinal lines.

Host : *Gardenia jasminoides*.

Distribution : INDIA : West Bengal.

386. *Diptilomiopus camerae* Mohansundaram

Diptilomiopus camerae Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 47-49.

Diagnosis : Shield with clear pattern of cells. Median, admedian and submedians forming 3 clear cells one bellow the other on either side and 4 cells on each side along the anterior border. Feather claw divided, 6 rayed in each. Abdomen with 57-60 clear smooth tergites and 75 finely microtuberculate sternites. Genital coverflap without any line, basal portion of coverflap with thick dot like granulations.

Host : *Lantana camera*.

Distribution : INDIA : Tamil Nadu.

387. *Diptilomiopus cocculae* Mohansundaram

Diptilomiopus cocculae Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 49.

Diagnosis : Body fusiform, light yellow. Shield broadly rounded

in front with a design of network of raised lines or carinae. No anterior shield lobe. Median line complete, slightly wavy, admedians complete and wavy, submedians complete and arched. Feather claw divided, the two sides of each diverge at a considerable angle, each side with 7 rays. Abdomen with 90-95 rings, tergites with fine microtubercles, sparsely placed; sternites with microtubercles, closely placed. Female genital coverflap without lines.

Host : *Cocculus hirsutus*.

Distribution : INDIA : Tamil Nadu.

388. *Diptilomiopus integrifoliae* Mohansundaram

Diptilomiopus integrifoliae Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 49-51.

Diagnosis : Fusiform, light yellowish mite. Shield with a network of raised lines, no anterior shield lobe. Median present at the base, branched anteriorly, joins with each other to form hexagonal cells. Dorsal tubercles without setae. Feather claw broadly divided, each with 5 rays. Abdomen with 57 clear anterior tergal segments and 5 indistinct posterior segments and 66 sternites. Tergites with shallow longitudinal furrows extending on either side of middorsum, fading caudally, tergites smooth, without microtubercles; sternites with fine microtubercles. Female genital coverflap with basal granulations.

Host : *Holoptelia integrifolia*.

Distribution : INDIA : Tamil Nadu.

389. *Diptilomiopus jevremovici* Keifer :

Diptilomiopus jevremovici Keifer, 1960, *Bl. Bur. Ent. Calif. Dep. Agr.*, p. 20.

Diptilomiopus jevremovici, Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 51.

Diagnosis : Shield shallow, subtriangular, shield design shows network, median line complete, admedian lines well separated and all are cross connected. Dorsal tubercles present as rudiments. Deeply divided feather claw each 6 rayed. Abdomen with 45 tergites and 70 sternites. Female genital coverflap with short longitudinal lines at basal area.

Hosts : *Ficus hispida*, *Streblus asper*, *Tectona grandis*, *Asystasia coromandaliana*.

Distribution : INDIA : Tamil Nadu.

390. Diptilomiopus knorri Keifer

Diptilomiopus knorri Keifer, 1974, *Eriophyd Studies, U. S. Dep. Agr., C-9* : 20.

Diptilomiopus knorri, Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 51.

Diagnosis : Divided feather claw each with 5 rays. Shield with lines forming a network of cells, with 4 broad cells radiating from a central smaller cell ; sides with smaller cells. Forecoxae somewhat separated with few scorings, hind coxae smooth. Genital coverflap with granulations and fine scorings basally and smooth distally.

Host : Rubiaceae.

Distribution : INDIA : Tamil Nadu ; outside India : Thailand.

Genus Diptilorhynacus Mondal, Ghosh & Chakrabarti
(Figs. 348-350)

Diptilorhynacus Mondal, Ghosh & Chakrabarti, 1981, *Oriental Ins.*, 407-409.

391. Diptilorhynacus sinusetus Mondal, Ghosh & Chakrabarti

Diptilorhynacus sinusetus Mondal, Ghosh & Chakrabarti, 1981, *Oriental Ins.*, 15(4) : 409-410.

Diagnosis : Shield more or less tetrangular ; shield design complicated with distinct median and admedian lines and with a number of cells ; median line complete ; admedian arises from the level of median line and meet the median line posteriorly on 0.5 and 0.25 part of shield by two transverse lines ; lateral sides with rows of cells. Feather claw bifurcated and each 7 rayed. Abdomen with 75-81 tergites and 88-91 microtuberculate sternites. Female genital coverflap with 11-15 longitudinal scorings.

Host : *Litsea* sp.

Distribution ; INDIA : West Bengal.

Genus Neodiptilomiopus Mohansundaram
(Figs. 351-352)

Neodiptilomiopus Mohansundaram, 1982, *Indian J. Acar.*, 7(1) : 33.

392. Neodiptilomiopus vishakantai Mohansundaram

Neodiptilomiopus vishakantai Mohansundaram, 1982, *Indian J. Acar.*, 7(1) : 33-34.

Diagnosis : Shield with a clear pattern of lines forming cells ; sides of shield granular ; dorsal tubercles at middle of shield. Feather

claw divided, each with 5 rays. Abdomen with about 80 tergites with elongated microtubercles and about 85 sternites with dot like microtubercles. Female genital coverflap smooth.

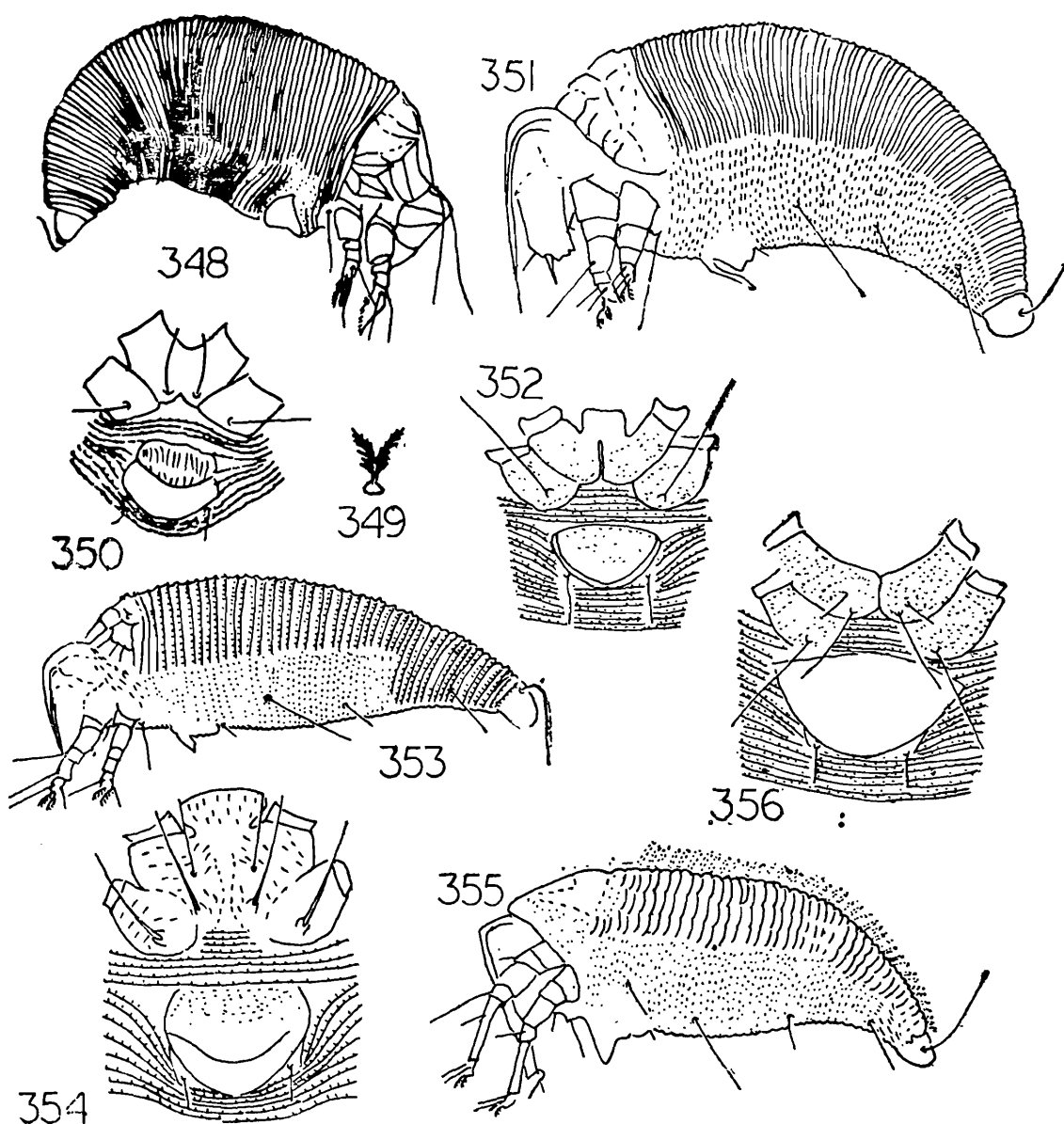
Host : Undet. tree.

Distribution : INDIA : Karnataka.

Genus *Neorhynacus* Mohansundaram

(Figs. 353-354)

Neorhynacus Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 53.



Figs. 348-350 : *Diptilorhynacus* sp.

Figs. 351-352 : *Neodiptilomiopus* sp.

Figs. 353-354 : *Neorhynacus* sp.

Figsr 355-356 : *Neodialox* sp.

Key to the Species of Neorhynacus

1. Feather claw 5 rayed	...	...	<i>rajendrani</i>
— Feather claw 7 rayed	...	...	<i>combretis</i>

393. *Neorhynacus rajendrani* Mohansundaram

Neorhynacus rajendrani Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 53-55.

Diagnosis : Shield with a clear pattern of lines. Median line represented in posterior two thirds, admedians and submedians forming a net work of cells. Dorsal tubercles away from shield margin. Divided feather claw each with 5 rays. Abdomen with about 52 tergites and 74 sternites. Female genital coverflap without lines, but basally granular with short dots and strokes.

Host : Not mentioned.

Distribution : INDIA : Kerala,

394. *Neorhynacus combretis* Ghosh & Chakrabarti

Neorhynacus combretis Ghosh & Chakrabarti, *Entomon*, 7(4) : 438-440.

Diagnosis : Shield subtriangular, anterior shield lobe absent. Median line absent, admedian line present upto 0.75 of shield and bifurcated posteriorly to form two cell structures just above the rear margin ; first submedian arises from anterior shield margin and runs straight upto 0.5 of shield posteriorly where it bifurcates. Divided feather claw each 7 rayed. Abdomen with about 45-48 tergites and 72-75 sternites ; microtubercles distinctly present on sternites. Female genital coverflap smooth.

Host : *Combretum decundrum*.

Distribution : INDIA : West Bengal.

Genus *Neodialox* Mohansundaram

(Figs. 355-356)

Neodialox Mohansundaram, 1983, *Indian J. Acar.*, 7(2) : 54-56.

395. *Neodialox palmyrae* Mohansundaram

Neodialox palmyrae Mohansundaram, 1983, *Indian J. Acar.*, 7(2) : 54-56.

Diagnosis : Shield with median, admedians joined at the rear end

and the submedian forming an inverted bell-shaped anterior border. Dorsal tubercles and setae absent. Divided feather claw each 10 rayed. Abdomen with about 60 tergites and about 100-110 sternites. Tergites with 5 longitudinal rows of wax bearing areas where the segment is broadened ; sternites narrow. Female genital coverflap smooth.

Host : *Borassus flabellifer*.

Distribution : INDIA : Tamil Nadu.

Genus *Cheiracus*

396. *Cheiracus sulcatus* Keifer

Cheiracus sulcatus Keifer, 1977, *Eriophyid Studies*, U. S. Dep. Agr., C-13 : 24.

Cheiracus sulcatus, Mohansundaram, 1981, *Oriental Ins.*, 15(1) : 45.

Diagnosis : Feather claw with about 16 rays around margin with many interval branching rays giving the appearance of a brush. Shield with median short, represented at the rear end, admedians broken, other lines absent ; sides of shield slightly granulated. Coxae granular, seta I nearer to seta II in the posterior half of forecoxae. Genital coverflap with fine short lines in the basal half, distally smooth.

Host : Paddy.

Distribution : INDIA : Tamil Nadu ; outside India : Thailand.

Family TARSONEMIDAE Kramer

Tarsonemidae Kramer, 1877, *Archiv. für. Naturgesch.*, 43 : 215.

History : Since the erection of this family by Kramer (1877) with type genus *Tarsonemus* Canestrini & Fanzago, 1876, some good taxonomic contributions have come out of those mention may be made of Ewing (1939), Beer (1954), Smiley (1964, 67, 69) and Beer & Nucifora (1965).

Diagnosis : Body rounded, gnathosoma with minute palpi lying closely appressed laterally. Chelae tiny and stylet like. Stigma of female opens behind gnathosoma ; male without stigma. Empodium without membraneous flap like organ attached to claw. Leg IV in female ending in terminal and subterminal whip like setae.

These are tiny glossy mites found on undersurface of leaves as well as in association of fungus. Males often carry female deutonymphs. Some of these mites are important crop pests.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Body divided into capitulum (carrying mouth parts), idiosomoa consisting of propodosoma and hysterosoma.

Capitulum : It consists of a paired palpi which are of indistinct segmentation and a pair of styliform and slender chelicerae.

Idiosoma : Propodosoma bears 4 pairs of setae. Females possess a specialised sense organ called pseudostigmatid organ between coxae I and II, its size varies (Figs. 362-364). Hysterosoma bears 4 pairs of setae.

Venter : The tarsonemids are characterised by pronounced development of apodemes (I-IV) (Fig. 358 P). Males possess genital papilla situated terminally on opisthosoma which contains within it the paired styliform aedeagi as well as other genital organs and appendages. Anal plate is also present.

Legs : Four pairs of legs are present in adult. Leg IV of males are regarded as accessory copulatory organs. It is 4 segmentend but tibia and tarsus in some cases fused (Figs. (365-367). Terminal claws of legs vary considerably from the conditions of prominence to nearly degenerations. Modifications of femur are quite evident in some species groups, ranging from a thin membrane like inner flanges to a spur like projection of the inner margin. Leg IV (Figs. 359-361) of female ends in terminal and subterminal whip like setae. Chaetotaxy of tibiotarsal segmet of leg IV in male is of taxonomic importance. Males have a structure called genital papilla situated terminally on the opisthosoma well visible in living specimens. Another structure, the anal plate, is often quite conspicuous, present subterminally on ventral opisthosoma just anterior to the ventral margin on the genital papilla. Females are characterised by the presence of specialised organ located dorsolaterally between coxae I and II. It has specialised sensory organ having no relationship with tracheal system.

Key to the genera of Tarsonemidae

- 1. Males with body laterally compressed ; tibia and tarsus or tibiotarsus IV slender, elongate, more than three times as long as basal width of tibia or tibiotarsus ... *Polyphagotarsonemu*
- Males with body dorsoventrally depressed ; tibia and tarsus or tibiotarsus IV at most 2½ times as long as basal width of tibia or tibiotarsus

2. Males with large, flange like expansion on inner margin of femur IV or if absent then 4th dorsal propodosomal seta in linear arrangement with setae of three preceding pairs or capitulum broader than long	...	...	<i>Steneotarsonemus</i>
— Males with inner flange on femur IV absent, or gently reduced in size ; 4th dorsal propodosomal seta always lateral from 3rd seta or capitulum longer than broad	...	...	3
3. Leg IV of male has distinct tibia and tarsus, their combined length being less than $\frac{1}{2}$ of femur and less than 3 times the basal width of the femur IV	...	...	<i>Tarsonemus</i>
— Leg IV of male has tibia and tarsus fused to form tibiotarsal segment	...	...	<i>Leptotarsonemus</i>

Genus *Polyphagotarsonemus* Beer & Nucifora

(Figs. 357-358)

Polyphagotarsonemus Beer & Nucifora, 1965, *Boll. Zool. Agr. Bachic*, (2)7 : 19-43.

397. *Polyphagotarsonemus latus* (Banks)

Tarsonemus latus Banks, 1904, *Proc. U. S. Nat. Mus.*, 32(1553) : 615.

Hemitarsonemus latus, Dutt, 1958, *Indian Farm.*, 8 : 10-12.

Diagnosis : Body oval, tiny, glossy or whitish. Hysterosoma of female with 1 pair of ventral setae situated between coxae IV. Tibiotarsus I without empodium. Terminal claw of leg IV of male reduced to small tubercle.

Hosts : Jute, cotton, *Zinia*, marigold, dalhia, *Datura*, *Amaranthus*, chilli, potato, tomato, brinjal, cucurbits, tea, cowpea, cluster-bean, sword-bean, lablab, dew-gram, horse-gram, green-gram, hollyhock, kidney-bean, sesamum, thorn-apple.

Nature of damage : The symptom caused by the infestation of this mite on chilli was named as 'Murda disease' of chilli (Kulkarni, 1922) and the same on potato was called 'Tambera disease' (Mann *et al.*, 1920). Oily looking blackish spots appear on the undersurface of the leaves specially on the young foliage. Later those spots turn reddish and extend to the entire leaf surface. All those leaves turn bronzy and edges of leaves become crinkled. Gradually the entire leaf withers leaving the main stalk green. It spreads rapidly in the entire field. The damage symptoms on brinjal are also of similar nature (Sandhu *et al.*, 1974). The damage caused by this mite on jute is very serious. All

the infested leaves get curled, twisted and become copperish brown and the internodes also get shortened. Such leaves dry up and fall off (Das & Raychaudhuri, 1978). Among the different jute varieties, JRC 201 and JRC 212 were least susceptible. Its infestation on cotton and some ornamental plants also cause the appearance of similar damage symptoms.

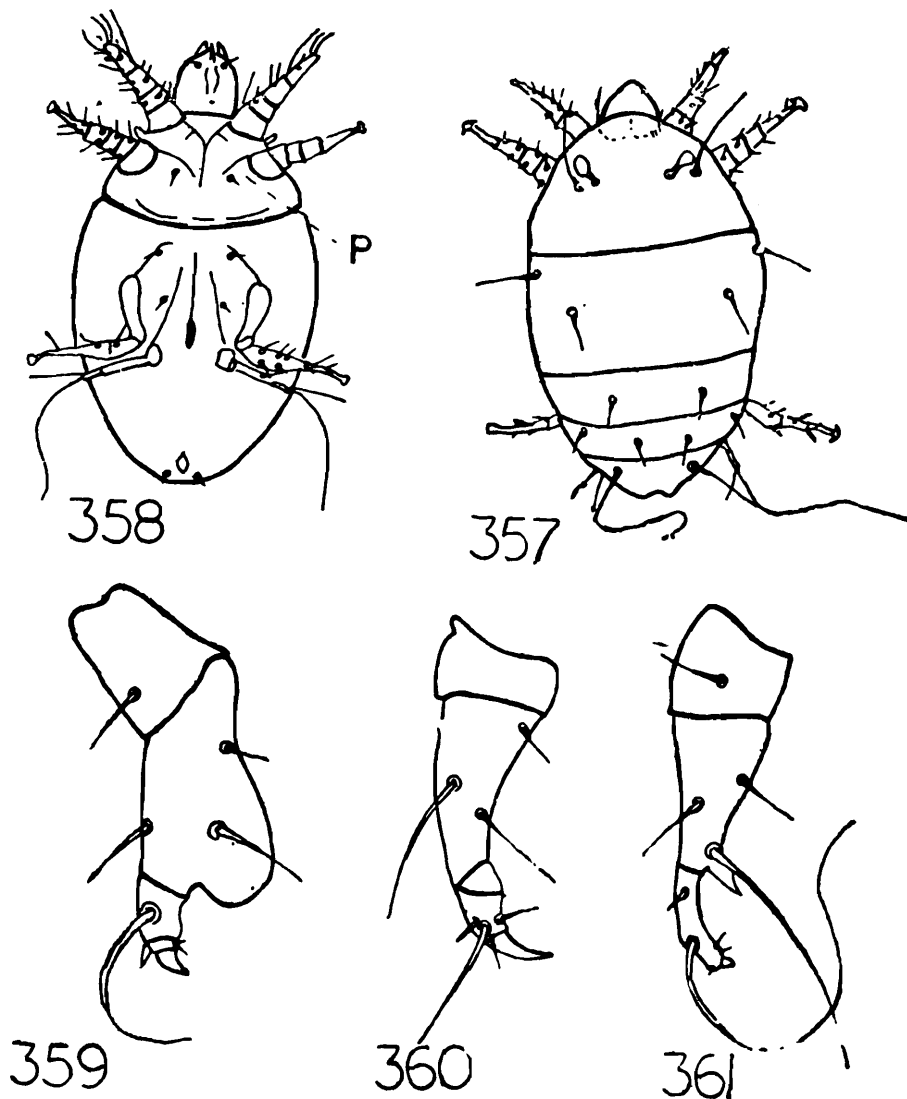


Fig. 357 : Dorsal aspect of a tarsonemid mite (*Polyphagotarsonemus* sp.)

Fig. 358 : Ventral aspect of a tarsonemid mite (*Polyphagotarsonem* sp.) ;
P-Apodeme

Figs. 359-361 : Hind leg (Male) in different genera of Tarsonemidae.

359 : *Steneotarsonemus*, 360 : *Tarsonemus* 361 : *Polyphagotarsonemus*

Bionomics : This mite remains in the field throughout the year on one or the other crop. The population dwindles considerably during rainy season. Its seasonal occurrence has been studied by Dhooria & Bindra (1977).

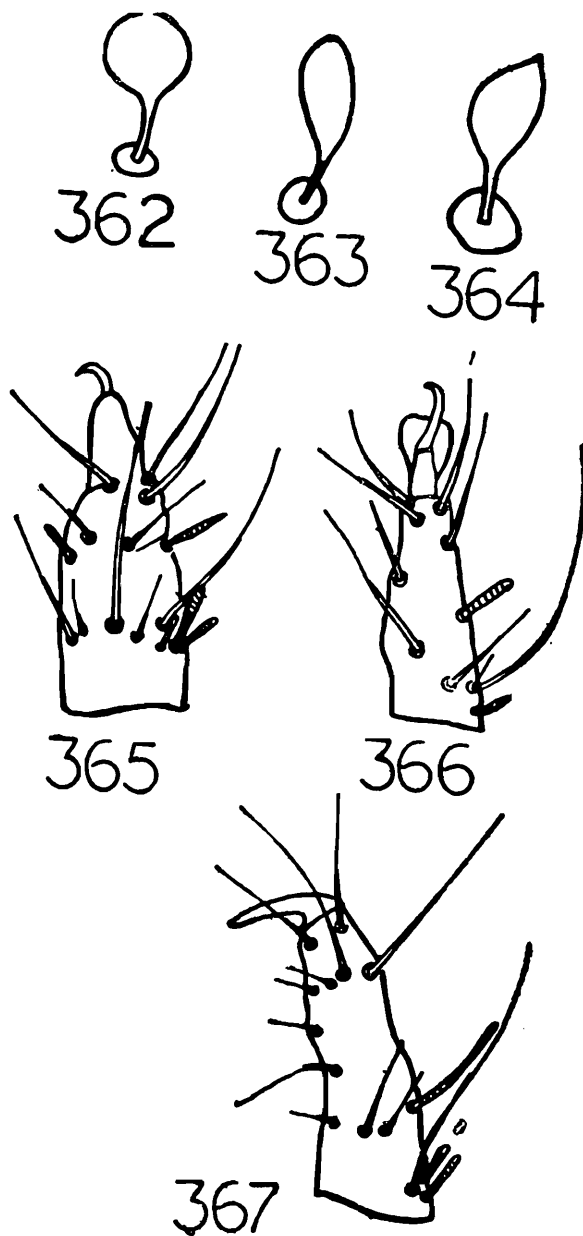
Control : Application of dicofol (0.025%) (Sandhu *et al.*, 1974)

and Galecron (Gupta & Dhooria, 1973 ; Saradamma *et al.*, 1979) were found to be quite promising. The effectiveness of amidithion, dimethoate and malathion were less effective.

Distribution : INDIA : Bihar, Karnataka, Maharashtra, Punjab, U.P., West Bengal.

Genus *Steneotarsonemus* Beer
(Figs. 368-369)

Steneotarsonemus Beer, 1954, *Univ. Kansas Sci. Bull.*, 36(16) : 1229.



Figs. 362-364 : Pseudostigmatid organs in Tarsonemidae.

Figs. 365-367 : Tibio-tarsus (Female) in different tarsonemid genera. 365. *Steneotarsonemus*, 366 *Tarsonemus*, 367 : *Polyphagotarsonemus*.

398. *Steneotarsonemus bancrofti* (Michael)

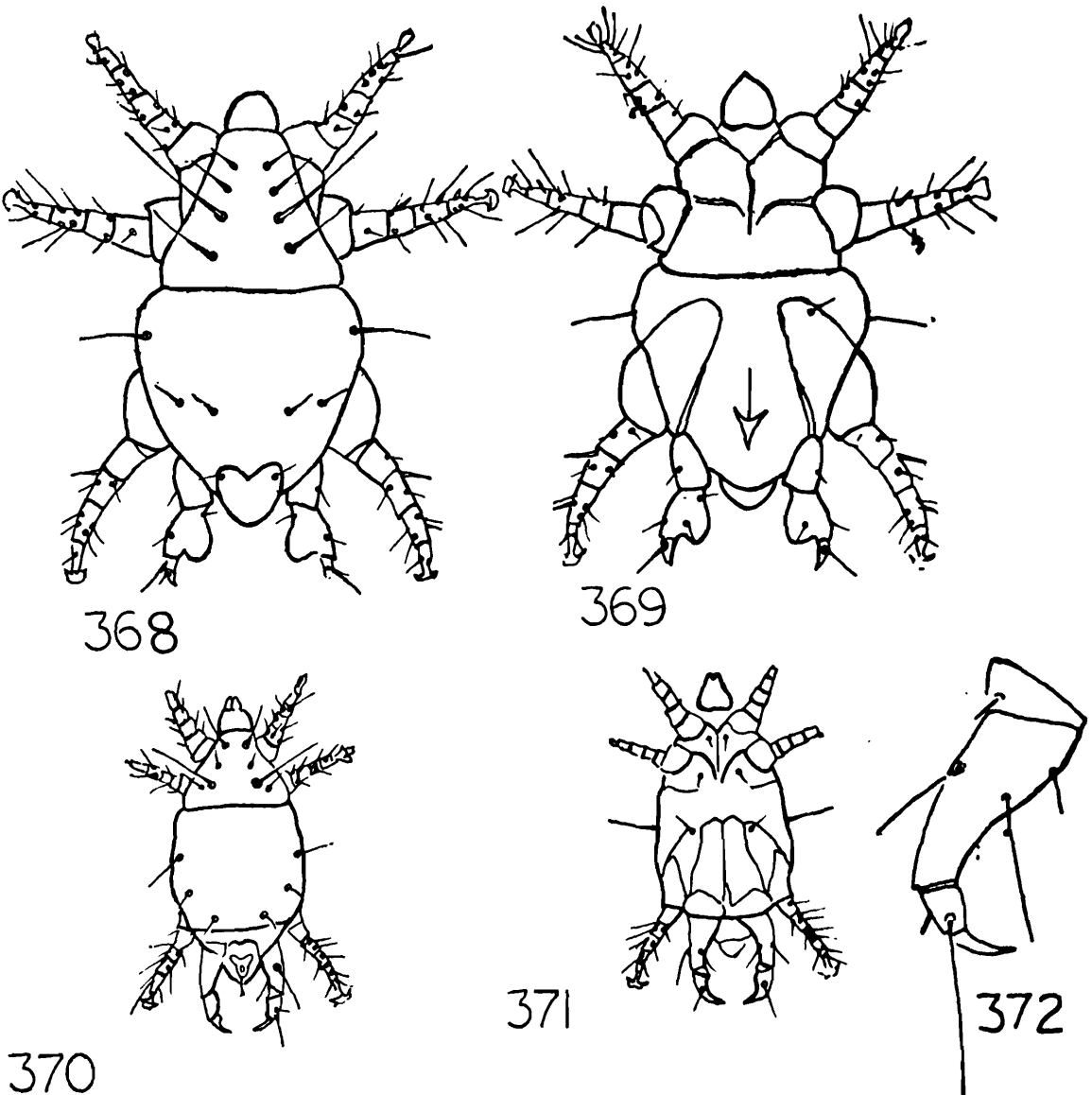
Tarsonemus bancrofti Michael, 1890, *Roy. Bot. Gard Kew, Bull. Misc. Info.*, 40 : 85.

Tarsonemus spinipes, Gupta et al., 1971, *Sci. & Cult.*, 37 : 296-297.

Diagnosis : Femur IV with inner margin produced to form a flange like expansion. Propodosoma with 4 pairs of dorsal setae ; first dorsal propodosomal seta longer than other three pairs of setae. Capitulum and leg IV very small compared to large size of idiosoma.

Host : Sugarcane.

Nature of damage : This mite is known to cause rusty patches on



Figs. 368-369 : Dorsal and ventral aspects of *Steneotarsonemus*

Figs. 370-371 : Dorsal and ventral aspects of *Tarsonemus*.

Fig. 372 : *Lupotarsonemus* (leg IV)

sugarcane leaves. Usually scabby and corroded patches appear at the internodes.

Distribution : INDIA : Punjab.

Genus *Lupotarsonemus* Beer & Nucifora

(Fig. 372)

Lupotarsonemus Beer & Nucifora, 1965, *Boll. Zool. Agr. Bachic*, (2)7 : 19-43.

399. *Lupotarsonemus randsi* (Ewing)

Tarsonemus randsi Ewing, 1939, *U. S. Dept. Agr. Tech. Bull.*, 653 : 25.

Tarsonemus randsi, Gupta & Nahar, 1979, *1st All India Cngr. Acar.*, p. 3.

Diagnosis : Femur IV not angulate at base. Tactile seta of tibia IV never as long as leg IV, usually shorter than femur IV ; femur IV without inner flange. Third propodosomal seta very long, much longer than setae of other 3 pairs. Femur IV in male broadest near base, width at midsegment much less than half length of segment ; tactile seta of tibia IV exceeded in length by at least one other seta on leg ; femur IV more than twice as long as broad at base ; tactile seta of tibia IV about 2/3 as long as femur IV.

Host : Sugarcane (Gupta & Nahar, 1981).

Distribution : INDIA : Bihar ; outside India : U.S.A.

Remarks : No significant damage symptom is produced by this mite.

Genus *Tarsonemus* Canestrini & Fanzago

(Figs. 370-371)

Tarsonemus Canestrini & Fanzago, 1876, *Atti Soc. Veneto-Trentina Sci. Nat., Padova*, 5 : 142.

400. *Tarsonemus krichneri* (Kramer)

Dendroptus krichneri Kramer, 1876, *Archiv. für Naturgesch.*, 42 : 28.

Tarsonemus krichneri, Cherian, 1931, *J. Asiat. Soc. Beng.*, 2 : 141-147.

Host : *Ipomoea* sp.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this mite is known.

PREDATORY MITES

Order PROSTIGMATA

Family CHEYLETIDAE Leach

Cheyletidae Leach, 1815, *Trans. Linn. Soc. Lond.*, 11 : 399.

History : The family Cheyletidae was erected by Leach (1815). Baker (1949) brought out the first taxonomic review of the family. Later, Dubinin (1957), Lawrence (1954), Volgin (1960, 61, 69) and Summers & Price (1970) made important taxonomic contributions in this family.

Diagnosis : Palp with thumb claw complex. Peritreme segmented. Cheliceral bases fused with the gnathosoma to form a rigid gnathosomal unit. Palptarsus mostly bears comb-like and sickle-like setae ; palp tibia with a strong claw. Dorsum with none, one or more plates.

These mites are free living predators while a few are parasitic on birds and mammals. Nearly 160 species in 50 genera are known from the world, of those, only 3 species are represented from India known to be associated with plants.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Body distinguishable into gnathosoma and idiosoma.

Gnathosoma : It is distinguishable into rostrum, protegmen and tegmen. Rostrum is the ventral conical porjection of *basis capitulum*. Protegmen is the part of the stylophore occurring in front of the peritremes. The extent and the configuration of the protegmen are highly variable and all these serve as important taxonomic characters (Summers & Price, 1970). The tegmen is the portion just posterior to it. The cheliceral stylets articulate with the protegmen by means of basal sclerites. Palp (Fig. 373) well developed, pincer-like, femur is the longest segment, genu and tibia stubby and arranged to direct the prominent tibial claw mesad. Palptarsus mostly with comb-like and sickle-like setae. The structure of the setae and their relationship with each other are important taxonomic characters.

Idiosoma : Dorsum may be without dorsal shield or may be with one or two dorsal shields (Fig. 374). Setae on dorsum varies in number and shape (may be stag horn-like, cloud-like, fan-like, rod-like, lanceolate, etc.) and all these play important role in cheyletid taxonomy. Lens like eyes may or may not be present.

Legs : Adults have 4 pairs of legs. Presence and absence of claws

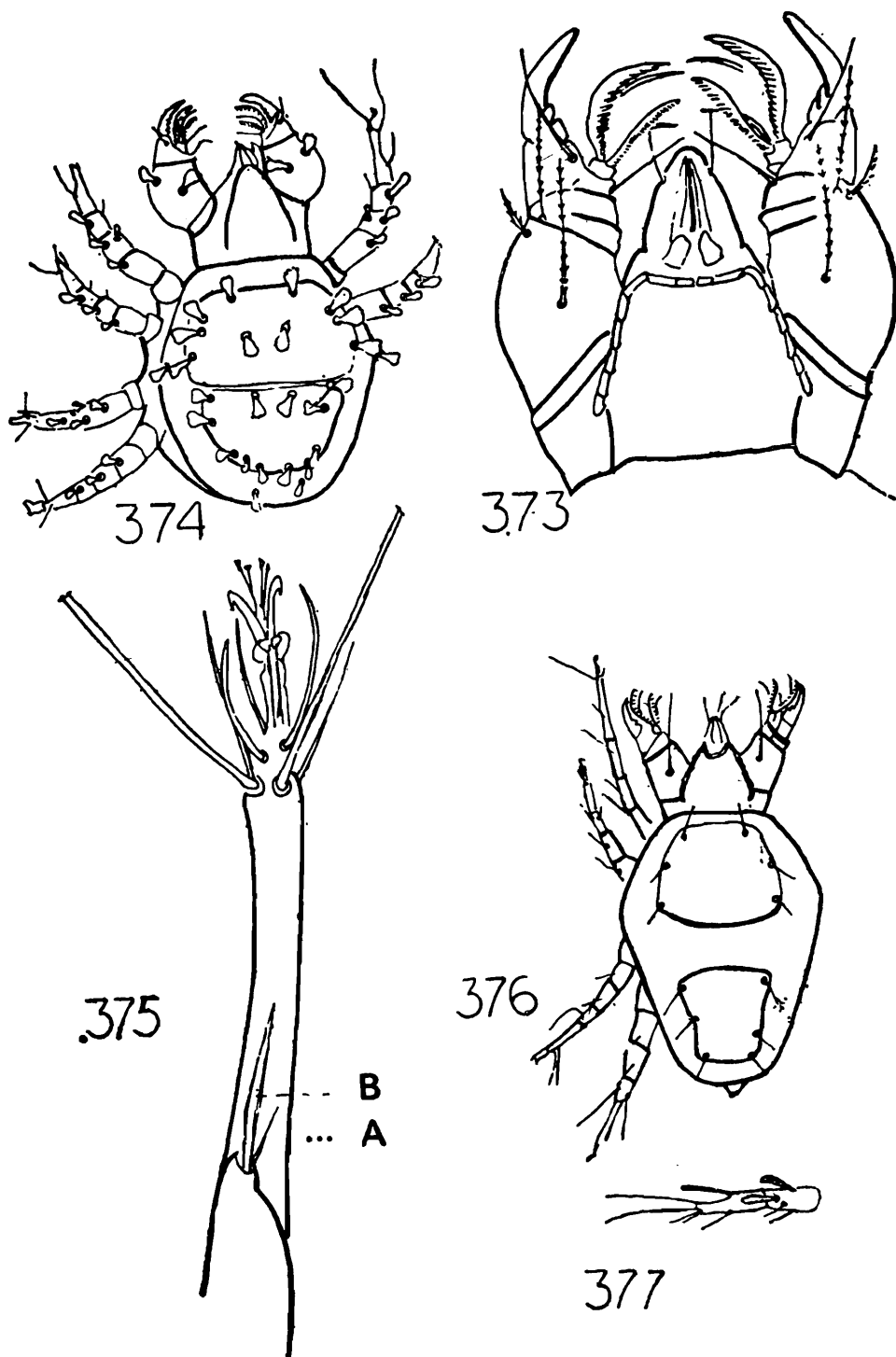


Fig. 373 : Gnathosoma (Female) of a cheyletid mite.

Fig. 374 : Dorsum of a cheyletid mite.

Fig. 375 : Tarsus I : A. Guard seta, B. Solenidion.

Figs. 376-377. *Cheletogenes* sp. : 376. Dorsum, 377. Tibia and tarsus I (Female).

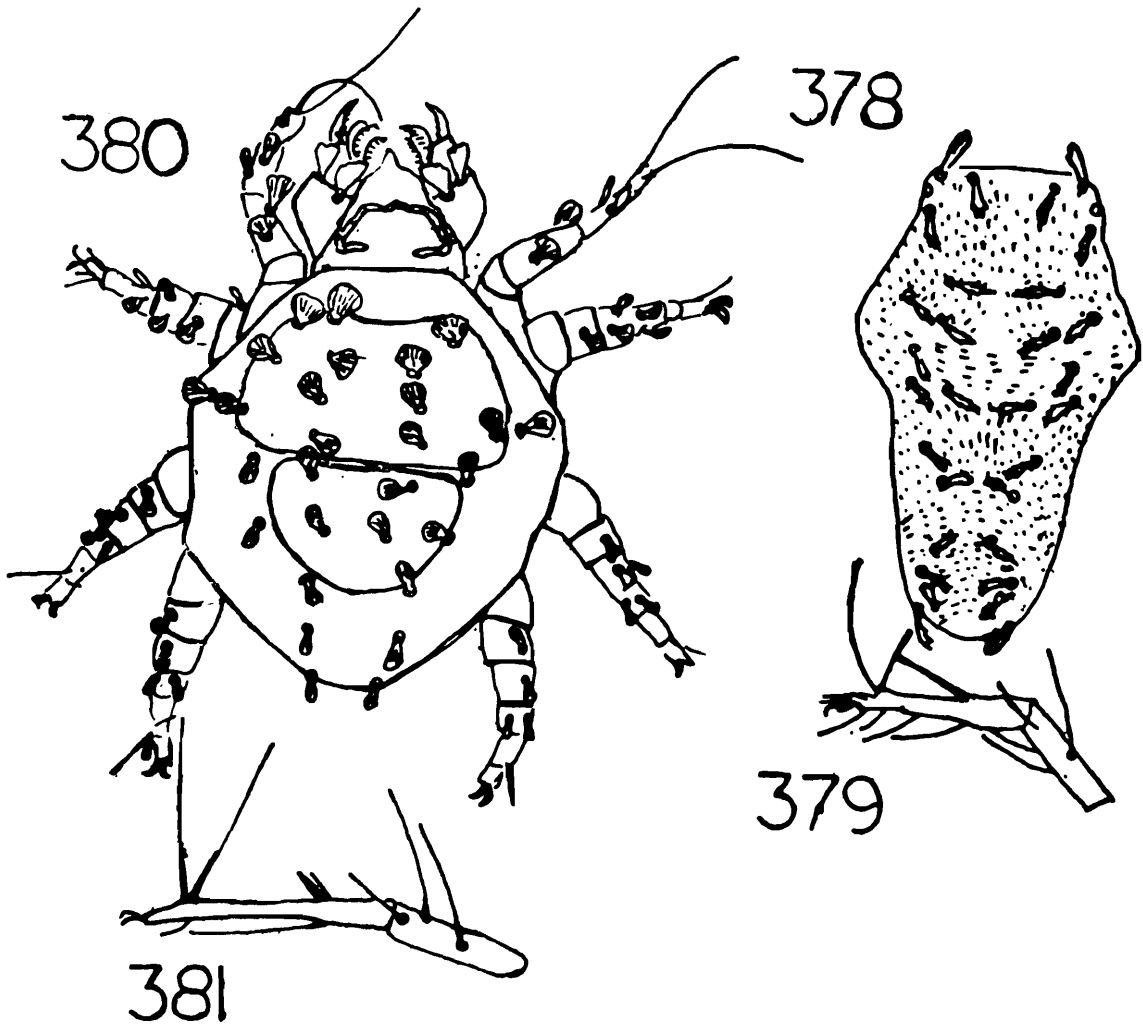
on tarsus I, presence and absence of basal outgrowths on claws of II-IV, length of leg in relation to body, etc. are used for separating genera, while chaetotaxy of leg segments and presence and absence of guard seta (Fig. 375) are characters used for separation of species.

Key to the Genera of Cheyletidae

1. Palptarsus with 2 sickle and 2 comb-like setae	...	2
— Palptarsus with 2 sickle and 1 comb-like setae	...	<i>Chelacaropsis</i>
2. Leg I normal with 2 claws	...	<i>Cheyletus</i>
— Leg I a sensory organ without claw	...	<i>Cheletogenes</i>

Genus *Chelacaropsis* Baker
(Figs. 378-379)

Chelacaropsis Baker, 1949, *Proc. U. S. Nat. Mus.*, 99(3238) : 315.



Figs. 378-379 : *Chelacaropsis* sp. : 378. Dorsum, 379. Tibia and tarsns I (Female).
Figs. 380-381 : *Cheyletus* sp. : 380. Dorsal surface, 381. Tibia and tarsus I (Female).

401. *Chelacaropsis moorei* Baker

Chelacaropsis moorei Baker, 1949, *Proc. U. S. Nat. Mus.*, 99(3238) : 315-316.
Chelacaropsis moorei, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 202.

Diagnosis : Small mite with narrow body and rostrum, dorsal seta of palpus simple, serrate, other palp setae simple, palpal claw long,

narrow with 3 basal teeth ; palp tibia with 1 comb-like seta and 2 sickle-like setae. Dorsal shield absent, striations on anterior portion of propodosoma and hysterosoma longitudinal and that on posterior portion transverse. A pair of lateral eyes present. Dorsal setae broadly squamiform, serrate, 6 pairs on propodosoma and 8 pairs on hysterosoma. Sensory seta on tarsus I almost half as long as tarsus.

Habitat : Paddy.

Distribution : INDIA : Andaman Isls. ; outside India : U.S.A.

Remarks : No economic importance of this species is known.

Genus *Cheletogenes* Oudemans

(Figs. 376-377)

Cheletogenes Oudemans, 1905, *Ent. Ber. Nederl. Ver.*, 1(21) : 208.

402. *Cheletogenes ornatus* (Canestrini & Fanzago)

Cheyletus ornatus Canestrini & Fanzago, 1876, *Att. Soc. Veneto-Trentina*, p. 106.

Cheletogenes ornatus, Oud., 1905, *Ent. Ber. Nederl. Ver.*, 1(21) : 208.

Cheletogenes ornatus, Narayanan, Kaur & Ghai, 1960, *Proc. Nat. Inst. Sci.*, 26 : 390.

Diagnosis : Small round mite with short rostrum. Femur of palpus strongly swollen on outer margin. Femoral and genual setae squamiform, serrate. Palp claw with many teeth ; 2 comb-like setae both with many teeth. Peritreme composed of sausage like segments. Single pair of eyes. Four pairs of squamiform serrate marginal setae and 3 pairs of similar dorsal submedian setae present ; single pair of shoulder setae also present. Hysterosomal shield not touching anterior shield, small, covering 1/2 of anterior hysterosoma. Anal and genital setae simple.

Habitat : Mango, fig.

Distribution : INDIA : Punjab ; outside India : U. S. A., Galapagos Isl., Italy, China, Hawaii, West Indies, Australia.

Remarks : This mite has been reported to be associated with fig mite and mango bud mite. Probably it feeds on these species. It has also been recorded to be associated with scale insects in Italy, China, Hawaii and other places, on which it might be feeding.

Genus *Cheyletus* Latreille

(Figs. 380-381)

Cheyletus Latreille, 1796, *Précis des Caractères généraux des insectes. An.*, p. 179.

403. *Cheyletus fortis* Oudemans

Cheyletus fortis Oudemans, 1904, *Ent. Ber. Nederl. Ver.*, 1 : 161.

Cheyletus fortis, Cherian, 1931, *J. Asiat. Soc. Beng.*, 27 : 141-147.

Diagnosis : Large mite with strong palpi ; palpal femur as wide as long ; dorsal femoral and genual setae pilose ; inner palpal comb with about 27 teeth ; outer palpal comb with 20 teeth. Anterior dorsal shield not covering entire propodosoma, with 4 pairs of lanceolate serrate marginal setae. Hysterosomal shield squarish with 3 pairs of narrow, lanceolate setae. Palpal claw with 1 tooth.

Habitat : Tree trunk.

Distribution : INDIA : West Bengal ; outside India : New guinea, Formosa, Burma, Japan, Australia, Philippines.

Remarks : No economic importance of this species is known.

Family STIGMAEIDAE Oudemans

Stigmaeidae Oudemans, 1931, *Ent. Ber.*, 8(179) : 251-263.

History : Stigmaeidae was erected by Oudemans (1931) with *Stigmaeus* Koch, 1836 as its type genus. Summers (1962) revised the genus *Stigmaeus*. Gonzalez (1965) presented a comprehensive key to the genera under this family and recognised 13 genera. Summers (1966) provided key for 14 genera giving diagnosis of each genus. Besides, several workers, viz. Wood (1964, 67, 71, 73), Gonzalez (1967) and Meyer (1969) made excellent contributions to advance our knowledge in this family.

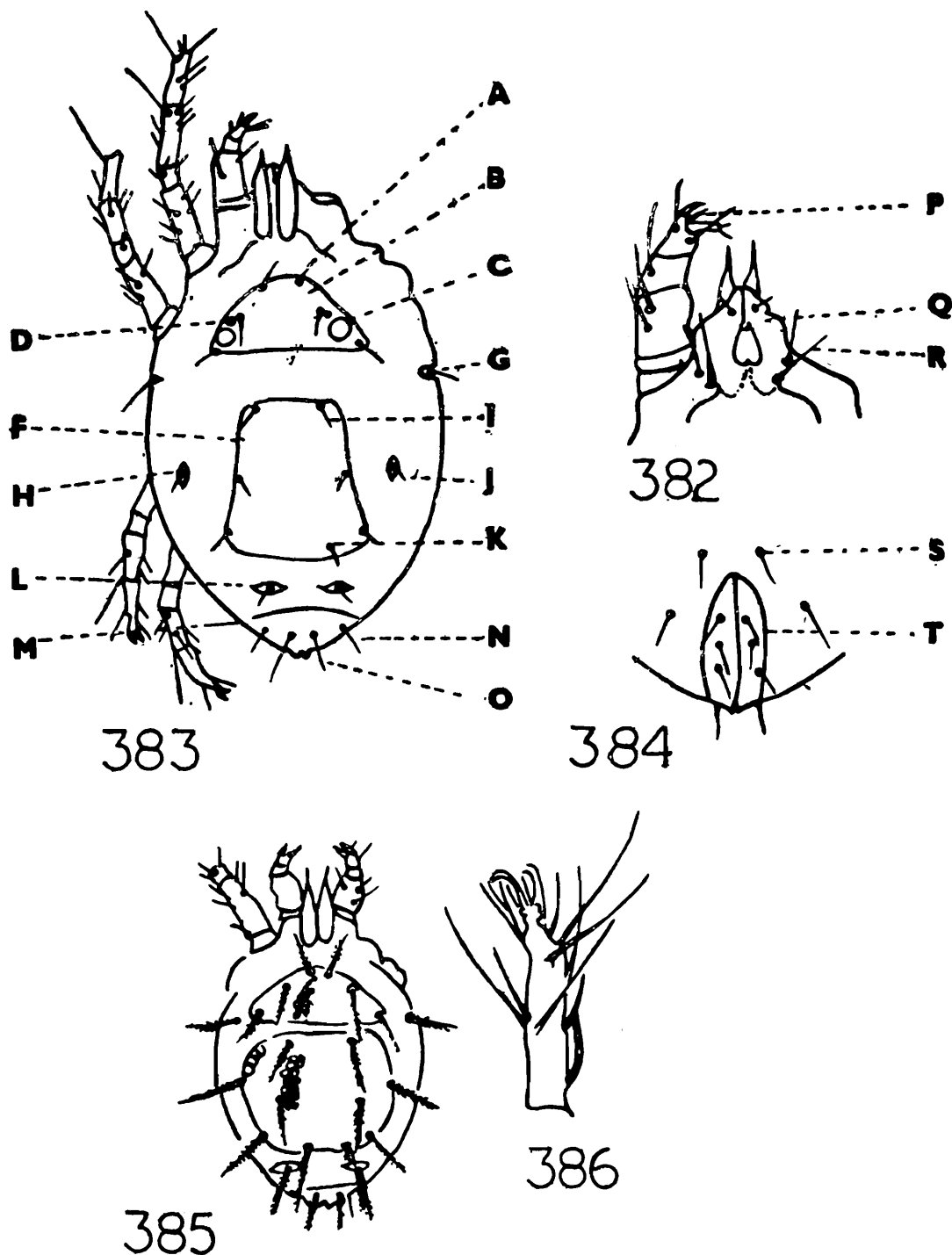
Diagnosis : Palptibia with a prominent claw which is sometimes with a small accessory claw. Palptarsus with a short appendage. Most of the setae have 3 tined fork at the top of palptarsus. Tracheal system originated in the middle between basal pieces of chelicerae, having no stigma or peritreme. Genital and anal vestibules closed externally by single pair of anogenital covers (Chaudhri *et al.*, 1974).

These mites are light to deep yellowish in colour, normally very active and efficient predators.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Body is differentiated into gnathosoma and idiosoma.

Gnathosoma (Fig. 382) : This consists of a pair of chelicerae and



Figs. 382-384 : Stigmaeid mite showing parts of taxonomic importance (after Gonzalez, 1965).

382. Ventral aspect of *basis capitulum* : P. Accessory claw, Q. Subcapitular seta, R. Subcapitular seta.

383. Dorsum of a stigmaeid mite : A. Vertical dorsal seta, B. Propodosomal plate, C. Postocular body, D. Preocular dorsal seta, F. Median plate, G. Humeral seta, H. Mediolateral plate, I. Dorsocentral dorsal seta, J. Dorsolateral dorsal seta, K. Dorsocentral dorsal seta, L. Intercalary plate, M. Suranal plate, N. Lateral suranal, O. Central suranal.

384. Posterior ventral surface of a stigmaeid mite S Paragenital seta, T. Genital seta.

Figs. 385-386 : *Agistemus* sp. : 385. Dorsum, 386. Tarsus I (Male).

a pair of pedipalpi. The chelicera is a fine needle like structure (Fig. 387) often may be joined and sometimes the peritreme may be associated with chelicerae. Pedipalp with a thumb-claw complex. Palp tibia may be with a claw of various shape and palptarsus may be with process.

Idiosoma (Fig. 383) : It consists of propodosoma and hysterosoma and each covered with plate or plates. Their number, shape, etc. help in separating the genera. Both propodosoma and hysterosoma bear setae of varying number and nature, which also serve as taxonomic characters at generic and specific levels. The setae are termed as, vertical, pre-ocular, post-ocular, humeral, dorsocentral, dorsolateral, intercalaries, central suranal and lateral suranals.

Venter : Each genus possesses a definite number of setae in sub-capitular region (1 or 2 pairs) and in opisthosomal region (4 pairs on each of anogenital covers of females (Fig. 384) ; besides, there are paragenital setae borne on independent genital plates.

Legs : The leg chaetotaxy in Stigmaeidae is fairly constant (Fig. 388)

Key to the Genera of Stigmaeidae

1. Dorsum covered with a single shield	...	...	<i>Indostigmaeus</i>
— Dorsum covered with 2 shields	...	...	<i>Agistemus</i> ,...2.
2. One pair of paragenital setae	...	...	<i>fleschneri</i>
— Two pairs of paragenital setae	...	...	<i>industani</i>

Genus *Agistemus* Summers
(Figs. 385-386)

Agistemus Summers, 1960, *Proc. Ent. Soc. Wash.*, 62 : 234.

404. *Agistemus industani* Gonzalez-Rodriguez

Agistemus industani Gonzalez-Rodriguez, 1965, *Univ. Calif. Pub. Ent.*, 41 : 40.

Diagnosis : Two pairs of paragenital setae. Dorsal plate smooth (not reticulated or ornamented). Seta le shorter than e ; ratio e/le = 1.4 or greater ; g₁ not long, projects slightly beyond base of g₂ ; postocular body often enlarged ; setae a equal to or longer than distance from a-b ; paragenital setae subequal ; dorsal setae relatively stout ; obviously brabed on most of shaft, set on tubercles, be not appreciably longer than other dorsals ; a/a-a = 1.1 or greater ; diameter

of postocular body more than $1/2$ length of ce ; this seta equals distance be-ce ; dorsalmost and mesal setae on genu I subequal ; ratio $ae/ae-ae=2.6$; la nearly equal to distance la to lm ; dorsal-most seta on genu I not more than 1.3 times longer than lateral one ; dorsal setae blunt tipped.

Habitat : *Cyperus rotundus*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

405. *Agistemus fleschneri* Summers

Agistemus fleschneri Summers, 1960, *Proc. Ent. Soc. Wash.*, 62 : 237-240.

Agistemus fleschneri, Gupta et al., 1971, *Sci. & Cult.*, 37 : 296-299.

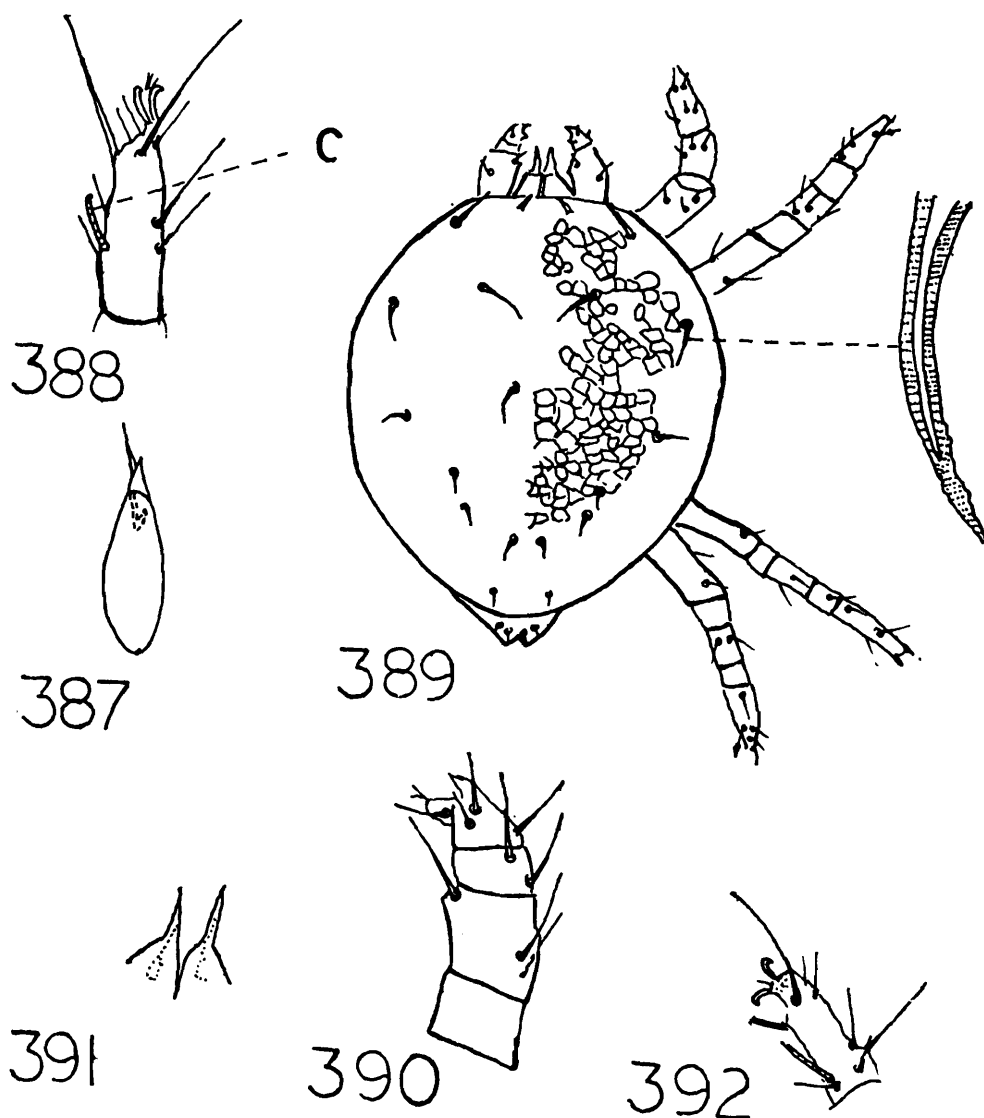


Fig. 387 : Chelicera.

Fig. 388 : Tarsus I (Male) : *C. Solenidion*.

Figs. 389-392 : *Indostigmaeus* sp.

Diagnosis : Dorsal shield extensively ornamented with coarse polygonal reticulation ; one pair of paragenital setae ; reticulum on median plate with 12 cells in median longitudinal row ; $a/a-a=1.0$ $ae/ae-ae=2.6$; median plate roughly octagonal in outline, covers $2/3$ of dorsal hysterosoma ; dorsal setae of median size set on tubercles and barbed ; postocular body incompletely outlined, its diameter not greater than twice that of eyes.

Habitat : Orange.

Distribution : INDIA : Punjab ; outside India : U.S.A., Mexico, Chile.

Remarks : This mite has been reported to be efficient predator of some tetranychid mites.

Genus *Indostigmaeus* Gupta & Ghosh

(Figs. 389-392)

Indostigmaeus Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 204-205.

406. *Indostigmaeus rangatensis* Gupta & Ghosh

Indostigmaeus rangatensis Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 205-206.

Diagnosis : Body almost rounded, dorsum characteristically reticulate except towards margins, cells polygonal, larger centrally while smaller towards anterior and posterior parts. Dorsal setae on tubercles with somewhat corrugated margin. Dorsocentral dorsal setae fairly large and almost of equal length ; dorsolateral dorsal setae small ; all setae being shorter than the longitudinal intervals between successive bases. Ventral striations longitudinal except centrally where it is transverse. One pair of setae present between coxae I, another pair slightly above coxae III.

Habitat : *Citrus medica*.

Distribution : INDIA : Andaman Isls.

Remarks : No economic importance of this species is known.

Family TYDEIDAE Kramer

Tydeidae Kramer, 1877, *Arch. Naturg.*, 43 : 232-246.

History : Kramer (1877) erected this family. The important taxonomic contributions are : Thor (1933), Baker (1965), Baker (1968, 1968a, 1968b, 1968c and 1970) and Carmona (1970).

Diagnosis : Small active mites. Body weakly sclerotized or smooth. Pedipalp 4 segmented with setae of diverse numbers ; palptarsus may be with solenidion. Chelicera needle like, unopposed. Propodosoma

with 3 pairs of dorsal setae, in addition, one pair of sensory setae also present. Hysterosoma with setae of different length and nature. Hysterosoma may be strongly lobed dorsally and laterally. Ventral body setae 3 pairs.

These mites occur on plants, mosses, lichens, trees, soils and stored food. Some are plant feeders, a few are predators and food habits of many are not known with certainty.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Gnathosoma : Pedipalp 4 segmented, setal count vary in genera. Palptarsus with 5 setae ; solenidion may also be present ventrally and proximally on this segment. Tibia, femur, genu may also possess 1 or 2 setae, femur with 1 or 2 setae ; trochanter without seta. Chelicera needle like and unopposed.

Idiosoma (Fig. 394) : Propodosoma with 4 pairs of setae including a pair of sensory setae set in large pseudostigmata. Hysterosoma consists of 5 transverse rows of 4 setae each or in some $4\frac{1}{2}$ rows, the post lateral pair lacking. The setae are labelled as dorsal row (D1-D5) and lateral row (L1-L5 or L4). Dorsal body setae may be nude, simple, pilose, serrate, lanceolate, club-like, etc. Ventrally (Fig. 395), there are 3 pairs of setae in addition to genital, paragenital and anal setae and their number may vary according to genera and species. Dorsal striation of body is important both generically and specifically. In *Tydeus*, the striation pattern is longitudinal on propodosoma and transverse on hysterosoma. In *Pronematus*, the striae are longitudinal on the dorsal anterior region of hysterosoma. In *Lorryia*, the striae form a reticulate pattern. Hysterosoma also may be strongly lobed dorsally and laterally. Eyes as pigmented area may be present on propodosoma.

Legs (Figs. 393, 396-397) : Chaetotactic pattern of leg segments, relative length of tibia and tarsus I, etc. serve as important species characters.

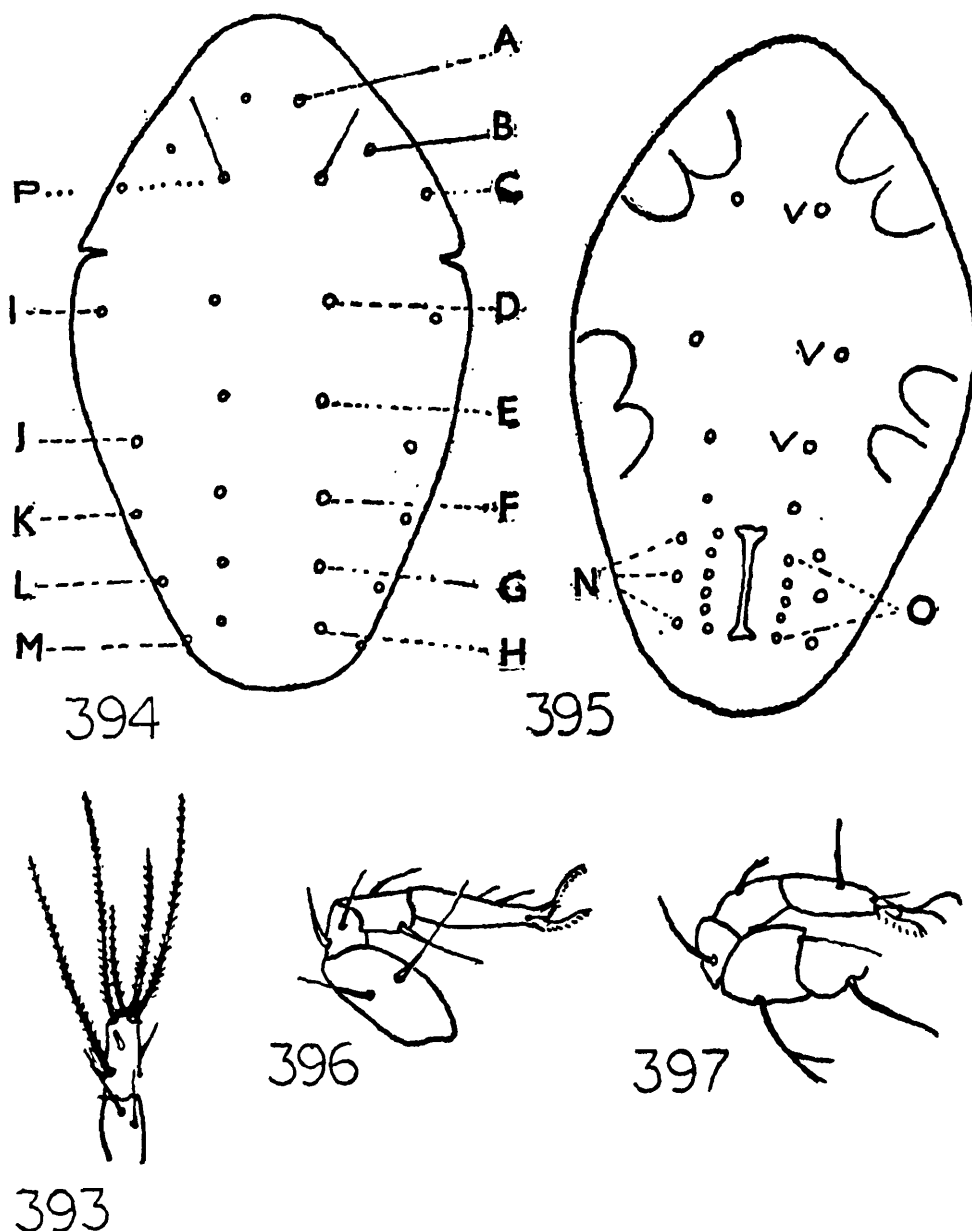
Sexes are similar except males are smaller with smaller genital opening.

Key to the Genera of Tydeidae

1. Hysterosomal seta L2 in normal lateral position	...	...	<i>Lorryia</i>
— Hysterosomal seta L2 in dorsal position	...	...	2
2. Femur III and IV each with forked seta	...	...	<i>Parapronematus</i>
— Femur III and IV without forked seta	...	...	<i>Pronematus</i>

Genus *Pronematus* Canestrini

(Figs. 398-401)

Pronematus Canestrini, 1886, *Atti Ist. Venet.*, (6)4 : 698.

Figs. 393-395 : Tydeidae showing parts of taxonomic importance (after Baker, 1965). 393. Tarsus and tibia I (Female), 394. Dorsum of a tydeid mite showing setal bases : A. P_1 , B. P_2 , C. P_3 , D. D_1 , E. D_2 , F. D_3 , G. D_4 , H. D_5 , I. L_1 , J. L_2 , K. L_3 , L. L_4 , M. L_5 , P—Sensory seta. 395. Ventral aspect of a tydeid mite : N. Paragenital setae, O. Genital setae. Fig. 396 : Leg II (Female) in *Parapronematus*. Fig. 397 : Leg III in *Parapronematus*.

Key to the Species of *Pronematus*

1. Distal setae of tarsus I serrate along entire length	...	...	2
— Distal setae of tarsus I not serrate along entire length	...	...	<i>elongatus</i>
2. Solenidion on tarsus I distal	...	...	<i>fleschneri</i>
— Solenidion on tarsus I medial	...	...	<i>sextoni</i>

407. *Pronematus elongatus* Baker

Pronematus elongatus Baker, 1968b, *Ann. Ent. Soc. Amer.*, 61 : 1093-1094.

Pronematus elongatus, Gupta & Dhooia, 1972, *Curr. Sci.*, 41 : 824-825.

Diagnosis : Dorsal body setae very small ; seta partly serrate. Propodosoma with fine longitudinal striae ; lobes taller than broad and sharp. Sensory seta finely serrate, whip-like, about 3 times as long as other setae, which are short, slightly lanceolate and serrate. Seta P_1 far posterior of sensory setae. Solenidion on tarsus I short and rounded.

Habitat : Grape vines.

Distribution : INDIA : Punjab, Himachal Pradesh ; outside India : Africa.

Remarks : No economic importance of this species is known.

408. *Pronematus fleschneri* Baker

Pronematus fleschneri Baker, 1968b, *Ann. Ent. Soc. Amer.*, 61 : 1092.

Pronematus fleschneri, Gupta & Dhooia, 1974, *Proc. Indian Sci. Congr.*, 61 : 69.

Diagnosis : Distal segment of palpus 2 times as long as penultimate segment. Propodosomal striae longitudinal, fine and with minute lobes. P_1 to P_8 subequal in length. Hysterosomal striae fine with minute lobes and longitudinal only to the area between setae D_1 to D . Solenidion on tarsus I long, distally placed and surpassing the end of the segment.

Habitat : Citrus.

Distribution : INDIA : Punjab, Bihar, Delhi ; outside India ; Belgian Congo.

Remarks : Putatunda *et al.* (1975) reported this mite feeding upon *Eutetranychus orientalis*.

409. *Pronematus sextoni* Baker

Pronematus sextoni Baker, 1968, *Ann. Ent. Soc. Amer.*, 61 : 1092.

Pronematus sextoni, Dhooia, 1982, *Acar. Newsl.*, 11 : 6.

Diagnosis : Rostrum not much longer than broad at base. Propodosoma with many fine longitudinal striae with minute lobes, setae P_1 - P_8 long, serrate, strong and subequal, P_1 slightly shorter. Hysterosomal striae similar like that on propodosoma. Tarsus I longer than tibia I, distal setae serrate along entire length, solenidion on tarsus I strong and bent.

Habitat : Citrus.

Distribution : INDIA : Delhi ; outside India : Belgian Congo.

Remarks : Dhooria (1982) reported this mite as predator on *Eutetranychus orientalis*.

Genus *Parapronematus* Baker
(Figs. 402-403)

Parapronematus Baker, 1965, *In Advances in Acarology*, pp. 115-116.

410. *Parapronematus acaciae* Baker

Parapronematus acaciae Baker, 1965, *In Advances in Acarology*, 2 : 116-117.

Parapronematus acaciae, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 203.

Diagnosis : Seta P_2 of propodosoma lacking ; P_1 shifted posteriorly and lie between the sensory setae. The forked seta of femur IV at least twice as long as the width of the segment. Hysterosoma with longitudinal striae reaching to D_2 setae, first and second row of hysterosomal setae similar to those of propodosoma ; third and fourth row much longer ; D_8 shorter and slender.

Habitat : Bamboo.

Distribution : INDIA : Nicobar Isl. ; outside India : Belgian Congo.

Remarks : No economic importance of this species is known.

Genus *Lorryia* Oudemans
(Figs. 404-405)

Lorryia Oudemans, 1925, *Ent. Ber. Nederl. Ver.*, 7 : 32.

411. *Lorryia africana* Baker

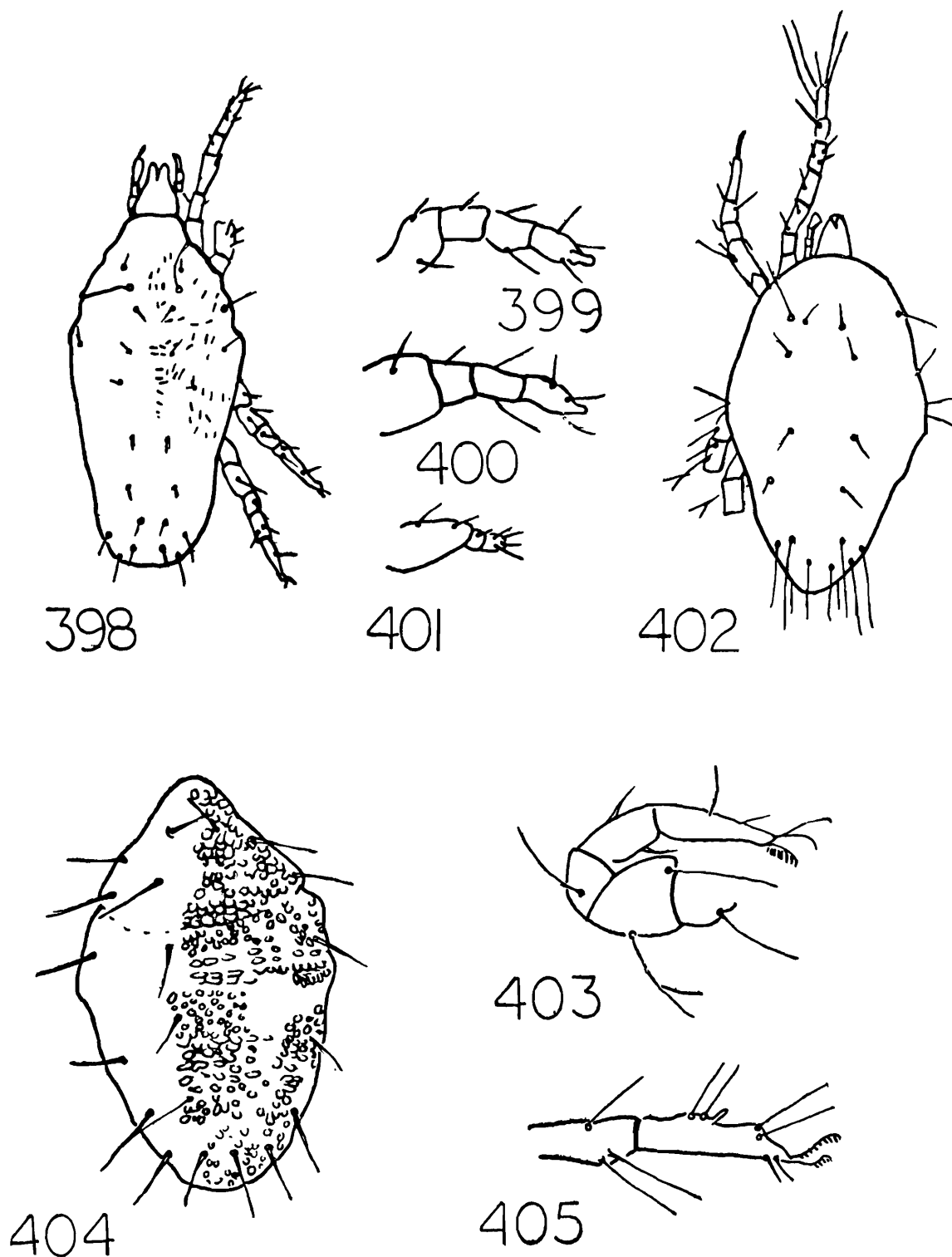
Lorryia africanus Baker, 1965, *In Advances in Acarology*, 2 : 107.

Lorryia africana Baker, 1968a, *Ann. Ent. Soc. Amer.*, 61 : 1002.

Lorryia africana, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 203.

Diagnosis : Body elongate, bilobed posteriorly, strong reticulations dorsally ; dorsocentral area of hysterosoma set off by striae. Sensory

setae on propodosoma simple, long and whip-like. Dorsal body setae strong, lanceolate and nude, subequal in length. Solenidion on tarsus I long and slender.



Figs. 398-401 : *Pronematus* sp. : 398. Dorsum, 399. Leg III (Female), 400. Leg IV (Female), 401. Palp (Male).

Figs. 402-403 : *Parapronematus* sp. : 402. Dorsum, 403. Leg IV (Female).

Figs. 404-405 : *Lorryia* sp. : 404. Dorsum, 405. Tibia and tarsus I (Female).

Habitat : Cashew nut.

Distribution : INDIA : Andaman Isls. ; outside India : Belgian Congo.

Remarks : No economic importance of this species is known.

Family BDELLIDAE Dugés

History : Dugés (1834) erected this family. Grandjean (1938), Womersley (1933), Baker & Balock (1944) and Thor (1931) made some valuable taxonomic contributions in this family. Later, Atyeo (1960), Atyeo & Tuxen (1962) and Atyeo (1963) contributed further in this family.

Diagnosis : Medium to large sized mites, elongated pear shaped, with sharp rostrum which gives them the name 'Snout Mite'. A suture present between propodosoma and hysterosoma. Dorsal integument striated. Pedipalp肘ed, palp tarsus without claws. Propodosoma with 4 pseudostigmata and sensory setae ; 2 pairs of eyes placed on lateral margins. Chelicera elongate with one or more dorsal setae. Three pairs of genital suckers present.

These mites are normally predatory in nature.

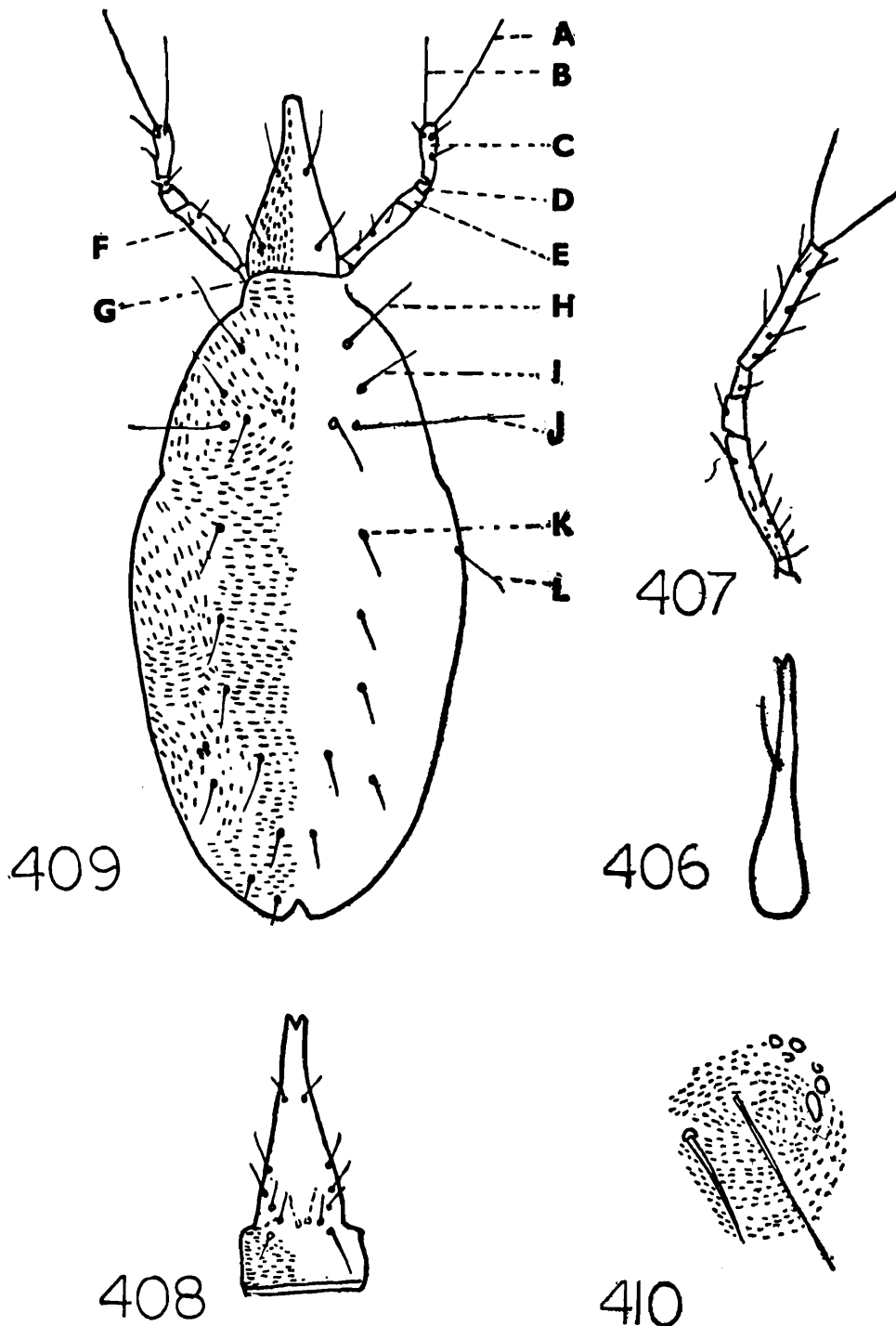
MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Gnathosoma : It consists of pedipalp and chelicera. Chelicera (Fig. 406) elongated with 1 or 2 dorsal setae and weak shears. Pedipalp 5 segmented (Fig. 407), genu and tibia being very short, femur very long or short, leg-like ; normally genu and tibia bent giving the palpi an elbowed appearance. Palptarsus terminates into 2 long whip-like setae. Setation of hypostome (Fig. 408) is of taxonomic importance.

Idiosoma (Figs. 409-410) : Body well distinguished into propodosoma and hysterosoma. Body with straight to gently sinous and parallel striae which form regular pattern. Propodosoma with 2 pairs of sensory setae. Hysterosoma with 9 pairs of setae.

Legs : Leg chaetotaxy is most important character in taxonomy of this family ; tarsi, tibia and genu have tactile setae and long ensory setae in deep sockets (trichoboths) or hollow chemosensory setae (solenidia). Genua I-IV with decreasing number of attenuate sensory setae. Tibia II may or may not have a trichoboth. Trichoboth also present on tibia I and IV and tarsus III and IV. Tarsus I normally exhibits 2 attenuate and 2 noticeably long, bluntly rounded sensory setae and 1 small peg. Tarsus II has 1 attenuate and 2 bluntly rounded

sensory setae and 1 peg. Tarsus III and IV each have a trichoboth inserted at the base.



Figs. 406-410 : Bdellidae showing parts of taxonomic importance (after Atyeo 1963). 406. Chelicera, 407. Palp, 408. Hypostome, 409. Dorsal surface : A. Dorsal end seta, B. Ventral end seta, C. Palp tibiotarsus, D. Genu, E. Telofemur, F. Basifemur, G. Trochanter, H. Anterior sensillum, I. Lateral propodosomal seta, J. Posterior sensillum, K. Internal humeral seta, L. Humeral seta. 410. Posterior sensillum.

Genus **Bdellodes** Oudemans

Bdellodes Oudemans, 1937, *Kritisch Hist. Overzicht der Acarologie*, 3(C) : 1217,

412. **Bdellodes (Hoploscirus) affinis** Atyeo
(Fig. 409)

Bdellodes (Hoploscirus) affinis Atyeo, 1963, *Bull. Univ. Nebraska Sta. Mus.*, 4(8) : 185-187.

Bdellodes (Hoploscirus) affinis, Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 201.

Diagnosis : Chelicera with a single seta ; palp tibiotarsus with 10-14 setae ; palpus with genu and telofemur approximately equal in length. Dorsal propodosoma with weak subcuticular thickenings on oblique lines anterolateral to anterior to posterior sensilla ; hysterosomal setae minutely branched. Ventral idiosomal striae as on dorsum.

Habitat : *Areca catechu*.

Distribution : INDIA : Andaman Isls. ; outside India : Australia.

Remarks : No economic importance of this mite is known.

Family CUNAXIDAE Thor

History : Since the erection of this family by Thor in 1902, the important taxonomic contributions made in this family are Thor & Willmann (1941), Baker & Hoffman (1948), Muma (1960), Meyer & Ryke (1959) and Smiley (1975).

Diagnosis : Soft or strongly sclerotized body, with or without dorsal and ventral plates. Chelicera separate and hinged at base. Gnathosoma cone-shaped, palpi 3-5 segmented with strong spines, spurs or apophyses terminating in strong claws. Propodosoma with 2 pairs of sensory setae. Eyes present or absent. Male or female genitalia with 2-3 pairs of discs ; tibia IV with trichobothrium.

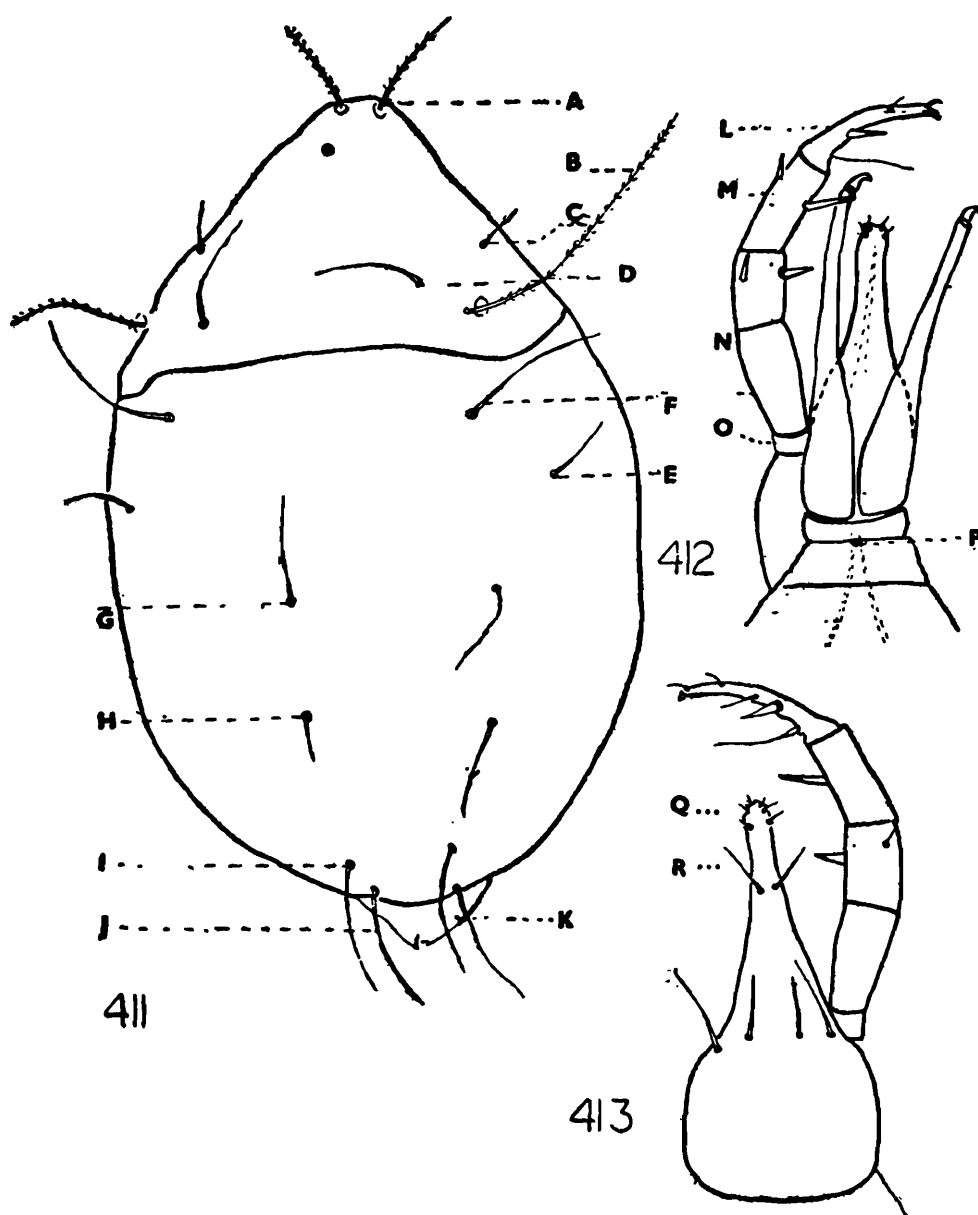
These are reddish, free living mites and are known to be good predators.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

The body is distinguished into gnathosoma and idiosoma.

Gnathosoma (Figs. 412, 413) : It consists of a pair of chelicerae and a pair of pedipalpi. Pedipalp 3-5 segmented, bent inwards, each segment with varying number of setae. Chelicera with fixed digit vestigial and movable digit sickle-shaped. The number of pedipalpal segment is used as character for generic separation. Ventrally hypostome conical with setae,

Idiosoma (Fig. 411): It is distinguished into propodosoma and hysterosoma, often these two regions are separated by suture. Propodosoma with 2 pairs of sensory setae, in addition another two pairs of setae may be present. Propodosoma and hysterosoma may be covered with plate or plate may be absent on hysterosoma. Normally 5 pairs of dorsal and 1 pair of lateral setae present on idiosoma. Ventrally idiosoma may be striated.



Figs. 411-413: Cunaxidae showing parts of taxonomic importance (after Smiley, 1975). 411. Dorsal aspect of a cunaxid mite showing locations of setae. A. Anterior sensillum, B. Posterior sensillum, C. P_1 , D. P_2 , E. L_1 , F. D_1 , G. D_2 , H. D_3 , I. D_4 , J. D_5 , K. Anal seta. 412. Dorsal surface of gnathosoma: L. Tibiotarsus, M. Genu, N. Femur, O. Trochanter, P. Stigmata. 413. Ventral surface of gnathosoma. Q. Adoral seta. R. Hypostomal seta.

Legs : Leg chaetotaxy and specially that of tarsus I are important taxonomic characters.

Key to the Genera of Cunaxidae

1. Gnathosoma enormously developed, palpal tibia and tarsus modified for clasping organ	...	<i>Indocunaxa</i>
— Gnathosoma normal, not enormously developed, palpal tibia and tarsus do not form clasping organ		2
2. Palpus 3 segmented		3
— Palpus 5 segmented		<i>Cunaxa</i>
3. Dorsum without conspicuous shield or shields		<i>Cunaxoides</i>
— Dorsum with conspicuous shield		<i>Neocunaxoides</i>

Genus *Cunaxa* von Heyden
(Figs. 414-415)

Cunaxa von Heyden, 1826, *Isis (Oken)*, 18 : 609.

Key to the Species of *Cunaxa*

1. Palp trochanter with spine on inner antero-lateral margin		<i>setirostris</i>
— Palp trochanter without such spine		2
2. Chelicera longer than tibiotarsus		<i>bambusae</i>
— Chelicera shorter than tibiotarsus		3
3. Chelicera barely reaches the base of genu		<i>myabunderensis</i>
— Chelicera reaches to tip of tibiotarsus		<i>cynodonae</i>

413. *Cunaxa bambusae* Gupta & Ghosh

Cunaxa bambusae Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 198-199.

Diagnosis : Palpal basifemur with 1 medioventral seta, telofemur with 1 outerlateral and 1 anteromiddorsal seta, genu with 2 innerlateral, 1 outerlateral and 1 anteromiddorsal seta ; tibiotarsus with a strong spine on inner lateral surface, anterior to it one small seta and 2 setae on outerlateral surface, anterior one longer and stronger. Propodosomal shield indistinct with 2 finely branched sensory setae and 2 fairly long simple setae, D₄ and D₅ setae of hysterosoma fairly long.

Habitat : *Bambusa arundinacea*.

Distribution : INDIA : Andaman Isls.

Remarks : Nothing about its economic importance is known.

414. *Cunaxa cynodona* Gupta & Ghosh

Cunaxa cynodona Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 196-198.

Diagnosis : Palp 5 segmented ; palpal basifemur with one outerlateral seta, telofemur with 1 outerlateral and 1 anterodorsal seta ; genu with 1 outerlateral, 1 innerlateral and 1 anterodorsal seta, all being simple ; tibiotarsus with 2 unequal simple setae on innerlateral surface, proximal one small, distal one longer ; 4 setae present on anterior tip. Propodosoma with a shield, hysterosoma without shield, with striation.

Habitat : *Cynodon* sp.

Distribution : INDIA : Car Nicobar Isl.

Remarks : Economic importance of this species is unknown.

415. *Cunaxa myabunderensis* Gupta & Ghosh

Cunaxa myabunderensis Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 195-196.

Diagnosis : Palp 5 segmented ; palpal telofemur with 1 weak spine-like seta on the inner surface and 1 outerlateral simple seta ; genu with a sharp spine like seta at the innersurface and one small seta anterolaterally with one anteromedian seta ; tibiotarsus with one small sharp seta on the inner surface. Propodosomal shield indistinct, hysterosomal region with striations and 6 pairs of short setae ; 5 pairs of setae on the ventral surface between coxae II and posterior tip of the body.

Habitat : *Aegle marmelos*.

Distribution : INDIA : Andaman Isl.

416. *Cunaxa setirostris* (Hermann)

Scirus setirostris Hermann, 1804, *Me'm. Aptelologique*, pp. 60-62.

Cunaxa setirostris, Singh & Mukharji, 1971, *Oriental Ins.*, 5 : 488.

Diagnosis : Palp 5 segmented, exceeding length of hypostome ; palpal telofemur with a strong spine on the inner anterolateral margin ; propodosoma with a reticulate subrectangular shield with 2 pairs of finely branched sensory setae ; hysterosoma without shield, with fine striations, with 8 pairs of short and simple setae ; 5 pairs of simple setae (excluding those of anal and genital regions) present ventrally ; genital plate with 4 pairs of simple setae, distal outer pair longer than other .

Habitat : *Tabernaemontana coronaria*.

Remarks : The economic importance of this species is unknown.

Distribution : INDIA : U. P., Andaman Isls. ; outside India : Cosmopolitan.

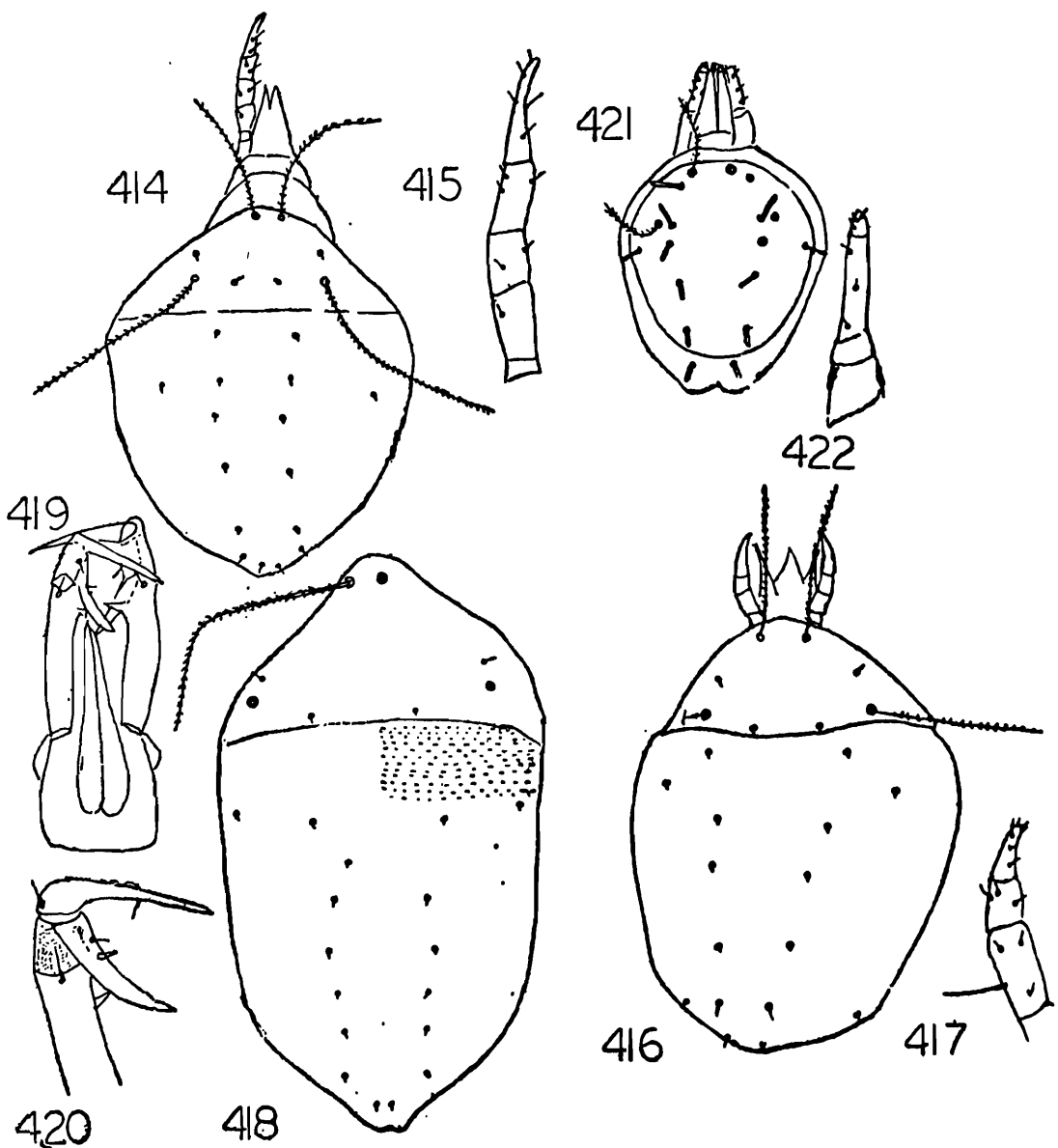
Genus *Cunaxoides* Baker & Hoffman
(Figs. 416-417)

Cunaxoides Baker & Hoffman, 1948, *An. Esc. Nac. Cienc. Biol. Mex.*, 5 : 241-251.

417. *Cunaxoides nicobarensis* Gupta & Ghosh

Cunaxoides nicobarensis Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 191-192.

Diagnosis : Body spindle shaped with a distinct furrow. Dorsum finely striated and tuberculated. Propodosoma hemispherical with 2 pairs of long sensory setae and 2 pairs of short simple setae ; venter



Figs. 414-415 : *Cunaxa* sp. : 414. Dorsal aspect, 415. Palp.

Figs. 416-417 : *Cunaxoides* : 416. Dorsal aspect, 417. Palp.

Figs. 418-420 : *Indocunaxa* sp. : 418. Dorsal aspect, 419. Gnathosoma, 420. Palp (enlarged view).

Figs. 421-422 : *Neocunaxoides* sp ; 421. Dorsum, 422. Palp.

with 6 pairs of short setae. Palp 3 segmented, 1st segment with 4 setae, second with 3 setae and 3rd with five setae.

Habitat : Undet. plant.

Distribution : INDIA : Car Nicobar Isl.

Remarks : Economic importance of this mite is unknown.

Genus *Indocunaxa* Gupta & Ghosh

(Figs. 418-420)

Indocunaxa Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 192-193.

418. *Indocunaxa smileyi* Gupta & Ghosh

Indocunaxa smileyi Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 193-194.

Diagnosis : Propodosomal shield weakly granulated ; palp 4 segmented, 1st segment with 1 small seta mediodorsally, one strong seta distally and 1 strong claw on the inner surface and another strong claw close by on the ventral surface ; second segment with 1 long fine seta basally facing inward, one spine like seta at the distal end and another stout and pointed seta on the outer surface ; 3rd and 4th segments being clasping organs, fixed digit with a long pointed seta and the movable digit with a strong spine medially and another more strongly developed at the tip. Hysterosoma with fine striae and 8 pairs of setae, all being simple and small.

Habitat : *Calamus tenuis*.

Distribution : INDIA : Andaman Isls.

Remarks : This mite is not known to have any economic importance.

Genus *Neocunaxoides* Smiley

(Figs. 421-422)

Neocunaxoides Smiley, 1975, *Ann. Ent. Soc. Amer.*, 68(2) : 237.

419. *Neocunaxoides pradhani* Gupta & Ghosh

Neocunaxoides pradhani Gupta & Ghosh, 1980, *Rec. Zool. Surv. India*, 77 : 190-191.

Diagnosis : Palp 3 segmented, almost as long as hypostome ; palptarsus with 2 outerlateral setae, 1 mediodorsal seta, 3 simple setae distally and a short strong claw. Dorsally propodosoma and hysterosoma covered with one single shield, 2 pairs of sensory setae and 2 pairs of thick rod-like setae (slightly expanded distally) are present in propodosomal region. Ventrally with 2 distinct plates with coxae I and II divided

medially ; coxae III and IV coalesced forming 2 elongate strong lateral plates. Idiosoma anterior ventral plates each with 6 pairs of simple setae, 5 pairs of simple setae on lateral ventral plates.

Habitat : *Artocarpus integrifolia*.

Distribution : INDIA : Andaman Nicobar Isls.

Remarks : This mite is not known to have any economic importance.

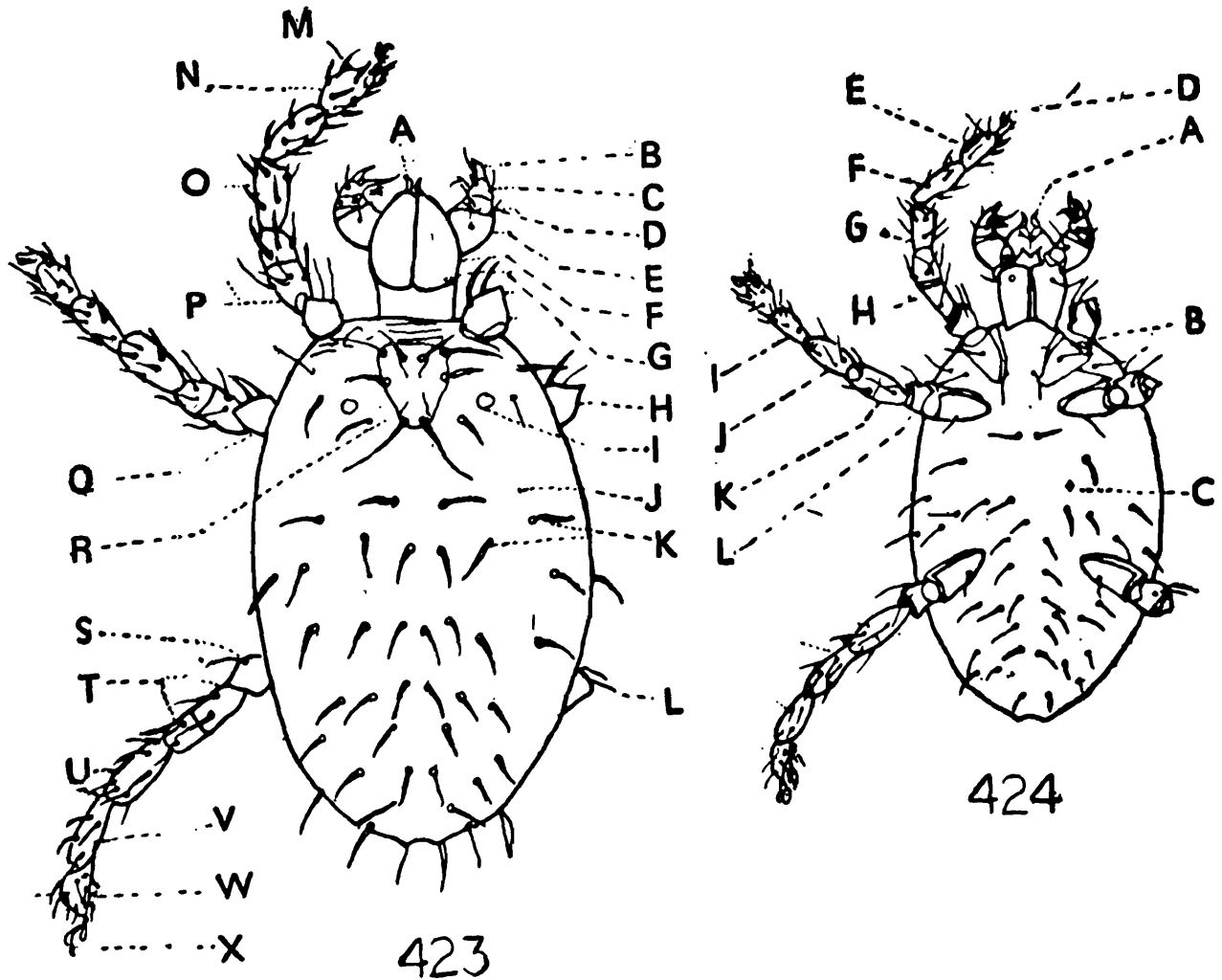


Fig. 423. Dorsal aspect of a larval erythraeid mite (after Southcott, 1961) :

A. Cheliceral digit, B. Tibial claw, C. Palpal tibia, D. Palpal genu, E. Palpal femur, F. Cheliceral base, G. Palpal supracoxalia, H. Trochanter II, I. Eye, J. Idiosoma, K. Dorsal idiosomal setae, L. Trochanter III, M. Tarsal seta, N. Tarsus I, O. Genu I, P. Femur I, Q. Trochanter II, R. Dorsal scutum, S. Trochanter III, T. Femur III, U. Genu III, V. Tibia III, W. Tarsus III, X. Tarsal claw.

Fig. 424 : Ventral aspect of a larval erythraeid mite (after Southcott, 1961) :

A. Cheliceral digit, B. Sternal area, C. Intercoxal area, D. Tibial claw, E. Tarsus I, F. Tibia I, G. Genu I, H. Femur I, I. Tibia II, J. Genu II, K. Femur II, L. Trochanter II.

Family : ERYTHRAEIDAE Robineau-Desvoidy

Erythraeidae Robineau-Desvoidy, 1828, *K.H.O.A.*, III D : 144.

History : This family was established by Oudemans in 1902. The Indian fauna is not well worked out. The important contributions made in this family in the world are Meyer (1959), Southcott (1961, 1965), etc.

Diagnosis (Figs. 423-424) : Reddish mite, larvae are heteromorphic, lack urstigma and are parasitic on arthropods. A shallow furrow separates the propodosoma from hysterosoma. The propodosoma has a median longitudinal 'Crista Metopica', which may reach posteriorly to middle of dorsum. There are 2 sensillary areas on Crista Metopica ; the anterior one is placed forward while the posterior one at the posterior end of crista. Sensillary areas each have a pair of sensory setae. One or two pairs of eyes are present. Coxae I & II and III & IV are in two groups. Palp tibia with strong claw. Chelicera unsegmented, stylet-like and toothed distally. Genital suckers are absent.

Adults of these mites are free living, normally predators and found on plants or in litter. The larvae are parasitic on insects.

Key to the Subfamilies of ERYTHRAEIDAE

1. Two eyes on each side	...	...	<i>Erythraeinae</i>
— One eye on each side	...	...	2
2. Eyes anterior to Crista	...	...	<i>Leptinae</i>
— Eyes behind middle of Crista	...	...	<i>Callidosomatinae</i>

Subfamily CALLIDOSOMATINAE Southcott

Callidosomatinae Southcott, 1957, *Rec. S. Aust. Mus.*, 13(I) : 97.

Key to the Genera of Callidosomatinae

1. Palptarsus greatly enlarged globular or pyriform, and extending beyond palpal tibial claw	...	...	<i>Sphaerolophus</i>
— Palptarsus not greatly enlarged or normal or nearly normal structure, not overreaching palp tibial claw or only slightly overreaching palptibial claw	...	...	<i>Abrololophus</i>

Genus *Sphaerolophus* Berlese

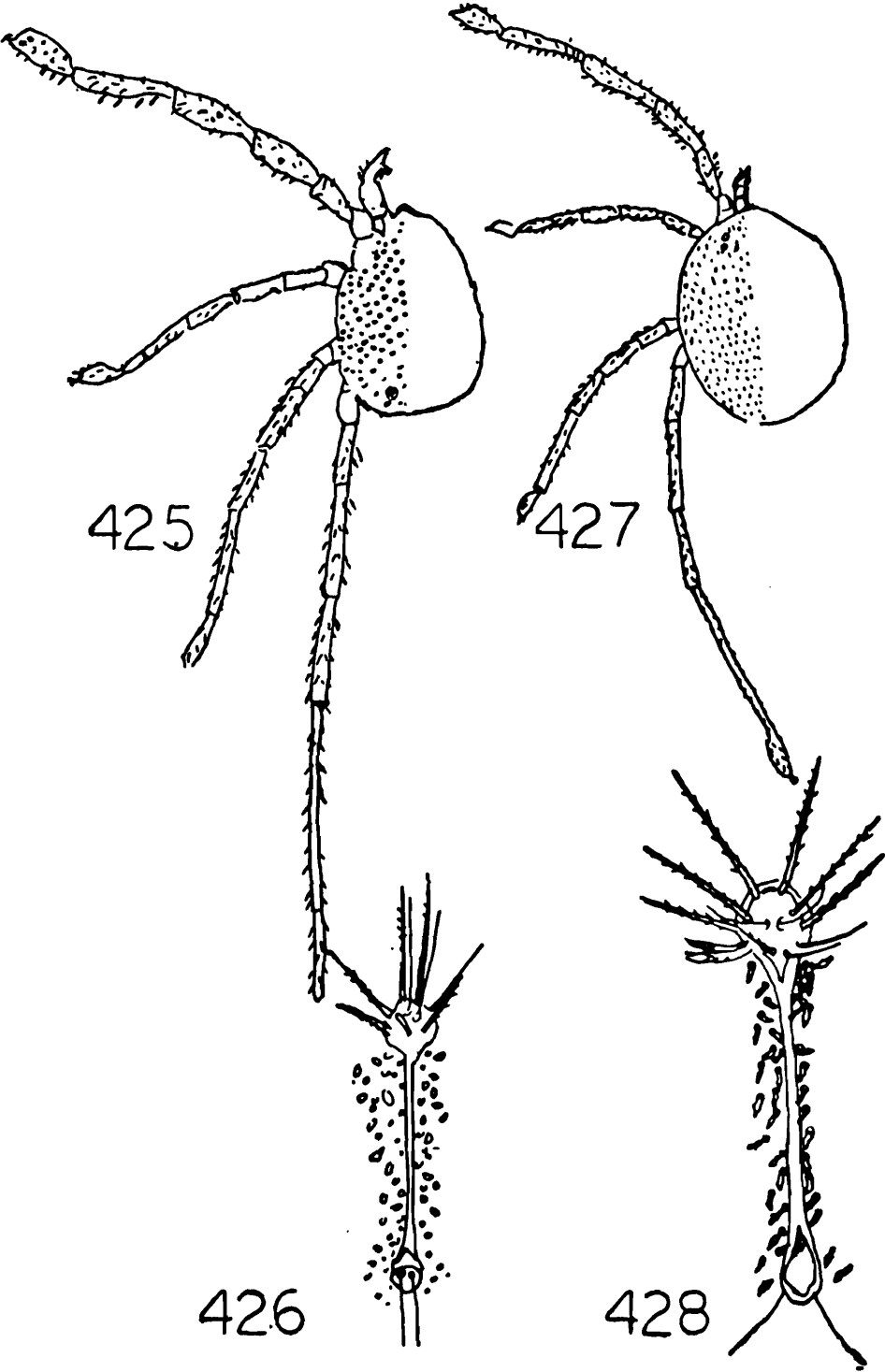
(Figs. 429-430)

Rhyncolophus Berlese, 1885, *A. M. S.*, 18 : 7

Sphaerolophus Berlese, 1910, *Redia*, 6 : 349.

Key to the Species of Sphaerolophus

1. Palptarsus pyriform	...	...	<i>gigas</i>
— Palptarsus spherical	...	...	<i>delhiensis</i>



Figs, 425-426 : *Erythraeus* sp.
Figs. 427-428 : *Paraerythraeus* sp.

420. *Sphaerolophus gigas* Khot

Sphaerolophus gigas Khot, 1965, *Acarologia*, 7 : 64.

Diagnosis : Bright red mite, dorsum with numerous small setae giving spur like appearance to the body, each seta with long median pointed stem and spiny ciliations upto the mid length. Crista with anterior sensillary area situated on anterior dorsal margin ; anterior sensillary area triangular in shape with nonsensillary setose setae situated along its anterior margin and 2 pairs on either side of sensillary setae. Posterior sensillary area situated on middle of dorsum having a posterior extension of crista and a pair of sensillary setae. Palpi comparatively small.

Habitat : Sugarcane.

Distribution : INDIA : Delhi.

Remarks : Economic importance of this species is not known.

421. *Sphaerolophus delhiensis* Khot

Sphaerolophus delhiensis Khot, 1965, *Acarologia*, 7 : 66.

Diagnosis : Bright red mite, body wide oval. Dorsum covered with dense spurs of minute, 0.091 mm long small, curved and pointed, lightly ciliated setae. Crista 0.942 mm long, with anterior sensillary area little below the anterior margin of dorsum and extending posteriorly beyond posterior sensillary area ; anterior sensillary area rectangular with a pair of smooth, pointed sensillary setae. Palptarsus spherical.

Habitat : Cotton.

Distribution : INDIA : Delhi.

Remarks : Economic importance of this species is not known.

Genus *Abrolophus* Berlese

(Figs. 431-432)

Abrolophus Berlese, 1891, *A. M. S.*, 59(1) : 2

Key to the Species of Abrolophus

1. First tarsus 3-3½ times as long as wide	...	...	<i>ripicola</i>
— First tarsus 2-2½ times as long as wide	...	...	<i>delhiensis</i>

422. *Abrolophus delhiensis* Khot

Abrolophus delhiensis Khot, 1965, *Acarologia*, 7 : 71.

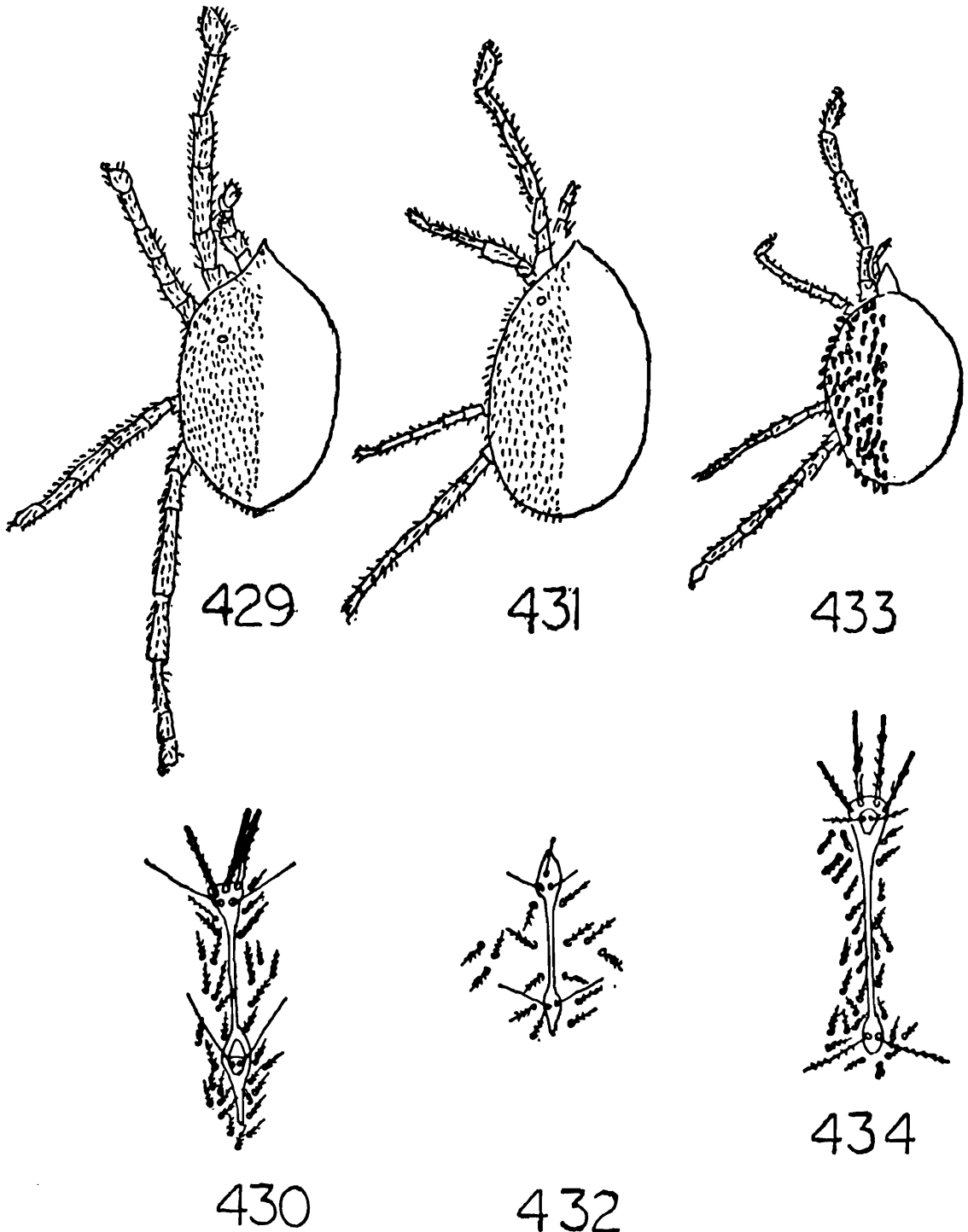
Diagnosis : Colour bright red. Body elliptical, crista with anterior

sensillary area with rounded tip forms a nasus with cristal plate. Sensillary area with sensillary setae. Crista extends posteriorly into a irregular projection. Dorsal setae setose. Palp with bent tibial claw and bullet shaped palp tarsus.

Habitat : Sugarcane.

Distribution : INDIA : Delhi.

Remarks ; No economic importance of this species is known.



Figs. 429-430 : *Sphaerolophus* sp. 431-432 : *Abrolophus* sp. 433-434 : *Leptus* sp.

423. *Abrolophus ripicola* Womersley

Abrolophus ripicola Womersley, 1934, *Rec. S. Aust. Mus.*, 7 : 228.

Abrolophus ripicola, Khot, 1965, *Acarologia*, 7 : 71.

Distribution : Dorsum with dense spur of small, lightly setose setae. Crista extending posteriorly, dorsally upto II coxae. Anteriorly, cristal plate forms a nasus, anterior sensillary area triangular with light transverse lines separating the area into 4 parts. Sensory setae smooth, pointed. Posterior sensillary area with irregular posterior margin. Tarsus I $3\frac{1}{2}$ times longer than wide.

Habitat : Orchard.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

Subfamily LEPTINAE Southcott

Leptinae Southcott, 1957, *Rec. S. Aust. Mus.*, 13(1) : 98.

Genus *Leptus* Latreille

(Figs. 433-434)

Leptus Latreille, 1796, *K. H. O. A.* II : 177.

Key to the Species of Leptus

1. Crista short, extending only upto the level of Coxae II ; eyes situated little above the mid- point of either sides of crista	...	...	<i>poonaensis</i>
— Crista long, extending posteriorly only upto the middle of dorsum ; eyes placed far anteriorly just behind the anterior sensillary area	...	...	<i>giganticus</i>

424. *Leptus poonaensis* Khot

Leptus poonaensis Khot, 1964, *Acarologia*, 6 : 682.

Diagnosis : Orange coloured, wide oval mite. Dorsal setae setose and pointed. Crista 0.222 mm long and stout. Anterior sensillary area long and pyriform having a pair of finely setose sensory setae and 4 stout densely setose nonsensillary setae. Posterior sensillary area with a pair of finely setose sensillary setae. Dorsal setae setose. Tarsus I $3\frac{1}{2}$ times longer than wide.

Habitat : Fig.

Distribution : INDIA : Maharashtra.

Remarks : No economic importance of this species is known.

425. *Leptus giganticus* Khot

Leptus giganticus Khot, 1965, *Acarologia*, 6 : 682.

Diagnosis : Large mite blackish red in colour. Body oval broader anteriorly. Dorsal setae small, roundish, heavily pigmented showing 2 lid like halves. Crista stout, extending beyond anterior sensillary area. Tarsus I $3\frac{1}{2}$ times longer than wide.

Habitat : Citrus.

Distribution : INDIA : U. P.

Remarks : This mite is not known to have any economic importance.

Subfamily ERYTHRAEINAE Southcott

Erythraeinae Southcott, 1957, *Rec. S. Aust. Mus.*, 13(1) : 97.

Key to the Genera of Erythraeinae

1. Legs with highly modified serrate setae	...	...	<i>Paraerythraeus</i>
— Legs without serrate setae	...	...	<i>Erythraeus</i>

Genus *Erythraeus* Latreille (Figs. 425-426)

Erythraeus Latreille, 1806, *K. H. O. A.*, III D : 146.

426. *Erythraeus plumosus* Khot

Erythraeus plumosus Khot, 1963, *Acarologia*, 5 : 240.

Diagnosis : Yellowish red mite, oval. Crista linear, extending dorsally upto the middle of coxae II and III ; anterior sensillary area with a pair of long, tapering, sensillary smooth setae, situated on the middle of the area, besides the 7 nonsensillary setose stout setae situated around sensillary setae. Posterior sensillary area having a pair of sensillary setae. Ventral setae lightly setose, Palpi with 5 conical spines along the ventral flexor edge of palp tibia distally with 3 conical spines on palp genu. Fourth leg longest, I and II equal.

Habitat : Grass.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

Genus **Paraerythraeus** Southcott
(Figs. 427-428)

Paraerythraeus Southcott 1946, *Proc. Linn. Soc. N. S. W.*, 71(1-2) : 11.

427. **Paraerythraeus serratociliatus** Khot

Paraerythraeus serratociliatus Khot, 1963, *Acarologia*, 5 : 236.

Diagnosis : Roundish body with deep orange colour, dorsal setae clavate and pigmented. Crista 0.871 mm long and stout with anterior sensillary area situated on anterior edge of dorsum ; anterior sensillary area with a pair of fine long sensillary setae and 3 nonsensillary setae, stout pointed, lightly setose, middle one situated on anterior margin and 2 little posterior to it. Posterior sensillary area pear shaped with fine, slender sensillary setae. Leg I little longer than body. Palpi with strong tibial claw.

Habitat : Grass.

Distribution : INDIA : Delhi.

Remarks : No economic importance of this species is known.

Order MESOSTIGMATA

Family AMEROSEIIDAE Evans

Ameroseiidae Evans, 1963, *Ann. Mag. nat. Hist.*, (13)6 : 210.

History : Evans (1963) published a good account in this group.

Diagnosis : Tritosternum present. Chaetotaxy of trochanter, femur and genu are 2, 5, 6, respectively. Both digits of chelicera conspicuous. Tibia I of adult with 3 ventral setae ; tibia and genu of leg I with 2 anterolateral setae. Tibia I of adult with 4-5 dorsal setae ; corniculi often may be divided distally into 2 or three processes. Dorsum of idiosoma of adult with holodorsal or schizodorsal shield ; ventroanal or holoventral shield of male not fused with holodorsal or schizodorsal shield posteriorly. Leg I normally with ambulacrum ; genu I with 3 ventral setae ; palp apotele 2-3 tined. Tarsus II in both sexes without spurs ; femur II of male without spurs. Third pair of sternal setae on unsclerotized cuticle or on discrete shields. Opisthonotal region without J₅ and R setae.

Genus *Neocypholaelaps* Vitzthum

(Figs. 435-438)

Neocypholaelaps Vitzthum, 1941, *Bronn's Tierreich*, 5 : 763.*Key to the Species of Neocypholaelaps*

1. Dorsal shield of male without lateral projection ; setae simple	...	...	<i>pradhani</i>
— Dorsal shield of male with lateral projection, setae leaf like	...	...	<i>stridulans</i>

428. *Neocypholaelaps pradhani* Gupta

(Figs. 435-436)

Neocypholaelaps pradhani Gupta, 1969, *Oriental Ins.*, 3 : 335-336.

Diagnosis : Dorsal shield weakly sclerotized with 29 pairs of simple setae, all short. Sternal shield with 2 pairs of setae, 3rd pair of sternal setae on small platelets and 4th pair lie on interscutal membrane. Anal shield with a pair of paraanal setae and a postanal seta. Male with dorsal setae J2 closely set, long and stout.

Habitat : *Pyrus malus*.**Distribution :** INDIA : Tamil Nadu.**Remarks :** It is of no known economic importance.429. *Neocypholaelaps stridulans* (Evans)

(Figs. 437-438)

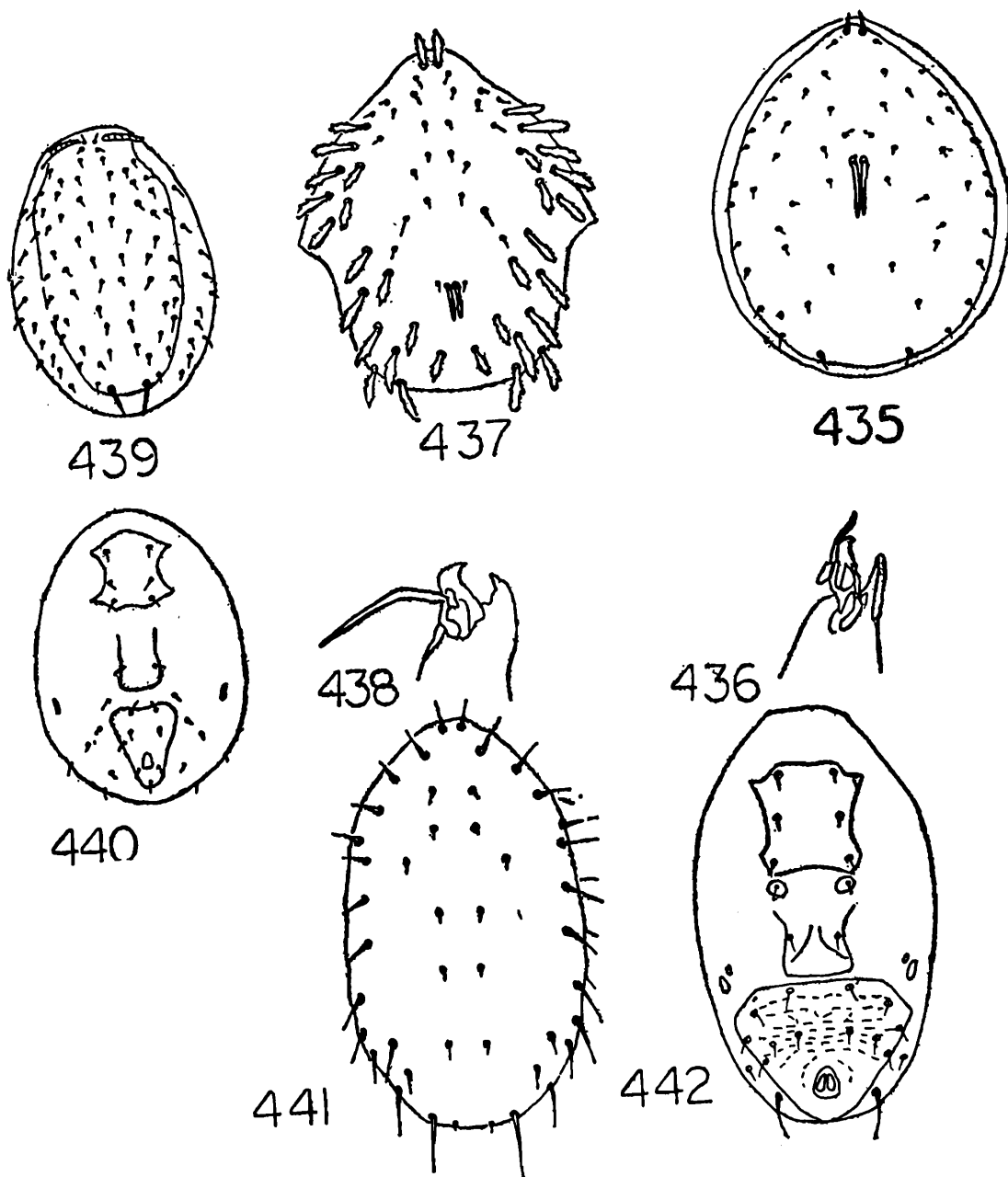
Indoseius stridulans Evans, 1955, *Bull. Nat. Ins. Sci. India*, 7 : 109.*Neocypholaelaps stridulans*, Evans, 1963, *Ann. Mag. Nat. Hist.*, (13)6 : 219-221.

Diagnosis : Female dorsal shield weakly sclerotized having punctate lines forming polygonal network with 29 pairs of leaf like setae. Sternal shield longer than wide, with 2 pairs of setae, sternal setae III lying on platelets ; metasternal setae situated on striated integument. Anal shield with a pair of para and postanal setae. Both digits of chelicera edentate ; movable digit with a membranous process. Male dorsal shield with lateral projection and numerous tubercles lying behind it. Setae J2 long and closely set.

Habitat : Coconut.

Distribution : INDIA : Kerala, W. Bengal ; outside India : Java, Philippines, Malaya.

Remarks : It is of no known economic importance,



Figs. 435-436 : Ameroseiidae. *Neocypholaelaps pradhani*. 435. Dorsum, 436, Chelicera.

Figs. 437-438. *N. strudulans* : 437. Dorsum, 438. Chelicera.

Figs. 439-440. *Melichares* sp. : 439. Dorsum, 440. Ventral aspect.

Figs. 441-442. *Lasioseius* sp. : 441. Dorsum, 442. Ventral aspect.

Family ASCIDAE VOIGTS & OUDEMANS

Ascidae Voigts & Oudemans, in Evans & Till, 1979, *Trans. Zool. Soc. Lond.*, 35 : 196.

History : This family is adequately worked out in other parts of the world (Bernhard, 1963 ; Evans, 1958 ; Evans & Hyatt, 1960 ; Chant, 1963 ; Evans & Till, 1979 and Lindquist and Evans, 1960).

Diagnosis : Tritosternum present. Chaetotaxy of trochanter, femur and genu 2-5-6. Chelicera of female conspicuous, chelate-dentate ; chelicera of male with spermatophoral process ; tibia I of adult with 3 ventral setae ; tibia and genu of leg I with 2 anterolateral setae, the former with 6 dorsal setae. Anal, ventro-anal, hologastric or holovenral shields in the adults not fused with dorsal shield ; posterior coxae without setigerous spurs in both sexes ; dorsum of idiosoma with a holodorsal or schizodorsal shield, coniculi horn-like, strongly or weakly sclerotized. Hypostome grooved in both sexes with 5-7 transverse rows of denticles. Adult with distinct podonotal and opisthonotal shields.

Apparently these mites are often confused with phytoseiids but normally these mites are more strongly sclerotized and possess more number of setae on dorsal shield ; besides there are other characters too to distinguish the two families. These mites are commonly found on foliage twigs and litter, stored food and are often known to predate upon other phytophagous mites.

Key to the Genera of Ascidae

1. Corniculi long and convergent distally, lying close to one another, ventral denticles on gnathosoma often reduced, fixed digit of chelicera with a membranous lobe in place of <i>pilus dentilis</i> .	...	...	<i>Melichares</i>
— Corniculi short, parallel or divergent ; ventral denticles on gnathosoma well developed with 5 or more transverse rows ; fixed digit of chelicera with a setiform <i>pilus dentilis</i> .	...	...	<i>Lasioseius</i>

Genus *Melichares* Hering

(Figs. 439-440)

Melichares Hering, 1839, *Acta Acad. Caes Leop Car. Nat. Cur.*, 18 : 626.

430. *Melichares (Melichares) fici* Narayanan & Ghai

Melichares (Melichares) fici Narayanan & Ghai, 1964a, *Proc. Nat. Inst. Sci. India*, **29** B (5) : 549-550.

Diagnosis : Dorsal shield 401 long, 242 wide, with 28 pairs of simple setae, almost of same size (16), Z_8 being longest (35) ; anterior dorsal shield with 14 pairs of setae of same size. Fourteen pairs of setae present on interscutal membrane surrounding dorsal shield, of those, 7 pairs lie on anterior dorsal shield. Sternal shield with lateral extension between coxae I and II, metasternal plate absent. Anal shield slightly roundish in shape, longer than broad, with 3 setae, leg IV without macrosetae.

Habitat : Fig.

Distribution : INDIA : Delhi.

Remarks : This species was found associated with hymenopterous insects inside the fruits of *Ficus infectoria* (Narayanan & Ghai, 1964a).

Genus *Lasioseius* Berlese

(Figs. 441-442)

Lasioseius Berlese, 1916, *Redia*, **12** : 34.

Key to the Species of Lasioseius

1. Dorsal shield with 31 pairs of setae, 15 of those on posterior dorsal shield	...	...	<i>quadrissetosus</i>
— Dorsal shield with 22 pairs of setae, 10 of those on posterior dorsal shield	...	...	<i>terrestris</i>

431. *Lasioseius quadrissetosus* Chant

Lasioseius quadrissetosus Chant, 1960, *Can. Ent.*, **92** : 64.

Diagnosis : Dorsal shield faintly sculptured with 31 pairs of setae on lateral interscutal membrane. Sternal, metasternal and genital shields normal ; ventrianal shield large, as wide as long (115), triangular, with 4 pairs of small preanal setae ; 2 pairs of broad metapodal plates. Leg IV with 2 macrosetae, one each on tarsus and basitarsus.

Habitat : Citrus.

Distribution : INDIA : Assam.

Remarks : The economic importance of the species is not known.

432. *Lasioseius terrestris* Menon & Ghai

Lasioseius terrestris Menon & Ghai, 1968a, *Indian J. Ent.*, 30 : 77-79.

Diagnosis : Dorsal shield slightly reticulate, with 22 pairs of simple setae, 10 of those are on posterior region, marginal setae not on interscutal membrane. Sternal, metasternal and genital shields normal ; ventrianal shield 170 wide, 135 long, reticulate, with 6 pairs of preanal setae. Metapodal plates 2 paired.

Habitat : Wheat.

Distribution : INDIA ; Delhi.

Remarks : Menon & Ghai (1968) found this mite associated with *Petrobia latens* infesting wheat crop.

Family PHYTOSEIIDAE Berlese

Phytoseiini Berlese, 1913, *Acaroth. Ital.*, p. 11.

Phytoseiinae Vitzthum, 1941, *des Tierreichs*, 5 (4) : 767.

Phytoseiidae Baker & Wharton, 1952, *An Introduction to Acarology*, The Macmillan Co., New York, p. 87.

History : Berlese (1916) proposed the tribe with *Phytoseius* Ribaga as its type genus. Nesbitt (1951) critically reviewed this group for the first time. Chant (1959) was the first to review the world phytoseiid fauna. Muma (1961) gave a new concept of classification of Phytoseiidae. Denmark (1966) revised the genus *Phytoseius*. Pritchard & Baker (1962), Schuster & Pritchard (1963), Chant & Baker (1965), Chant (1965), Ehara (1959, 1966, 1967, 1970), Ehara & Bhandhufalck (1967), Muma & Denmark (1970), DeLeon (1965), Chaudhri (1974) and others made creditable contributions for advancement of our knowledge in this family.

Diagnosis : Female can be diagonalised as : dorsal shield entire or transversely divided with less than 19 pairs of dorsal setae (except in Gnoriminae) arranged in three longitudinal rows as dorsal, median and lateral ; sublateral setae 1-3 pairs. Peritreme opens through stigmata, situated between coxae III and IV and extends anteriorly. Palpal apotele 2-tined. Chelicera chelate with variable number of teeth on both the digits. Ventrally, sternal shield with 2-3 pairs of setae. Genital shield truncated posteriorly with a pair of setae. Ventrianal shield of diverse shape, 1-4 pairs of preanal setae, in addition to para and postanals, ventrolateral setae 1-4 pairs. A pair of spermatheca present opening between coxae III and IV. Legs provided with pretarsi and ambulacra. Males with spermatophoral process on movable digit of chelicera.

These mites are small whitish or creamish white, active and efficient predators of phytophagous mites. These are found on the under-surface of leaves, but may also occur on twigs, under barks, in axils of buds, within galls (made by other mites or insects), in soil litter, etc.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

Gnathosoma : It bears chelicerae and pedipalpi, mouth is surrounded within these appendages. Dorsally a part of gnathosoma is covered with tectum.

Chelicera : It is paired, each consists of two digits (Fig. 443) of those one is fixed and the other one is movable. Male chelicera with a process on the movable digit (Fig. 444) which is called spermatophoral process.

Pedipalpi : It is paired ; coxae of palpi fused to form *basis capituli*. Pedipalp consists of 6 segments, coxa, trochanter, femur, genu, tibia and tarsus ; tarsus apotele long.

Idiosoma (Fig. 445) : It is covered with dorsal shield which may be entire or divided. There are always 19 or less pairs of setae except in Gnoriminae, arranged in several rows as vertical (1 pair), clunal (1 pair), dorsocentral (3-6) pairs, dorsolateral (8-10) pairs, median (2-3) pairs and sublateral (1-3 pairs). The nature of setae, number of setae, relative length and position of setae, serve as important taxonomic characters in separation of genera and species.

Venter (Fig. 446) : There are 3 major plates, viz. sternal, genital and ventrianal. In addition, metasternal and metapodal plates are also often present. Sternal shield variously shaped with 2-3 pairs of setae, 4th pair of setae lie on metasternal plates. Genital shield truncated posteriorly with a pair of genital setae. Ventrianal shield variously shaped with 1-4 pairs of preanal setae, besides a pair of anal and a postanal seta also present. Often small platelets present between genital and ventrianal shields as well as around ventrianal shield on interscutal membrane. Ventrocaudal setae 3-4 pairs. A pair of metapodal plates present laterally between genital and ventrianal shields. The shape of ventrianal plate and number of setae on it serve as important taxonomic characters. A pair of spermatheca (Fig. 447) present each of which opens between coxae III and IV. Its structure is important for separation of species. Peritreme extends anteriorly from lateral

stigmata which is enclosed in stigmal shield and is followed by peritrematal shield. Length of peritreme is variable. In male, a sternitigenital shield (Fig. 448) with 4 pairs of setae and a ventrianal shield (Fig. 449) with 3 pairs of preanal setae present.

Legs : Adults have 4 pairs of legs ; often genu, tibia and basitarsus of leg IV and in some cases genu II, III and tibia III possess macrosetae whose number, relative length and shape vary extremely in different species.

Key to the Subfamilies of PHYTOSEIIDAE

1. Dorsal shield with four pairs of prolateral setae	...	...	<i>Amblyseiinae</i>
— Dorsal shield with five to six pairs of prolateral setae.	...	...	<i>Phytoseiinae</i>

Subfamily AMBLYSEIINAE Muma

Amblyseiinae Muma, 1961, *Bull. Fla. Sta. Mus.*, 5 (7) : 273.

Key to the Genera of Amblyseiinae

1. Ventrianal shield absent or indistinctly demarcated ; only preanal setae distinctly present.	...	...	<i>Indoseiulus</i>
— Ventrianal shield distinctly present.	...	...	2
2. Sublateral seta II (R_1) absent.	...	...	<i>Platyseiella</i>
— Sublateral seta II (R_1) present.	...	...	3
3. Lateral integument sclerotized so that r_s and R_1 though present on usual lateral position appear to be on lateroventral extension of dorsal shield.	...	...	<i>Iphiseius</i>
— Lateral integument not sclerotized as above.	...	...	4
4. Metapodal plates large, single paired, triangular, genital shield very broad and punctate, ventrianal shield massive, genu III with 6 setae.	...	...	<i>Paraamblyseius</i>
— Metapodal plates 2 paired, slender, elongate and ventrianal shield usually narrow, genu III with 7 setae.	...	...	<i>Amblyseius</i>

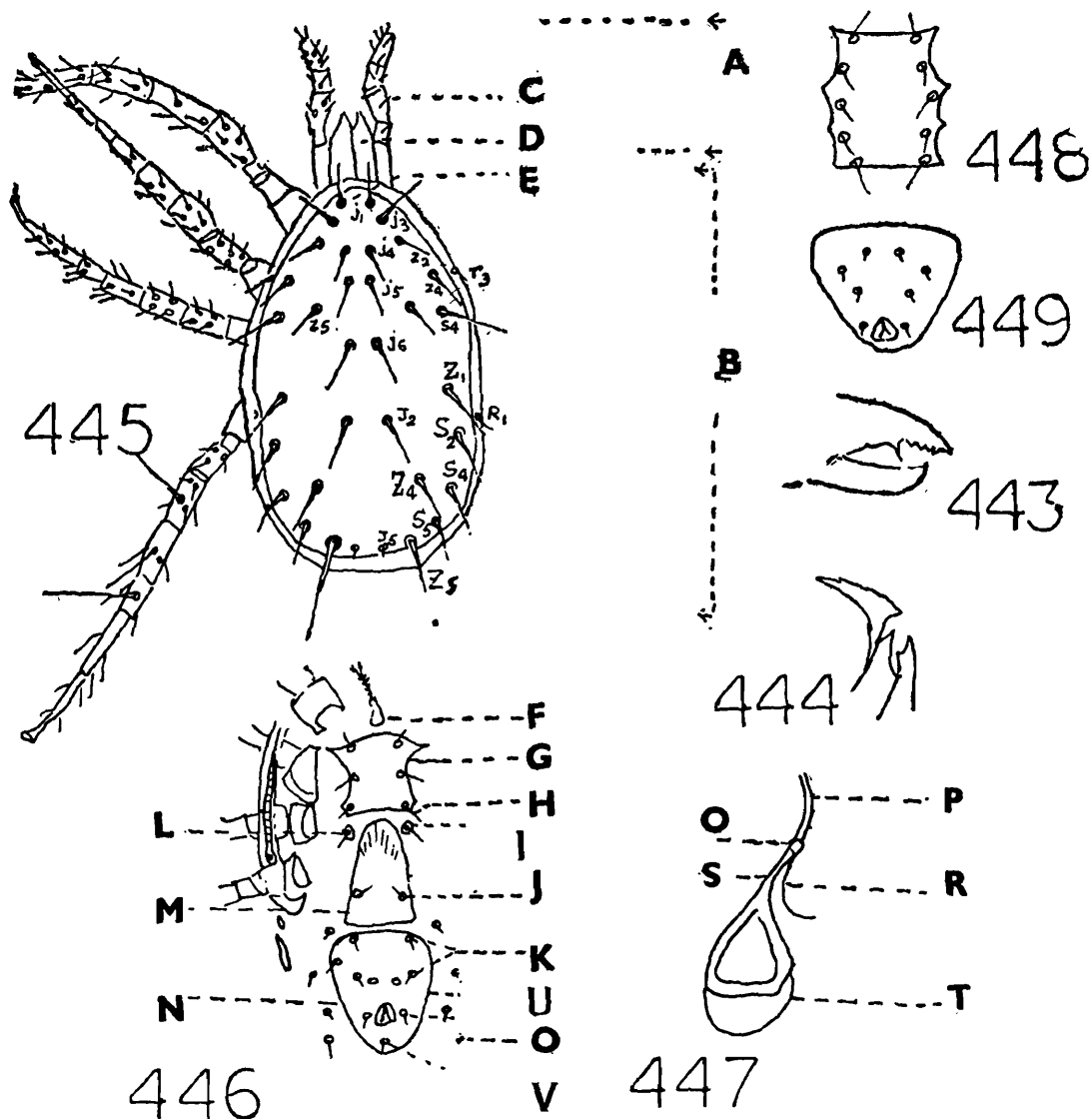
Genus *Amblyseius* Berlese

(Figs. 450-488)

Amblyseius Berlese, 1914, *Redia*, 10 : 143.

Key to the Subgenera of *Amblyseius*

1. Dorsal shield with 5 pairs of postlateral setae.	...	...	4
— Dorsal shield with less than 5 pairs of postlateral setae.	...	...	2
2. Seta Z_1 present.	...	...	3
— Seta Z_1 absent.	...	...	<i>Proprioseius</i>
3. Seta S_2 present	...	...	<i>Asperoseius</i>
— Seta S_2 absent	...	...	<i>Paraphytoseius</i>



Figs. 443-449 : Phytoseiidae showing parts of taxonomic importance.

443—Chelicera (Female), 444—Chelicera (Male), 445—Dorsal surface showing position and nomenclature of setae : A—Gnathosoma, B—Idiosoma, C—Pedi-palp, D—Chelicera, E—Dorsal shield, 446—Ventral surface showing different plates : F—Tritosternum, G—Sternal shield, H—Sternal seta, I—Metasternal seta, J—Genital seta, K—Preanal setae, L—Metasternal plate, M—Genital shield, N—Ventrianal shield, O—JV5, U—Praanal seta, V—Postanal seta, 447—Spermatheca : P—Major duct, Q—Atrium, R—Minor duct, S—Cervix, T—Vesicle, 448—Sternitigenital shield (Male), 449—Ventrianal shield (Male).

4. Ventrianal shield massive covering major portion of postventral surface.	...	...	5
— Ventrianal shield not like above	...	..	6
5. Seta J_6 present	...	...	<i>Propriozeiopsis</i>
— Seta J_6 absent	...	...	<i>Phytoscutella</i>
6. Seta Z_6 and S_4 and or Z_4 long and whip like, longer than distance between their bases ; leg IV with macrosetae on genu and erect seta on tarsus I.	...	...	<i>Amblyseius</i>
— Seta Z_6 shorter, at most as long as distance between their bases ; leg I with no macroseta or only one on genu, no erect seta on tarsus I.	...	...	7
7. Sternal shield distinct and straight or concave posteriorly, ventrianal shield approximately shield shaped or pentagonal.	...	...	8
— Sternal shield indistinct, may be trilobate posteriorly, ventrianal shield elongate vase shaped or concave laterally.	...	...	9
8. Z_6 and Z_4 distinctly serrate, sternal shield as wide as or wider than long, macrosetae may be present on genu I and present on genu II and III.	...	...	<i>Typhlodromips</i>
— Z_6 and Z_4 indistinctly serrate, sternal shield longer than wide ; genu I, II and III without macrosetae.	...	...	<i>Neoseiulus</i>
9. Peritreme extends anteriorly upto j_1 , anterior pair of preanal setae adjacent to anterior margin of ventrianal shield.	...	...	<i>Typhlodromalus</i>
— Peritreme not extends anteriorly upto j_1 , anterior pair of preanal setae removed from anterior margin of ventrianal shield.	...	...	<i>Euseius</i>

Subgenus *Amblyseius* Berlese

(Figs. 450-453)

Amblyseius Berlese, 1914, *Redia*, 10 : 143.*Key to the Species of subgenus Amblyseius*

1. Ventrianal shield vase shaped with lateral margins concave.	...	...	2
— Ventrianal shield triangular, pentagonal or squarish.	...	...	4
2. Spermatheca with cervix straight or of uniform length.	...	...	3
— Spermatheca fundibuliform.	...	...	<i>deleoni</i>

3. Seta s_4 and Z_4 of similar length.	...	...	<i>largoensis</i>
— Seta s_4 shorter than Z_4 .	...	...	<i>adhatodae</i>
4. Seta Z_5 very long, more than 1/2 length of dorsal shield.	...	...	7
— Seta Z_5 not so long	...	...	5
5. Cervix of spermatheca elongated and slender.	...	...	<i>mcmurtryi</i>
— Cervix of spermatheca funnel like or otherwise shaped,	...	...	6
6. Seta s_4 shorter than Z_4	...	...	<i>neorykei</i>
— Seta s_4 equal to Z_4	...	...	<i>shoreae</i>
7. Seta s_4 only slightly shorter than Z_4 .	...	...	8
— Seta s_4 noticeably shorter than Z_4	...	...	9
8. Spermatheca with cervix long, broad, dorsal shield faintly reticulate.	...	...	<i>channabasavanni</i>
— Spermatheca with cervix narrow, tubular, dorsal shield smooth,	...	...	<i>kulini</i>
9. Cervix of spermatheca looped.	...	...	<i>paraaerialis</i>
— Cervix of spermatheca straight.	...	...	10
10. Sternal shield broader than long, or as broad as long.	...	...	11
— Sternal shield longer than broad.	...	...	<i>ipomoeae</i>
11. Seta z_2 longer than z_4 .	...	...	<i>aerialis</i>
— Seta z_2 equal to z_4 .	...	...	12
12. Cervix long, tubular	...	...	<i>orientalis</i>
— Cervix short, wider internally	...	...	<i>rhabdus</i>

433. *Amblyseius* (*Amblyseius*) *adhatodae* Muma

Amblyseius adhatodae Muma, 1967, *Fla. Ent.*, 50 (4) : 268-270.

Diagnosis : Dorsal shield smooth with 17 pairs of setae, j_1 , j_3 , s_4 , Z_5 and Z_4 being long, other setae minute ; Z_4 longer than s_4 and 1/2 as long as Z_5 ; cervix of spermatheca long and elongated ; fixed digit of chelicera multidentate ; movable digit with 1 tooth.

Habitat : *Ipomoea* sp., *Adhatoda vasica*.

Distribution : INDIA : Maharashtra.

Remarks : No economic importance of this species is known.

434. *Amblyseius* (*Amblyseius*) *aerialis* (Muma)

Amblyseiopsis aerialis Muma, 1955, *Ann. Ent. Soc. Amer.*, 48 : 264, 266.

Typhlodromus (*Amblyseius*) *aerialis*, Rao & Rao, 1964, *Com. Inst. Biol. Contr. Tech. Bull.*, 4 : 38.

Diagnosis : Dorsal shield with 17 pairs of setae ; j_3 , s_4 , Z_5 , Z_4

being long and measuring respectively, 55, 120, 288, 144. Ventrianal shield rectangular, 115 long, 75 wide, with 3 pairs of preanal setae and a pair of elliptical preanal pores. Spermathecal cervix tubular ; macrosetae on leg IV : genu-132, tibia-100, basitarsus-76.

Habitat : *Citrus* sp. ; ornamental plant.

Distribution ; India : Karnataka, Bihar ; outside India : Mexico, U. S. A., Bermuda, Galapagos Isl., Jamaica, Puerto Rico, Brazil.

Remarks : Rao & Rao (1964) reported this mite to be an important predator of tetranychid species (*Panonychus citri*).

435. *Amblyseius* (*Amblyseius*) *channabasavanni* Gupta & Daniel

Amblyseius channabasavanni Gupta & Daniel, 1978, *Oriental Ins.*, 12 (3) : 328-329.

Diagnosis : Dorsal shield smooth with 17 pairs of setae, Z_6 longer (212) ; measurements of other setae : s_4 -72, Z_4 -72, j_3 -40, j_1 -28 ; other setae minute. Sternal shield weakly sclerotized with 3 pairs of sternal setae ; metasternal plates present. Ventrianal shield pentagonal, much longer (108) than broad (80), with 3 pairs of preanal setae ; 2 pairs of metapodal plates present. Fixed digit of chelicera multidentate ; 4 teeth on movable digit. Spermatheca with tubular cervix. Leg IV with macrosetae on genu-80, tibia-60, basitarsus-52.

Habitat : *Chrysanthemum* sp., *Dahlia* sp.

Distribution ; India : Kerala, Tamil Nadu.

Remarks : Its biology has been studied in the laboratory by Daniel (1979). According to her, the incubation period is 32.3 hrs in females and 30.2 hrs. in males. The duration of larval, protonymphal and deutonymphal periods in males are : 17.2 hrs., 22.2 hrs. and 23.8 hrs., respectively, while those in case of females are 20.4 hrs., 21.9 hrs, 23.4 hrs., respectively. The total developmental period feeding on eggs of *Raoiella indica* is 85-107 hrs. in case of males and 84-113 hrs. in case of females consuming 15-38 eggs by a female and 14-19 eggs by a male. The females lay in average 23.7 eggs in the life time during average oviposition period of 15.7 days. All the stages are attacked by all the feeding stages of the predator. Alternative food included *Tetranychus fijiensis*, eggs and crawlers of scale insects and mealy bugs. The population of predator was maximum during May-June coinciding with the peak population of the prey.

436. *Amblyseius (Amblyseius) deleoni* Muma & Denmark

Amblyseius (Amblyseiulus) largoensis Muma, Muma, 1961, *Bull. Fla. Sta. Mus.*, 5 (7) : 287, not *largoensis*.

Amblyseius deleoni Muma & Denmark, 1970, *Arthropods of Florida*, 6 : 68-69.

Amblyseius deleoni, Muraleedharan & Chadrasedharan, 1981, *Pestology*, 5 (6) : 11-15.

Diagnosis : Dorsal shield smooth with 17 pairs of setae, j_1 -35, j_4 - j_6 -4-5 each, J_2 - J_5 -4-5 each, j_3 -33, z_2 -9, z_4 -11, s_4 -107, Z_1 -9, S_2 -13, S_4 -9, S_5 -13, Z_5 -205, z_5 -6, Z_4 -125, r_3 -11, R_1 -7. Ventrianal shield 116 long, 67 wide, with 3 pairs of preanal setae. Fixed digit of chelicera with 5 strong teeth and a *pilus dentilis* ; movable digit with 3 minute teeth. Macrosetae on leg IV : genu-129, tibia-90, basitarsus-76.

Habitat : *Aegle marmelos*, tea ; outside India : *Amaranthus tricolor*, *Citrus* sp. *Podocarpus* sp., *Quercus* sp., *Rubus* sp., *Sabal palmetto*, *Trillandria usneoides*.

Distribution : INDIA : Uttar Pradesh, Tripura, Tamil Nadu ; outside India : U. S. A., Portugal, South America, Mexico, Philippines, British West Indies, Taiwan, Thailand, Madagascar, Brazil, Japan.

Remarks : This mite has been recorded to feed upon tea mites, *Acaphylla theae* and *Calacarus carinatus* (Muraleedharan & Chandrasekharan, 1981).

437. *Amblyseius (Amblyseius) ipomoeae* Ghai & Menon

Amblyseius ipomoeae Ghai & Menon, 1967, *Oriental Ins.*, 1 : 71-72.

Diagnosis : Dorsal shield sclerotized with 17 pairs of setae ; j_1 , j_3 , s_4 , Z_5 and Z_4 long, other setae minute. Sternal shield longer than broad ; ventrianal shield pentagonal, longer than broad, lateral margins parallel, with 3 pairs of preanal setae and a pair of elliptical preanal pores ; metapodal plates 2 paired ; leg IV with 3 long macrosetae on genu, tibia and basitarsus, all being long.

Habitat : *Ipomoea* sp.

Distribution : INDIA : Maharashtra.

Remarks : It has no known economic importance. This species appears to be same as *A. (A.) adhatodae* Muma.

438. *Amblyseius (Amblyselus) kulini* Gupta

Amblyseius kulini Gupta, 1978, *Indian J. Acar.*, 2 (2) : 63-65.

Diagnosis : Dorsal shield 300 long, 220 wide, with 17 pairs of

setae ; excepting setae j_1 , j_3 , s_4 , Z_5 , and Z_4 , which measure respectively, 28, 44, 80, 200 and 84, other setae being 6-8 long. Sternal, metasternal and genital shields normal. Ventrianal shield longer than broad, pentagonal, with 3 pairs of preanal setae. Cervix of spermatheca tubular. Macrosetae on leg IV : genu-80, tibia-64 and basitarsus-62.

Habitat : *Bambusa* sp.

Distribution : INDIA : Assam.

Remarks : No economic importance of this species is known.

439. *Amblyseius* (*Amblyseius*) *largoensis* (Muma)

Amblyseiopsis largoensis Muma, 1955, *Ann. Ent. Soc. Amer.*, 48 : 266.

Amblyseius largoensis, Rao & Rao, 1964, *Comm. Inst. Biol. Contr. Tech. Bull.*, 4 : 38-39.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae, all being minute except j_1 , j_3 , s_4 , Z_5 and Z_4 which measure respectively, 34, 48, 93, 270 and 95. Sternal, metasternal and genital shields normal. Ventrianal shield widest at the anal region, with 3 pairs of preanal setae and a pair of preanal pores. Metapodal plates present. Macrosetae on leg IV : genu-115, tibia-90 and basitarsus-62.

Habitat : China rose, *Nerium indicum*, *Ficus* sp., *Calophyllum inophyllum*, Citrus, *Eucalyptus*, bamboo, *Tabernaemontana coronaria*, arecanut, mango, *Syzygium* sp., *Tectona* sp. fig, coconut, guava, pepper, cashewnut, banana, litchi, plum, *Manglietia insignis*, chilli, pomegranate, *Shorea* sp., *Bauhinia acuminata*, papaya, *Musa* sp., poppy, castor, banyan, *Dalbergia* sp., *Cassia fistula*, *Mussandra corymbosa*.

Distribution : INDIA : Himachal Pradesh, Orissa, Gujarat, West Bengal, Andaman Nicobar Isls., Karnataka, Manipur, Assam, Meghalaya, Nagaland, Tripura, Tamil Nadu, Pondicherry, Kerala, Bihar ; outside India : Angola, Brazil, Costa Rica, Guatemala, Hawaii, Hong Kong, Honduras, Israel, Japan, Mexico, New Zealand, Philippines, Puerto Rico, S. Africa, U. S. A.

Remarks : The importance of this species as an efficient predator was first observed in India when Rao & Rao (1964) found this mite feeding upon *Panonychus citri*. Subsequently, Gupta *et al.* (1971) and Gupta (1977) also reported it feeding upon *Tetranychus* sp., *Eutetranychus* sp., respectively, infesting different crops. It is believed that proper utilisation of this mite can bring efficient biological control of tetranychid mites.

440. *Amblyseius (Amblyseius) memurtryi* Muma

Amblyseius memurtryi Muma, 1967, *Fla. Ent.*, 50 (4) : 270.

Diagnosis : Dorsal shield 360 long, 208 wide, with 17 pairs of setae, all setae minute (6-8 long) except j_1 , j_3 , s_4 , Z_5 and Z_4 which measure respectively, 25, 36, 58, 140 and 60. Sternal, metasternal and genital shields normal. Ventrianal shield 108 long, 80 wide, with 3 pairs of preanal setae and a pair of preanal pores. Macrosetae on leg IV : genu-72, tibia-44 and basitarsus-56. Spermatheca with tubular cervix.

Habitat : *Citrus* sp., guava.

Distribution : INDIA : Assam, Meghalaya.

Remarks : So far no economic importance of this species has been reported

441. *Amblyseius (Amblyseius) neorykei* Gupta

Amblyseius neorykei Gupta, 1977, *Ent. Mon. Mag.*, 112 ; 56-57.

Diagnosis : Dorsal shield 235 long, 203 wide, with 17 pairs of setae and 6 pairs of pores. Measurements of setae : j_1 -27, j_3 -49, Z_5 -135, Z_4 -85. Sternal shield with 3 pairs of sternal setae and posterior lateral projections ; metasternal plates present. Ventrianal shield 100 long, 81 wide, with 3 pairs of preanal setae and a pair of preanal pores. Macrosetae on leg IV : genu-70, tibia-50, basitarsus-72.

Habitat : *Chrysanthemum* sp.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

442. *Amblyseius (Amblyseius) orientalis* Ehara

Amblyseius orientalis Ehara, 1959, *Acarologia*, 1 : 291.

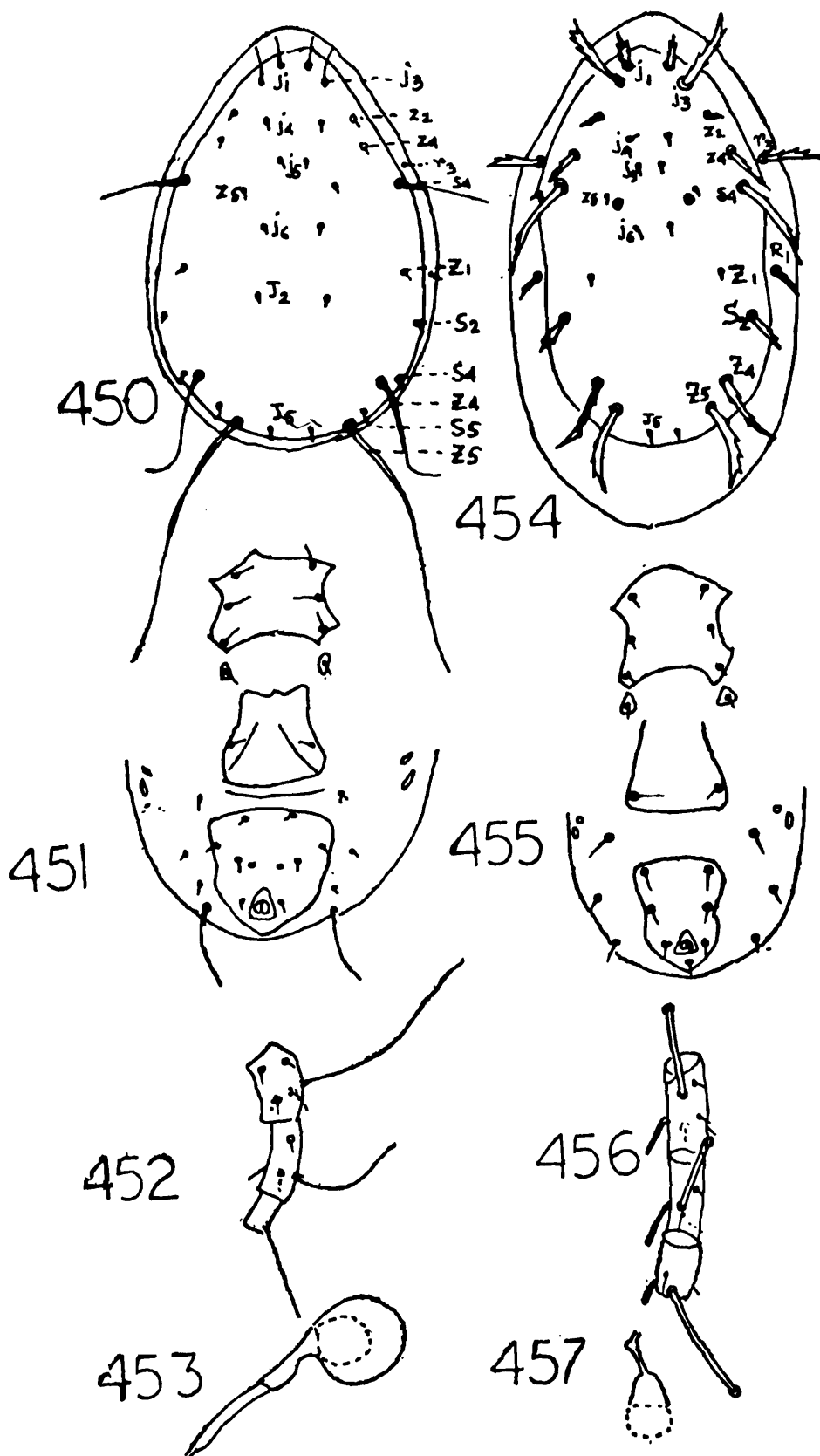
Amblyseius orientalis, Gupta, 1978, *Indian J. Acar.*, 2 : 69-71.

Diagnosis : Dorsal shield 340 long, 245 wide. Measurements of setae : j_1 -28, j_3 -56, s -95, Z_5 -280, Z -112 ; other setae tiny. Ventrianal shield 124 long, 80 wide. Spermatheca with tubular cervix. Macrosetae on leg IV : genu-112, tibia-64, basitarsus-72.

Habitat : Undet. plant.

Distribution : India : Assam ; outside India : Japan.

Remarks : No economic importance of this species is known.



Figs. 450-453 : *Amblyseius (Amblyseius)* sp. : 450—Dorsum, 451—Ventral surface, 452—Genu, tibia and basitarsus of leg IV, 453—Spermatheca,
 Figs. 454-457 : *Amblyseius (Asperoseius)* sp. : 454—Dorsum, 455—Ventral surface, 456—Genu, tibia and basitarsus of leg IV, 457—Spermatheca.

443. *Amblyseius (Amblyseius) paraaerialis* Muma

Amblyseius paraaerialis Muma, 1967, *Fla. Ent.*, 50 : 270.

Diagnosis : Dorsal shield 320 long, 210 wide, with 17 pairs of setae. Measurements of setae : j_1 -32, j_4 - j_6 , J_2 - J_5 4-5 each, j_3 -28, s_4 -68, Z_1 -9, S_2 -12, S_4 -16, S_5 -8, Z_5 -192, z_5 -6, Z_4 -84. Sternal, metasternal and genital shields normal. Ventrianal shield 104 long, 84 wide, with 3 pairs of preanal setae. Macrosetae on leg IV : genu : 84, tibia-68, basitarsus-80.

Habitat : Citrus.

Distribution : INDIA : Assam, Kerala, Meghalaya ; outside India : Thailand.

Remarks : No economic importance of this species is known.

444. *Amblyseius (Amblyseius) rhabdus* Denmark

Amblyseius rhabdus Denmark, 1965, *Fla. Ent.*, 48 (2) : 95.

Abbyseius rhabdus, Muraleedharan & Chandrasekharan, 1981, *Pestology*, 5 : 13.

Diagnosis : Dorsal shield 403 long, 253 wide, with 17 pairs of setae. Setae j_1 , j_3 , s_4 , Z_5 , Z_4 long measuring respectively, 27, 47, 103, 319, 156, other setae small (5-6 long). Sternal, metasternal and genital shields normal. Ventrianal shield pentagonal, reticulate, with 3 pairs of preanal setae and a pair of preanal pores. Fixed digit of chelicera multidentate, movable digit with 2 teeth.

Habitat : Tea.

Distribution : INDIA : Tamil Nadu.

Remarks : This mite has been reported to be a predator of tea mites, *Acaphylla theae* and *Calacarus carinatus* (Muraleedharan & Chandrasekharan, 1981). This species was tentatively identified as *rhabdus* but that identification appears to be incorrect and it may turn out to be a new species.

445. *Amblyseius (Amblyseius) shoreae* Gupta

Amblyseius shoreae Gupta, 1977, *Ent. Mon. Mag.*, 112 : 57.

Diagnosis : Dorsal shield 335 long, 205 wide, with 17 pairs of setae, j_1 -27, j_3 -50, s_4 -60, Z_5 -98, Z_4 -60, other setae minute. Sternal shield nearly as broad as long, with posterior lateral projection. Ventrianal shield 100 long, 84 wide, with 3 pairs of preanal setae ;

metapodal plates 2 paired. Macrosetae on leg IV : genu-54, tibia-44, basitarsus-37.

Habitat : *Shorea robusta*.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

Subgenus *Asperoseius* Chant

(Figs. 454-457)

Asperoseius Chant, 1957, *Can. Ent.*, 89 : 360.

446. *Amblyseius* (*Asperoseius*) *nucifera* (Gupta)

Paraphytoseius (*Tropicoseius*) *nucifera* Gupta, 1979, *Bull. Zool. Surv. India*, 2 (1) : 80-81.

Diagnosis : Body elongated oval. Dorsal shield 305 long, 165 wide, notched at the level of s_4^* . Measurements of setae : j_1 -28, j_4 - j_8 -4 each, j_3 -68, z_2 -16, z_4 -32, s_4 -80, Z_1 -4, S_2 -40, Z_5 -76, Z_4 -68, z_5 -5, r_3 -56, R_1 -28. Sternal shield with 3 pairs of setae ; ventrianal shield 80 long, 60 wide, with 3 pairs of preanal setae ; 3 pairs of setae around ventrianal shield. Fixed digit of chelicera multidentate. Macrosetae on leg IV : genu-44, tibia-38, basitarsus-64.

Habitat : *Cocos nucifera*.

Distribution : INDIA : Kerala.

Subgenus *Euseius* Wainstein

(Figs. 458-461)

Amblyseius (*Amblyseius*) *sec. Euseius* Wainstein, 1962, *Acarologia*, 4 : 15.

Key to the Species of Euseius

1. All the setae on dorsal shield minute except Z_5 and j_1	...	...	2
— Besides j_1 and Z_5 , some other setae also long	...	...	4
2. S_5 longer than S_4	...	...	3
— S_5 and S_4 of same length	...	...	ovalis
3. Spermatheca long and tubular	...	...	rhododendronis
— Spermatheca fundibuliform	...	...	sacchari
4. Dorsal shield smooth	...	...	5
— Dorsal shield reticulate	...	...	7

5. j_1 longer than j_3	...	...	<i>neococcineae</i>
— j_1 shorter than j_3	...	...	6
6. S_2 longer than Z_1	...	...	<i>alstoniae</i>
— S_2 and Z_1 almost of same length	...	...	<i>delhiensis</i>
7. Z_6 serrate	...	...	<i>pruni</i>
— Z_6 smooth	...	...	8
8. z_2 and z_5 almost of same length	...	...	9
— z_2 noticeably longer than z_4	...	...	12
9. Spermatheca saccular	...	...	<i>finlandicus</i>
— Spermatheca not saccular	...	...	10
10. Macrosetae on leg IV acuminate	...	...	<i>eucalypti</i>
— Macrosetae on leg IV with broadened tip	...	...	11
11. s_4 and S_4 almost of same length	...	...	<i>coccococius</i>
— s_4 slightly longer than S_4	...	...	<i>bambusae</i>
12. Spermatheca elongated tubular	...	...	<i>kodaikanalensis</i>
— Spermatheca saccular	...	...	<i>coccineae</i>

447. *Amblyseius (Euseius) alstoniae* Gupta

Amblyseius alstoniae Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 31-32.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae and 6 pairs of pores. Measurements of setae : j_1 -27, j_4 , j_5 , 13 each, j_6 -J₂-22 each, J₅-6, j_3 -31, z_2 -27, z_4 -36, s -50, Z_1 -19, S_2 -27, S_4 -18, S_5 -27, Z_5 -65, (serrate), z_5 -12, Z_4 -28. Ventrianal shield longer than wide, constricted at preanal region, with 3 pairs of preanal setae ; macrosetae on leg IV : genu-48, tibia-37, basitarsus-70. Spermatheca with elongated cervix and rounded vesicle.

Habitat : *Alstonia scholaris*, *Shorea robusta*, brinjal, Sapota, chilli, cotton, date palm, *Acacia* sp., oleander, cucurbits, pomegranate, *Tabernaemontana coronaria*, palm, pear, maize, sugarcane, *Dalbergia sissoo*, *Zinia* sp., Malvaceae.

Distribution : INDIA : Bihar, West Bengal, Orissa, Meghalaya, Assam, Tripura, Tamil Nadu, Rajasthan, Punjab, Delhi.

Remarks : The importance of this species in biological control was stressed by Gupta (1977) when he observed this mite feeding upon eggs and protonymphs of *Eutetranychus orientalis*. Recently, this has been seen to feed on all the stages of *E. orientalis* but it had preference for larvae and protonymphs. A single adult takes in an average 110.00, 124.37, 205.00, 221.80 and 460.20 seconds to consume an egg, a larva, a protonymph, a deutonymph and one adult, respectively (Dhooria, 1980).

448. *Amblyseius (Euseius) bambusae* Ghai & Menon

Amblyseius bambusae Ghai & Menon, 1967, *Oriental Ins.*, 1 : 66-67.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae, measurements of setae : j_1 -32, j_4 - j_5 -4-6 each, j_8 , J_2 -11 each J_5 -4 j_3 -24, z_2 -20, z_4 -20, s_4 -28, Z_1 -12, S_2 -16, S_4 -20, S_5 -17, Z_5 -50, Z -12,. Sternal, metasternal and genital shields normal. Ventrianal shield vase-shaped, with 3 pairs of preanal setae and a pair of pores. Fixed digit of chelicera with 4 teeth, movable digit with 1 tooth. Spermatheca with elongated cervix. Macrosetae on leg IV : genu-52, tibia-45, basitarsus-62, all with pointed tip.

Habitat : Bomboo, pear, *Butea monosprma*, *Dalbergia* sp., *Ficus religiosa*, coffee, pine.

Distribution : INDIA : Karnataka, Tamil Nadu, Kerala, Andhra Pradesh.

Remarks : Nothing about its economic importance is known.

449. *Amblyseius (Euseius) coccineae* Gupta

Amblyseius coccineae Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 33.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae. Measurements of setae ; j_1 -25, j - j_8 , z_5 , 10-12 each, J_5 -6, j_1 -27, z_2 , z -19-20 each, s_4 -32, Z_1 -11, S_2 - S_5 -21 each, Z_5 -58, Z_4 -13. Ventrlanal shield vase-shaped with 3 pairs of preanal setae. Chelicera with 2 teeth on fixed digit and none on movable digit. Macrosetae on leg IV : genu-47, tibia-37, basitarsus-55 ; all with capitate tip.

Habitat : *Coccinia indica*, citrus, cashew nut, bamboo, *Terminalia arjuna*, *Eugenia*, arum, marigold, *Tabernaemontana coronaria*.

Distribution : INDIA : West Bengal, Meghalaya, Orissa, Pondicherry, Tamil Nadu, Andhra Pradesh.

Remarks : Gupta (1977) reported that this mite attacked the eggs of *Oligonychus mangiferus* and sucked the egg contents.

450. *Amblyseius (Euseius) cocosocius* Ghai & Menon

Amblyseius cocosocius Ghai & Menon, 1967, *Oriental Ius.*, 1 : 67-68.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae. Measurements of setae : j_1 -28, j_4 - j_5 , j_8 , J_2 -10-12 each, j_3 -21, z_2 - z_4 -15 each, s_4 -26, Z_1 -9, S_2 -16, S_4 -25, S_5 -29, Z_5 -57, z_5 -8, Z_4 -14. Sternal

shield as long as broad. Ventrianal shield vase-shaped, slightly broader at preanal region with 3 pairs of preanal setae and a pair of crescent shaped preanal pores. Leg I with macrosetae on genu-36, tibia-32, basitarsus-45.

Habitat : *Alstonia scholaris*, *Clerodendron macrosiphon*, guava, papaya, mango.

Distribution : INDIA : Karnataka, Punjab, West Bengal, Pondicherry, Tamil Nadu, Kerala, Andhra Pradesh.

Remarks : This mite was collected in association with scale insects Ghai & Menon (1967). Gupta (1977) found this mite in association with *Brevipalpus phoenicis*.

451. *Amblyseius* (*Euseius*) *delhiensis* (Narayanan & Kaur)

Typhlodromus (*Amblyseius*) *delhiensis* Narayanan & Kaur, 1960, *Proc. Indian Acad. Sci.*, 51B : 5-7.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae. Setae $Z_5 = s_4$; j_6 , J_2 , Z_1 , S_4 , S_5 , Z_4 almost of equal length, Z_5 slightly serrate, z_4 greater than z_2 , $Z_1 = S_2$. Ventrianal shield vase shaped, $1\frac{1}{2}$ times as long as broad, with 3 pairs of preanal setae. Leg IV with macrosetae on genu, tibia and basitarsus; that on tibia being smallest.

Habitat : Citrus, lady's finger, cotton, maize, *Syzygium javanicum*, grape vines, guava, *Hibiscus rosa-sinensis*.

Distribution : INDIA : Punjab, Delhi, West Bengal, Orissa.

Remarks : A number of reports are available in favour of its predatory nature, of those, mention may be made of Gupta *et al.* (1971), Gupta (1976) reporting its feeding on all stages of *E. orientalis*; Gupta *et al.* (1971) on *O. indicus*; Gupta & Dhooria (1972) on *Brevipalpus phoenicis*; Gupta, Dhooria & Sidhu (1976) on *T. cinnabarinus* and Sandhu *et al.* (1973) on phytophagous mites infesting maize. Besides mites, it is also known to feed on eggs of cotton jassid (Somchoudhury, 1979). According to them, the population of this mite increases from September onwards and attains peak in November. Extreme temperature affects the mite population.

452. *Amblyseius* (*Euseius*) *eucalypti* Ghai & Menon

Amblyseius eucalypti Ghai & Menon, *Oriental Ins.*, 1 : 69-70.

Diagnosis : Dorsal shield faintly reticulate, with 17 pairs of setae; s_4 greater than $j_1 = j_2 = z_2 = z_4$; j_4 , j_5 , J_5 , z_5 , Z_4 short; J_2 , j_6 , Z_5

long. Ventrianal shield longer than broad, with 3 pairs of preanal setae ; metapodal plate single paired. Leg IV with 3 acuminate macrosetae one each on genu, tibia and basitarsus.

Habitat : *Eucalyptus* sp.

Distribution : INDIA : Karnataka.

Remarks : It is of no known economic importance.

453. *Amblyseius (Euseius) finlandicus* (Oudemans)

Seiulus finlandicus Oudemans, 1915, *Acarol. Aant. 56 Ent. Ber.*, 4 : 183.

Amblyseius finlandicus, Ghai & Menon, 1967, *Oriental Ins.*, 1 : 70.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae. Measurements of setae j_1 -28, j_4 , j_5 10 each, j_6 - J_2 -12 each, J_5 -6, j_1 -24, z_2 , z_4 16 each, s_4 -28, Z_4 -12, S_2 - S_4 -20 each, S_5 -24, Z_5 -56, z_5 -10, Z_4 -16. Ventrianal shield vase shaped with 3 pairs of preanal setae. Leg IV : macrosetae on genu-40, tibia-24, basitarsus-48. Fixed digit of chelicera with 2 teeth, movable digit toothless.

Habitat : Guava, maize, pear, sugarcane, hedge plant.

Distribution : INDIA : Karnataka, Punjab, West Bengal, Orissa, outside India : Algeria, Canada, Europe, Georgia, Indonesia, Japan, Mexico, South America, U.S.A.

Remarks : The reports which are available regarding predatory habit of this mite are Gupta *et al.* (1971) on *E. orientalis*, Gupta *et al.* (1976) on *T. cinnabarinus* infesting castor and Sandhu *et al.* (1973) feeding upon phytophagous mites infesting maize.

454. *Amblyseius (Euseius) kodaikanalensis* (Gupta)

Euseius kodaikanalensis Gupta, 1978, *Oriental Ins.*, 12 : 331-333.

Diagnosis : Dorsal shield 350 long, 220 wide, with 17 pairs of setae all being smooth and pointed. Measurements of setae : j_1 -32, j_4 - j_6 , J_2 -13 each, J_5 -5, j_3 -24, z_2 -16, z_4 -20, s_4 -23, Z_1 -12, S_2 -16, S_4 -20, S_5 -17, Z_5 -48. Sternal and metasternal shields normal. Ventrianal shield vase shaped with 3 pairs of preanal setae and a pair of elliptical preanal pores. Metapodal plates 2 paired. Spermatheca with a filamentous cervix. Macrosetae on leg IV : genu-44, tibia-32, basitarsus-56.

Habitat : Pear.

Distribution : INDIA : Tamil Nadu.

Remarks : Nothing about its economic importance is known. This species appears to be same as *A.(E.) rhododendronis* Gupta.

455. *Amblyseius (Euseius) neococcineae* Gupta

Amblyseius neococcineae Gupta, 1978, *Indian J. Acar.*, 2 (2) : 69.

Diagnosis : Dorsal shield 265 long, 145 wide, with 17 pairs of setae. Measurements of setae : j_1 -26, j_4 - j_5 -8 each, j_6 , J_2 -12 each, J_5 -5, j_3 , z_2 -12 each, z_4 -16, s -24, Z_1 -12, S_2 -16, S -16, S_5 -18, Z_5 -45, z_5 -12, Z_4 -16. Sternal and genital shields normal, metasternal plates absent. Ventrianal shield with lateral margins convex at preanal region with 3 pairs of preanal setae and a pair of crescent shaped preanal pores. Leg IV with macrosetae on genu-20, tibia-24, basitarsus-32, all being smooth with flattened tip. Spermatheca with bell shaped cervix.

Habitat : *Datura metel*.

Distribution : INDIA : Tamil Nadu.

Remarks : Nothing about its economic importance is known.

456. *Amblyseius (Euseius) ovalis* (Evans)

Typhlodromus ovalis Evans, 1953, *Ann. Mag. Nat. Hist.*, 6 : 458-461.

Typhlodromus (Amblyseius) ovalis, Narayanan *et al.*, 1960, *Proc. Nat. Inst. Sci. India*, 26B : 388-389.

Diagnosis : Dorsal shield 345 long, 244 wide, with 17 pairs of setae, all the setae small except j_1 -31 and Z_5 -55, the length of others vary between 6-10. Ventrianal shield oval, 102 long, 81 wide, with 3 pairs of preanal setae and a pair of crescent shaped preanal pores ; metapodal plates 2 paired. Spermatheca bowl shaped. Macrosetae on leg IV : genu-40, tibia-36, basitarsus-52.

Habitat : Arecanut, banana, *Ficus*, *Boungainvillea spectabilis*, *Terminalia arjuna*, mango, grass, beans, lucern, castor, *Nerium indicum*, coconut, *Bauhinia purpurea*, pomegranate, rose, coffee, paddy, *Vitex pubescens*, *Tabernaemontana coronaria*, cashew nut, chrysanthemum, sugarcane.

Distribution : INDIA : Karnataka, Maharashtra, West Bengal, Andaman Nicobar Isls., Manipur, Meghalaya, Tripura, Gujarat, Tamil Nadu, Pondicherry, Kerala, Andhra Pradesh, Bihar ; outside India : Hawaii, Hong Kong, Indonesia, Japan, Malaya, Mauritius, Mexico, New Zealand.

Remarks : In India, this mite was first collected in association with tetranychid mites (Narayanan *et al.*, 1960). Subsequently, the voracious feeding of *T. cinnabarinus* by this mite was reported by Gupta (1977) and Rao *et al* (1970).

457. *Amblyseius (Euseius) pruni* Gupta

Amblyseius pruni Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 40-42.

Diagnosis : Dorsal shield 315 long, 230 wide, with 17 pairs of setae and 4 pairs of pores ; shield reticulate. Measurements of setae : j_1 -31, j_4 , j_5 -8 each, j_6 , J_2 -13-14 each- J_5 -5, j_3 -27, z_2 , z_4 19 each, s_4 -33, Z_1 -13, S_2 -18, S_4 -18, S_5 -22, Z_5 -58 (weakly serrate), z_5 -12, Z_4 -13. Sternal, metasternal and genital shields normal. Ventrianal shield vase shaped, slightly longer than wide with 3 pairs of preanal setae and a pair of pores. Macrosetae on leg IV : genu-40, tibia-36, basitarsus-58.

Habitat : *Prunus persica*, *Bauhinia acuminata*.

Distribution : INDIA : West Bengal, Assam, Meghalaya, Tripura.

Remarks : No economic importance of this mite is known.

458. *Amblyseius (Euseius) rhododendronis* Gupta

Amblyseius rhododendronis Gupta, 1970, *Oriental Ins.*, 4 : 187-188.

Diagnosis : Dorsal shield 315 long, 220 wide, with 17 pairs of setae and 5 pairs of pores. Measurements of setae : j_1 -27, j - j_6 , J_2 -8-9 each, J_5 -4, j_3 -16, z_2 - z_4 -10-11 each s_4 -20, Z_1 -8, S_2 -11, S_4 -17, S_5 -9, Z_5 -54, z_5 -5, Z^4 -9. Sternal, metasternal and genital shields normal. Ventrianal shield elongated, 94 long, 72 wide, with 3 pairs of preanal setae and a pair of preanal pores. Spermatheca filamentous. Macrosetae on leg IV : genu-31, tibia-22, basitarsus-42, all with broadened tip.

Habitat : *Rhododendron* sp.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

459. *Amblyseius (Euseius) sacchari* Ghai & Menon

Amblyseius sacchari Ghai & Menon, 1967, *Oriental Ins.*, 1 : 75-76.

Diagnosis : Dosal shield 337 long, 211 wide, with 17 pairs of setae and a few pairs of pores. Measurements of setae : j_1 -27, j_4 - j_6 , J_2 - J_5 -6 each, j_3 -12, z_2 - z_4 , Z_1 , S_2 - S_5 -6-10 each, s_4 -17, Z_5 -42 (serrate),

z_5 -5, Z_4 -9. Ventrianal shield elongate, much longer (114) than broad (72), with 3 pairs of preanal setae and a pair of preanal pores, metapodal plates 2 paired. Spermatheca with funnel shaped cervix and a long duct. Macrosetae on leg IV : genu-36, tibia-40, basitarsus-60.

Habitat : Sugarcane.

Distribution : INDIA : Karnataka, Gujarat, Tamil Nadu, West Bengal.

Remarks : This species was collected in association with eriophyid mites (Ghai & Menon, 1967).

Subgenus *Neoseiulus* Hughes

(Figs, 462-465b)

Neoseiulus Hughes, 1948, The mites associated with stored food products. Min. Agr. Fish. Lond., p. 141.

Key to the Species of *Neoseiulus**

1. All the setae on dorsal shield very small except Z_5	...	...	<i>assamensis</i>
— Setae on dorsal shield of diverse length	...	...	2
2. Setae on dorsal shield of same length or uniformly long, none greatly longer than others	...	...	3
— Some setae on dorsal shield appreciably longer, others being small or very small	...	...	4
3. All setae very long except S_5 which is minute	...	...	<i>longispinosus</i>
— All setae of uniform length	...	...	<i>fallacis</i>
4. Dorsal shield narrow, much longer than wide	...	...	8
5. Only setae Z_5 and Z_4 long, other setae almost of same length	...	...	<i>indicus</i>
— Besides Z_5 and Z_4 there are also other long setae on dorsal shield	...	...	6
6. Setae j_1 , s_4 , Z_5 longer than other dorsal setae	...	...	<i>fraterculus</i>
— Only setae s_4 , Z_5 and Z_4 longer than other dorsal setae	...	...	7
7. Ventrianal shield pentagonal	...	...	<i>cynodonae</i>
— Ventrianal shield triangular	...	...	<i>rangatensis</i>

8. Sternal shield with postlateral angulation ...	...	<i>paspalivorus</i>
— Sternal shield without postlateral angulation ...	...	9
9. Spermatophoral process as in fig. 465 b ...	...	<i>dhooriai</i>
— Spermatophoral process as in fig. 465 a ...	...	<i>aceriae</i>

* *A. (N.) cucumeris* (Oud.) is a doubtful record from India.

460. *Amblyseius* (*Neoseiulus*) *aceriae* Gupta

Amblyseius aceriae Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 30.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae, all being small (8-10 long) except Z_5 which is 49 long, thick and serrate. Sternal shield much longer than wide; metasternal plate with seta present. Ventrianal shield quadrangular, much longer than broad, metasternal plate with seta present. Metapodal plates large. Spermatheca with bell shaped cervix. Macroseta present only on basitarsus IV (18 long).

Habitat : Mango, *Chrysanthemum* sp.

Distribution : INDIA : West Bengal, Gujarat.

Remarks : This mite was collected in association with mango bud mite but it is not known with certainty whether it fed on it. This mite was also associated with black aphid (*Macrosiphoniella sanborni*) (Gupta, 1977).

461. *Amblyseius* (*Neoseiulus*) *assamensis* (Chant)

Typhlodromus (*Amblyseius*) *assamensis* Chant, 1960, *Can. Ent.*, 92 : 60.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae, all being small except s_4 (12 long), Z_5 (40, thick). Ventrianal shield pentagonal. Fixed digit of chelicera multidentate, movable digit with no tooth. Macrosetae on leg IV : genu-12, tibia-20, basitarsus-32.

Habitat : Citrus.

Distribution : INDIA : Assam.

Remarks : No economic importance of this species is known.

462. *Amblysius* (*Neoseiulus*) *cynodonae* Gupta

Amblyseius cynodonae Gupta, 1977, *Oriental Ins.*, 11 (4) : 626-627.

Diagnosis : Dorsal shield smooth, Z_5 , Z_4 and s_4 being long, other

setae short, pointed. Measurements of setae : j_1 -17, j_4 - j_5 , J_5 -5 each, j_6 - J_2 -10 each, j_3 -12, z_2 , z_4 -9 each, s_4 -25, Z_1 -10, S_2 -16, S_4 -12, S_5 -10, Z_5 -60, z_5 -5, Z_4 -36, Ventrianal shield pentagonal, as long as wide. Macrosetae on leg IV : genu-40, tibia-18, basitarsus-55.

Habitat : *Cynodon dactylon*.

Distribution : INDIA : Andaman Isl.

Remarks : So far no economic importance of this mite is known.

463. *Amblyseius* (*Neoseiulus*) *dhooriai* Gupta

Amblyseius dhooriai Gupta, 1977, *Indian J. Acar.*, 1 : 30-31.

Diagnosis : Dorsal shield with 17 pairs of setae. Measurements of setae : j_1 -12, j_4 - j_6 , J_2 -12-14 each, j_3 -15, z_2 -12, z_4 -14, s_4 -16, Z_1 -12, S_2 -12, S_4 -29, S_5 -29, Z_5 -75, (serrate), z_5 -12, Z_4 -21. Ventrianal shield, triangular, slightly longer than wide with 3 pairs of preanal setae and a pair of pores. Macroseta on basitarsus IV : 48.

Habitat : Sugarcane.

Distribution : INDIA : Punjab.

Remarks : Nothing about its economic importance is known.

464. *Amblyseius* (*Neoseiulus*) *fallacis* (Garman)

Iphidulus fallacis Garman, 1948, *Bull. Conn. Agr. Exp. Sta.*, No. 520 : 13.

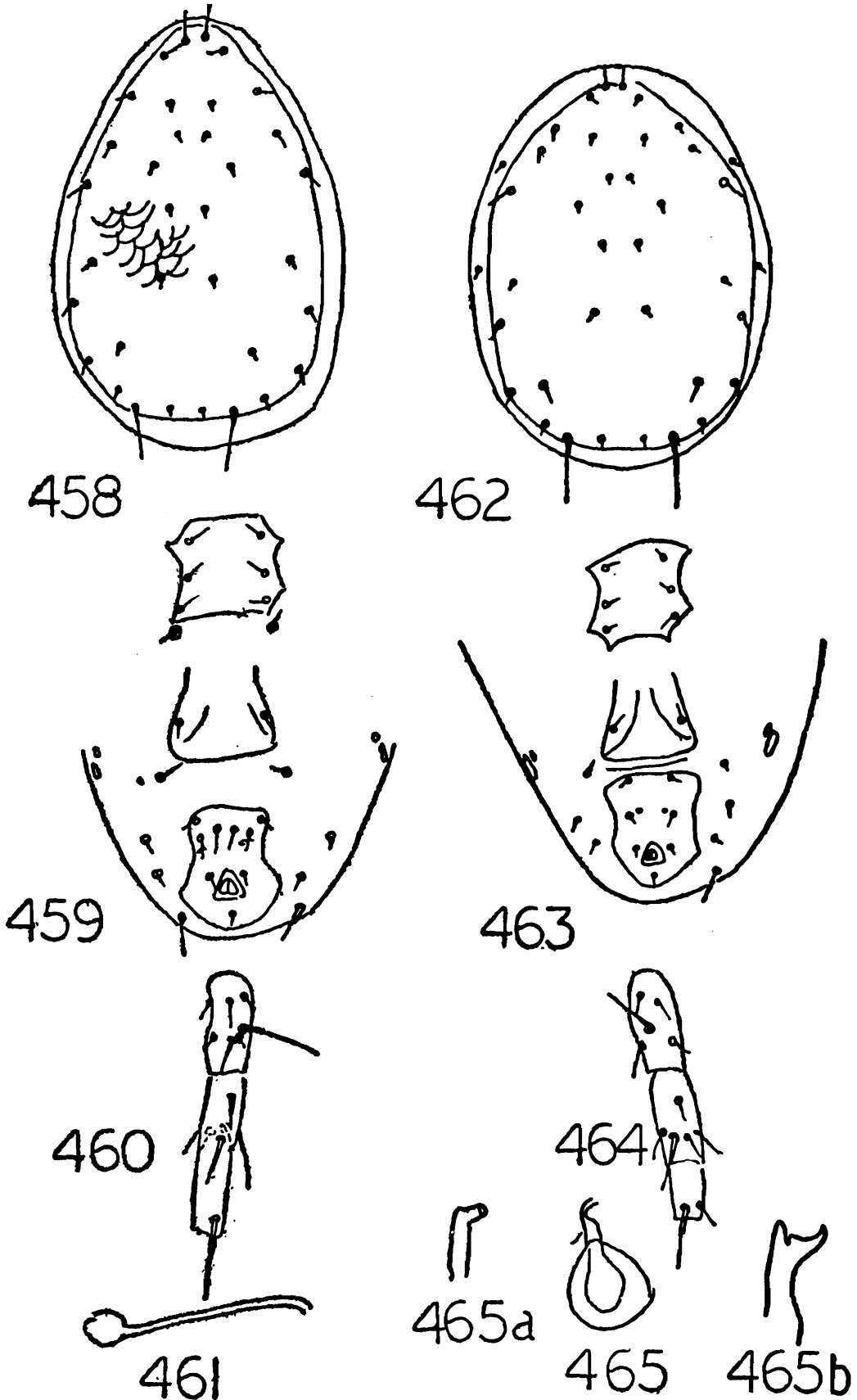
Typhlodromus (*Amblyseius*) *fallacis*, Narayanan *et al.*, 1960, *Proc. Nat. Ins. Sci. India*, 26B : 387-388.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae. Measurements of setae : j_1 -23, j_4 -20, j_5 -23, j_6 -37, J_2 -45, J_5 -11, j_3 -36, z_2 -31, z_4 -32, s_4 -40, Z_1 -40, S_2 -41, S_4 -48, S_5 -48, Z_5 -68, z_5 -28, Z_4 -59. Sternal and genital shields normal. Ventrianal shield triangular, as long as broad or slightly longer than broad, with 3 pairs of preanal setae, 2 pairs of metapodal plates present. Macrosetae on leg IV : genu- 17, tibia- 32. basitarsus- 50.

Habitat : Paddy, Sowank, arum, *Musa* sp., carrot, grass.

Distribution : INDIA : Haryana, Punjab, West Bengal, Andaman Isl., Assam, Meghalaya, Tripura, Tamil Nadu ; outside India : Algeria, Austria, U. S. A., Canada.

Remerks : Gupta *et al* (1971) observed the predatory habit of this mite as they recorded it feeding upon *Oligonychus* sp. at Ludhiana, in



Figs. 458-461 : *Amblyseius (Euseius)* sp. : 458—Dorsum, 459—Ventral surface, 460—Genu, tibia and basitarsus of leg IV, 461—Spermatheca.

Figs. 462-465 : *Amblyseius (Neoseiulus)* sp. : 462—Dorsum, 463—Ventral surface, 464—Genu, tibia and basitarsus of leg IV, 465—Spermatheca, 465a—Spermatheca of *aceriae*, 465b—Spermatheca of *dhoorial*.

Punjab. It was also found to prey upon paddy mite, *Schizotetranychus andropogoni* (Gupta, 1975a, 1977).

465. *Amblyseius* (*Neoseiulus*) *fraterculus* Berlese

Amblyseius fraterculus Berlese, 1917, *Redia*, 12 : 172.

Amblyseius fraterculus, Ghai & Menon, 1967, *Oriental Ins.*, 1 : 70.

Diagnosis : Dorsal shield with 17 pairs of setae, s_4 , Z_5 , Z_4 long, z_2 , z_4 , Z_1 and S_2 equal to one another, minute. Ventrianal shield triangular, lateral margins convex, with 3 pairs of preanal setae ; 1 pair of metapodal plates present. Leg IV with macrosetae on genu, tibia and basitarsus.

Habitat : Red gram.

Distribution : INDIA : Tamil Nadu ; outside India : Argentina.

Remarks : Economic importance of this species is unknown.

466. *Amblyseius* (*Neoseiulus*) *indicus* (Narayanan & Kaur)

Typhlodromus (*Amblyseius*) *indicus* Narayanan & Kaur, 1960, *Proc. Indian Acad. Sci.*, 51B. 2-5.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae. Measurements of setae : j_1 -12, j_4 - j_6 , J_2 - J_5 -9 each, j_3 -12, z_2 , z_4 -12-13 each, s_4 -16, Z_1 -10, S_2 - S_5 -18 each, Z_5 -56, z_5 -9, Z_4 -23. Sternal shield as long as broad. Ventrianal shield pentagonal, metapodal plates 2 paired. Spermatheca with long, narrow cervix. Leg IV with macroseta only on basitarsus-45 long.

Habitat : Maize, potato, paddy, wheat.

Distribution : INDIA : Punjab, Delhi, West Bengal.

Remarks : This mite was described on the basis of material collected from *Gnorimoschema operculella* infested potatoes and feeding upon *Tyrophagus putrescentiae* (Narayanan & Kaur, 1960). Gupta (1977) observed it feeding upon eggs of *Petrobia latens* infesting wheat. *A. (N.) bindrai* Gupta appears to be a synonym for this species.

467. *Amblyseius* (*Neoseiulus*) *longispinosus* (Evans)

Typhlodromus longispinosus Evans, 1952, *Ann. Mag. Nat. Hist.*, (12) 5 : 413-416.

Typhlodromus longispinosus, Evans, 1953, *Ibid.*, 6 : 447-449.

Diagnosis : Dorsal shield 325 long, 190 wide, smooth, well sclerotized,

with 17 pairs of setae, mostly long excepting j_1 , J_5 and S_5 which are shorter. Measurements of setae : j_1 -20, j_4 -54, j_5 -67, j_6 -72, J_2 -72, J_5 -7, j_3 -49, z_2 -69, z_4 -76, s_4 -82, Z_1 -76, S_2 -76, S_4 -59, S_5 -18, Z_5 -78, z_5 -31, Z_4 -69. Sternal, metasternal and genital shields normal. Ventrianal shield triangular, reticulate, longer than wide, with 3 pairs of preanal setae and a pair of preanal pores. Spermatheca with funnel shaped cervix. Macroseta only on basitarsus IV-58 long.

Habitat : *Datura metel*, paddy, rose, guava, *Bauhinia purpurea*, castor, *Zinia*, beans, lady's finger, *Tabernaemontana coronaria*.

Distribution : INDIA : West Bengal, Tamil Nadu, Andaman Isl., Bihar, Orissa, Pondicherry ; outside India : Hawaii, Jamaica, South America, Japan, Philippines, New Zealand.

Remarks : It is known to be an important predator of *Tetranychus ludeni* (Mallick, 1974). While studying the interactions between this mite and *T. ludeni*, at 1 : 4 ratio, it was found that the peak of the predator population was attained on the 6th day and none of the predators was found on the 11th day showing the rise of the predator population coinciding with the rise of the population of the prey. In those cases, where the predator was not released, the population of prey was very high even during 6th week. This is also a predator of *S. andropogoni*, infesting paddy.

468. *Amblyseius* (*Neoseiulus*) *paspalivorus* DeLeon

Amblyseius paspalivorus DeLeon, 1957, *Fla. Ent.*, 40 : 143-144.

Amblyseius lula Pritchard & Baker, Gupta, 1970, *Sci. & Cult.*, 36 : 98-99.

Diagnosis : Dorsal shield 365 long, 195 wide, with 17 pairs of setae. Measurements of setae : j_1 -10, j_4 - j_5 -7 each, j_6 - J_2 -11 each, j_3 -20, z_2 -10, z_4 -13, s_4 -20, Z_1 -8, S_2 -19, S_4 -32, S_5 -29, Z_5 -80, Z_4 -24. Ventrianal shield longer than wide, reticulate, with 3 pairs of preanal setae. Metapodal plates 2 paired. Macrosetae on basitarsus IV-45.

Habitat : *Salix elegans*.

Distribution : INDIA : West Bengal ; outside India : Florida, Jamaica, Philippines.

Remarks : This species was earlier identified as *A. lula* but that appears to be a misidentification and the correct identity is *paspalivorus*.

469. *Amblyseius* (*Neoseiulus*) *rangatensis* Gupta

Amblyseius rangatensis Gupta, 1977, *Oriental Ins.*, 11 (4) : 632-633.

Diagnosis : Dorsal shield 316 long, 200 wide, smooth, with 17 pairs of setae, all being short (6-10 long) except j_1 , j_3 , s_4 , Z_5 , Z_4 which measure 16, 20, 32, 60 (weakly serrate) and 40 (smooth) respectively. Sternal, metasternal and genital shields normal. Ventrianal shield triangular with 3 pairs of preanal setae and a pair of pores. Macrosetae on leg IV : genu-40, tibia-nil, basitarsus-56.

Habitat : Brinjal.

Distribution : INDIA : Andaman Isl.

Remarks : It has no known economic importance.

Subgenus *Paraphytoseius* Swirski & Shechter

(Figs. 466-469)

Paraphytoseius Swirski & Shechter, 1961, *Israel J. agric. Res.*, 11 : 113-114.

Key to the Species of *Paraphytoseius*

1. z_2 and z_4 serrate	...	...	<i>scleroticus</i>
— z_2 and z_4 smooth	...	...	<i>multidentatus</i>

470. *Amblyseius* (*Paraphytoseius*) *multidentatus* (Swirski & Shechter)

Paraphytoseius multidentatus Swirski & Shechter, 1961, *Israel J. agric. Res.*, 11 (2) : 114-116.

Typhlodromus (*Amblyseius*) *orientalis* Narayanan, Kaur & Ghai, 1960, *Proc. Nat., Inst. Sci. India*, 26B (6) : 394.

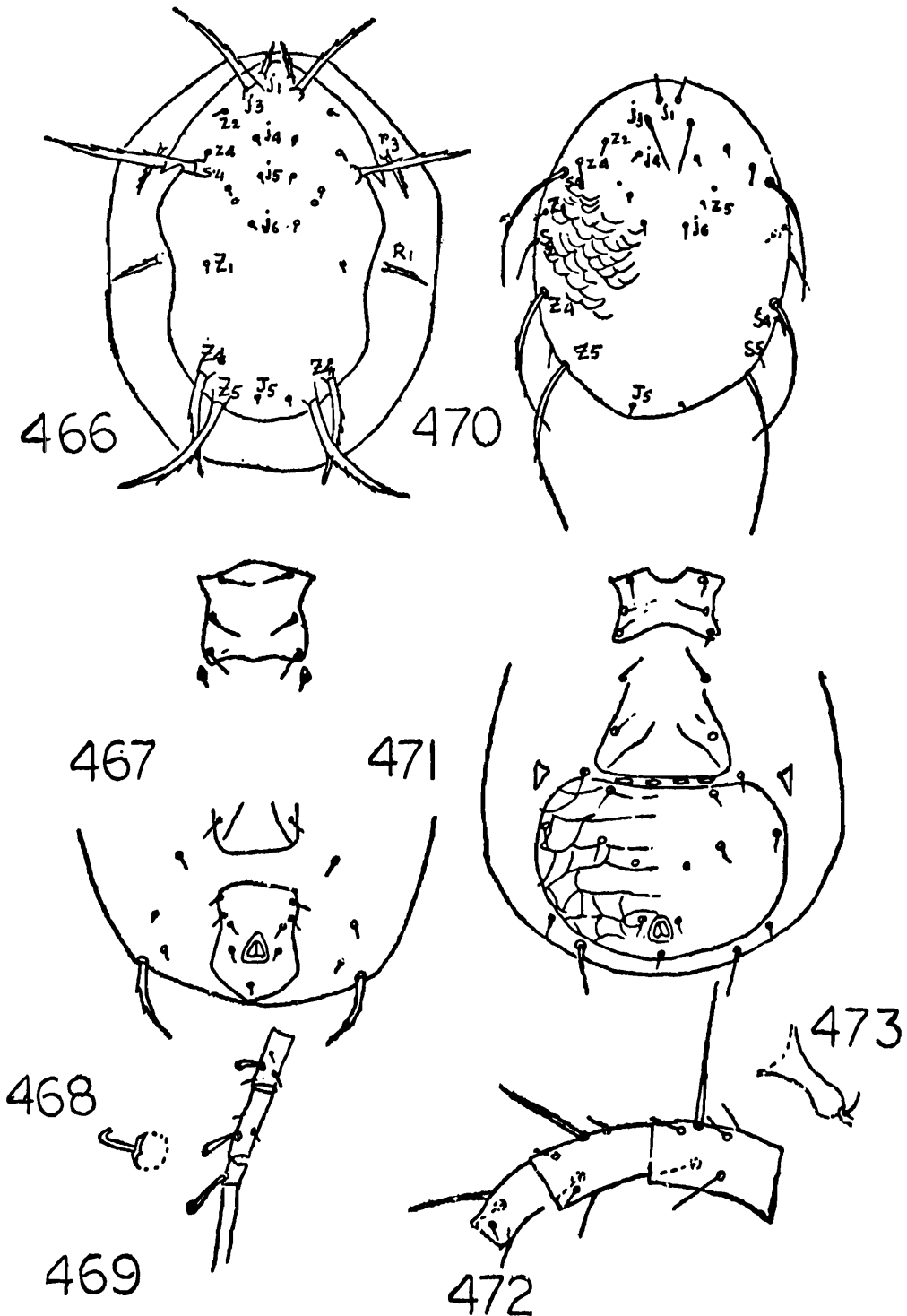
Diagnosis : Dorsal shield elongate, notched at the level of s_4 , with 14 pairs of setae. Setae j_1 , j_3 , s_4 , Z_4 and Z_5 being long, thick and serrate measuring respectively, 30, 88, 120, 70 and 130. Ventrianal shield 90 long, 55 wide, with 3 pairs of preanal setae. Fixed digit of chelicera multidentate, movable digit 3-dentate.

Habitat : *Eupatorium odoratum*, *Datura metel*, rose paddy, pigeon-pea, *Rubus* sp., banana, pear, brinjal, fern, *Shorea robusta*, sunflower, cashew nut, *Dalbergia* sp., *Ipomoea*, cotton.

Distribution : INDIA : West Bengal, Arunachal Pradesh, Tripura, Assam, Meghalaya, Bihar, Orissa, Maharashtra, Punjab, Andhra Pradesh, Jammu & Kashmir, Uttar Pradesh, Andaman Isl.,

Tamil Nadu, Karnataka ; outside India : Hong Kong, Thailand, Malagassy, Nigeria, Madagascar.

Remarks : This mite is of significant economic importance as very often it was seen in the field to feed voraciously on various species



Figs. 466-469 : *Amblyseius (Paraphytoseius)* sp. : 466—Dorsum, 467—Ventral surface, 468—Spermatheca, 469—Genu, tibia and basitarsus of leg IV.
Figs. 470-473 : *Amblyseius (Phytoscutella)* sp. : 470—Dorsum, 471—Ventral surface, 472—Genu, tibia and basitarsus of leg IV, 473—Spermatheca.

of *Tetranychus*. *A.(P.) bhadrakaliensis* Gupta, *A.(P.) narayanani* Ehara & Ghai and *A.(P.) nicobarensis* Gupta, are synonyms for *multidentatus*.

471. *Amblyseius (Paraphytoseius) scleroticus* Gupta & Ray

Amblyseius (Paraphytoseius) scleroticus Gupta & Ray, 1981, *Bull. Zool. Surv. India*, 4 (1) : 42-43.

Diagnosis : Dorsal shield reticulate, 260 long, 135 wide, setae j_3 , z_4 , j_1 , s_4 , Z_5 , Z_4 , r_3 , being long, thick and serrate ; 4 pairs of pores present on dorsal shield. Measurements of setae : j_1 -25, j_4 - j_6 -8 each, J_5 -5, z_5 -7, j_3 -56, z_2 -11, z_4 -20, s_4 -69, Z_1 -9, S_5 -11, Z_5 -69, Z_4 -45, r_3 -20, R_1 -16. Ventrianal shield 90 long, 50 wide, with 3 pairs of preanal setae on one side and 2 pairs on other side. Macrosetae on leg IV : genu-15, tibia-29, basitarsus-34, distitarsus-34, all with knobbed tip.

Habitat : Undet. plant.

Distribution : INDIA : Uttar Pradesh.

Remarks : No economic importance of this species is known.

Subgenus *Phytoscutella* Muma

(Figs. 470-473)

Phytoscutella Muma, 1961, *Bull. Fla. St. Mus.*, 5 (7) : 475.

472. *Amblyseius (Phytoscutella) salebrosus* (Chant)

Taphlodromus (Amblyseius) salebrosus Chant, 1960, *Can. Ent.*, 92 : 58-60.

Diagnosis : Dorsal shield rugose, sclerotized, with 15 pairs of setae : setae j_5 , J_2 absent. Measurements of setae : j_1 -12, j_4 -4, j_6 -11, J_5 -4, j_3 -16, z_2 -9, z_4 -13, s_4 -134, Z_1 -9, S_2 -52, S_4 -16, S_5 -16, Z_5 -202, z_5 -4, Z_4 -157. Sternal shield much wider than long ; genital shield reticulate, ventrianal shield massive, reticulate, with 3 pairs of preanal setae. Spermatheca with saccular cervix. Macrosetae on leg IV : genu-34, tibia-45, basitarsus-24.

Habitat : Citrus.

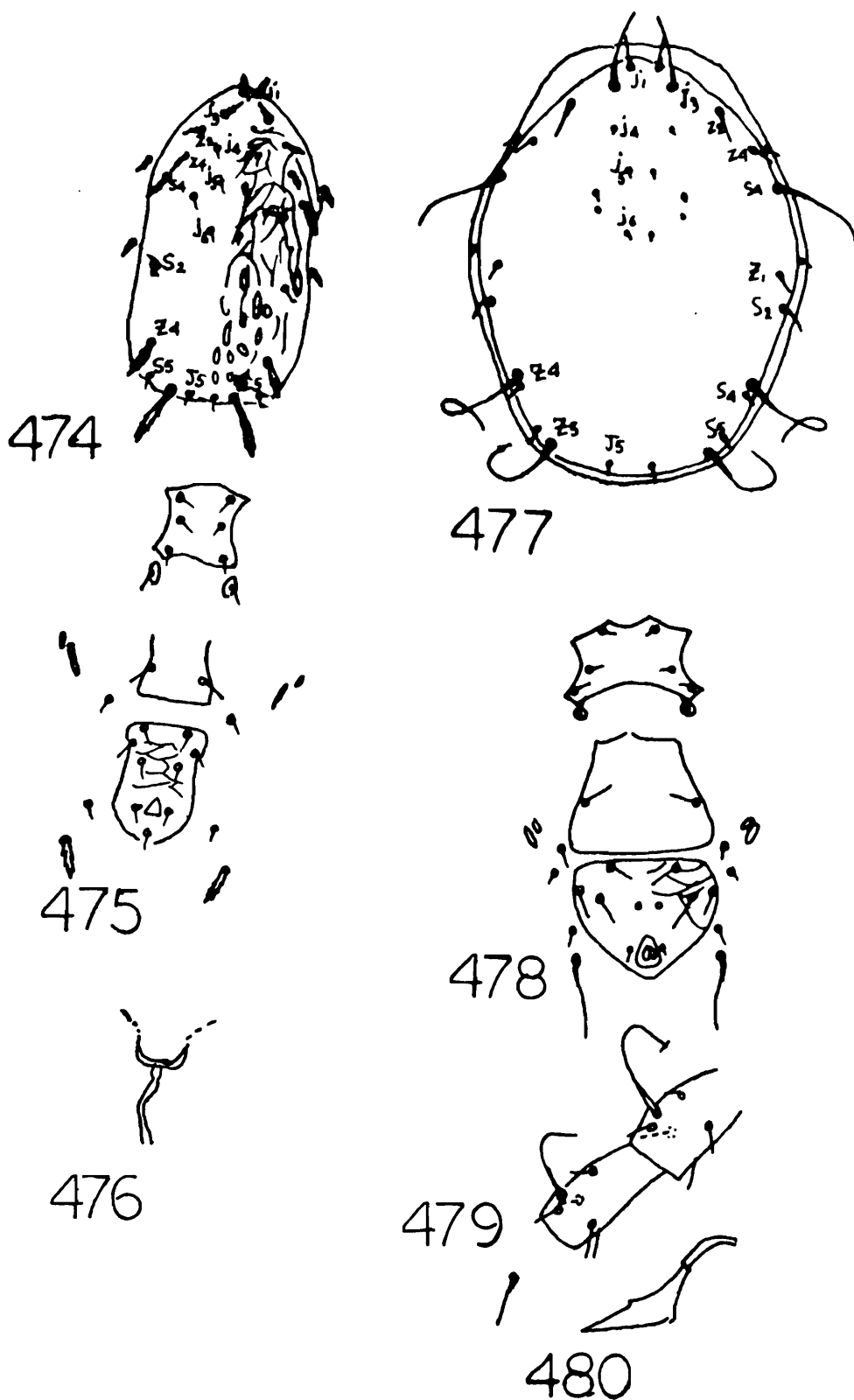
Distribution : INDIA : Assam ; outside India : Taiwan.

Remarks : No economic importance of this species is known.

Subgenus *Proprioseius* Chant

(Figs. 474-476)

Proprioseius Chant, 1957, *Can. Ent.*, 89 : 357-358.



Figs. 474-476 : *Amblyseius (Proprioseius)* sp. : 474—Dorsum, 475—Ventral surface, 476—Spermatheca.

Figs. 477-480. *Amblyseius (Proprioseiopsis)* sp. : 477—Dorsum, 478—Ventral surface, 479—Genu, tibia and basitarsus of leg IV, 480—Spermatheca.

473. *Amblyseius (Proprioseius) kumaonensis* (Gupta)

Proprioseius Kumaonensis Gupta, 1982. *Indian J. Acar.*, 6 (1-2) : 28-29.

Diagnosis : Dorsal shield 312 long, 252 wide, highly rugose, well sclerotized, with 14 pairs of setae. Measurements of setae : j_1 -36, j_4 -5, j_5 -5, j_6 -7, J_5 -5, j_3 -53, z_2 -15, z_4 -27, s_4 -86, S_2 -17, S_5 -12, Z_5 -72, z_5 -5, Z_4 -50, r_3 -20. Ventrianal shield 96 long, 60 wide, lateral margins concave with 3 pairs of preanal setae, metapodal plates one paired. Macrosetae present on genu, tibia and basitarsus of leg IV, all being spatulate.

Habitat : Undet. plant.

Distribution : INDIA : Uttar Pradesh.

Remarks : The economic importance of this species is unknown.

Subgenus *Proprioseiopsis* Muma

(Figs. 477-480)

Proprioseiopsis Muma, 1961, *Bull. Fla. St. Mus.*, 5 (7) : 277.

474. *Amblyseius (Proprioseiopsis) peltatus* Van der Merwe

Amblyseius (Amblyseius) peltatus Van der Merwe, 1968, *Ent. Mem. Dept. Agr. & Tech. Serv., Repub. S. Africa*, 18 : 119.

Iphiseius punicae Gupta, 1979, *Ent. Mon. Mag.*, 115 : 213.

Diagnosis : Dorsal shield 315 long, 212 wide, lateral margins highly sclerotized and appear to be fused with dorsal shield. Measurements of setae : j_1 -27, j_4 - j_6 -4 each, j_3 -54, z_2 -31, z_4 -22, s_4 -93, Z_1 -18, S_2 -22, S_4 -10, S_5 -8, Z_5 -80, z_5 -4, Z_4 -93. Sternal shield reticulate with 3 pairs of sternal setae, ventrianal shield robust, triangular, reticulate, 90 long, 108 wide, with 3 pairs of preanal setae and a pair of preanal pores. Spermatheca with funnel shaped cervix. Macrosetae on leg IV : genu-63, tibia- 37, basitarsus-76.

Habitat : *Punica granatum*.

Distribution : INDIA : West Bengal ; outside India : S. Africa, Madagascar, Thailand.

Remarks : No economic importance of this species is known.

Subgenus *Typhlodromalus* Muma

(Figs. 481-484)

Typhlodromalus Muma, 1961, *Bull. Fla. St. Mus.*, 5 (7) : 277.

Key to the Species of Typhlodromalus

1. Ventrianal shield vase shaped	...	...	2
— Ventrianal shield squarish or pentagonal	...	...	5
2. j_3 only slightly longer than z_2	...	...	<i>kalimpongensis</i>
— j_3 more than 2 times as long as z_2	...	...	3
3. Z_4 reaches almost upto base of Z_5	...	...	4
— Z_4 much shorter than distance between its base and that of Z_5	...	...	<i>sorghumae</i>
4. Z_4 and Z_5 weakly serrate, spermatheca funnel shaped	...	...	<i>jarooa</i>
— Z_4 and Z_5 smooth, spermatheca tubular	...	...	<i>swaga</i>
5. j_3 and z_2 almost equal or j_3 only slightly longer	...	...	6
— j_3 2 times as long as z_2	...	...	<i>eucalypticus</i>
6. z_4 $2\frac{1}{2}$ times as long as z_2	...	...	<i>manipurensis</i>
— z_4 either equal to or only slightly longer than z_2	...	...	7
7. Z_4 reaches beyond base of S_5	...	...	<i>lablabi</i>
— Z_4 much shorter than distance between its base and that of S_5	...	...	<i>havu</i>

475. *Amblyseius (Typhlodromalus) eucalypticus* (Gupta)

Thphlodromalus eucalypticus Gupta, *Oriental Ins.*, 12 (3) : 330-331.

Diagnosis : Dorsal shield with anterior lateral margins imbricate, with 17 pairs of setae. Measurements of setae : j_1 -24, j_3 -20, s_4 -28, Z_5 -64, Z_4 -24. ; other setae 5-6 long. Ventrianal shield longer than broad with 3 pairs of preanal setae ; spermatheca with elongated flask shaped cervix, bulbous atrium and long duct. Macrosetae on leg IV : genu-48, basitarsus-60.

Habitat : *Eucalyptus* sp.

Distribution : INDIA : Karnataka.

Remarks : No economic importance of this species is known.

476. *Amblyseius (Typhlodromalus) havu* Pritchard & Baker

Amblyseius (Amblyseius) havu Pritchard & Baker, 1962, *Hilgardia*, 33 : 257.

Amblyseius havu, Ghai & Menon, 1967, *Oriental Ins.*, 1 : 70.

Diagnosis : Dorsal shield smooth, with 17 pairs of setae. Ventrianal shield broadest anteriorly, sides concave. Metapodal plate single

paired. Spermatheca with long cervix. Macrosetae on leg IV present on genu, tibia and basitarsus, all subcapitate.

Habitat : *Clerodendron serratus*.

Distribution : INDIA : Maharashtra ; outside India : Africa.

Remarks : Though this has been reported from India, but its identity needs re-checking.

477. *Amblyseius* (Typhlodromalus) *jarooa* Gupta

Amblyseius jarooa Gupta, 1977, *Oriental Ins.*, 11 (4) ; 629.

Diagnosis : Dorsal shield 320 long 180 wide, with 17 pairs of setae and a pair of pores above the level of Z_4 . Dorsal setae mostly small, thin and smooth except j_1 , j_3 , s_4 , Z_5 and Z_4 which are long and measure 24, 20, 40, 88 (serrate) and 48, respectively. Sternal and genital shields normal, metasternal plates absent. Spermatheca funnel shaped. Macrosetae on leg IV : genu-53, tibia-38 and basitarsis-53.

Habitat : Undet. plant.

Distribution : INDIA : Andaman Isl.

Remarks : No economic importance of this species is known.

478. *Amblyseius* (Typhlodromalus) *kalimpongensis* Gupta

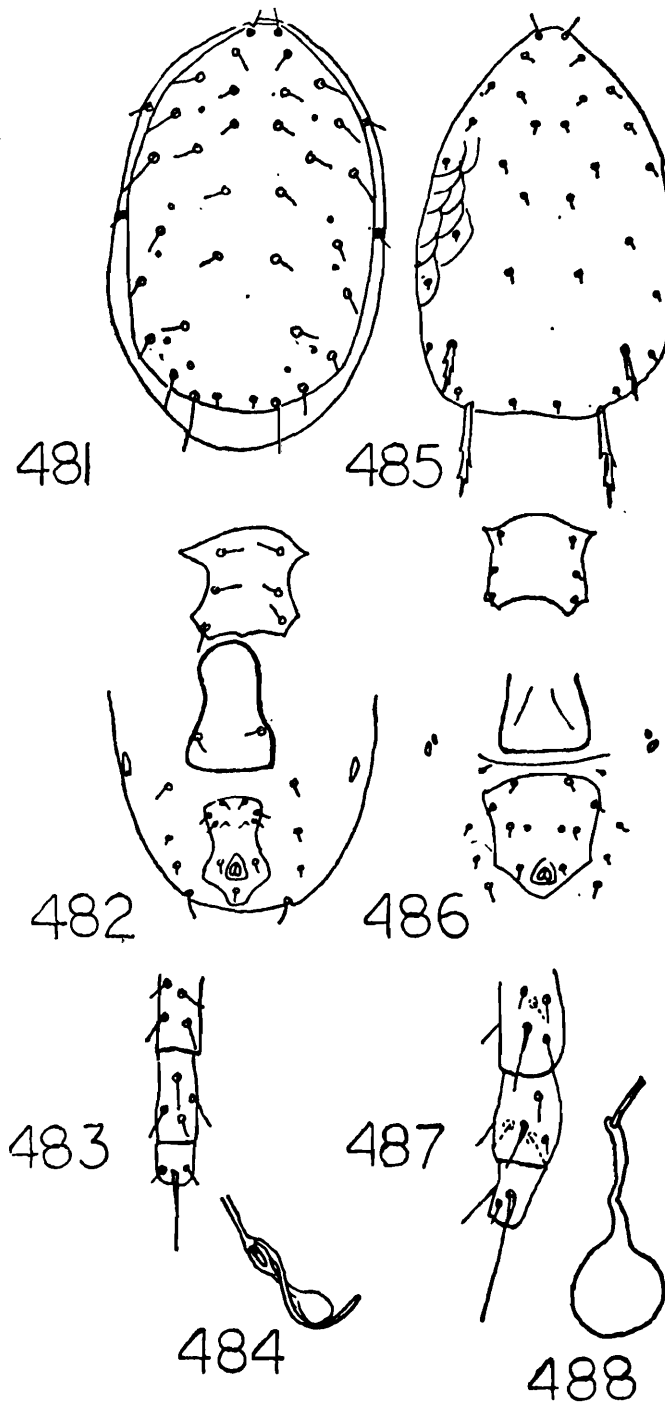
Amblyseius kalimpongensis Gupta, 1970, *Bull. Ent.*, 10 : 128-129.

Diagnosis : Dorsal shield smooth with 17 pairs of setae and 5 pairs of pores. Measurements of setae : j_1 - j_6 , J_2 -18-19 each J_5 -6, j_3 -27, z_2 -26, z_4 -27, s_4 -31, Z_1 -17, S_2 -20, S_4 -18, S_5 -26, Z_5 -40, z_5 -16, Z_4 -18. Sternal and genital shields normal, metasternal plates absent, only seta present. Ventrianal shield vase shaped, strongly concave laterally, with 3 pairs of preanal setae and a pair of pores. Metapodal plates single paired. Spermatheca club shaped. Leg IV with macroseta only on basitarsus IV : 31 long.

Habitat : *Citrus reticulata*, *Jasminum multiflorum*, *Shorea* sp., cashew nut, Malvaceae, weed, guava, banana, brinjal.

Distribution : INDIA : West Bengal, Assam, Bihar, Orissa, Gujarat, Tamil Nadu, Karnataka, Andhra Pradesh.

Remarks : This species was reported in association with a *Brevipalpus* mite (Gupta, 1970a) and *Tetranychus* sp. (Gupta, 1977), but in no case it was found to feed upon them.

479. *Amblyseius (Typhlodromalus) lablabi* Ghai & Menon*Amblyseius lablabi* Ghai & Menon, 1967, *Oriental Ins.*, 1 : 72-73.**Diagnosis :** Dorsal shield reticulate, with 17 pairs of setae, j_3 longer

Figs. 481-484 : *Amblyseius (Typhlodromalus) sp.* : 481—Dorsum, 482—Ventral surface, 483—Genu, tibia and basitarsus of leg IV, 484—Spermatheca.

Figs. 485-488 : *Amblyseius (Typhlodromips) sp.* : 485—Dorsum, 486—Ventral surface, 487—Genu, tibia and basitarsus of leg IV, 488—Spermatheca.

than $j_1 = z_2$; z_4 and s_4 progressively longer; j_4 , j_5 and z_5 shorter than the rest of dorsal setae. Posterior margin of sternal shield lobed; ventrianal shield reticulate, pentagonal, longer than broad, anterior margin rounded, lateral margins concave with 3 pairs of preanal setae and a pair of pores. Leg IV with macrosetae on genu, tibia and basitarsus, all pointed.

Habitat : *Dolichos lablab*.

Distribution : INDIA : Karnataka.

Remarks : This mite was collected in association with tetranychids (Ghai & Menon, 1967).

480. *Amblyseius (Typhlodromalus) manipurensis* Gupta

Amblyseius manipurensis Gupta, 1978, *Indian J. Acar.*, 2 (2) : 66-67.

Diagnosis : Dorsal shield smooth with 17 pairs of setae. Measurements of setae : j_1 -22, j_4 - j_6 -7 each, J_2 -12, J_5 -8, j_3 -12, z_2 -8, z_4 -24, s_4 -40, Z_1 -12, S_2 -16, S_4 , S_5 -8 each, Z_5 -69 (faintly serrate), z_5 -8, Z_4 -48 (smooth). Sternal, metasternal and genital shields normal. Ventrianal shield 92 long, 64 wide, with 3 pairs of preanal setae and a pair of pores. Spermatheca with tubular cervix. Macrosetae on leg IV : genu-28, tibia-28, basitarsus-64.

Habitat : *Abelmoschus esculentus*.

Distribution : INDIA : Manipur.

Remarks : No economic importance of this species is known.

481. *Amblyseius (Typhlodromalus) sorghumae* Gupta

Amblyseius sorghumae Gupta, 1977, *Oriental Ins.*, 11 (4) : 635-636.

Diagnosis : Dorsal shield 330 long, 225 wide, smooth, with 17 pairs of setae. Measurements of setae : j_1 -18, j_4 - j_6 , J_2 -6-8 each, j_3 -11, z_2 , z_4 -9 each, s_4 -16, Z_1 , S_2 - S_5 -7 each, Z_5 -72, z_5 -5, Z_4 -17. Sternal, metasternal and genital shields normal. Ventrianal shield 92 long, 64 wide, lateral margins concave at preanal region, metapodal plates 2 paired. Spermatheca with filamentous cervix. Macrosetae on leg IV : genu-48, tibia-40, basitarsus-36.

Habitat : Maize.

Distribution : INDIA : Nicobar Isl.

Remarks : No economic importance of this mite is known.

482. *Amblyseius* (*Typhlodromalus*) *swaga* Pritchard & Baker

Amblyseius (*Amblyseius*) *swaga* Pritchard & Baker, 1962, *Hilgardia*, 33 : 266-271.

Amblyseius swaga, Gupta, 1977, *Indian J. Acar.*, 2 (2) : 73.

Diagnosis : Dorsal shield with 17 pairs of setae. Measurements of setae : j_1 -28, j_3 -25, s_4 -48, Z_5 -88 (weakly serrate), Z_5 -45 (weakly serrate) ; other setae between 8-12 long. Ventrianal shield 90 long, 65 wide. Macrosetae on leg IV : genu-48, tibia-44, basitarsus-60.

Habitat : *Tectona grandis*.

Distribution : INDIA : Assam ; outside India : Africa.

Remarks : No economic importance of this mite is known. The identification of this species appears to be doubtful.

Subgenus *Typhlodromips* DeLeon

(Figs. 485-488f)

Typhloromips DeLeon. 1959, *Ent. News.*, 70 : 133.

Key to the Species of Typhlodromips

1. Besides setae Z_6 and Z_4 other setae being subequal	...	...	2
— Besides Z_6 and Z_4 there are other long setae	...	...	8
2. Z_4 quite long at least 3 times the length of S_4	...	...	3
— Z_4 not so long	...	...	6
3. Z_4 distinctly serrate or weakly serrate	...	...	4
— Z_4 smooth	...	...	5
4. Cervix of spermatheca saucer shaped	...	...	<i>syzygii</i>
— Cervix of spermatheca elongated flask shaped	...	...	<i>suknaensis</i>
5. Spermatheca and spermatophoral process as in fig. 488 a	...	...	<i>arecae</i>
— Spermatheca and spermatophoral process as in fig. 488 b	...	...	<i>meghalayensis</i>
6. Ventrianal shield as long as wide	...	...	<i>saplenticola</i>
Ventrianal shield longer than wide	...	...	7
7. Spermatheca as in fig 488 f	...	...	<i>officinaria</i>
Spermatheca as in fig. 488 d	...	...	<i>polyantheae</i>

8. Setae z_2 and z_4 unequal	...	...	9
— Setae z_2 and z_4 equal	...	...	11
9. S_2 more than 4 times as long as Z_1	...	...	<i>tetranychivorus</i>
— S_2 only slightly longer than Z_1	...	...	10
10. Macroseta on genu IV and tibia IV almost equal	...	...	<i>potentillae</i>
— Macrosetae on genu IV longer than that on tibia IV	...	...	<i>mangiferae</i>
11. Z_4 reaches almost upto the base of Z_5	...	...	12
— Z_4 much shorter than the distance between its base and that of Z_5	...	...	<i>neocrotalariae</i>
12. Lateral margins of ventrianal shield concave	...	...	<i>crotalariae</i>
— Lateral margins of ventrianal shield straight	...	...	13
13. Spermatheca as in fig. 488 c	...	...	<i>guajavae</i>
— Spermatheca as in fig 488 e	...	...	<i>eujeniae</i>

483. *Amblyseius* (Typhlodromips) *arecae* Gupta

(Fig. 488a)

Amblyseius arecae Gupta, 1977, *Oriental Ins.*, 11 (4) : 624-626.

Diagnosis : Dorsal shield well sclerotized, with 17 pairs of setae, mostly small except Z_5 and Z_4 which are longer measuring 90 and 26 respectively. Sternal and metasternal shields normal. Ventrianal shield squarish but concave at preanal region, with 3 pairs of preanal setae. Spermatheca with elongated cervix and knobbed atrium. Macrosetae on leg IV : genu-44, tibia-32, basitarsus-49.

Habitat : *Areca catechu*.

Remarks : No economic importance of this species is known.

484. *Amblyseius* (Typhlodromips) *crotalariae* Gupta

Amblyseiys crotalariae Gupta, 1977, *Ent. Mon. Mag.*, 112 : 53-55.

Diagnosis : Dorsal shield smooth with 17 pairs of setae and 5 pairs of pores ; excepting setae j_1 , j_3 , s_4 , Z_5 and Z_4 which are long and measure 18, 22, 36, 63 (serrate) and 45, respectively, the others are small. Sternal shield slightly reticulate, almost as long as broad ; metasternal plates distinct. Ventrianal shield elongate, lateral sides constricted with 3 pairs of preanal setae. Macrosetae on leg IV : genu-46, tibia-36, basitarsus-55.

Habitat : *Crotalaria* sp., fern, *Nyctanthes arbortristis*.

Distribution : INDIA : West Bengal, Assam, Meghalaya, Tripura.

Remarks : No economic importance of this species is known.

485. *Amblyseius (Typhlodromips) eujeniae* Gupta
(Fig. 488e)

Amblyseius eujeniae Gupta, 1977, *Oriental Ins.*, 11 (4) : 627-629.

Diagnosis : Dorsal shield smooth. Measurements of setae : j_1 -20, j_4 - j_6 -5 each, J_2 -10, J_5 -5, j_3 -35, z_2 -8, z_4 -8, s_4 -52, Z_1 -8, S_2 - S_5 -8 each, Z_5 -80, z_5 -9, Z_4 -56. Ventrianal shield squarish with 3 pairs of preanal setae, 2 pairs of metapodal plates present. Macrosetae on leg IV : genu-52, tibia-28, basitarsus-64.

Habitat : *Syzygium cumini*, banana.

Distribution : INDIA : Andaman Isl.

Remarks : No economic importance of this species is known.

486. *Amblyseius (Typhlodromips) guajavae* Gupta
(Fig. 488c)

Amblyseius guajavae Gupta, 1978, *Indian J. Acar.*, 2 (2) : 63.

Diagnosis : Dorsal shield with 17 pairs of setae. Measurements of setae j_1 -32, j_3 -36, s_4 -64, Z_5 -80, Z_4 -60; other setae measure 6-8 microns. Sternal, metasternal and genital shields present as usual. Ventrianal shield roughly pentagonal, much longer than broad, with 3 pairs of preanal setae. Spermatheca with tubular cervix. Leg IV with macrosetae on genu-40, tibia-30, basitarsus-76.

Habitat : Guava.

Distribution : INDIA : Meghalaya.

Remarks : No economic importance of this species is known.

487. *Amblyseius (Typhlodromips) mangiferae* Ghai & Menon

Amblyseius mangiferae Ghai & Menon, 1967, *Oriental Ins.*, 1 : 74-75.

Diagnosis : Dorsal shield smooth with 17 pairs of setae ; Z_5 being longest and thickest, j_1 , j_3 , z_2 , z_4 , s_4 , j_6 , J_2 , quite long ; rest being small ; j_3 - z_4 being shorter than the distance between their bases. Ventrianal shield longer than wide with 3 pairs of preanal setae and a pair of circular pores. Leg IV with macrosetae on genu, tibia and basitarsus.

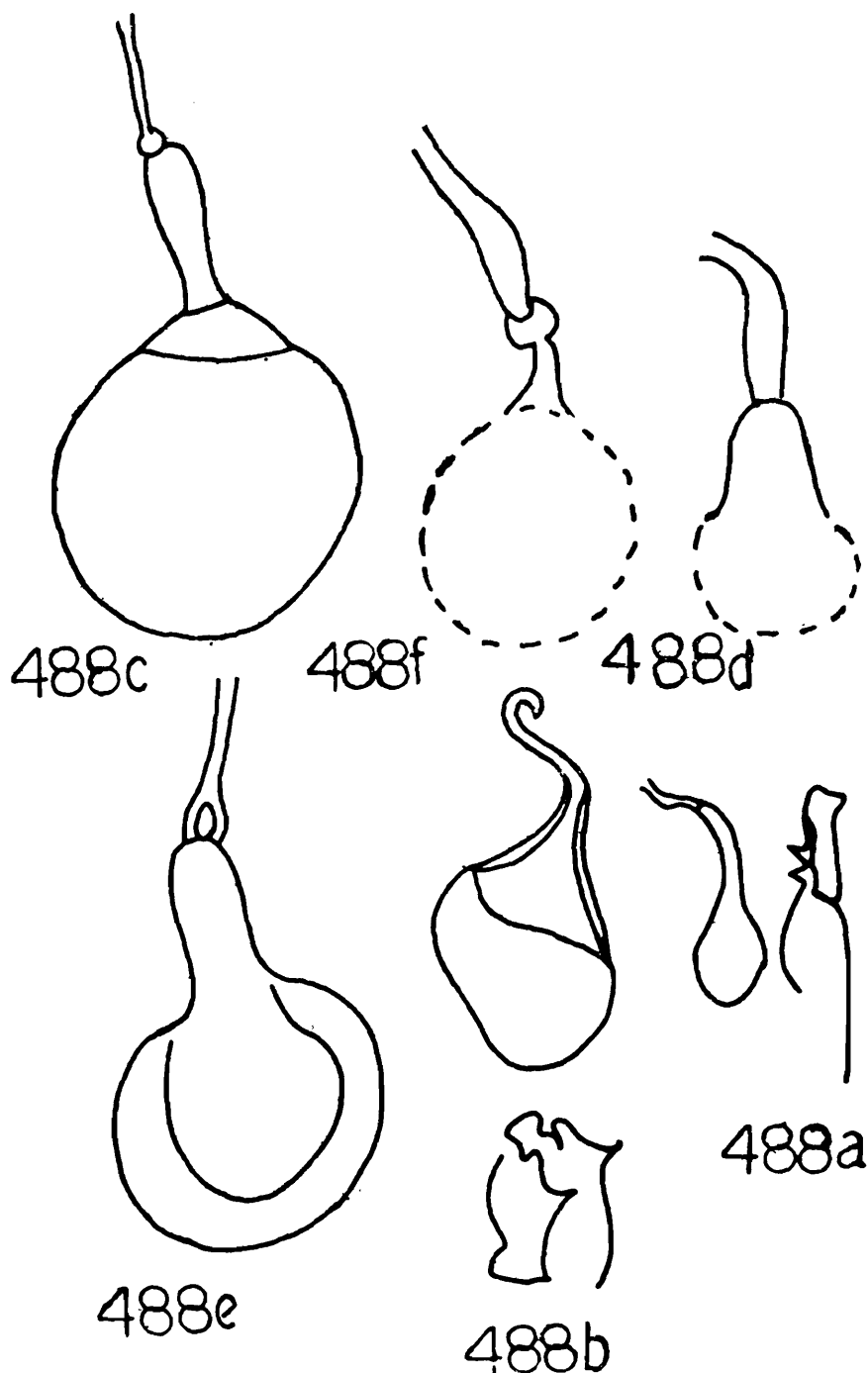
Habitat : Mango.

Remarks : This mite was reported to be associated with mango samples infested with eriophyid mites (Ghai & Menon, 1967).

488. *Amblyseius (Typhlodromips) meghalayensis* Gupta
(Fig. 488b)

Amblyseius meghalayensis Gupta, 1978, *Indian J Acar.*, 2 (2) : 67-69.

Diagnosis : Dorsal shield 300 long, 162 wide, reticulate, with 17 pairs of setae. Measurements of setae: j_1 -20, j_4 - j_5 -8 each,



Figs. 488a-488f: Spermatheca and spermatophoral process in some species of *Amblyseius (Typhlodromips)*: 488a—Spermatheca and spermatophoral process of *arecae*, 488b—Spermatheca and spermatophoral process of *meghalayensis*, 488c—spermatheca of *guajavae*, 488d—*polyantheae*, 488e—*eujeniae*, 488f—*officinaria*.

j_6 - J_2 -10 each, J_5 -6, J_3 , z_2 -10 each, z_4 -16, s_4 -24, Z_1 -12, S_2 -17, S_4 -16, S_5 -16, Z_5 -64, z_5 -8, Z_4 -41; all setae being small and pointed. Sternal shield longer than wide. Ventrianal shield 88 long, 70 wide, with 3 pairs of preanal setae and a pair of preanal pores; metapodal plates 2 paired. Spermatheca with tubular cervix. Macrosetae on leg IV: genu-24, tibia-20, basitarsus-48.

Habitat : Guava.

Distribution : INDIA : Meghalaya.

Remarks : This mite is not known to have any economic importance.

489. *Amblyseius* (Typhlodromips) *neocrotalariae* (Gupta)

Typhlodromips neocrotalariae Gupta, 1978, *Oriental Ins.*, 12 (3) : 335.

Diagnosis : Dorsal shield 324 long, 212 wide, reticulate, with 17 pairs of setae, all being smooth. Measurements of setae: j_1 -20, j_4 - j_5 -8 each, j_6 - J -12 each, J_5 -8, j_3 -28, z_2 - z_4 -9 each, s_4 -30, Z_1 - S_3 -12 each, S_4 - S_5 -8 each, Z_5 -68 (weakly serrate), z_5 -8, Z_4 -40. Sternal, metasternal and genital shields normal. Ventrianal shield 108 long, 80 wide, with 2 pairs of metapodal plates. Spermatheca roughly poculiform. Macrosetae on leg IV: genu-52, tibia-40, basitarsus-60.

Habitat : *Datura metel*.

Distribution : INDIA : Tamil Nadu.

Remarks : No economic importance of this species is known.

490. *Amblyseius* (Typhlodromips) *officinaria* Gupta

(Fig. 488f)

Amblyseius officinaria Gupta, 1957, *Internat. J. Acarol.*, 1 (2) : 39.

Diagnosis : Dorsal shield with margins slightly imbricate and 17 pairs of setae. Measurements of setae: j_1 -18, j_4 - j_5 -6 each, j_6 -10, J_2 -12, J_5 -7, j_3 , z_2 - z_4 -18 each, s_4 -18, Z_1 -9, S_2 -12, S_4 -11, S_5 -10, Z_5 -82, z_5 -8, Z_4 -30. Sternal, metasternal and genital shields normal. Ventrianal shield 104 long, 72 wide, with 5 pairs of pores present around ventrianal shield. Spermatheca with cup shaped cervix. Macrosetae on leg IV: genu—23, tibia-37, basitarsus-46.

Habitat : *Saccharum officinarum*.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

491. **Amblyseius (Typhlodromips) polyantheae** Gupta
(Fig. 488d)

Amblyseius polyantheae Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 42-43.

Diagnosis : Dorsal shield 325 long, 250 wide, with 17 pairs of setae. Measurements of setae : j_1 -18, j_4 - j_6 , J_2 - J_5 -6-8 each, j_3 -14, z_2 -12, z_4 -8, s_4 -27, Z_1 -18, S_2 -14, S_4 -14, S_5 -9, Z_5 -57, z_5 -6, Z_4 -27. Ventrianal shield longer than broad with 3 pairs of preanal setae. Macrosetae on leg IV : genu-27, tibia-31, basitarsus-36.

Habitat : *Polyanthea tuberosa*.

Distribution : INDIA : West Bengal.

492. **Amblyseius (Typhlodromips) sapienticola** Gupta

Amblyseius sapienticola Gupta, 1977, *Oriental Ins.*, 11 : 633-635.

Diagnosis : Dorsal shield reticulate, with 17 pairs of setae. Measurements of setae : j_1 -16, j_4 - j_6 , J_2 - J_5 -8 each, j_3 -12, z_2 , z_4 -8 each, s_4 -16, Z_1 -8, S_4 - S_5 -8 each, S_2 -12, Z_5 -64, z_5 -8, Z_4 -18. Sternal, metasternal and genital shields normal. Ventrianal shield 100 long, 108 wide, lateral margins notched, with 3 pairs of preanal setae, 2 pairs of metapodal plates present. Macrosetae on leg IV : genu-48, tibia-33, basitarsus-48.

Habitat : Banana.

Distribution : INDIA : Andaman Isl.

Remarks : Economic importance of this species is unknown.

493. **Amblyseius (Typhlodromips) suknaensis** Gupta

Amblyseius suknaensis Gupta, 1970, *Oriental Ins.*, 4 : 185-186.

Diagnosis : Dorsal shield with 17 pairs of setae and 3 pairs of pores. Measurements of setae : j_1 -18, j_4 - j_6 , J_2 - J_5 -6-8 each, j_3 -13, z_2 -9, z_4 -11, s_4 -13, Z_1 , S_2 - S_5 -9 each, Z_5 -67, z_5 -6, Z_4 -47. Sternal, metasternal and genital shields normal. Ventrianal shield pentagonal, 90 long, 85 wide, with 3 pairs of preanal setae and a pair of pores ; 2 pairs of metapodal plates present. Macrosetae on leg IV : genu-27, tibia-18, basitarsus-48.

Habitat : *Colocasia* sp., *Tectona grandis*, *Shorea robusta*.

Distribution : INDIA : Andaman Isl., Assam, Meghalaya, Tripura, Orissa, Kerala.

Remarks : Often this mite has been seen attacking tetranychid mites. *A. (T.) daturae* Gupta appears to be same as *A. (T.) suknaensis*.

494. *Amblyseius* (Typhlodromips) *syzygii* Gupta

Amblyseius syzygii Gupta, 1975, *Internat. J. Acarol.*, 1 (2) : 44-45.

Diagnosis : Dorsal shield reticulate with 17 pairs of setae. Measurements of setae : j_1 -15, j_4 - j_6 , J_2 - J_5 -7-10 each, j_3 -16, z_2 - z_4 -9 each s_4 -20, Z_1 , S_2 - S_5 -10 each, Z_5 -67 (serrate), z_5 -9, Z_4 -31 (serrate). Sternal, metasternal and genital shields normal. Ventrianal shield 110 long, 85 wide, with 3 pairs of preanal setae and a pair of pores. Macrosetae on leg IV : genu-45, tibia-31, basitarsus-49.

Habitat : *Syzygium cumini*.

Distribution : INDIA : West Bengal, Tripura, Orissa ; outside India : Thailand.

495. *Amblyseius* (Typhlodromips) *tetranychivorus* (Gupta)

Typhlodromips tetranychivorus Gupta, 1978, *Oriental Ins.*, 12 (3) : 337-338.

Diagnosis : Dorsal shield with imbrications on antero-lateral margins with 17 pairs of setae. Measurements of setae : j_1 -28, j_4 - j_6 , J_2 - J_5 -8-10 each, j_3 -44, z_2 -17, z_4 -36, s_4 -76, Z_1 -8, S_2 -36, S_4 -8, S_5 -8, Z_5 -80, z_5 -8, Z_4 -66. Sternal shield with posterior lateral angulation. Ventrianal shield longer (100) than broad, anterior margin rounded, lateral margins straight, with 3 pairs of preanal setae. Macrosetae on leg IV : genu-48, tibia-40, basitarsus-68. Spermatheca with cup shaped cervix.

Habitat : Brinjal and also on an undet. plant.

Distribution : INDIA : Tamil Nadu, Kerala, Karnataka, Bihar.

Remarks : This species was first reported in association with *Tetranychus cinnabarinus* (Gupta, 1978a) but its actual importance as predator was first brought into light by Puttaswamy (1978), who after studying its biology and interactions with different levels of prey density, found it to be a potential predator of *T. ludeni* Zacher and could suppress the prey population. However, its rate of prey consumption decreased with the increase of the amount of pollen (Puttaswamy & ChannaBasavanna, 1979). The average incubation period, larval, protonymphal and deutonymphal periods of females and males when studied on *Raoiella indica* as prey were respectively, 1.92, 1.06, 1.06, 0.98, and 1.92, 1.14, and 1.14 days (Jagadish & Nagesha Chandra, 1979). The total developmental period at $27 \pm 1^\circ\text{C}$ and $95 \pm 3\%$ R. H. was

47.95 $\pm$ 3.60 hrs. while the same at 24 $\pm$ 1°C and 65 $\pm$ 3% R. H. was 142.28 hrs. At temperature of 27 $\pm$ 1°C and 30 $\pm$ 1°C with the humidity range of 85 $\pm$ 3 to 95 $\pm$ 3% R. H. the total developmental period decreased, whereas at 24 $\pm$ 1°C and 32 $\pm$ 1°C, this period decreased and increased alternatively (ChannaBasavanna, 1981). The application of pesticides as dicofol (0.02-0.01%) and sulphur (0.05-0.015%) could conserve the predator in the field (ChannaBasavanna, 1981). Short term feeding of castor pollen by this mite resulted in higher density of predator as against those feeding on *T. ludeni* alone (Nangia & ChannaBasavanna, 1982). The females and males completed their development in 140.19 $\pm$ 7.51 and 136.21 $\pm$ 6.00 hrs., respectively at 14-27°C and 62-80% R.H. (Puttaswamy & ChannaBasavanna, 1979a). An ovipositing female fed on 3.5 adult females, 1.45 nymphs, 0.60 larva and 3.98 eggs of *T. ludeni* on an average each day. The preoviposition period of 3.11 $\pm$ 0.87 was seen. Female laid in average 45.33 $\pm$ 7.16 eggs during its average oviposition period of 28.89 $\pm$ 4.01 days (Puttaswamy & ChannaBasavanna, 1979a). The life cycle took shorter time on red palm mite than on spider mite (Jagadish and Nagesha Chandra, 1982).

496. *Amblyseius (Typhlodromips) potentillae* (Garman)

Amblyseiopsis potentillae Garman, 1958, *Ann. Ent. Soc. Amer.*, 51 : 76-77.

Amblyseius charui Gupta, 1970, *Bull. Ent.*, 10 : 126-127.

Amblyseius potentillae, Gupta, 1981, *Indian J. Acar.*, 5 : 47.

Diagnosis : Dorsal shield 300 long, 172 wide, with 17 pairs of setae and 3 pairs of pores. Setae j_1 , j_3 , s_4 , Z_4 and Z_5 being long measuring respectively, 20, 44, 72, 60 and 84. Ventrianal shield 100 long, 84 wide, with 3 pairs of preanal setae and a pair of preanal pores ; 2 pairs of metapodal plates present. Fixed digit of chelicera multidentate, movable digit tridentate. Spermatheca with bell shaped cervix. Macrosetae on leg IV : genu-40, tibia-40 and basitarsus-60.

Habitat : *Calophyllum inophyllum* and also on an undet. plant.

Distribution : INDIA : Jammu & Kashmir, West Bengal ; outside India : Holland, New Jersey, Greece, Italy, Netherlands.

Remarks : *A. charui* Gupta, on re-examination of the type, appears to be same as *A. (T.) potentillae*. Further, the record of *A. rykei* Pritchard & Baker (Gupta, 1970 ; Prasad, 1974 ; Gupta, 1975) also refers to *potentillae*.

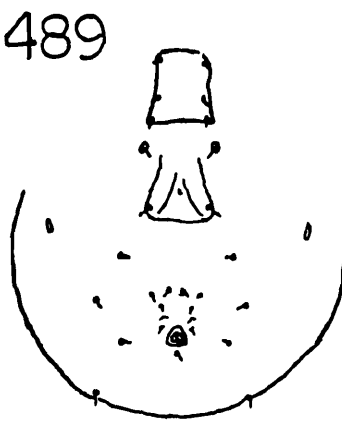
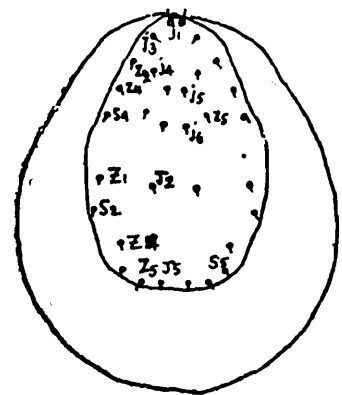
Genus *Indoseiulus* Ehara
(Figs. 489-491)

Indoseiulus Ehara, 1982, *Appl. Ent. Zool.*, 17 (1) : 42.

497. *Indoseiulus ricini* (Ghai & Menon)

Indoseius ricini Ghai & Menon, 1969, *Oriental Ins.*, 3 : 348.

Diagnosis : Dorsal shield oval, do not cover the whole of dorsum,



Figs. 489-491 : *Indoseiulus* sp. : 489—Dorsum, 490—Ventral surface, 491—Spermatheca.

reticulate, with 16 pairs of setae. Measurements of setae : j_1 -21, j_4 -8, j_5 -10, j_6 -12, J_2 -12, J_5 -5, j_3 -10, z_2 -10, z_4 -16, s_4 -16, Z_1 -16, S_2 -16, S_5 -14, Z_5 -25, z_5 -12, Z_4 -12. Sternal, metasternal and genital shields normal. Ventrianal shield absent, only preanal setae present ; metapodal plates 2 paired. Macrosetae on leg IV : genu-32, tibia-40, basitarsus-36.

Habitat : Castor.

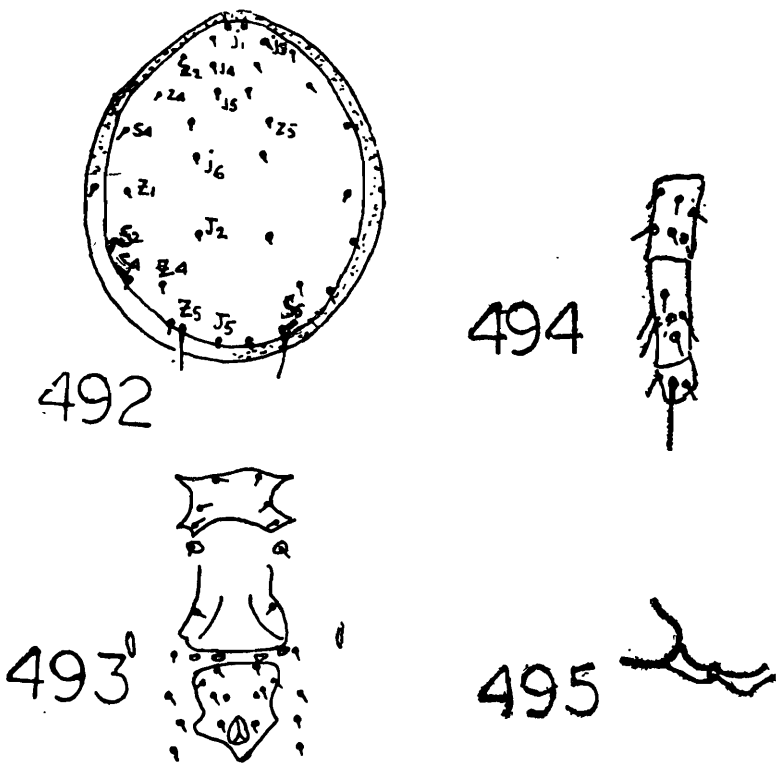
Distribution : INDIA : Tamil Nadu, Gujarat, W. Bengal.

Remarks : This mite appears to be an efficient predator of tetranychid mites. Very often these mites were seen in the field in fully engorged condition after consuming tetranychid mites.

Genus *Iphiseius* Berlese

(Figs. 492-495)

Iphiseius Berlese, 1916, *Redia*, 12 : 33.



Figs. 492-495 : *Iphiseius* sp. : 492—Dorsum, 493—Ventral surface, 494—Genu, tibia and basitarsus of leg IV, 495—Spermatheca

Key to the Species of *Iphiseius*

1. All setae but Z_5 short	...	...	<i>andamanicus</i>
— Setae Z_5 , Z_4 , s_4 very long	...	...	<i>bakeri</i>

498. *Iphiseius andamanicus* Gupta

Iphiseius andamanicus Gupta, 1980, *Ent. Mon. Mag.*, **115** : 213-214.

Diagnosis : Dorsal shield oval, smooth, with 17 pairs of setae, all being short (5-8) except Z_5 which is 27 long. Sternal shield twice as long as broad, metasternal plates and genital shield normal. Ventrianal shield pentagonal, 99 long, 68 wide, constricted at the anal region with 3 pairs of preanal setae ; small platelets present between genital and ventrianal shields. Macrosetae on leg IV ; genu-11, tibia-14, basitarsus-50.

Habitat : *Dolichos lablab*.

Distribution : INDIA : Andaman Isl.

Remarks : No economic importance of this species is known.

499. *Iphiseius bakeri* Gupta

Iphiseius bakeri Gupta, 1980, *Ent. Mon. Mag.*, **115** : 214-215.

Diagnosis (Known by male only) : Dorsal shield highly sclerotized, reticulate, with 15 pairs of setae (j_5 and J_2 lacking). All the setae small (5-10) excepting s_4 , Z_5 , Z_4 which measure 117, 189 and 135, respectively, S_2 -23. Ventrianal shield reticulate with 3 pairs of preanal setae and a pair of preanal pores. Macrosetae on leg IV ; genu-54, tibia-45, basitarsus-36.

Habitat : Arecanut.

Distribution : INDIA : Andaman Islands.

Remarks : Economic importance of this species is not known.

Genus *Paraamblyseius* Muma

(Figs. 496-499)

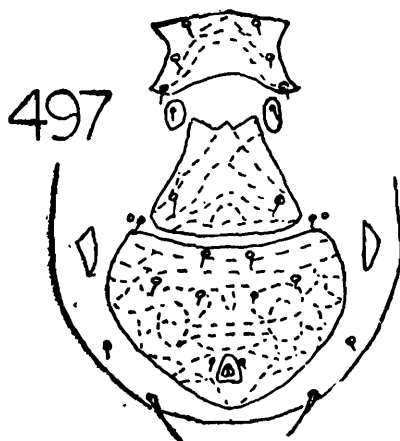
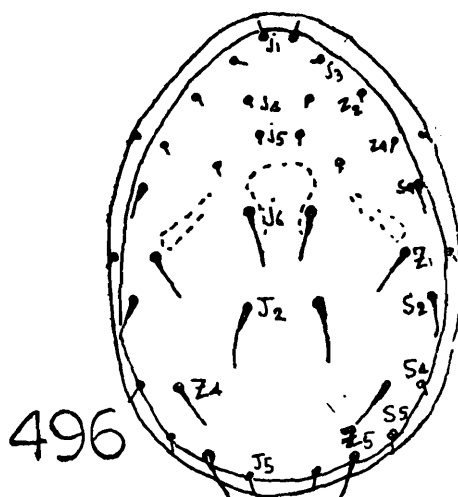
Paraamblyseius Muma, 1962, *Fla. Ent.*, **45** : 8.

Key to the Species of Paraamblyseius

1. J_2 subequal to Z_4	...	...	2
— J_2 much shorter than Z_4	...	...	<i>formosanus</i>
2. Metasternal plate round, J_2 longer than Z_1	...	...	<i>mumai</i>
— Metasternal plate kidney shaped, J_2 subequal to Z_1	...	...	<i>fragariae</i>

500. *Paraamblyseius formosanus* (Ehara)*Iphiseius formosanus* Ehara, 1970, *Mushi*, 43 (6) : 59-61.*Paraamblyseius formosanus*, Gupta, 1980, *Ent. Mon. Mag.*, 116 : 35.

Diagnosis : Dorsal shield 300 long, 220 wide, punctate, with 17 pairs of setae. Measurements of setae : j_1 -16, j_4 - j_5 -12 each, j_6 -24, J_2 -29, J_5 -9, j_3 -12, z_2 -16, z_4 -20, s_4 -29, Z_1 -32, S_2 -32, S_4 -16, S_5 -20, Z_5 -36,



Figs. 496-499 : *Paraamblyseius* sp. : 496—Dorsum, 497—Ventral surface, 498—Genu, tibia and basitarsus of leg IV, 499—Spermatheca.

z_5 -8, Z_4 -45. Sternal shield wider (100) than long (44), reticulate, with 3 pairs of setae. Ventrianal shield massive, reticulate, 105 long, 172 wide, with 3 pairs of preanal setae. Metapodal plates single paired. No macroseta on leg IV.

Habitat : Undet. plant.

Distribution : INDIA : Manipur ; outside India : Taiwan.

Remarks : No economic importance of this species is known. This identification is doubtful and may turn out to be same as *fragariae*.

501. *Paraamblyseius fragariae* Gupta

Paraamblyseius fragariae Gupta, 1980, *Ent. Mon. Mag.*, 115 : 215-216.

Diagnosis : Dorsal shield highly rugose, reticulate ; measurements of setae : j_1 -12, j_4 -14, j_5 -16, j_6 -33, J_2 -40, J_5 -12, j_3 -18, z_2 -22, z_4 -22, s_4 -33, Z_1 -38, S_2 -36, S_4 -29, S_5 -27, Z_5 -38, Z_4 -45, Z_5 -weakly serrate. Sternal shield reticulate, wider than long ; genital shield reticulate. Ventrianal shield massive, sculptured, with 3 pairs of preanal setae and a pair of pores. Macrosetae absent on leg IV.

Habitat : *Fragaria nilgerrensis*.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

502. *Paraamblyseius mumai* Gupta

Paraamblyseius mumai Gupta, 1980, *Ent. Mon. Mag.*, 116 : 33-34.

Diagnosis : Dorsal shield heavily sclerotized, punctate with 17 pairs of setae. Measurements of setae : j_1 -36, j_4 -16, j_5 -16, j_6 -40, J_2 -48, J_5 -14, j_3 , z_2 -16 each, z_4 -20, s_4 -24, Z_1 -38, S_2 -28, S_4 -20, S_5 -17, Z_5 -32, z_5 -36, Z_4 -40. Sternal shield much wider than long, reticulate ; genital shield reticulate. Ventrianal shield 110 long, 168 wide, with 3 pairs of preanal setae and a pair of pores ; metapodal plates triangular. Macrosetae absent on leg IV.

Habitat : Undet. plant.

Distribution : INDIA : Meghalaya.

Remarks : No economic importance of this species is known.

Genus *Platyseiella* Muma

(Figs. 500-502)

Platyseiella Muma, 1961, *Bull. Fla. St. Mus.*, 5 (7) : 280.

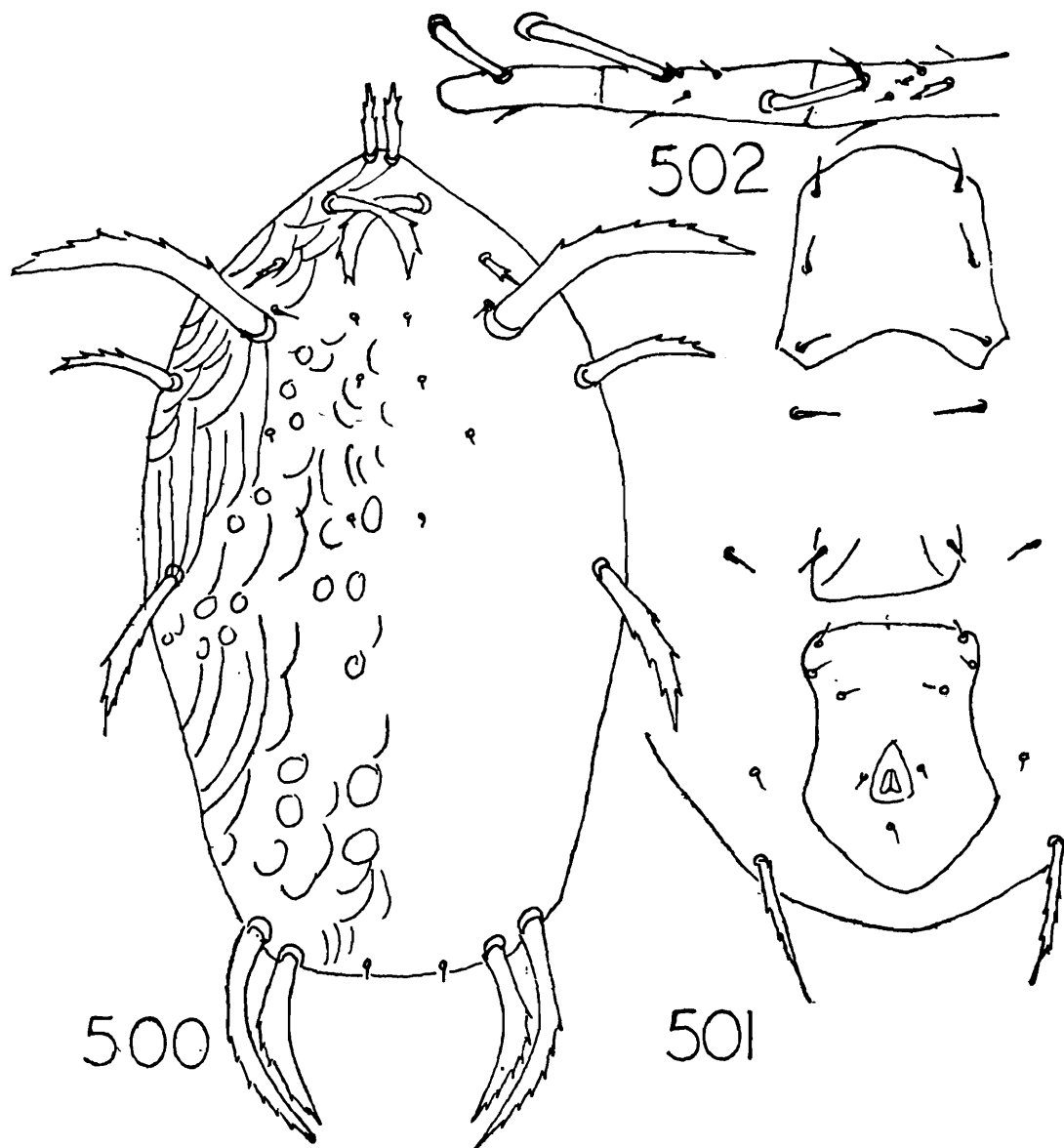
503. *Platyseiella mumai* Ray & Gupta

Platyseiella mumai Ray & Gupta, 1981, *Bull. Zool. Surv. India*, 4 (3) : 277-279.

Diagnosis : Dorsal shield rugose with 14 pairs of setae. Besides setae j_5 , j_4 , j_6 and z_5 which are small and simple, the others are long, thick and serrate. Sternal shield with 3 pairs of setae, metasternal plate absent. Ventrianal shield longer than broad, lateral margins concave with 3 pairs of setae. Macrosetae present on genu, tibia and basitarsus, that on genu being longest, all spatulate.

Habitat : Undet. plant.

Distribution : INDIA : Tripura.



Figs. 500-502. : *Platyseiella* sp. n. 500—Dorsum, 501—Ventral surface, 502—Genu, tibia and basitarsus of leg IV.

Subfamily **Phytoseiinae** Berlese**Phytoseiinae** Berlese, 1916, *Redia*, 12 : 11.*Key to the Genera of Phytoseiinae*

1. r_3 and R_1 on dorsal shield	...	...	<i>Indodromus</i>
— r_3 may or may not be on dorsal shield, R_1 , if present, always on lateral integument	...	...	2
2. r_3 on dorsal shield, genu I with 7 setae, genu III with 6 setae	...	...	<i>Phytoseius</i>
— r_3 on lateral integument, genu II with 7 or 8 setae ; genu III with 6 or 7 setae	...	...	<i>Typhlodromus</i>

Genus **Indodromus** Ghai & Menon

(Figs. 503-506)

Indodromus Ghai & Menon, 1969, *Oriental Ins.*, 3 : 348.504. **Indodromus meerutensis** Ghai & Menon*Indodromus meerutensis* Ghai & Menon, 1969, *Oriental Ins.*, 3 : 349.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae ; setae being progressively longer posteriorly ; S_2 , S_4 , Z_5 and Z_4 being serrate ; S_5 , J_5 being tiny ; r_3 and R_1 on dorsal shield. Sternal shield with 2 pairs of sternal setae, 3rd pair on interscutal membrane, 4th pair on metasternal plates. Ventrianal shield longer (92) than wide (57), margins irregular. Leg IV with macroseta.

Habitat : Mango.**Distribution :** INDIA : Uttar Pradesh.**Remarks :** It is of no known economic importance.Genus **Phytoseius** Ribaga

(Figs. 507-514)

Phytoseius Ribaga, 1904, *Riv. Pat. Veg.*, 10 : 177.*Key to the Subgenera of Phytoseius*

1. R_1 present	...	...	<i>Pennaseius</i>
— R_1 absent	...	...	<i>Phytoseius</i>

Subgenus **Pennaseius** Pritchard & Baker

(Figs. 507-510)

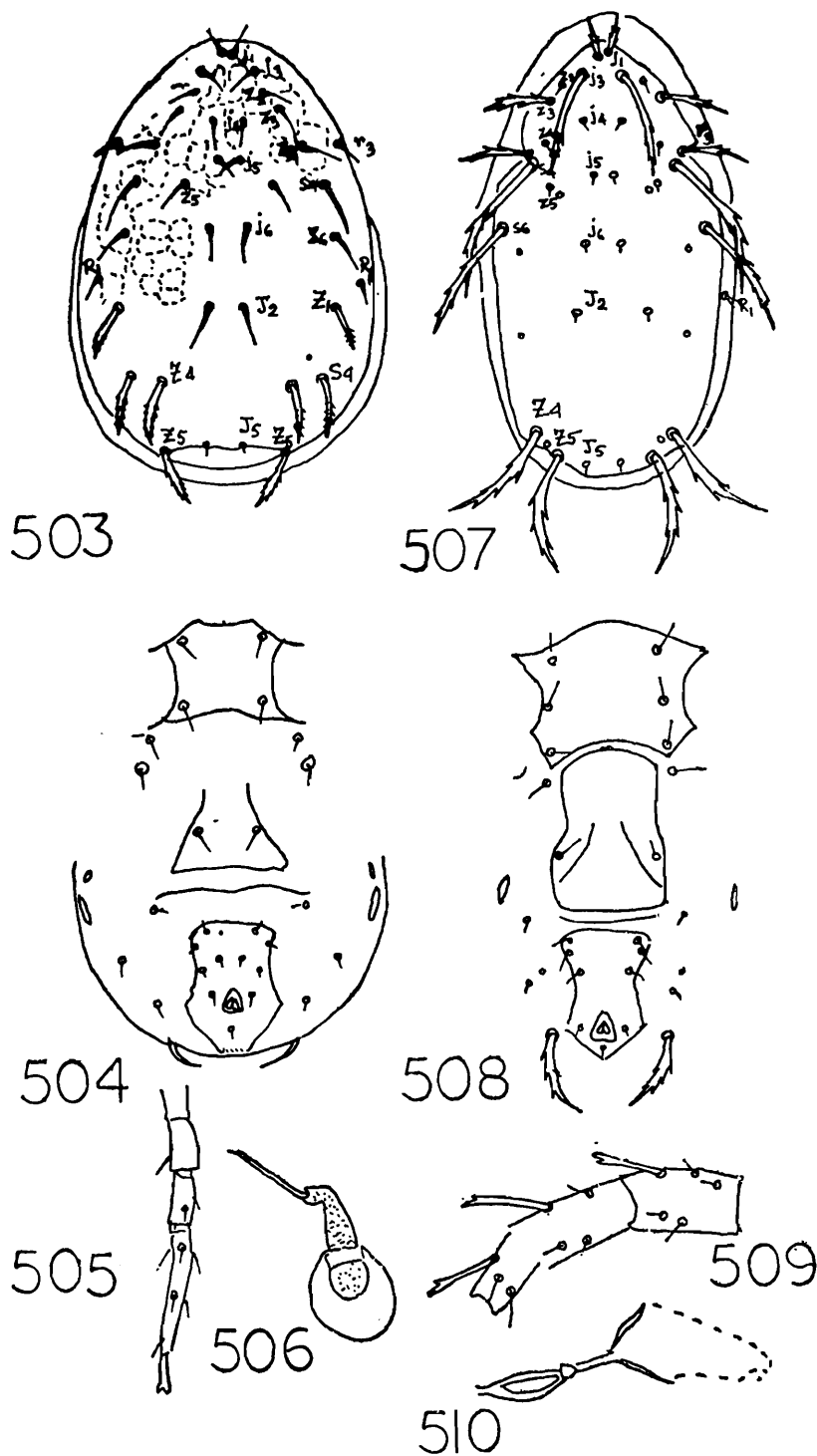
Pennaseius Pritchard & Baker, 1962, *Hilgardia*, 33 : 223.*Key to the Species of Pennaseius*

1. Dorsal shield notched at the level of r_3	...	...	<i>kapuri</i>
— Dorsal shield not notched at the level of r_3	...	...	<i>minutus</i>

505. *Phytoseius (Pennaseius) kapuri* Gupta

Phytoseius (Phytoseius) kapuri Gupta, 1969, *Israel J. agric. Res.*, 19 : 115-117.

Diagnosis : Dorsal shield notched at the level of r_3 with 16 pairs of setae and 4 pairs of pores, of those, the pair associated with z_5 being



Figs. 503-506 : *Indodromus* sp. : 503—Dorsum, 504—Ventral surface, 505—Genu, tibia and basitarsus of leg IV, 506—Spermatheca.

Figs. 507-510 : *Phytoseius (Pennaseius)* sp. : 507—Dorsum, 508—Ventral surface, 509—Genu, tibia and basitarsus of leg IV, 510—Spermatheca.

largest. Measurements of setae : j_1 -26, j_4 - j_6 -4-5 each, J_2 -9, J_5 -4, j_3 -65, z_2 -12, z_3 -40, z_4 -6, s_4 -14, s_6 -81, Z_5 -76, Z_4 -76, r_3 -45. Sternal, metasternal and genital shields normal. Ventrianal shield 73 long, 47 wide, lateral sides concave, with 3 pairs of preanal setae. Spermatheca with funnel shaped cervix. Macrosetae on leg IV : genu-27, tibia-30, basitarsus-24, distitarsus-24.

Habitat : *Adantheria pavoniana*, *Syzygium javanica*, brinjal, sugarcane, kendu, *Shorea robusta*.

Distribution : INDIA : Andaman Isl., Gujarat, Punjab, Assam, West Bengal, Meghalaya, Orissa.

Remarks : This mite is known to feed upon *Tetranychus neocaledonicus* and *T. cinnabarinus* (Gupta, 1977a)

506. *Phytoseius* (*Pennaseius*) *minutus* Narayanan, Kaur & Ghai

Phytoseius minutus Narayanan *et al.*, 1960, *Proc. Nat. Inst. Sci. India*, 26B : 391-392.

Diagnosis : Dorsal shield smooth with 16 pairs of setae and 8 pairs of small pores, the pair associated with z_5 being the largest. Setae j_4 , j_5 , j_6 , J_2 , J_5 , z_2 , z_4 , z_5 being small, others are long and serrate. Measurements of setae : j_1 -30, j_3 -71, z_2 -17, z_3 -52, s_4 , s_6 -86 each, Z_5 -83, Z_4 -79, r_3 -49. Ventrianal shield longer than wide, with 3 pairs of preanal setae. Macrosetae on leg IV : genu-30, tibia-28, basitarsus-27.

Habitat : *Abelmoschus esculentus*.

Distribution : INDIA : Delhi, West Bengal.

Remarks : This mite was found associated with tetranychid species.

Subgenus *Phytoseius* Ribaga

(Figs. 511-514)

Phytoseius Ribaga, 1904, *Riv. Pat. Veg.*, 10 : 175.

Key to the Species of *Phytoseius*

1. No macroseta on leg IV	...	...	<i>intermedius</i>
— Macroseta present on leg IV	...	...	2
2. s_4 and Z_4 large, flat and divided	...	...	<i>crinitus</i>
— s_4 and Z_4 not flat and divided	...	...	3
3. Genu IV without macroseta	...	...	4
— Genu IV with macroseta	...	...	8

4. Macrosetae on basitarsus IV subequal to that of tibia IV	...	...	<i>macrosetosus</i>
— Macrosetae on basitarsus IV always smaller than that of tibia IV	...	...	5
5. Macroseta on genu IV as long as the segment	...	...	6
— Macroseta on genu IV shorter than that of the segment	...	...	7
6. z_2 and z_4 shorter and smooth	...	...	<i>roseus</i>
— z_2 and z_4 longer and serrate	...	...	<i>mixtus</i>
7. Cervix of spermatheca elongated more than 2 times as long as wide	...	...	<i>neocorniger</i>
— Cervix of spermatheca as long as or only slightly longer than wide	...	...	<i>jujuba</i>
8. s_4 longer than s_6	...	...	13
— s_4 as long as or shorter than s_6	...	...	9
9. j_3 only slightly longer than z_2 ; s_4 shorter than s_6	...	...	<i>meyerae</i>
— j_3 much longer than z_2 ; s_4 longer than s_6	...	...	10
10. Z_3 longer than Z_4	...	...	11
— Z_5 subequal or shorter than Z_4	...	...	12
11. Macroseta on genu IV and basitarsus IV equal	...	...	<i>neglecta</i>
— Macroseta on genu IV shorter than that of basitarsus IV —	...	...	<i>swirskii</i>
12. Spermatheca narrowed towards atrium	...	...	<i>punjabensis</i>
— Spermatheca broad towards atrium	...	...	<i>jaunpurensis</i>
13. s_6 , Z_5 and Z_4 almost equal or subequal	...	...	14
— s_6 , Z_5 and Z_4 unequal	...	...	16
14. Macroseta on genu IV and basitarsus IV almost equal	...	...	<i>bandipurensis</i>
— Macrosetae on genu IV and basitarsus IV unequal	...	...	15
15. Cervix broad with clear knobbed atrium	...	...	<i>macropilis</i>
— Cervix narrow, atrium scarcely visible	...	...	<i>woodburyi</i>
16. Macroseta on leg IV spatulate	...	...	<i>rachela</i>
— Macroseta on leg IV not spatulate	...	...	17
17. z_4 $1\frac{1}{2}$ times as long as z_2	...	...	<i>wainsteini</i>
— z_4 and z_2 almost equal	...	...	<i>corniger</i>

507. *Phytoseius (Phytoseius) bandipurensis* Gupta

Phytoseius (Dubininellus) bandipurensis Gupta, 1980, *Bull. Zool. Surv. India*, 3 (1 & 2) : 53-54.

Diagnosis : Dorsal shield heavily sculptured with 15 pairs of setae.

Measurements of setae : j_1 -24, j_3 -28, z_2 , z_4 -8 each, z_3 -28, s_4 -88, s_6 -56, Z_5 -63, Z_4 -72, r_3 -36. Ventrianal shield short, lateral margins deeply concave, with 3 pairs of preanal setae. Spermatheca with long duct and Y-shaped cervix. Fixed digit of chelicera with 2 teeth, none on movable digit. Macrosetae on leg IV : genu-18, tibia-40, basitarsus-16, distitarsus-20, all spatulate.

Habitat : Undet. plant.

Distribution : INDIA : Karnataka.

Remarks : No economic importance of this species is known.

508. *Phytoseius (Phytoseius) corniger* Wainstein

Phytoseius (Dubininellus) corniger Wainstein, 1959, *Zool. Zh.*, 38 : 1362-1364.

Phytoseius (D.) corniger, Gupta, 1981, *Indian J. Acar.*, 5 (1-2) : 45-46.

Diagnosis : Dorsal shield rugose, with 15 pairs of setae. Measurements of setae : j_1 -28, j_3 -48, z_3 -32, z_2 , z_4 -12 each, s_4 -128, s_6 -72, Z_5 -64, Z_4 -84. Ventrianal shield elongate, narrow, lateral margins deeply concave with 3 pairs of preanal setae. Fixed digit of chelicera with 3 teeth, movable digit with one tooth. Spermatheca with elongated cervix and a fairly long and broad duct. Macrosetae on leg IV : tibia-34, basitarsus-25.

Habitat : Guava ; outside India : *Malus pumila*.

Distribution : INDIA : Jammu & Kashmir ; outside India : U. S. S. R., Pakistan.

Remarks : No economic importance of this species is known.

509. *Phytoseius (Phytoseius) crinitus* Swirski & Shechter

Phytoseius (Dubininellus) crinitus Swirski & Shechter, 1961, *Israel J. agric. Res.*, 11 : 102-104.

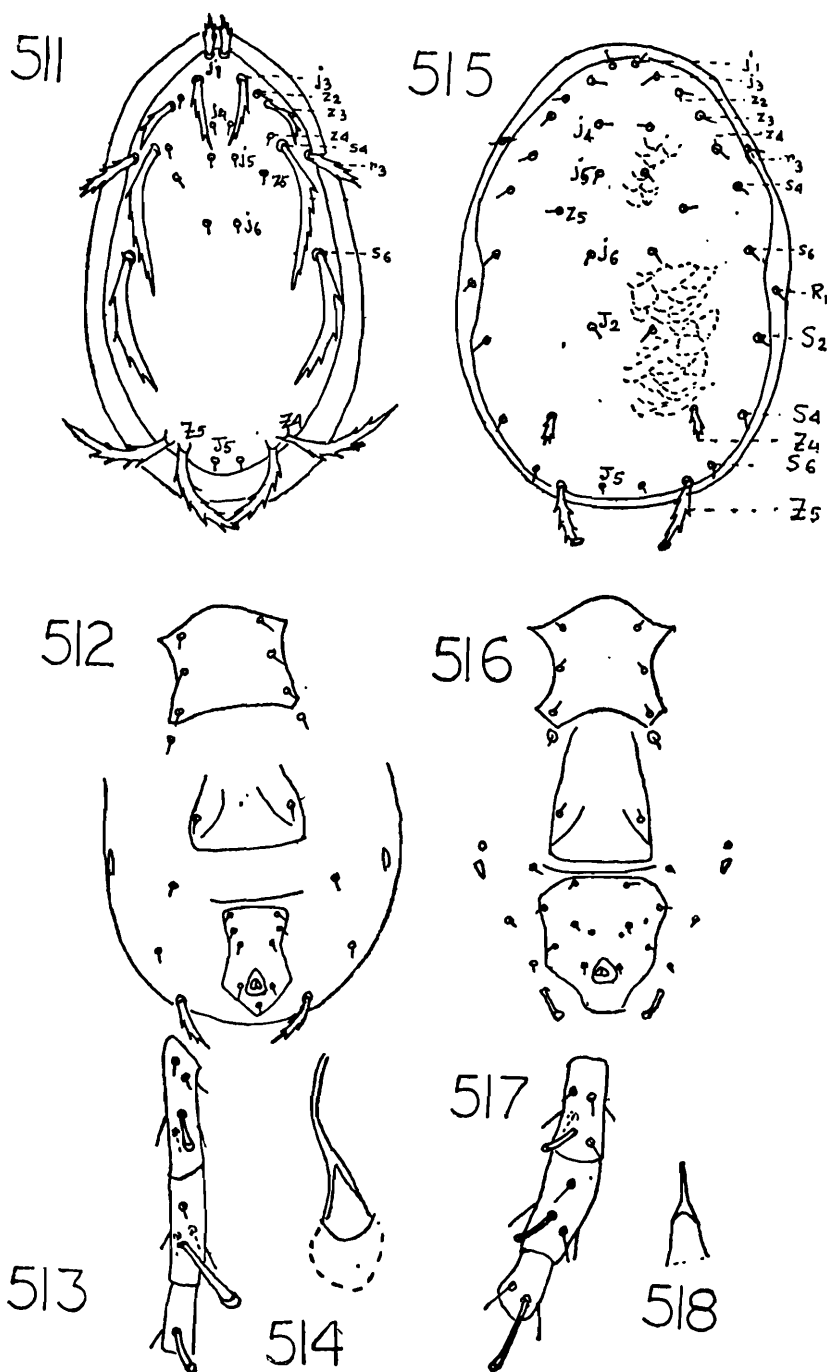
Phytoseius (Phytoseius) crinitus, Ray & Gupta, 1983, *Bull. Zool. Surv. India*, 80 : 303-304.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -29, j_3 -40, z_2 -18, z_3 -31, z_4 -11, s_4 -101, s_6 -67, Z_5 -65, Z_4 -83, r_3 -38. Setae s_4 and Z_4 large, flat and divided. Ventrianal shield longer (90) than wide (56), with 3 pairs of preanal setae. Chelicera with 3 teeth on fixed digit and one on movable digit. Macrosetae on leg IV : genu-31, tibia-50, basitarsus-27, distitarsus-22, all spatulate,

Habitat : Undet. plant ; outside India : *Homalium conchinchinense*, *Psidium guajava*, *Ficus hirta*, *Celtis chinensis*, *Rhodomyrtus tomentosus*.

Distribution : INDIA : Assam ; outside India : Hong Kong.

Remarks : This has no economic importance.



Figs. 511-514 : *Phytoseius (Phytoseius)* sp. : 511—Dorsum, 512—Ventral surface, 513—Genu, tibia and basitarsus of leg IV, 514—Spermatheca.

Figs. 515-518 : *Typhlodromus (Amblydromella)* sp. : 515—Dorsum, 516—Ventral surface, 517—Genu, tibia and basitarsus of leg IV, 518—Spermatheca.

510. *Phytoseius (Phytoseius) intermedius* Evans & Macfarlane

Phytoseius (Dubininellus) intermedius Evans & Macfarlane, 1962, *Ann. Mag. Nat. Hist.*, (13) 4 : 587-588.

Phytoseius (D.) intermedius, Gupta, 1970, *Sci. & Cult.*, 36 : 98.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -22, j_3 -22, z_2 -18, z_3 -31, z_4 -13, s_4 -54, s_6 -72, Z_5 -54, Z_4 -76 ; other setae small. Ventrianal shield 76 long, 45 wide, with 3 pairs of preanal setae. Macroseta absent on leg IV.

Habitat : Undet. plant.

Distribution : INDIA : West Bengal ; outside India : Pakistan, Central Africa, South Rhodesia, Belgian Congo, Madagascar, Japan.

Remarks : The economic importance of this species is not known.

511. *Phytoseius (Phytoseius) jaunpurensis* Gupta

Phytoseius (Dubininellus) jaunpurensis Gupta, 1982, *Rec. Zool. Surv. India*, 79 : 367-368.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -25, j_3 -60, z_2 -12, z_3 -36, z_4 -12, s_4 -100, s_6 -100, Z_5 -66, Z_4 -70. Ventrianal shield 72 long, 48 wide, lateral margins deeply concave, with 3 pairs of preanal setae. Macrosetae on leg IV : genu-16, tibia-36, basitarsus-22.

Habitat : Undet. plant.

Distribution : INDIA : Uttar Pradesh.

Remarks : It is of no known economic importance. This species is likely to be the same as *P. (P.) punjabensis* Gupta.

512. *Phytoseius (Phytoseius) jujuba* Gupta

Phytoseius (Dubininellus) jujuba Gupta, 1977, *Indian J. Acar.*, 1 : 13.

Diagnosis : Dorsal shield with 15 pairs of setae, all being minute except j_3 , z_3 , s_4 , Z_5 , Z_4 , r_3 , which measure : 36, 33, 66, 69, 72, and 40, respectively. Ventrianal shield longer (68) than wide. Spermatheca with flask shaped cervix and elongate duct. Macrosetae on leg IV : genu-nil, tibia-36, basitarsus-20.

Habitat : *Zizyphus jujuba*.

Distribution : INDIA : Gujarat.

Remarks : It is of no known economic importance.

513. *Phytoseius (Phytoseius) macropilis* (Banks)

Sejus macropilis Banks, 1909, *Proc. Ent. Soc. Wash.*, 11 : 135.

Phytoseius macropilis, Narayanan, Kaur & Ghai, 1960, *Proc. Nat. Ins. Sci.*, 26B : 386-387.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -25, j_3 -36, z_2 -5, z_3 -25, z_4 -5, s_4 -100, s_6 -76, Z_5 -70, r_3 -44. Ventrianal shield elongated, vase shaped, lateral margins concave, 80 long, 52 wide, with 3 pairs of preanal setae. Macrosetae on leg IV : genu-22, tibia-48, basitarsus-32.

Habitat : *Ficus* sp., *Lantana camara*, *Morus alba*, *Shorea robusta*.

Distribution : INDIA : Delhi, Orissa ; outside India : Georgian SSR., Kazakh SSR., Tadjik SSR., Europe, England, Canary Isl, Canada, U. S. A., Mexico, Panama, British West Indies, Hawaii, Australia.

Remarks : No economic importance of this species is known.

514. *Phytoseius (Phytoseius) macrosetosus* Gupta

Phytoseius (Dubininellus) macrosetosus Gupta, 1977, *Indian J. Acar.*, 1 ; 15-16.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -20, j_3 -36, z_2 -16, z_3 -32, z_4 -24, s_4 -62, s_6 -64, Z_5 -50, Z_4 -52. Ventrianal shield 56 long, 40 wide, with 3 pairs of preanal setae, lateral sides concave. Macrosetae on leg IV : genu-nil, tibia-16, basitarsus-20, all with spatulate tip.

Habitat : Rose, Kendu.

Distribution : INDIA : Madhya Pradesh.

Remarks : No economic importance of this species is known.

515. *Phytoseius (Phytoseius) meyeræ* Gupta

Phytoseius (Dubininellus) meyeræ Gupta, 1977, *Indian J. Acar.*, 2 (1) : 7.

Diagnosis : Dorsal shield with 15 pairs of setae. Measurements of setae : j_1 -20, j_3 -20, z_2 -12, z_3 -20, z_4 -20, s_4 -44, s_6 -60, Z_5 -37, r_3 -28, Z_4 -33. Ventrianal shield 72 long, 50 wide, with 3 pairs of preanal setae. Fixed digit of chelicera with 3 teeth, movable digit with 1 tooth. Macrosetae on leg IV : genu-7, tibia-36, basitarsus-20.

Habitat : Undet. plant, banana.

Distribution : INDIA : Assam, Meghalaya.

Remarks : No economic importance of this species is known.

516. *Phytoseius (Phytoseius) mixtus* Chaudhri

Phytoseius (Phytoseius) mixtus Chaudhri, 1973, *Pak. J. Zool.*, **5** : 83-85.

Phytoseius (Phytoseius) mixtus, Ray & Gupta, 1983, *Rec. Zool. Surv. India*, **80** : 301-302.

Diagnosis : Dorsal shield rugose, with 15 pairs of setae and a few pairs of pores. Measurements of setae : j_1 -29, j_3 -56, z_2 -16, z_3 -36, z_4 -20, s_4 -130, s_8 -78, Z_5 -72, Z_4 -95 ; other setae small. Macrosetae on leg IV : tibia-56, basitarsus-31, distitarsus-31.

Habitat : Grass ; outside India : *Morus alba*.

Distribution : INDIA : Uttar Pradesh ; outside India : Pakistan.

Remarks : No economic importance of this species is known.

517. *Phytoseius (Phytoseius) neglecta* Gupta

Phytoseius (Dubininellus) neglecta Gupta, 1969, *Israel J. agric. Res.*, **19** : 117-119.

Diagnosis : Dorsal shield 299 long, 145 wide, with 15 pairs of setae. Measurements of setae : j_1 -27, j_3 -27, z_3 -29, s_4 -72, s_8 -72, Z_5 -50, Z_4 -65, r_3 -36 ; other setae small. Ventrianal shield twice as long as broad, with 3 pairs of preanal setae. Spermatheca with cup-shaped cervix. Macrosetae on leg IV : genu-18, tibia-40, basitarsus-18.

Habitat : *Saraca indica*.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known. This species appears to be same as *P. (P.) indicus* Bhattacharyya (1969).

518. *Phytoseius (Phytoseius) neocorniger* Gupta

Phytoseius (Dubininellus) neocorniger Gupta, 1977, *Indian J. Acar.*, **1** : 13-15.

Diagnosis : Dorsal shield highly sclerotized with 15 pairs of setae. Measurements of setae : j_1 -28, j_3 -44, z_2 -12, z_3 -33, z_4 -12, s_4 -120, s_6 -80, Z_5 -70, Z_4 -75, r_3 -40. Ventrianal shield 60 long, 40 wide, constricted at preanal level, with 3 pairs of preanal setae. Spermatheca with tubular flask shaped cervix. Macrosetae on leg IV : genu-nil, tibia-40, basitarsus-26.

Habitat : *Lantana camara*.

Distribution : INDIA : Rajasthan.

Remarks : No economic importance of this species is known.

519. **Phytoseius (Phytoseius) punjabensis** Gupta

Phytoseius (Dubininellus) punjabensis Gupta, 1977, *Indian J. Acar.*, 1 : 16.

Diagnosis : Dorsal shield with 15 pairs of setae. Setae j_1 , j_3 , z_3 , s_4 , s_6 , Z_5 and Z_4 being long, thick and serrate ; other setae small. Ventrianal shield 76 long, 98 wide, with 3 pairs of preanal setae, Spermatheca with elongated flask shaped cervix. Macrosetae on leg IV : genu-16, tibia-36, basitarsus-24.

Habitat : Fig.

Distribution : INDIA : Punjab.

Remarks : No economic importance of this species is known.

520. **Phytoseius (Phytoseius) rachelae** Swirski & Shechter

Phytoseius (Dubininellus) rachelae Swirski & Shechter, 1961, *Israel J. agric. Res.*, 11 : 108-109.

Phytoseius (Dubininellus) rachelae, Gupta, 1980, *Bull. Zool. Surv. India*, 3 (1 & 2) : 52.

Diagnosis : Dorsal shield with 15 pairs of setae ; $j_1 = j_3$, s_4 -longest ; s_6 greater than Z_5 and the latter greater than Z_4 . Measurements of setae : j_1 -28, j_3 -28, z_2 -8, z_3 -20, z_4 -14, s_4 -100, s_6 -80, Z_5 -76, Z_4 -64 ; r_3 -40. ; other setae-small. Ventrianal shield 64 long, 44 wide, with 3 pairs of preanal setae. Spermatheca with Y-shaped cervix. Leg IV with macrosetae on genu-12, tibia-48, basitarsus-20, all spatulate.

Habitat : *Hibiscus* sp.

Distribution : INDIA : Karnataka ; outside India : Hong Kong.

Remarks : No economic importance of this species is known.

521. **Phytoseius (Phytoseius) roseus** Gupta

Phytoseius (Dubininellus) roseus Gupta, 1969, *Israel J. agric. Res.*, 19 : 119-120.

Diagnosis : Dorsal shield with 15 pairs of setae, rugose. Measurements of setae : j_1 -27, j_3 -40, z_3 -31, s_4 -108, s_6 -70, Z_5 -81, Z_4 -81, r_3 -45. Ventrianal shield 81 long, 50 wide, with 3 pairs of preanal setae. Macrosetae on leg IV : tibia-36, basitarsus-22, distitarsus-27, those of the first two segments being spatulate.

Habitat : Rose, milk weed, *Zizyphus*, fig.

Distribution : INDIA : West Bengal, Gujarat, Punjab.

Remarks : It is of no known economic importance.

522. *Phytoseius (Phytoseius) swirskii* Gupta

Phytoseius (Phytoseius) swirskii Gupta, 1980, *Ent. Mon. Mag.*, **115** : 210-212.

Diagnosis : Dorsal shield rugose, with 15 pairs of setae. Measurements of setae : j_1 -20, j_3 -25, z_3 -26, z_4 -12, s_4 -70, s_6 -70, Z_5 -58, Z_4 -47, r_3 -32 ; all being thick and serrate ; other setae being tiny. Ventrianal shield longer (82) than broad (45), with 3 pairs of preanal setae. Metapodal plates one paired. Macrosetae on leg IV : genu-11, tibia-36, basitarsus-21, all being spatulate.

Habitat : *Ficus* sp.

Distribution : INDIA : West Bengal.

Remarks : It has no known economic importance.

523. *Phytoseius (Phytoseius) rugosus* Denmark

Phytoseius (Dubininellus) rugosus Denmark, 1966, *Bull. Fla. Dep. Agri.*, **6** : 100.

Phytoseius (Dubininellus) rugosus, Gupta, 1977, *Indian J. Acar.*, **2** : 7-9.

Diagnosis : (Male) : Dorsal shield rugose, 200 long, 155 wide, with 15 pairs of setae. Measurements of setae : j_1 -19, j_3 -18, z_3 -24, s_4 -45, s_6 -29, Z_5 -26, Z_4 -26 ; other setae small. Macrosetae on leg IV : genu-6 (peg like), tibia-7, basitarsus-20.

Habitat : *Terminalia arjuna*.

Distribution : INDIA : Orissa ; outside India : Pakistan.

Remarks : This mite is known by male only. No economic importance of this species is known.

524. *Phytoseius (Phytoseius) wainsteini* Gupta

Phytoseius (Dubininellus) wainsteini Gupta, 1981, *Indian J. Acar.*, **5** (1-2) : 43-44.

Diagnosis : Dorsal shield rugose with 15 pairs of setae : j_1 -30, j_3 -56, z_2 -16, z_3 -32, z_4 -28, s_4 -124, s_6 -68, Z_5 -72, Z_4 -84, r_3 -36 ; Z_4 thicker than Z_5 . Ventrianal shield elongated, 80 long, 40 wide, with 3 pairs of preanal setae. Macrosetae on leg IV : genu-14, tibia-60, basitarsus-32.

Habitat : Uudet. plant, dahlia.

Distribution : INDIA : Jammu & Kashmir.

Remarks : No economic importance of this species is known.

525. *Phytoseius (Phytoseius) woodburyi* DeLeon

Phytoseius (Phytoseius) woodburyi DeLeon, 1965, *Fla. Ent.*, **48** : 130.

Phytoseius (Dubininellus) woodburyi, Gupta, 1970, *Sci. & Cult.*, **36** : 98.

Diagnosis : Dorsal shield with 15 pairs of setae ; setae j_1 , j_3 , z_3 , s_4 ,

s_6 , Z_5 , Z_4 and r_3 being thick, long and serrate measuring, 26, 30, 30, 126, 75, 70, 60 and 59, respectively ; others being small. Ventrianal shield 90 long, 49 wide, with 3 pairs of preanal setae. Metapodal plates single paired. Spermatheca with broad cervix and knobbed atrium. Macrosetae on leg IV : genu-12, tibia-45, basitarsus-22.

Habitat : *Polygonum molle*.

Distribution : INDIA : West Bngal ; outside India : Puerto Rico.

Remarks : It is of no known economic importance.

Genus *Typhlodromus* Scheuten

(Figs. 515-536)

Typhlodromus Scheuten, 1857, *Arch. Naturges*, 23 : 111.

Key to the Subgenera of *Typhlodromus*

1. Dorsal shield with 11 pairs of setae	...	...	<i>Typhloctomus</i>
— Dorsal shield with less than 11 pairs of setae	...	...	2
2. Dorsal shield with 10 pairs of setae	...	...	3
— Dorsal shield with less than 10 pairs of setae	...	...	<i>Brethria</i>
3. 3 pairs of median setae	...	...	<i>Paraseiulus</i>
— 2 pairs of median setae	...	...	4
4. Most of the lateral setae plumose	...	...	<i>Clavidromus</i>
— Most of the lateral setae not plumose, only a few may be serrate	...	...	5
5. Z_5 and Z_4 knobbed	...	...	<i>Amblydromella</i>
— Z_5 and Z_4 not knobbed	...	...	6
6. Some of the lateral setae much longer than others, macrosetae normally present on genu, tibia and basitarsus of leg IV (except <i>T. (O.) channabasavanni</i>)	...	...	<i>Orientiseius</i>
— None of the lateral setae greatly longer than others ; macrosetae present on basitarsus IV only	...	...	<i>Typhlodromus</i> s. str.

Subgenus *Amblydromella* Muma

(Figs. 515-518)

Amblydromella Muma, 1961, *Bull. Fla. St. Mus.*, 5 (7) : 294.

Key to the Species of Amblydromella

1. Z_5 knobbed	...	...	2
— Z_5 simple	...	...	9
2. Macroseta present only on basitarsus IV	...	...	3
— Macrosetae present on other leg segments besides basitarsus IV	...	...	6
3. s_4 longer than z_4	...	...	<i>himalayensis</i>
— s_4 as long as z_4	...	...	4
4. Z_4 almost as long as Z_5	...	...	<i>bakeri</i>
— Z_4 longer than Z_5	...	...	5
5. Macroseta on basitarsus IV knobbed	...	...	<i>homalii</i>
— Macroseta on basitarsus IV simple	...	...	<i>rhenanus</i>
6. Macrosetae present on genu, tibia and basitarsus of leg IV	...	...	7
— Macrosetae present on genu, and basitarsus of leg IV, absent on tibia IV	...	...	<i>mori</i>
7. Ventrianal shield much longer than wide	...	...	<i>fleschneri</i>
— Ventrianal shield only slightly longer than wide	...	...	8
8. Spermatheca corniform	...	...	<i>eharai</i>
— Spermatheca sacculiform	...	...	<i>bambusicolus</i>
9. Setae comparatively long, Z_4 exceeds beyond the base of Z_5	...	...	10
— Setae comparatively shorter, Z_4 never reaches upto the base of Z_5	...	...	11
10. Spermatheca funnel shaped	...	...	<i>gopali</i>
— Spermatheca more or less saccular	...	...	<i>divergentis</i>
11. Macroseta on basitarsus IV knobbed	...	...	12
— Macroseta on basitarsus IV simple	...	...	<i>rhododendronis</i>
12. Cervix of spermatheca very narrow and elongate	...	...	<i>chrysanthemi</i>
— Cervix of spermatheca wide, as much as 1/2 its length	...	...	<i>kodaikanalensis</i>

526. *Typhlodromus* (*Amblydromella*) *bakeri* (Garman)

Seiulus bakeri Garman, 1948, *Bull. Conn. Agr. Exp. Sta.*, 520 : 15.

Typhlodromus (*Typhlodromus*) *bakeri*, Narayanan, Kaur & Ghai, 1960, *Proc. Nat. Inst. Sci. India*, 26B : 389-390.

Diagnosis : Dorsal shield heavily sclerotized, with 18 pairs of setae, Z_5 longest-46, j_1 -16, z_2 -17, z_3 -18, z_4 -20, s_4 -21, s_6 -24, S_2 -26, S -31,

S_5 -32 (serrate), Z_4 -29. Sternal shield with 2 pairs of setae, 3rd pairs on interscutal membrane. Ventrianal shield pentagonal, reticulate with 4 pairs of preanal setae and a pair of pores. ; 2 pairs of metapodal plates present. Spermatheca with elongate cervix. Leg IV with macroseta on basitarsus IV.

Habitat : Grape vines, litchi.

Distribution : INDIA : West Bengal, Delhi, ; outside India : Europe, Canada, Australia, New Zealand.

Remarks : The record of this species appears to be doubtful.

527. *Typhlodromus* (*Amblydromella*) *bambusicolus* Gupta

Typhlodromus bambusicolus Gupta, 1977, *Indian J. Acar.*, 2(1) : 2-4.

Diagnosis : Dorsal shield well sclerotized, reticulate, with 18 pairs of setae. Measurements of setae : j_1 -12, j_4 - j_5 -10-11 each, j_6 -16, J_2 -20, J_5 -8, j_3 -15, z_2 -12, z_3 -12, z_4 -16, s_4 -16, s_6 -20, S_2 -20, S_4 -22, S_5 -12, Z_5 -49 (serrate), z_5 -14, Z_4 -24 (serrate). Sternal, metasternal and genital shields normal. Ventrianal shield pentagonal, 76 long, 72 wide, with 3 pairs of preanal setae and a pair of pores. Spermatheca with broad, tubular cervix. Macrosetae on leg IV : genu-8, tibia-12, basitarsus-20, all with bulging tip.

Habitat : Bamboo, citrus.

Distribution : INDIA : Assam.

Remarks : No economic importance of this species is known.

528. *Typhlodromus* (*Amblydromella*) *chrysanthemi* Gupta

Typhlodromus chrysanthemi Gupta, 1977, *Indian J. Acar.*, 1 : 11-12.

Diagnosis : Dorsal shield reticulate, 312 long, 200 wide, with 18 pairs of setae. mostly thin and small except Z_4 and Z_5 which are thick and serrate. Measurements of setae : j_1 -22, j_4 -20, j_5 -20, j_6 -20, J_2 -25, J_5 -8, j_3 -18, z_2 -20, z_3 -20, z_4 -22, s_4 -26, s_6 -28, S_2 -29, S_4 -32, S_5 -18, Z_5 -48, z_5 -20, Z_4 -33. Ventrianal shield 108 long, 80 wide, lateral margins concave at preanal region with 4 pairs of preanal setae and a pair of preanal pores. Spermatheca with elongated cervix. Macroseta on basitarsus IV-28.

Habitat : *Chrysanthemum* sp.

Distribution : INDIA : Gujarat.

Remarks : No economic importance of this species is known.

**529. *Typhlodromus (Amblydromella) divergentis*
(Chaudhri, Akbar & Rasool)**

Amblydromella divergentis Chaudhri et al., 1974, pp. 217-220.

Typhlodromus divergentis, Dhooria, 1982, *Acar. Newsl.*, 11 : 6.

Diagnosis : Dorsal shield with 18 pairs of setae. Measurements of setae : j_1 -20, j_4 -20, j_5 -20, j_6 -24, J_2 -28, J_5 -8, j_3 -25, z_2 -19, z_3 -29, z_4 -28, s_4 -30, s_6 -40, S_2 -47, S_4 -44, S_5 -9, Z_5 -47, z_5 -20, Z_4 -48. Ventrianal shield longer (92) than broad. Spermatheca funnel shaped. Leg IV with macroseta on basitarsus IV.

Habitat : Undet. plant ; outside India : Chaudhri *et al.* (1974) recorded a number of plants wherefrom this species was collected in Pakistan.

Distribution : INDIA : Punjab ; outside India : Pakistan.

Remarks : No economic importance of this species is known.

530. *Typhlodromus (Amblydromella) eharai* Gupta

Typhlodromus eharai Gupta, 1980, *Ent. Mon. Mag.*, 115 : 209-210.

Diagnosis : Dorsal shield reticulate, with 18 pairs of setae. Measurements of setae : j_1 -10, j_4 - j_5 -11 each, j_6 -15, J_2 -18, J_5 -9, j_3 -14, z_2 -12, z_3 -13, z_4 -15, s_4 -17, s_6 -20, S_2 -22, S_4 -22, S_5 -19, Z_5 -40 (serrate, knobbed), z_5 -12, Z_4 -21 (serrate). Ventrianal shield slightly longer than wide, with 4 pairs of preanal setae and a pair of rounded pores. Metapodal plates 2-paired. Macrosetae on leg IV : genu-8, tibia-15, basitarsus-29.

Habitat : Cassia, coffee.

Distribution : INDIA : West Bengal, Karnataka, Tamil Nadu.

Remarks : Gupta (1978) reported this mite associated with *O. coffeae* but it did not feed on it.

531. *Typhlodromus (Amblydromella) fleschneri* Chant

Typhlodromus fleschneri Chant, 1960, *Can Ent.*, 92 : 60-62.

Diagnosis : Dorsal shield 338 long, 195 wide, reticulate, with 18 pairs of setae. Measurements of setae : j_1 - j_6 -20 each, J_2 -25, J_5 -10, j_3 , z_2 - z_4 , s_4 - s_6 -32 each, S_2 -32, S_4 -36, S_5 -16, Z_5 -44 ; Z_5 and Z_4 with bulbous tip. Ventrianal shield longer (94) than broad (68), with 4 pairs of preanal setae. Spermatheca with bell shaped cervix. Macrosetae on leg IV : genu-16, tibia-19, basitarsus-24,

Habitat : Citrus, cotton.

Distribution : INDIA : Assam, Meghalaya, Karnataka, West Bengal.

Remarks : It is of unknown economic importance.

532. *Typhlodromus (Amblydromella) gopali* Gupta

Typhlodromus gopali Gupta, 1969, *Sci. & Cult.*, 35 : 277.

Diagnosis : Dorsal shield with 18 pairs of setae. Measurements of setae : j_1 -19, j_4 -22, j_5 -22, j_6 -31-34, J_2 -40, J_5 -9, j_3 -37, z_2 -18, z_3 -24, z_4 -27, s_4 -36, s_6 -45, S_2 -52, S_4 -52, S_5 -6, Z_5 -56, z_5 -22, Z_4 -55. Sternal, metasternal and genital shields normal. Ventrianal shield 100 long, 63 wide, with 4 pairs of preanal setae and a pair of preanal pores ; metapodal plates 2 paired. Spermatheca with funnel shaped cervix. Macrosetae on basitarsus IV-27 long.

Habitat : Palm.

Distribution : INDIA : West Bengal.

Remarks : It is of no known economic importance.

533. *Typhlodromus (Amblydromella) himalayensis* Gupta

Typhlodromus himalayensis Gupta, 1981, *Indian J. Acar.*, 5 : 32-33.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae. Measurements of setae : j_1 -12, j_4 -10, j_5 -12, j_6 -16, J_2 -16, J_5 -8, j_3 -14, z_2 -14, z_3 -15, z_4 -16, s_4 -20, s_6 -24, S_2 -24, S_4 -25, S_5 -17, Z_5 -40 (serrate, knobbed), z_5 -16, Z_4 -24. Ventrianal shield 108 long, 68 wide, with 4 pairs of preanal setae. Spermatheca with bell shaped cervix. Macrosetae on leg IV : basitarsus-34 (knobbed).

Habitat : Pear.

Distribution : INDIA : Himachal Pradesh.

Remarks : It is of no known economic importance.

534. *Typhlodromus (Amblydromella) homalii* Gupta

Typhlodromus homalii Gupta, 1970, *Oriental Ins.*, 4 : 188-189.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae, Z_4 and Z_5 serrate and the latter with bulging tip. Measurements of setae : j_1 - j_6 -18-20 each, J_2 -22, J_5 -9, j_3 , z_2 - z_4 -18-20 each, s_4 , s_6 , S_2 - S_4 -25-27 each, S_5 -18, Z_5 -45, z_5 -18, Z_4 -29. Sternal, metasternal and genital shields normal. Ventrianal shield pentagonal, lateral sides concave, 103 long,

75 wide, with 4 pairs of short preanal setae. Metapodal plates 2 paired. Macrosetae on leg IV : basitarsus-15 (with bulbous tip).

Habitat : *Homalium tomentosum*, *Zizyphus* sp., *Ficus bengalensis*, arum, citrus.

Distribution : INDIA : West Bengal, Punjab, Orissa, Meghalaya, Kerala, Tamil Nadu.

Remarks : Gupta (1978) reported this mite feeding on the eggs of *Oligonychus* sp. infesting an unknown shrub in Trivendrum.

535. *Typhlodromus (Amblydromella) kodaikanalensis* Gupta

Typhlodromus kodaikanalensis Gupta, 1978, *Bull. Zool. Surv. India*, 1 : 47-49.

Diagnosis : Dorsal shield reticulate, with 18 pairs of setae, Z_6 thickest and serrate, other setae smooth and simple. Measurements of setae : j_1 -21, j_4 - j_6 -16 each, J_2 -20, J_5 -6, j_3 -20, z_2 -20, z_3 -20, z_4 -20, s_4 -24, s_6 -28, S_2 -28, S_4 -28, S_5 -16, Z_5 -48, z_5 -16, Z_4 -28. Sternal, metasternal and genital shields, normal. Ventrianal shield 92 long, 76 wide, with 4 pairs of preanal setae and a pair of pores ; metapodal plates 2 paired. Spermatheca with flask shaped cervix. Macroseta only on basitarsus IV : 40 long.

Habitat : Pear.

Distribution : INDIA : Tamil Nadu.

Remarks : Gupta (1978) reported this mite associated with *Tetranychus* sp. which infested pear. Adults of this species chased the juvenile forms of the prey but feeding was not observed.

536. *Typhlodromus (Amblydromella) mori* Gupta

Typhlodromus mori Gupta, 1981, *Indian J. Acar.*, 5(1-2) : 39-40.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae. Measurements of setae : j_1 -12, j_4 - j_6 -16 each, J_2 -20, J_5 -8, j_3 -24, z_2 -16, z_3 -20, z_4 -20, s_4 -24, s_6 -24, S_2 - S_4 -27 each, S_5 -20, Z_5 -44, z_5 -16, Z_4 -28, r_3 -44, R_1 -16. Ventrianal shield longer (100) than broad (80), with 4 pairs of preanal setae ; 2 pairs of metapodal plates present. Spermatheca with wide flask shaped cervix. Macrosetae on leg IV : genu-10 (knobbed), basitarsus-36 (knobbed).

Habitat : Mulberry, apple.

Distribution : INDIA : Jammu & Kashmir.

Remarks : No economic importance of this mite is known.

537. *Typhlodromus* (*Amblydromella*) *rhenanus* (Oudemans)

Seiulus rhenanus Oudemans, 1905, *Tij. Ent.*, 48 : 78.

Typhlodromus (*Typhlodromus*) *rhenanus*, Narayanan & Ghai, 1964, *Proc. Nat. Inst. Sci. India*, 29B : 539-541.

Diagnosis : Dorsal shield imbricate with 18 pairs of setae. Ventrianal shield with 4 pairs of preanal setae and a pair of preanal pores. Macroseta present only on basitarsus IV.

Habitat : Citrus, mango.

Distribution : INDIA : Delhi, Punjab ; outside India : Israel, Georgian SSR., Europe, England, Canada, U. S. A.

Remarks : It was first reported in India in association with eriophyid mite on mango malformed twig. Subsequently, reports came about its feeding on *Brevipalpus californicus* (Gupta *et al.*, 1971).

538. *Typhlodromus* (*Amblydromella*) *rhododendronis* Gupta

Typhlodromus rhododendronis Gupta, 1978, *Bull. Zool. Surv. India*, 1(1) : 80.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae. Measurements of setae : j_1 -15, j_4 -15, j_5 -18, j_6 -20, J_2 -25, J_5 -8, j_3 -25, z_2 -16, z_3 -20, z_4 -20, s_4 -24, s_6 -25, S_2 -26, S_4 -32, S_5 -20, Z_5 -44, z_5 -20, Z_4 -36. Ventrianal shield 84 long, 60 wide, lateral margins concave with 4 pairs of preanal setae. Macroseta on leg IV : basitarsus-25 long.

Habitat : *Rhododendron* sp.

Distribution : INDIA : Karnataka.

Remarks : No economic importance of this species is known.

Subgenus **Brethria** Tuttle & Muma
(Figs. 519-520)

Brethria Tuttle & Muma, 1973, *Tech. Bull. Agr. Exp. Sta. Univ. Arizona*, 208 : 35.

Key to the Species of Brethria

1. Ventrianal shield very long, almost 2 times as long as wide	...	...	<i>roshanlali</i>
— Ventrianal shield only slightly longer than wide, lateral margins slightly concave	...	...	<i>confusus</i>

539. *Typhlodromus* (*Brethria*) *confusus* Narayanan, Kaur & Ghai

Typhlodromus (*Typhlodromus*) *confusus* Narayanan *et al.*, 1960, *Proc. Nat. Inst. Sci. India*, 26B : 392-393.

Diagnosis : Dorsal shield faintly reticulate, with 17 pairs of setae ; all setae smooth except Z_5 and Z_4 which are thick and serrate ; j_3 , z_3 , z_4 almost equal, S_2 and S_5 almost equal, z_2 shorter. Ventrianal shield longer than broad. No macroseta on leg IV.

Habitat : *Helianthus annuus*.

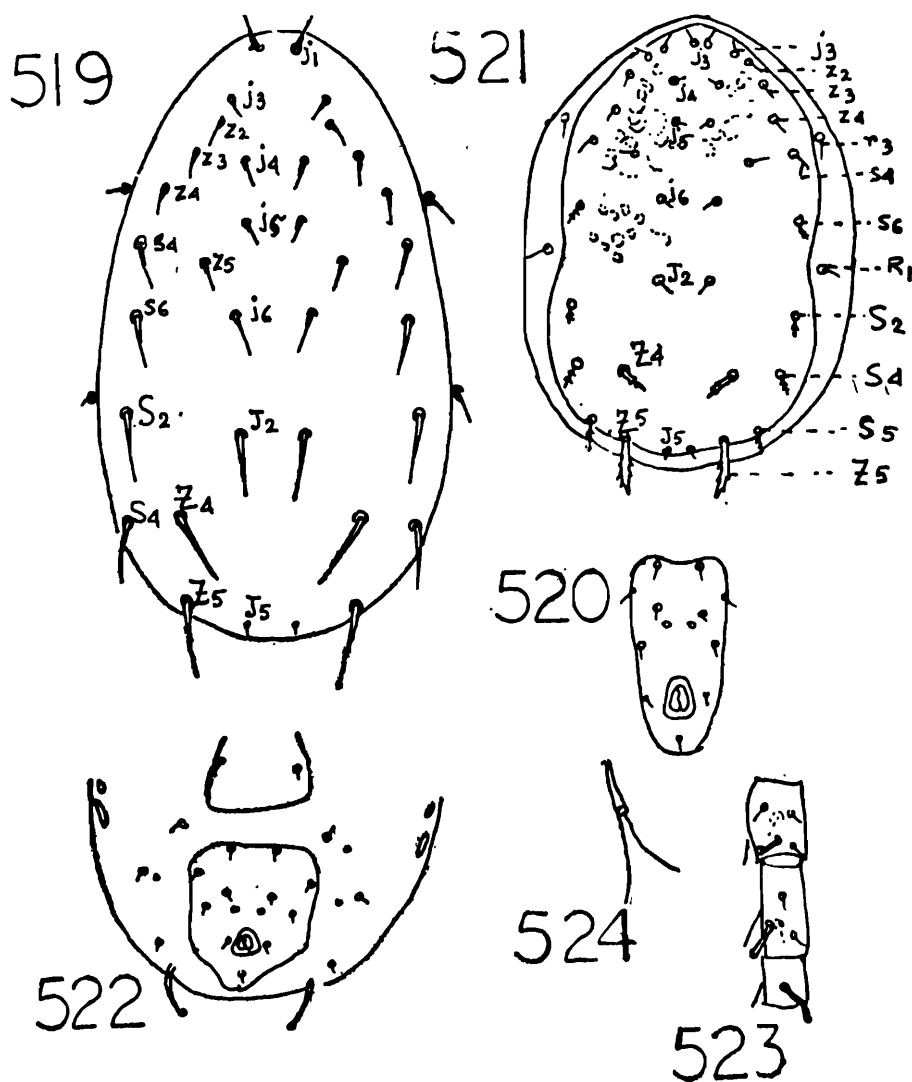
Distribution : INDIA : Delhi.

Remarks : Economic importance of this species is not known.

540. *Typhlodromus (Brethria) roshanlali* Narayanan & Ghai

Typhlodromous (Typhlodromus) roshanlali Narayanan & Ghai, 1964, *Proc. Nat. Inst. Sci. India*, 29B : 539.

Diagnosis : Dorsal shield reticulate with, 17 pairs of setae, all



Figs. 519-520 : *Typhlodromus (Brethria)* sp. : 519—Dorsum, 520—Ventrianal shield.

Figs. 521-524 : *Typhlodromus (Clavidromus)* sp. : 521—Dorsum, 522—Postventral surface, 523—Genu, tibia and basitarsus of leg IV, 524—Spermatheca.

being smooth. Measurements of setae : j_1 -24, j_4 -20, j_5 -20, j_6 -32, J_2 -44, J_5 -8, j_3 -16, z_2 -23, z_3 -31, z_4 -31, s_4 -35, s_6 -45, S_2 -50, S_4 -42, Z_5 -50, z_5 -20, Z_4 -56. Sternal, metasternal and genital shields normal. Ventrianal shield longer (124) than broad, with 4 pairs of preanal setae and a pair of preanal pores. Macroseta absent on leg IV.

Habitat : Mango.

Distribution : INDIA : Delhi.

Remarks : This mite was collected in association with an eriophyid mite.

Subgenus **Clavidromus** Muma
(Figs. 521-524)

Clavidromus Muma, 1961, *Bull. Fla. St. Mus.*, 5(7) : 296.

541. **Typhlodromus (Clavidromus) neotransvaalensis** Gupta

Typhlodromus neotransvaalensis Gupta, 1978, *Bull. Zool. Surv. India*, 1(1) : 49-50.

Diagnosis : Dorsal shield heavily sculptured, with 18 pairs of setae, all being weakly serrate. Measurements of setae : j_1 - j_6 , J_2 -16-20 each, J_5 -12, j_3 , z_2 - z_4 -18 each, s_4 -20, s_6 -24, S_2 -20, S_4 -24, S_5 -24, Z_5 -36, z_5 -18, Z_4 -28. Sternal, -metasternal and genital shields normal. Ventrianal shield 112 long, 92 wide, smooth, with 4 pairs of preanal setae ; 2 pairs of metapodal plates present. Macrosetae on leg IV : genu-16, tibia-20, basitarsus-26, all with flattened tip.

Habitat : *Casuarina equisetifolia*.

Distribution : INDIA : Tamil Nadu.

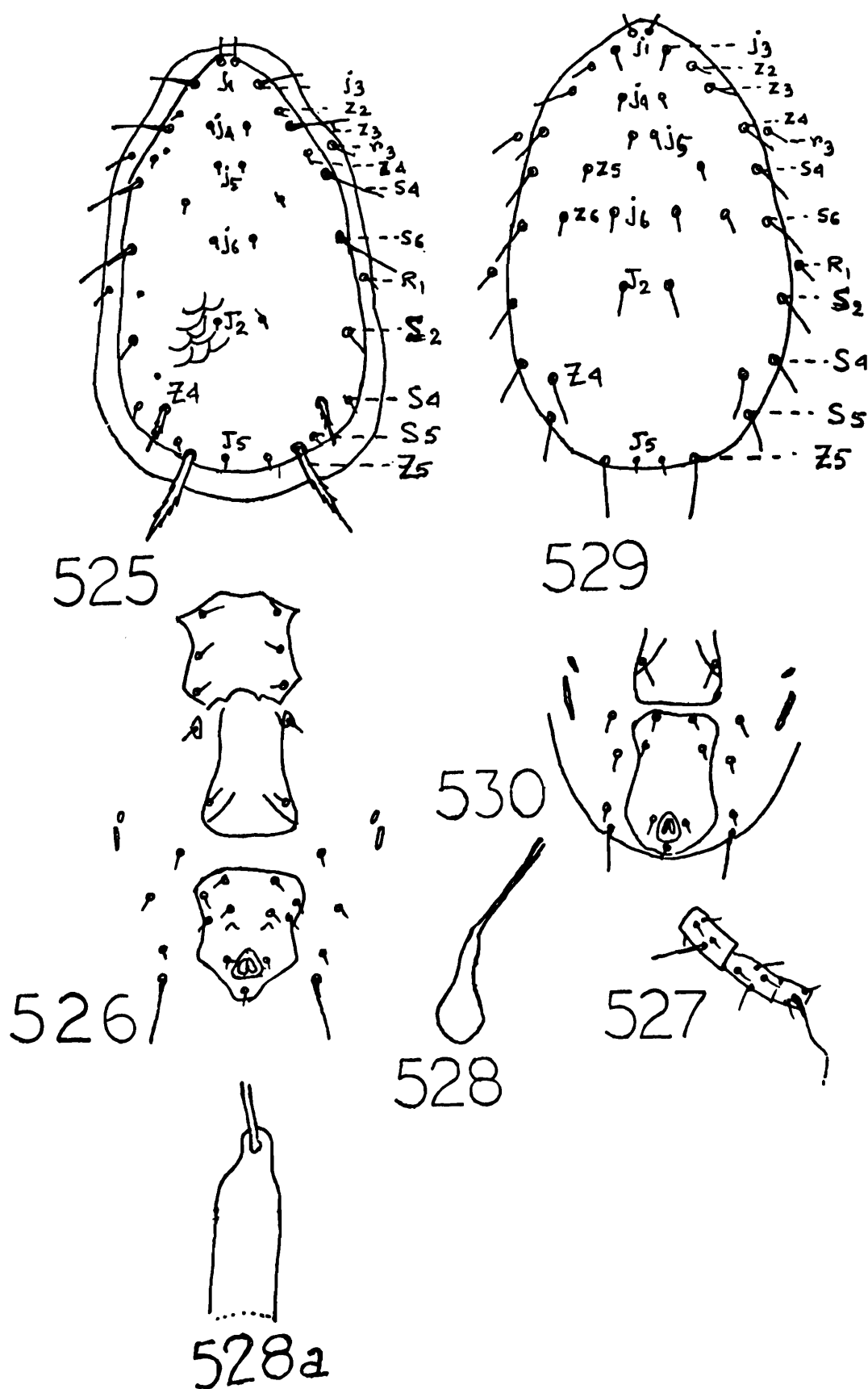
Remarks : No economic importance of this species is known.

Subgenus **Orientiseius** Muma & Denmark
(Figs. 525-528, 528a)

Orientiseius Muma & Denmark, 1968, *Fla. Ent.*, 51 : 238.

Key to the Species of Orientiseius

1. z_3 only 2 times as long as z_2	...	...	<i>manipurensis</i>
— z_3 over 3-4 times as long as z_2	...	...	2
2. Length of j_4 - j_6 vary between 8-10 microns	...	...	3
— Length of j_4 - j_6 vary between 26-60 microns	...	...	5
3. z_2 and z_4 equal	...	...	<i>pruni</i>
— z_2 and z_4 unequal	...	...	4



Figs .525-528 : *Typhlodromus (Orientiseius)* sp. : 525—Dorsum, 526— Ventral surface, 527—Genu, tibia and basitarsus of leg IV, 528—Spermatheca of *channabasavanni*, 528a—Spermatheca of *Kashmiricus*.
 Figs. 529-530 : *Typhlodromus (Paraseiulus)* sp. : 529—Dorsum, 530—Posterior ventral surface.

4. S_5 less than $1/2$ of S_2 , spermatheca as in fig. 528	...	...	<i>channabasavanni</i>
— S_5 more than $1/2$ of S_2 , spermatheca as in fig. 528a	...	...	<i>kashmiricus</i>
5. Ventrianal shield only slightly longer than wide	...	...	<i>orissaensis</i>
— Ventrianal shield about $1\frac{1}{2}$ times as long as wide	...	...	<i>rickeri</i>

542. Typhlodromus (Orientiseius) channabasavanni Gupta
(Fig. 528)

Typhlodromus channabasavanni Gupta, 1978, *Bull. Zool. Surv. India*, 1(1) : 50-52.

Diagnosis : Dorsal shield with 18 pairs of setae, all being smooth and pointed. Measurements of setae : j_1 -16, j_4 - j_5 -8 each, j_6 - J_2 -18 each, j_5 -6, j_3 -36, z_2 -8, z_3 -36, z_4 -8, s_4 -45, s_6 -48, S_2 -48, S_4 -32, S_5 -12, Z_5 -70, z_5 -8, Z_4 -56. Ventrianal shield much longer (100) than wide (72) with 4 pairs of preanal setae ; metapodal plates 2 paired. Spermatheca with funnel shaped cervix and bulbous atrium. Leg IV with macroseta on basitarsus IV-56.

Habitat : Tea.

Distribution : INDIA : Tamil Nadu.

Remarks : It has been reported in association with *Brevipalpus phoenicis*.

543. Typhlodromus kashmiricus Gupta
(Fig. 528a)

Typhlodromus kashmiricus Gupta, 1981, *Indian J. Acar.*, 5 : 37-38.

Diagnosis : Dorsal shield with 18 pairs of setae, measurements of setae : j_1 -22-23, j_4 -5-7, j_5 -5-8, j_6 -10-16, J_2 -14-16, J_5 -4-5, j_3 -36-43, z_2 -7-8, z_3 -49-53, z_4 -18-25, s_4 -45-56, s_6 -56-61, S_2 -43-53, S_4 -32-40, S_5 -29-35, Z_5 -68-74, z_5 -5-7, r_3 -27-29, R_1 -25. Ventrianal shield 100 long, 76 wide, with 4 pairs of preanal setae. Macrosetae on leg IV : genu-24-30, tibia-32-35, basitarsus-40-45.

Habitat : Rose.

Distribution : INDIA : Jammu & Kashmir.

Remarks : On re-examination of the type it appeared that this species may be the same as *T. (O.) hadii* (Chaudhri)

544. Typhlodromus (Orientiseius) manipurensis Gupta

Typhlodromus manipurensis Gupta, 1977, *Indian J. Acar.*, 2(1) : 1-2.

Diagnosis : Dorsal shield with 18 pairs of setae, all being small

and simple, Z_5 longest-52, other setae : j_1 -20, j_4 -8, j_5 -12, j_6 -16, J_2 -16, J_5 -6, j_3 -12, z_2 -8, z_3 -18, z_4 -18, s_4 -24, s_6 -32, S_2 -32, S_4 -24, S_5 -20, z_5 -12, Z_4 -32,. Sternal, metasternal and genital shields normal. Ventrianal shield longer (88) than wide (69), with 4 pairs of preanal setae and a pair of preanal pores. Spermatheca with thick broad cervix. Leg IV with macrosetae on genu-25, tibia-28, basitarsus-56.

Habitat : Undet. plant.

Distribution : INDIA : Manipur.

Remarks : No economic importance of this species is known.

545. *Typhlodromus (Orientiseius) orissaensis* Gupta

Typhlodromus orissaensis Gupta, 1977, *Indian J. Acar.*, 2(1) : 4-6.

Diagnosis : Dorsal shield with 11 pairs of setae, all being smooth and slender. Measurements of setae : j_1 -24, j_4 -26, j_5 -33, j_6 -48, J_2 -54, J_5 -5, j_3 -44, z_2 -6, z_3 -53, z_4 -24, s_4 -53, s_6 -64, S_2 -62, S_4 -40, S_5 -16, Z_5 -64, z_5 -12, Z_4 -56. Sternal and genital shields normal. Ventrianal shield 88 long, 76 wide, with 4 pairs of preanal setae, lateral margins of shield deeply concave ; 2 pairs of metapodal plates present. Spermatheca with thick long cervix. Macrosetae on leg IV : genu-10, tibia-14, basitarsus-36.

Habitat : Undet. plant.

Distribution : INDIA : Orissa.

Remarks ; No economic importance of this species is known.

546. *Typhlodromus (Orientiseius) pruni* Gupta

Typhlodromus pruni Gupta, 1970, *Oriental Ins.*, 4 : 189-190.

Diagnosis : Dorsal shield reticulated, with 18 pairs of setae. Measurements of setae : j_1 -27, j_4 -4, j_5 -5, j_6 -7, J_2 -9, J_5 -4, j_3 -36, z_2 -5, z_3 -45, z_4 -6, s_4 -45, s_6 -48, S_2 -27, S_4 -14, S_5 -9, Z_5 -76, z_5 -5, Z_4 -36. Sternal, metasternal and genital shields normal. Ventrianal shield 100 long, 72 wide, with 4 pairs of preanal setae and a pair of preanal pores. Macrosetae on leg IV : genu-40, tibia-27, basitarsus-46.

Habitat : Pear.

Distribution : INDIA : West Bengal.

Remarks : No economic importance of this species is known.

547. *Typhlodromus (Orientiseius) rickeri* Chant

Typhlodromus rickeri Chant, 1960, *Can. Ent.*, 92 : 62-64.

Diagnosis : Dorsal shield with 18 pairs of setae. Measurements of setae : j_1 -20, j_4 -12, j_5 -24, j_6 -24, J_2 -32, J_5 -6, j_3 -44, z_2 -8, z_3 -52, z_4 -10, s_4 -50, s_6 -66, S_2 -61, S_4 -36, S_5 -16, Z_5 -76, z_5 -8, Z_4 -60. Ventrianal shield 92 long, 64 wide, pentagonal with 4 pairs of preanal setae. Spermatheca with funnel shaped cervix. Macrosetae on leg IV : genu-32, tibia-28, basitarsus-48.

Habitat : Citrus, *Mahonea leschenaulti*, cashew nut, *Eucalyptus*, sp. *Dalbergia latifolia*.

Distribution : India : Andhra Pradesh, Karnataka, Nagaland, Kerala, Tamil Nadu, Meghalaya ; outside India : U. S. A. (introduced).

Remarks : This mite was seen associated with a tetranychid mite infesting *Dalbergia latifolia* at Ambuli Perai (Tamil Nadu) (Gupta, 1978).

Subgenus *Paraseiulus* Muma

(Figs. 529-530)

Paraseiulus Muma, 1961, *Bull. Fla. St. Mus.*, 5(7) : 299.

548. *Typhlodromus (Paraseiulus) neosoleiger* Gupta

Typhlodromus neosoleiger Gupta, 1981, *Indian J. Acar.*, 5(1-2) : 41-43.

Diagnosis : Dorsal shield reticulate with 19 pairs of setae. Measurements of setae : j_1 -23, j_4 -16, j_5 -16, j_6 -16, J_2 -16, J_5 -6, j_3 -20, z_2 -16, z_3 -18, z_4 -20, s_4 -20, s_6 -20, S_2 -20, S_4 -22, S_5 -20, Z_5 -36, z_5 -16, z_6 -16, Z_4 -24, r_3 -24, R_1 -20. Ventrianal shield 116 long, 68 wide, with 4 pairs of preanal setae ; a number of platelets present around ventrianal shield. Macroseta on leg IV : basitarsus-24.

Habitat : *Chrysanthemum* sp.

Distribution : INDIA : Jammu & Kashmir.

Remarks : No economic importance of this species is known.

Subgenus *Typhloctomus* Muma

(Figs. 531-532)

Typhloctomus Muma, 1961, *Bull. Fla. St. Mus.*, 5(7) : 299.

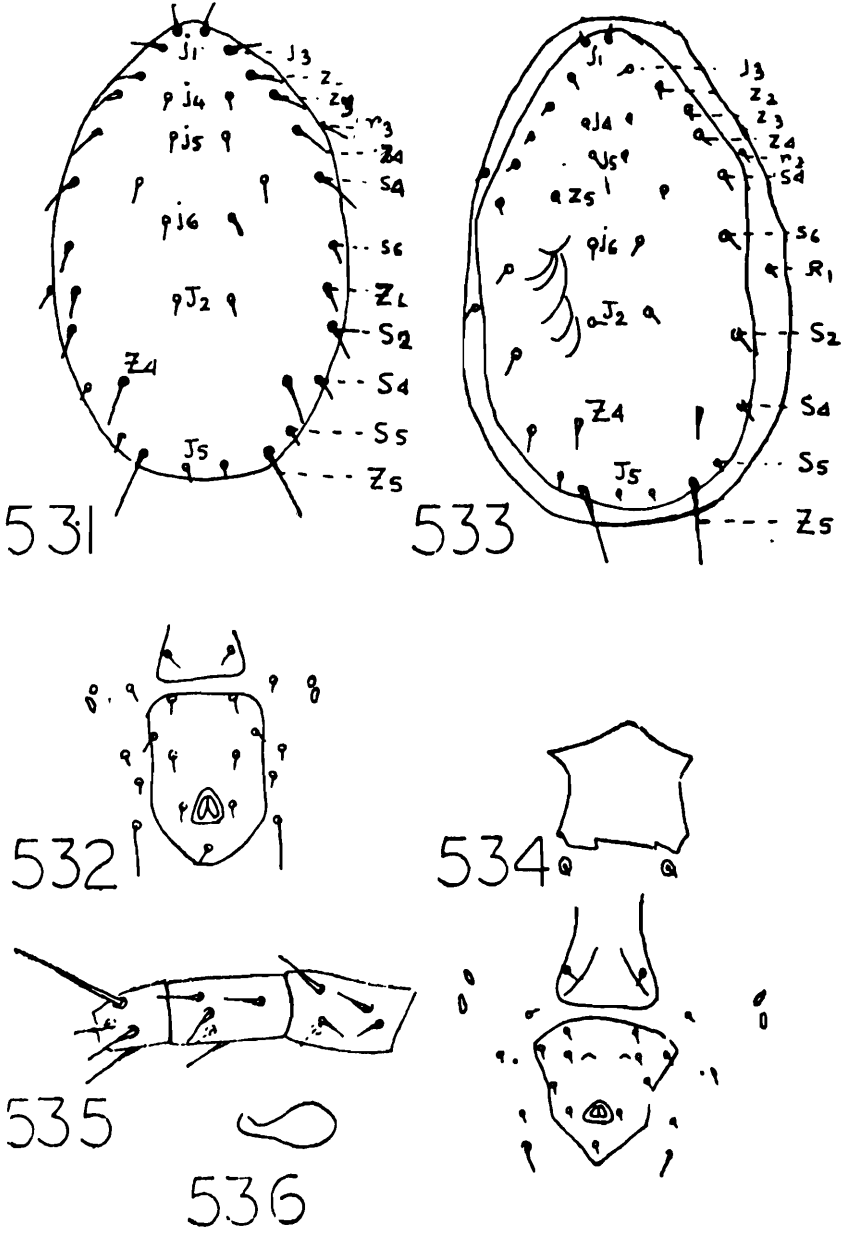
Key to the Species of Typhlodromus

- 1. Ventrianal shield with 3 pairs of preanal setae, Z_5 simple *nesbitti*
- Ventrianal shield with 4 pairs of preanal setae, Z_5 knobbed *transitans*

549. *Typhlodromus (Typhlodromus) nesbitti* Womersley

Typhlodromus nesbitti Womersley, 1954, *Aust. J. Zool.*, 2 : 179-180.

Typhlodromus (Typhlodromus) nesbitti, Narayanan & Ghai, 1964, *Proc. Nat. Inst. Sci. India*, 29B : 541-542.



Figs. 531-532 : *Typhlodromus (Typhlodromus)* sp. : 531—Dorsum, 532—Post-ventral surface.
Figs. 533-536 : *Typhlodromus (Typhlodromus)* sp. : 533—Dorsum, 534—Ventral surface, 535—Genu, tibia and basitarsus of leg IV, 536—Spermatheca.

Diagnosis : Dorsal shield with 19 pairs of setae. Measurements of setae : j_1 -28, j_4 -17, j_5 -17, j_8 -17, J_2 -20, J_5 -11, j_3 -20, z_2 -20, z_3 -22, z_4 -22, s_4 -25, s_8 -25, Z_1 -20, S_2 -28, S_4 -22, S_5 -22, Z_5 -56, z_5 -17, Z_4 -36, Ventrianal shield 143 long, 110 wide, with 3 pairs of preanal setae and a pair of preanal pores. Macroseta present only on basitarsus IV.

Habitat : Mango.

Distribution : INDIA : Delhi ; outside India : Australia.

Remarks : This mite was collected from mango malformed tree in association with eriophyid mite (Narayanan & Ghai, 1964).

550. *Typhlodromus* (*Typhloctomus*) *transitans* Gupta

Typhlodromus (*Typhloctomus*) *transitans* Gupta, *Indian J. Acar.*, 5 (1-2) : 40-41.

Diagnosis : Dorsal shield lightly sclerotized, reticulate, with 19 pairs of setae. Measurements of setae : j_1 -16, j_4 -16, j_5 -16, j_8 -18, J_2 -20, J_5 -8, j_3 -21, z_2 -16, z_3 -21, z_4 -24, s_4 -24, s_8 -24, Z_1 -20, S_2 -28, S_4 -28, S_5 -20, Z_5 -48, z_5 -16, Z_4 -28, r_3 -21, R_1 -20. Ventrianal shield smooth, 92 long 64 wide, with 4 pairs of preanal setae. Spermatheca with bell shaped cervix. Macrosetae on leg IV : genu-20, tibia-18, basitarsus-36.

Habitat : Pear, mulberry.

Distribution : INDIA : Jammu & Kashmir.

Remarks : No economic importance of this species is known.

Subgenus *Typhlodromus* Scheuten

(Figs. 533-536)

Typhlodromus Scheuten 1857, *Arch. Naturges*, 23 : 104-112.

Key to the Species of *Typhlodromus* Gupta

1. Ventrianal shield much longer than broad, Z_4 smaller or subequal to s_4	...	...	<i>garhwalicus</i>
— Ventrianal shield almost as long as broad, Z_4 longer than s_4	...	...	2
2. S_5 very small $1/2$ as long as S_4 , Z_1 much shorter than distance between its base and that of Z_5	...	...	<i>communis</i>
— S_5 subequal to S_4 , Z_4 almost touches base of Z_5	...	...	<i>neorhenanus</i>

551. Typhlodromus (Typhlodromus) communis Gupta

Typhlodromus communis Gupta, 1980, *Ent. Mon. Mag.*, 115 : 209.

Diagnosis : Dorsal shield reticulate with 18 pairs of setae. Measurements of setae : j_1 -13, j_4 -13, j_5 -10, j_6 -12, J_2 -14, J_5 -5, j_3 -12, z_2 -6, z_3 -12, z_4 -12, s_4 -13, s_6 -16, S_2 -13, S_4 -21, S_5 -47, Z_5 -47 (smooth), z_5 -12, Z_4 -30 (smooth). Ventrianal shield as wide as long, with 3 pairs of preanal setae and a pair of pores ; metapodal plates 2 paired. Macroseta only on basitarsus IV-35.

Habitat : Pear, eucalyptus, *Dalbergia* sp.

Distribution : INDIA : West Bengal, Karnataka, Tamil Nadu.

Remarks : No economic importance of this species is known.

552. Typhlodromus (Typhlodromus) garhwalicus Gupta

Typhlodromus garhwalicus Gupta, 1982, *Indian J. Acar.*, 6(1-2) : 29-30.

Diagnosis : Dorsal shield with 18 pairs of setae, mostly small except Z_5 which is long. Measurements of setae : j_1 -13, j_4 - j_6 - J_2 -14-18 each, J_5 -8, j_3 -22, z_2 -17, z_3 -17, z_4 -17, s_4 -13, s_6 -22, S_2 -26, S_4 -30, S_5 -21, Z_5 -37, Z_4 -26, z_5 -14, r_3 -26. Ventrianal shield 129 long, 69 wide, with 4 pairs of preanal setae ; small platelets present around ventrianal shield. Leg IV with macroseta only on basitarsus IV.

Habitat : *Casuarina* sp.

Distribution : INDIA : Uttar Pradesh.

Remarks : No economic importance of this species is known.

553. Typhlodromus (Typhlodromus) neorhenanus Gupta

Typhlodromus neorhenanus Gupta, 1977, *Indian J. Acar.*, 2(1) : 4.

Diagnosis : Dorsal shield with 18 pairs of setae. Measurements of setae : j_1 -16, j_4 -10, j_5 -16, j_6 -20, J_2 -24, J_5 -8, j_3 -13, z_2 -8, z_3 -16, z_4 -22, s_4 -25, s_6 -28, S_2 -33, S_4 -36, S_5 -32, Z_5 -56, z_5 -16, Z_4 -44. Ventrianal shield broader anteriorly, lateral margins concave, with 4 pairs of preanal setae ; 2 pairs of metapodal plates present. Macroseta only on basitarsus-IV-40. Spermatheca with funnel shaped cervix.

Habitat : Fern.

Distribution : INDIA : Meghalaya.

Remarks : No economic importance of this species is known.

SUBFAMILY Gnoriminae Chaudhri

Gnoriminae Chaudhri, 1975, *Pak. J. Agr. Sci.*, 12(1-2) : 100.

Genus *Garhwalicus* Gupta & Ray

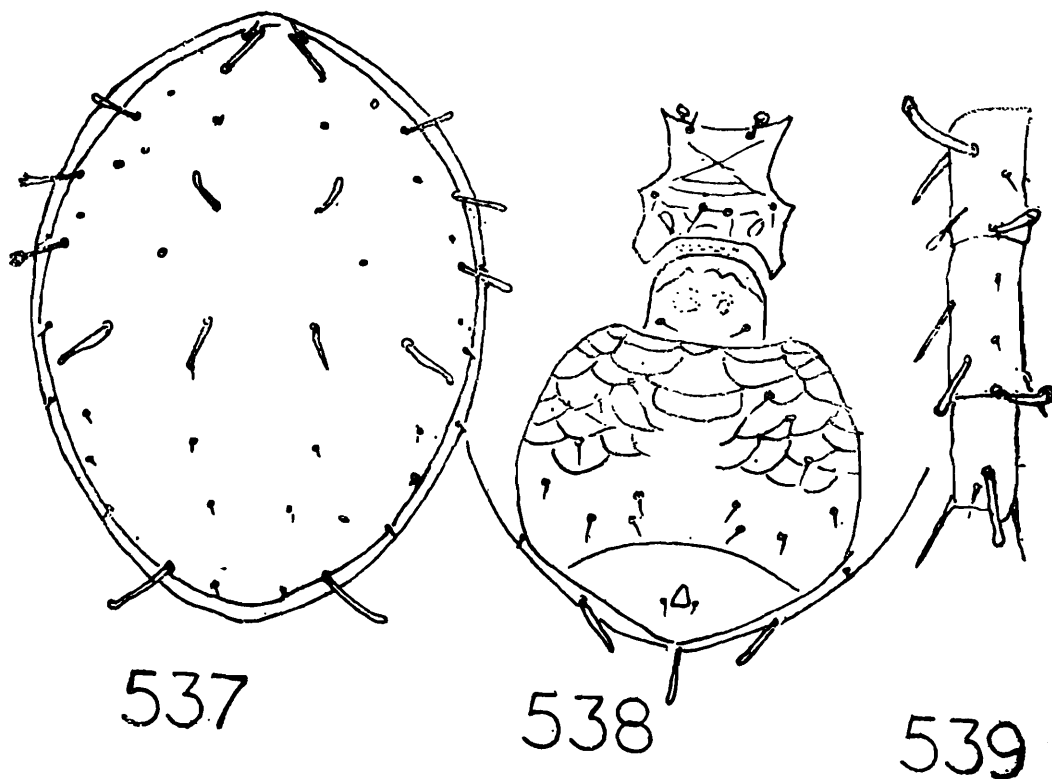
(Figs. 537-539)

Garhwalicus Gupta & Ray, 1981, *Bull. Zool. Surv. India*, 4(3) : 268.

554. *Garhwalicus himalayensis* Gupta & Ray

Garhwalicus himalayensis Gupta & Ray, 1981, *Bull. Zool. Surv. India*, 4(3) : 268-269.

Diagnosis : Dorsal shield with 12 pairs of lateral, 2 pairs of median and 6 pairs of dorsocentral setae of diverse length ; 3 pairs of sublateral setae on lateral integument ; some of the setae on dorsal shield with widened base. Sternal shield with 3 pairs of setae ; metasternal plate



Figs. 537-339 : *Garhwalicus* sp. : 537—Dorsum, 538—Ventral surface, 539—Genu, tibia and basitarsus of leg VI.

with seta absent. Genital shield granulate on either side. Ventrianal shield robust, reticulate anteriorly, with 7 pairs of preanal setae ; 2 pairs of setae present around ventrianal shield. Leg IV with 2 macrosetae on genu and tibia and one on basitarsus, all being spatulate.

Habitat : Undet. plant.

Distribution : INDIA : Uttar Pradesh.

MITES OF UNCERTAIN ECONOMIC IMPORTANCE

Family Acaridae Ewing & Nesbitt

History : The important contributions in this family are : Ewing & Nesbitt (1942), Robertson (1959), Griffiths (1964, 70), Manson (1972) and Hughes (1976).

Diagnosis : The body is distinguished into two regions by a transverse line into propodosoma and hysterosoma. Body stout, white, chelicerae chelate. Five pairs of setae present on propodosoma : a. rostral setae, b. Grandjean's organ, c. cervical setae, d. outer propodosomal setae and e. inner propodosomal setae. A pair of pseudostigmatid organ also present on propodosoma. Male and female genital openings present between coxae III and IV. Two distinct copulatory suckers are located on the sides of the male anus. Epimera I is united with sternum but all others are free. Tarsus I bears characteristic setae. Relative length of setae on tarsus IV is important.

Key to the Genera of Acaridae

1. Opisthosoma with long whip like setae	...	...	<i>Tyrophagus</i>
— Opisthosoma without such setae	...	...	<i>Rhizoglyphus</i>

Genus *Rhizoglyphus* Claparède
(Figs. 540-544)

555. *Rhizoglyphus echinopus* (Fumouse & Robin)

Tyrophagus echinopus Fumouse & Robin, 1868, *J. Anat. Physiol.*, 5 : 287.

Rhizoglyphus echinopus, Wadhi, Verma and Srivastava, 1971, *Indian J. Ent.*, 33 : 107-108.

Diagnosis : Internal scapular setae long. Grandjean's organ with forked tip ; penis broad and rounded with short tube-like opening into a transverse sac with a V-shaped projecion in each end ; anal slit surrounded by six pairs of short setae.

Habitat : Potato.

Distribution : INDIA : Delhi ; outside India : Cosmopolitan.

Remarks : Sometimes this mite attacks potato, onion, tulip, dahlia tubers, etc. either in the field or in storage. The damage sometimes may be serious.

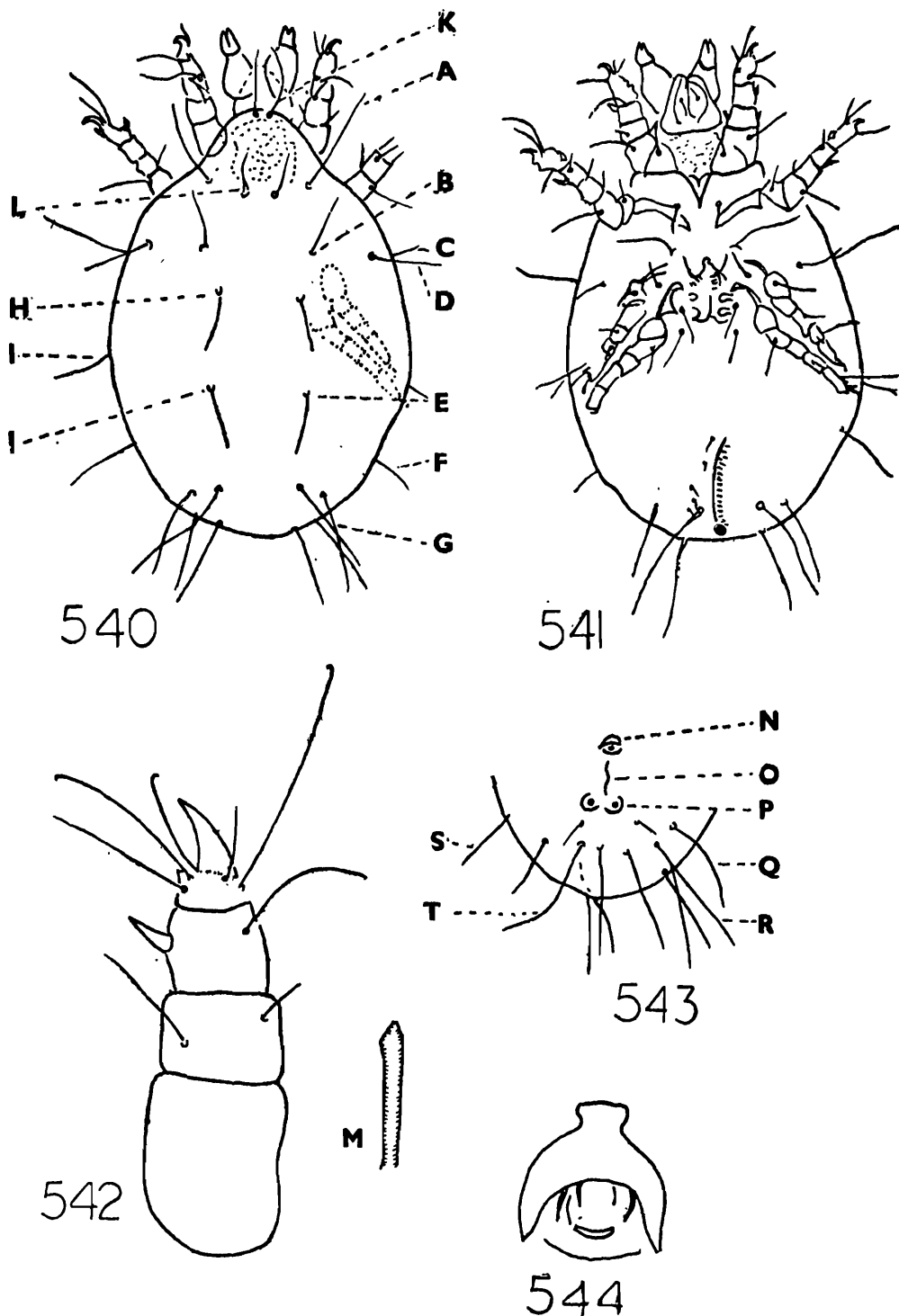


Fig. 540 : Dorsal surface of *Rhizoglyphus* sp. A—External scapular, B— d_1 , C—External humeral, D—Internal humeral, E— d_3 , F—Post-lateral, G—Sacral, H— d_2 , I—Anterior lateral, J— d_3 , K—Internal vertical, L—Scapular.

Fig. 541 : Ventral surface of an acarid mite.

Fig. 542 : Leg III of an acarid mite : M—Solenidion of tarsus I (Male).

Fig. 543 : Postventral surface of male : N—Genital opening, O—Anal slit, P—Anal sucker, Q, R—Postanal setae, S—Lateral postanal, T—Sacral.

Fig. 544 : Genital area of an acarid mite (Male).

Genus *Tyrophagus* Oudemans
(Figs. 545-552)

Tyrophagus Oudemans, 1924, *Ent. Ber. Amst.*, 6 : 250.

556. *Tyrophagus putrescentiae* (Schrank)

Acarus putrescentiae Schrank, 1781, *Enum. Ins. Aust. Indig.*, 521.

Tyrophagus putrescentiae, Oudemans, 1924, *Ent. Ber.*, 6 : 136, 250.

Tyrophagus putrescentiae, Pillai, 1955, *J. Zool. Soc.*, 7 : 141-144.

Tyrophagus putrescentiae, Banerjee, 1965, *Two. Bud.*, 12 : 4-7.

Diagnosis : In dorsoventral view of male, arms of penis support towards outwards ; pseudostigmatid organs large with long pectinations at its enlarged base. Seta lp approximately of same length as remaining posterior setae. Seta d_2 2-3 times as long as $1a$. Distal half of penis shaft curved. External scapular seta shorter than internal scapular seta. The ratio $d_2/1_4 = 2.03$; ratio x/y (distance between 1st and 3rd pairs of postanal setae) = 2.75. Solenidion w_1 on first tarsus enlarged at tip. Distance of $a + b$ (distance from base of 4th tarsus to distal margin of 2nd sucker) = 1.70 and as long as c (distance from latter point to tip of the tarsus).

Habitat : *Saraca indica*.

Distribution : INDIA : West Bengal ; outside India : Cosmopolitan.

Remarks : It is associated normally with the fungal growth on plant.

Family ORIBATULIDAE THOR

Genus *Scheloribates* Berlese

Scheloribates Berlese, 1908, *Redia*, 5 : 2.

557. *Scheloribates zealandicus* Hammer

Scheloribates zealandicus Hammer, 1967, *Biol. Skr. Dan. Vid. Selsk.*, 15 (4) : 40.

Scheloribates zealandicus, Venugopalrao, Sanyal & Rammohan Rao, 1982, *IRRN*, 7(1) : 11.

Diagnosis : Rostrum rounded, rostral setae barbed, project by half their length beyond the tip of the rostrum ; lamellar setae as long as the lamellae ; interlamellar setae short, barbed ; pseudostigmatid organ with lanceolate head ; hysterosoma long with slightly convex margin ; pteromorphae project almost as far anteriorly as the anterior border of the hysterosoma ; 4 pairs of sacculi ; sejugal apodeme longer than apodeme III ; 4 pairs of genital setae ; all tarsi tridactylate.

Habitat : Paddy.

Nature of damage : Leaves of rice (varieties : Mypali, Sannabayya-hunda, Ramasagaralu and Phalguna) cultivated around Anakapalle were found to have brown streaks between veins and tears parallel to veins,

giving a gale-torn appearance (Venugopalrao, Sanyal & Rammohan Rao, 1982).

Distribution : INDIA : Andhra Pradesh.

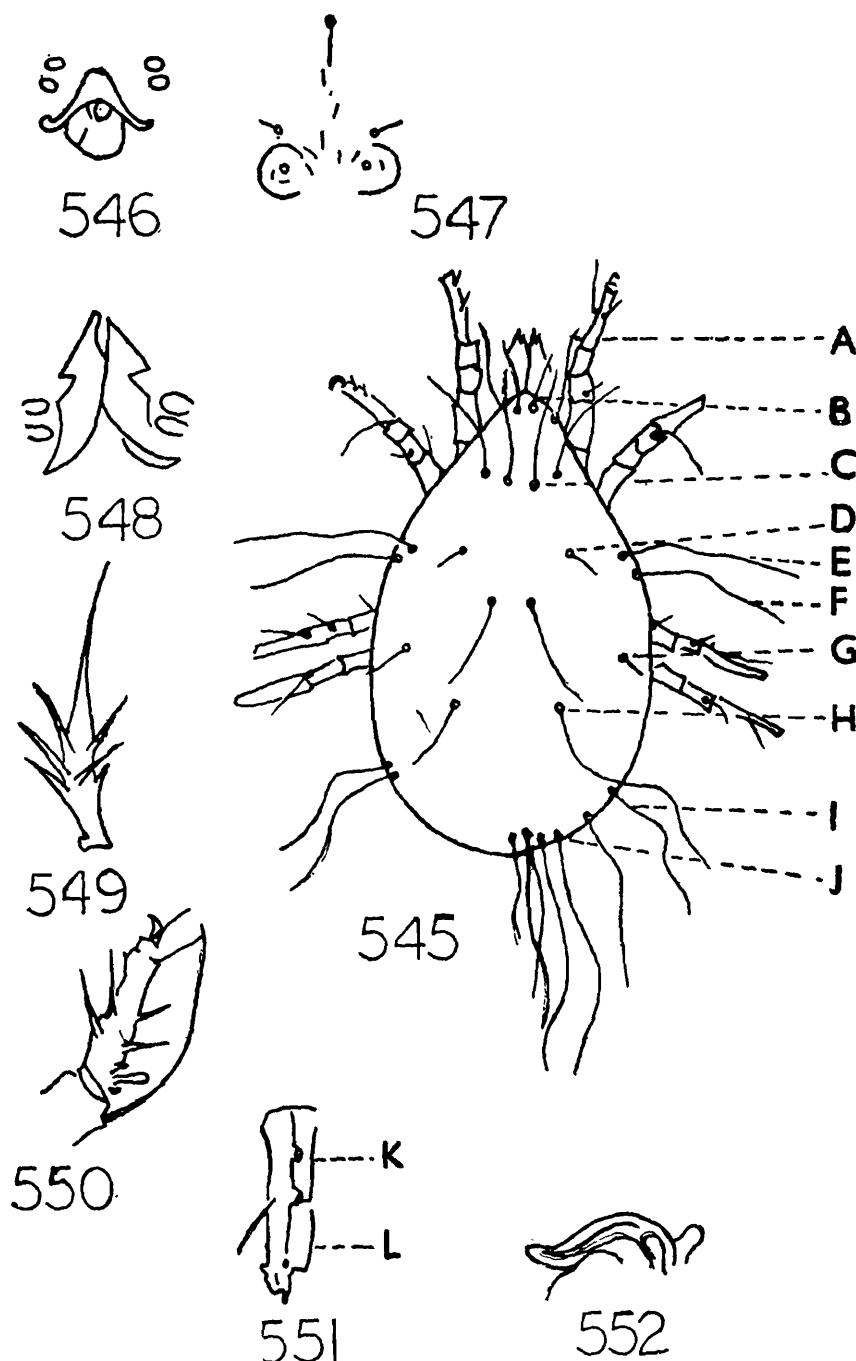


Fig. 545. Dorsal surface of *Tyrophagus* sp. A, B—Vertical setae, C—Scapular seta, D— d_1 , E—Internal humeral, F—External humeral, G—Lateral, H— d_2 , I— d_4 , J—Postanal.

Fig. 546 : Basal structure of penis in *Tyrophagus*.

Fig. 547 : Male genital opening and anus in *Tyrophagus*.

Fig. 548 : Female genital opening in *Tyrophagus*.

Fig. 549 : Supracoxal seta in *Tyrophagus*.

Fig. 550 : Tarsus I in *Tyrophagus*.

Fig. 551 : Tarsus IV in *Tyrophagus* (Male) : K— $a+b$, L— c .

Fig. 552 : Penis.

PLANT-MITE CATALOGUE

*recorded outside India

Name of plant	Name of mite
A	
<i>Abelmoschus esculentus</i> Moench	<i>Tetranychus cinnabarinus</i> , <i>T. macfarlanei</i> , <i>T. neocaledonicus</i> , <i>Oligonychus coffeae</i> , <i>Brevipalpus californicus</i> , <i>Raoiella indica</i> , <i>Amblyseius</i> (<i>Euseius</i>) <i>delhiensis</i> , <i>A.</i> (<i>Neoseiulus</i>) <i>longispinosus</i> , <i>A.</i> (<i>Typhlo-</i> <i>dromalus</i>) <i>manipurensis</i> , <i>A.</i> (<i>T.</i>) <i>kalim-</i> <i>pongensis</i> , <i>Phytoseius</i> (<i>Phytoseius</i>) <i>minutus</i>
<i>Abies pindrow</i>	<i>Bryobia praetiosa</i> *
<i>Abutilon</i> sp.	<i>Brevipalpus phoenicis</i>
<i>Abutilon indicum</i> Don.	<i>Porcupinychus abutiloni</i> , <i>Aculops abutiloni</i>
<i>Acacia</i> sp.	<i>Eriophyes acaciae</i>
<i>Acacia arabica</i> Willd.	<i>Tenuipalpus acacii</i> , <i>T. caudatus</i> , <i>Schizote-</i> <i>tetranychus undulatus</i> , <i>Typhlodromus</i> (<i>Amblydromella</i>) <i>divergentis</i> , <i>Brevipalpus</i> <i>rugulosus</i>
<i>Acacia farnesiana</i> Wall	<i>Tenuipalpus faresianus</i> , <i>T. indicus</i> , <i>Ambly-</i> <i>seius</i> (<i>Euseius</i>) <i>alstoniae</i>
<i>Acacia ferruginea</i> DC.	<i>Aceria viddhagiriensis</i>
<i>Acacia modesta</i> Lindl.	<i>Eutetranychus orientalis</i> *, <i>T.</i> (<i>A.</i>) <i>diver-</i> <i>gentis</i>
<i>Acacia nilotica</i> Delile	<i>E. orientalis</i> *
<i>Acacia pennata</i> (Willd.)	<i>Aceria dichrostachyia</i>
<i>Acalypha</i> sp.	<i>Tetranychus urticae</i>
<i>Acalypha hispida</i> Blume.	<i>Brevipalpus phoenicis</i>
<i>Acalypha wilkesiana</i> Muell.	<i>Brevipalpus rugulosus</i>
Acanthaceae	<i>Aculops acanthae</i> , <i>Aculus atturensis</i>
<i>Acer</i> sp.	<i>E. orientalis</i> *, <i>B. californicus</i> .
<i>Achras sapota</i> Linn.	<i>B. californicus</i> , <i>A.</i> (<i>E.</i>) <i>alstoniae</i> , <i>Eutetra-</i> <i>nychus anneckeii</i> , <i>B. phoenicis</i>
<i>Achyranthus aspera</i> Linn.	<i>Bryobia praetiosa</i> , <i>Aceria justiciae</i>
<i>Acineta</i> sp.	<i>B. californicus</i> *

<i>Adathoda</i> sp.	<i>B. praetiosa</i> *
<i>Adathoda vasica</i> Nees	<i>Anthocoptes adhatodae</i> , <i>Amblyseius</i> (<i>Amblyseius</i>) <i>adhatodae</i>
<i>Adenanthera pavoniana</i> Linn.	<i>Phytoseius</i> (<i>Pennaseius</i>) <i>kapuri</i>
<i>Aegle marmelos</i> Correa	<i>E. orientalis</i> , <i>Cunaxa myabunderensis</i> , <i>A. (A.) deleoni</i> , <i>Polyphagotarsonemus</i> <i>latus</i>
<i>Ageratum conyzoides</i> Linn.	<i>Tetranychus cinnabarinus</i>
<i>Ailanthus excelsa</i> Roxb.	<i>E. orientalis</i> *
<i>Alangium</i> sp.	<i>Diptilomiopus alangii</i>
<i>Alangium salvifolium</i> Wang	<i>Floracarus salvifoliae</i> , <i>Eriophyes alangii</i>
<i>Albizzia lebbek</i> Benth & Hook.	<i>Paratetra albizziae</i>
<i>Albizzia procera</i> Benth & Hook.	<i>Phytoptipalpus albizziae</i> , <i>E. orientalis</i>
<i>Alhagi camelorum</i> Fisch.	<i>Porcupinychus abutiloni</i> *
<i>Allium cepa</i> Linn.	<i>Petrobia</i> (<i>Petrobia</i>) <i>latens</i> , <i>Bakerina</i> <i>orissaensis</i> , <i>T. cinnabarinus</i>
<i>Allium sativum</i> Linn.	<i>Aceria tulipae</i>
<i>Alnus</i> sp.	<i>Brevipalpus lewisi</i> *, <i>Vasates dhoda-</i> <i>bettaensis</i>
<i>Alnus glutinosa</i> Medic.	<i>Panonychus ulmi</i>
<i>Alnus nitida</i> End.	<i>B. praetiosa</i> *
<i>Alpinia</i> sp.	<i>B. phoenicis</i>
<i>Alstonia scholaris</i>	<i>A. (E.) coccosocius</i> , <i>A. (E.) alstoniae</i>
R. Br.	
<i>Alternanthera</i> sp.	<i>B. praetiosa</i> *
<i>Althaea rosea</i> Hohen.	<i>E. orientalis</i> *, <i>P. latens</i> *, <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. phoenicis</i> , <i>P. latus</i>
<i>Amaranthus mangostanus</i> Linn.	<i>T. cinnabarinus</i>
<i>Amaranthus</i> sp.	<i>E. orientalis</i> *
<i>Amaranthus tricolor</i> Linn.	<i>A. (A.) deleoni</i>
<i>Amaranthus viridis</i> Linn.	<i>E. orientalis</i> , <i>B. californicus</i> , <i>P. latus</i> , <i>T.</i> <i>neocaledonicus</i>
<i>Amygdalus communis</i> Linn.	<i>Tenuipalpus amygdalusae</i>
<i>Anacardium occidentale</i> Linn.	<i>Oligonychus coffeae</i> , <i>Lorryia africana</i> , <i>A.</i> (<i>E.</i>) <i>coccineae</i> , <i>A. (T.) kalimpongensis</i> , <i>A. (A.) largoensis</i> , <i>A. (E.) ovalis</i> , <i>A.</i> (<i>Paraphytoseius</i>) <i>multidentatus</i> , <i>Typhlo-</i> <i>dromus</i> (<i>Orientiseius</i>) <i>rickeri</i> , <i>Abacarus</i> <i>anacardiae</i>

<i>Annaas</i> sp.	<i>Dolichotetranychus floridanus</i>
<i>Anemone</i> sp.	<i>Brevipalpus obovatus</i> *
<i>Andropogon annulatus</i> F. Muell.	<i>Schizotetranychus andropogoni</i>
<i>Angulosa</i> sp.	<i>B. californicus</i> *
<i>Anisomeles indica</i> O. kza	<i>Phyllocoptes indicae</i>
<i>Anisomeles ovata</i> R. Br.	<i>B. obovatus</i> *
<i>Anona squamosa</i> Linn.	<i>Oligonychus mangiferus</i> , <i>B. phoenicis</i>
<i>Antedsma ghesembilla</i> Gaertn.	<i>Calepitrimerus antedesmae</i>
<i>Anthurium</i> sp.	<i>B. californicus</i> *
<i>Anthocephalus cadamba</i> Miq.	<i>Brevipalpus karachiensis</i>
<i>Antidesma</i> sp.	<i>B. californicus</i>
<i>Aphelandra</i> sp.	<i>B. californicus</i> *
<i>Apium graveolens</i> Linn.	<i>T. ludeni</i> , <i>T. cinnabarinus</i>
<i>Arachis hypogaea</i> Linn.	<i>T. cinnabarinus</i> , <i>T. hypogaeae</i>
<i>Aralia</i> sp.	<i>B. phoenicis</i> *, <i>Calacarus araliae</i>
<i>Areca catechu</i> Linn.	<i>Oligonychus biharensis</i> , <i>O. indicus</i> , <i>Raoiella indica</i> , <i>Bdellodes</i> (<i>Hoploscirus</i>) <i>affinis</i> , <i>A. (T.) arecae</i> , <i>A. (A.) largoensis</i> , <i>Iphiseius bakeri</i> , <i>A. (E.) ovalis</i> , <i>Tetranychus fijiensis</i>
<i>Aristida setacea</i> Retz.	<i>Aceria setaceus</i>
<i>Artemisia scoparia</i> Waldst. & Kit.	<i>B. obovatus</i> *
<i>Artocarpus altilis</i>	<i>B. phoenicis</i>
<i>Artocarpus integrifolia</i> Linn.	<i>Bakerina orissaensis</i> , <i>Petrobia</i> (<i>Tetranychina</i>) <i>harti</i> , <i>P. ulmi</i> , <i>Tenuipalpus lalbaghensis</i> , <i>Neocunaxoides pradhani</i> , <i>P. citri</i> , <i>Diptilomiopus artocarpae</i> , <i>Eutetranychus anneckeii</i>
<i>Artocarpus heterophyllus</i> Lamk.	<i>B. phoenicis</i> , <i>Tegolophus indica</i>
<i>Arundo donax</i> Linn.	<i>Aceria donacis</i> , <i>Aculus mckenziei</i> , <i>E. orientalis</i> , <i>Aponychus sulcatus</i>
<i>Asystasia coromandeliana</i> Nees.	<i>Diptilomiopus jevremovici</i>
<i>Atylosia</i> sp.	<i>B. californicus</i>
<i>Aucuba</i> sp.	<i>B. essigi</i> *
<i>Averrhoa carambola</i> Linn.	<i>E. orientalis</i>
<i>Avicennia officinalis</i> Linn.	<i>Keiferophyes avicenniae</i>
Avocado	<i>Oligonychus punicae</i>

Azadirachta indica A. Juss.*E. orientalis*, *Schizotetranychus hindustanicus*, *Calepitrimerus azadirachtae**Azima tetracantha* Lamk.*Epitrimerus azimae*

B

Balanites agyptica Del.*Aceria balanites**Bambusa aurandinacea* Willd.*Aponychus corpuzae*, *A. sarjui*, *A. (Stylophoronichus) baghensis*, *A. (S.) lalii*, *Ncopetrobia simlaensis*, *A. (E.) coccineae*, *A. (A.) kulini*, *A. (A.) largoensis*, *Typhlodromus (Amblydromella) bambusicolus*, *A. (E.) bambusae*, *Cunaxa bambusae**Bambusa vulgaris* Nees*Aceria bambusae*, *Tegolophus bambusae*, *Parapronematus acaciae**Barleria biternata**B. phoenicis**Barleria cristata* Linn.*B. phoenicis*, *Aceria barleriae*, *B. californicus**Barleria cuspidata* Heyne*B. phoenicis**Bassia* sp.*Tegonotus bassius**Bauhinia acuminata* Linn.*A. (A.) largoensis*, *A. (E.) pruni**Bauhinia* sp.*Neometaculus bauhiniae**Bauhinia purpuria* Linn.*Tetra bauhiniae*, *A. (N.) longispinonius*, *A. (E.) ovalis**Bauhinia variegata* Linn.*E. orientalis*, *B. californicus*, *B. obovatus*, *B. karachiensis*, *Eotetranychus uncatus*, *E. neoperplexus**Benincasa cerifera* Savi*T. cinnabarinus*, *T. macfarlanei*, *T. neocaledonicus**Beta vulgaris* Linn.*T. cinnabarinus*, *T. neocaledonicus**Bidens biternata* (Lour.)*Brevipalpus deleoni**Bidens pilosa* Linn.*T. neocaledonicus*, *T. urticae**Bignonia venusta* Ker-Gawl.*B. phoenicis**Bletia* sp.*B. californicus***Blumea* sp.*B. obovatus***Blumea membranacea* DC*E. orientalis***Boerhaavia diffusa* Linn.*E. orientalis**, *A. sulcatus*, *Aculops boerhaeviae*

<i>Borassus flabellifer</i> Linn.	<i>Notostrix flabelliferae</i> , <i>Mackiella borasis</i> , <i>Neodialox palmyrae</i>
<i>Bougainvillea glabra</i> Choisy	<i>B. californicus</i>
<i>Bougainvillea spectabilis</i> Willd.	<i>B. californicus</i> , <i>A. (E.) ovalis</i> ,
<i>Bougainvillea</i> sp.	<i>Eriophyes ladakhensis</i>
<i>Brassica</i> sp.	<i>B. californicus</i> , <i>T. ludeni</i>
<i>Brassica campestris</i> Linn.	<i>T. cinnabarinus</i> , <i>T. neocalodonicus</i> , <i>B. praetiosa</i> , <i>B. californicus</i>
<i>Brassica juncea</i> Hook. & Thom.	<i>T. neocaledonicus</i>
<i>Brassica kaber</i>	<i>T. cinnabarinus</i>
<i>Brassica oleracea</i> var. <i>capitata</i>	<i>B. praetiosa</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>T. ludeni</i>
<i>Brassica oleracea</i> var. <i>sarsoon</i>	<i>T. cinnabarinus</i>
<i>Brayenia</i> sp.	<i>Calacarus citrifolii</i>
<i>Breynia patens</i> Rolfe	<i>Phytoptus breyniae</i>
<i>Breynia rhamnoides</i> Muell.	<i>Thamnacus euphorbiae</i>
<i>Buddleia</i> sp.	<i>Brevipalpus essigi*</i>
<i>Buddleia asiatica</i> Lour.	<i>Brevipalpus obovatus</i>
<i>Butea monosperma</i> Taub.	<i>Brevipalpus pulchur</i> , <i>A. (E.) bambusae</i>

C

<i>Cajanus cajan</i> Druce	<i>Petrobia (Petrobia) latens</i> , <i>Schizotetranychus</i> <i>cajani</i> , <i>S. fluvialis</i> , <i>T. ludeni</i> , <i>Aceria cajani</i> , <i>Amblyseius (Paraphytoseius) multidentatus</i>
<i>Cajanus indicus</i> Spreng.	<i>Eotetranychus broodryki</i> , <i>A. (Neoseiulus)</i> <i>fraterculus</i>
<i>Calamus tenuis</i> Roxb.	<i>Indocunaxa smileyi</i>
<i>Callicarpa</i> sp.	<i>B. californicus*</i>
<i>Callistemon lanceolatus</i> Sweet	<i>B. californicus</i> , <i>B. karachiensis</i>
<i>Callistemon speciosus</i> DC.	<i>O. mangiferus</i>
<i>Calophyllum inophyllum</i> Linn.	<i>A. (T.) potentillae</i> , <i>A. (A.) largoensis</i>
<i>Calotropis procera</i> R. Br.	<i>E. orientalis*</i> , <i>B. obovatus</i> , <i>Tennipalpus</i> <i>pernicis</i> , <i>Tegolophus calotropi</i>
<i>Cammelina</i> sp.	<i>T. neocaledonicus</i>
<i>Campsis grandiflora</i>	<i>Brevipalpus rugulosus</i>
<i>Canavalia ensiformes</i> DC.	<i>P. latus</i>
<i>Canna indica</i> Linn.	<i>B. rugulosus</i>

<i>Cannabis sativa</i> Linn.	<i>E. orientalis</i> , <i>T. cinnabarinus</i> , <i>Brevipalpus obovatus</i> , <i>B. rugulosus</i>
<i>Canthium parviflorum</i> Lam.	<i>Phytoptus canthii</i>
<i>Capsicum annum</i> Linn.	<i>P. latus</i> , <i>A. (E.) alstoniae</i> , <i>A. (A.) largoensis</i> , <i>Calacarus citrifolii</i> , <i>calacarus capsica</i>
<i>Capsicum frutescens</i> Linn.	<i>Calacarus capsica</i>
<i>Capsicum pseudocapsicum</i>	<i>B. obovatus</i>
<i>Carica papaya</i> Linn.	<i>A. sulcatus</i> , <i>E. orientalis</i> , <i>P. citri</i> , <i>T. cinnabarinus</i> , <i>T. fijiensis</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>A. (E.) coccosocius</i> , <i>A. (A.) largoensis</i> , <i>Tetranychus papayae</i> , <i>Calacarus brionesae</i>
<i>Carissa</i> sp.	<i>Phytoptus carissae</i>
<i>Carthamus tinctorius</i> Linn.	<i>T. cinnabarinus</i>
<i>Casearia tomentosa</i> Roxb.	<i>Eotetranychus sujinamensis</i>
<i>Cassia auriculata</i> Linn.	<i>Vasates cassiae</i>
<i>Cassia spectabilis</i> DC	<i>B. phoenicis</i>
<i>Cassia</i> sp.	<i>Typhlodromus (Amblydromella) eharai</i> <i>E. orientalis*</i>
<i>Cassia fistula</i> Linn.	<i>E. orientalis</i> , <i>O. mangiferus</i> , <i>B. californicus</i> , <i>A. (A.) largoensis</i>
<i>Cassia holosericea</i> Fresen	<i>P. abutiloni*</i> , <i>E. orientalis*</i>
<i>Cassia occidentalis</i> Linn.	<i>B. californicus</i> , <i>E. orientalis*</i>
<i>Cassia spectabilis</i> DC.	<i>B. deleoni</i> , <i>B. phoenicis</i>
<i>Cassia sophera</i> Linn.	<i>Aculus cassiae</i>
<i>Cassia tora</i> Linn.	<i>Aculus cassiae</i> , <i>B. deleoni</i>
<i>Casuarina equisetifolia</i> Linn.	<i>Phytoptus casuarinae</i> , <i>Typhlodromus (Clavidromus) neotransvaalensis</i>
<i>Casuarina</i> sp.	<i>Tuckerella indica</i> , <i>Typhlodromus (Typhlodromus) garhwalicus</i>
<i>Catasetum</i> sp.	<i>B. californicus*</i>
<i>Celosia cristata</i> Linn.	<i>B. rugulosus</i>
<i>Celtis chinensis</i>	<i>Phytoseius (Phytoseius) crinitus*</i>
<i>Celtis wightii</i> Planch.	<i>Aculus indicus</i>
<i>Cerebera</i> sp.	<i>T. neocaledonicus</i>
<i>Cerebera odollam</i>	<i>B. phoenicis</i>
<i>Cestrum diurnum</i> Domb.	<i>B. phoenicis</i>
<i>Cestrum nocturnum</i> Lamk.	<i>B. californicus</i> , <i>T. (A.) divergentis*</i>

<i>Chaetacme</i> sp.	<i>Tenuipalpus micheli</i> *
<i>Chenopodium album</i> Linn.	<i>P. (P.) latens</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i>
<i>Chenopodium murole</i> Linn.	<i>T. cinnabarinus</i> , <i>T. ludeni</i>
Chinese fan	<i>T. neocaledonicus</i>
<i>Chloris incomplata</i> Roth	<i>Schizotetranychus andropogoni</i>
<i>Chrysanthemum</i> sp.	<i>T. (A.) divergentis</i> *, <i>T. (Paraseiulus) neosoleiger</i> , <i>T. (A.) chrysanthemi</i>
<i>Chrysanthemum coronarium</i> Linn.	<i>B. eharai</i> , <i>T. cinnabarinus</i> , <i>Paraphytoseius chrysanthemi</i> , <i>A. (Neoseiulus) aceriae</i> , <i>A. (A.) channabasavanni</i> , <i>A. (A.) neorykei</i> , <i>A. (E.) ovalis</i>
<i>Chrysanthemum morifolium</i> Linn.	<i>B. eharai</i> *, <i>E. orientalis</i> *, <i>T. cinnabarinus</i>
<i>Ciba pentandra</i> Linn.	<i>Vasates cassiae</i>
<i>Cichorinm intybus</i> Linn.	<i>T. cinnabarinus</i> , <i>B. obovatus</i> , <i>E. orientalis</i>
<i>Cinnamomum</i> sp.	<i>Colopodacus cinnamommae</i>
<i>Cinnamomum camphora</i> Nees & Eberm.	<i>O. biharensis</i>
<i>Cissus quadrangularis</i> Linn.	<i>Monotrimacus quadrangularis</i>
<i>Cissampelos pareira</i> Linn.	<i>Tenuipalpus cissampelosa</i>
<i>Citrullus vulgaris</i> Schrad.	<i>T. cinnabarinus</i> , <i>T. ludeni</i> , <i>B. californicus</i>
<i>Citrullus vulgaris</i> var. <i>fistulosus</i> Stroks	<i>E. orientalis</i> , <i>T. cinnabarinus</i> , <i>T. urticae</i> , <i>B. californicus</i>
<i>Citrus</i> sp.	<i>P. (P.) latens</i> , <i>E. orientalis</i> , <i>Tenuipalponychus citri</i> , <i>Eotetranychus kankitus</i> , <i>E. mandensis</i> , <i>E. pamelae</i> , <i>E. sexmaculatus</i> , <i>O. coffeae</i> , <i>P. citri</i> , <i>S. hindustanicus</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. chilensis</i> *, <i>B. deleoni</i> , <i>B. lewisi</i> *, <i>Phytoptus ficivorus</i> , <i>Aceria sheldoni</i> , <i>Cosella fleschneri</i> , <i>Phyllocoptruta oleivora</i> , <i>Pronematus fleschneri</i> , <i>Leptus giganticus</i> , <i>A. (A.) aerialis</i> , <i>A. (A.) largoensis</i> , <i>A. (A.) mcmurtryi</i> , <i>A. (A.) paraaerialis</i> , <i>A. (A.) deleoni</i> , <i>A. (E.) coccineae</i> , <i>A. (E.) delhiensis</i> , <i>A. (N.) assamensis</i> , <i>A. (Phytoscutella) salebrosus</i> , <i>Typhlodromus (Amblydromella) bambusicolus</i> , <i>T. (A.)</i>

<i>Citrus aurantifolia</i> Swingle	<i>fleschneri</i> , <i>T. (A.) homalii</i> , <i>T. (A.) rhenanus</i> , <i>T. (O.) rickeri</i> , <i>Lasioseius quadrisetosus</i> , <i>E. citri</i> , <i>E. anneckeii</i>
<i>Citrus aurantium</i> Linn.	<i>E. orientalis</i>
<i>Citrus decumana</i> Murr.	<i>E. orientalis</i> , <i>E. africanus</i> , <i>Schizotetranychus baltazari</i> , <i>T. cinnabarinus</i> , <i>T. fijiensis</i> , <i>Agistemus fleschneri</i> , <i>B. californicus</i> , <i>B. phoenicis</i>
<i>Citrus jambhiri</i> Lush	<i>B. phoenicis</i> , <i>B. californicus</i>
<i>Citrus karna</i> Raf.	<i>B. californicus</i> , <i>E. orientalis</i> , <i>P. oleivora</i>
<i>Citrus limattioides</i> Janaka	<i>E. orientalis</i>
<i>Citrus limonum</i> Osb.	<i>B. californicus</i>
<i>Citrus maxima</i> Merr.	<i>P. oleivora</i> , <i>Diptilomiopus assamica</i> , <i>E. africanus*</i> , <i>E. orientalis</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. rugulosus</i>
<i>Citrus medica</i> Linn.	<i>E. orientalis</i>
<i>Citrus paradisi</i> Macfad.	<i>E. africanus</i> , <i>E. orientalis</i> , <i>B. phoenicis</i> , <i>Indostigmaeus rangatensis</i>
<i>Citrus reticulata</i> Blanco	<i>E. orientalis</i> , <i>B. deleoni</i> , <i>B. californicus</i>
<i>Citrus sinensis</i> Osb.	<i>A. (T.) kalimpongensis</i> , <i>T. cinnabarinus</i> , <i>B. californicus</i> , <i>E. orientalis</i>
<i>Citrus tengirina</i> Janaka	<i>B. californicus</i> , <i>E. orientalis</i>
<i>Citrus trifoliata</i> Linn.	<i>B. californicus</i>
<i>Citrus unshiu</i> More	<i>E. orientalis</i>
<i>Clausena viscosa</i> Linn.	<i>B. californicus</i>
<i>Cleome viscosa</i> Linn.	<i>T. cinnabarinus</i>
<i>Clerodendron</i> sp.	<i>T. cinnabarinus</i>
<i>Clerodendron inerme</i> Gaertn.	<i>B. californicus*</i> , <i>B. phoenicis</i>
<i>Clerodendron macrosiphon</i> Hook	<i>Aceria clerodendronis</i> , <i>A. (E.) finlandicus</i>
<i>Clerodendron serratum</i> Spreng	<i>A. (E.) cocosocius</i>
<i>Clerodendron viscosum</i> Vent.	<i>A. (Typhlodromalus) havu</i>
<i>Coccinea indica</i> Wight & Arn.	<i>Calacarus keiferi</i> , <i>Epicecidophyes clerodendronis</i> , <i>E. indica</i> , <i>Aceria clerodendronis</i>
<i>Cocculus hirsutus</i> (Linn.)	<i>T. ludeni</i> , <i>A. (E.) coccineae</i>
<i>Cocos</i> sp.	<i>Diptilomiopus cocculae</i>
	<i>B. californicus*</i>

<i>Cocos nucifera</i> Linn.	<i>T. fijiensis</i> , <i>B. phoenicis</i> , <i>R. indica</i> , <i>A. (A.) largoensis</i> , <i>A. (E.) ovalis</i> , <i>A. (Asperoseius) nucifera</i> , <i>Neocypholaelaps stridulans</i> , <i>Scolocenus spiniferus</i>
<i>Coffea arabica</i> Linn.	<i>O. coffeae</i> , <i>B. phoenicis</i> , <i>A. (E.) bambusae</i> , <i>A. (E.) ovalis</i> , <i>T. (A.) eharai</i>
<i>Coleus amboinicus</i> Lour.	<i>Aculus colei</i>
<i>Colocasia</i> sp.	<i>A. (Typhlodromips) suknaensis</i> , <i>B. californicus</i>
<i>Colocasia antiquorum</i> Schott.	<i>A. (E.) coccineae</i> , <i>A. (N.) fallacis</i> , <i>T. (A.) homalii</i> , <i>B. eharai</i>
<i>Combretum decandrum</i> Roxb.	<i>Colopodacus combretus</i> , <i>Neorhynacus combratis</i> , <i>Indonotalox sudarsani</i>
<i>Commelina jacobii</i> Fischer	<i>Aceria commelinae</i>
<i>Convolvulus</i> sp.	<i>T. ludeni</i> , <i>B. karachiensis</i>
<i>Corchorus olitorius</i> Linn.	<i>O. coffeae</i> , <i>T. cinnabarinus</i> , <i>P. latus</i>
<i>Cordia</i> sp.	<i>Aceria boraginae</i> , <i>Tegonotus cardiavagrans</i> ,
<i>Cordia dichotoma</i> Forst.	<i>Aceria dichotomae</i>
<i>Cordia myxa</i> Linn.	<i>Aceria cordiae</i> , <i>Tegonotus cordis</i> , <i>Calepitrimerus cordiae</i>
<i>Cordia obliqua</i> Willd.	<i>Typhlodromus (Amblydromella) divergentis</i> *
<i>Coriandrum sativum</i> Linn.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i>
<i>Cornus</i> sp.	<i>B. praetiosa</i> *
<i>Cosmos</i> sp.	<i>T. ludeni</i> , <i>B. phoenicis</i> , <i>B. rugulosus</i>
<i>Cragrostis</i> sp.	<i>T. neocaledonicus</i>
<i>Crataegus monogyna</i> Jacq.	<i>B. praetiosa</i> *
<i>Crescentia</i> sp.	<i>B. californicus</i> *
<i>Crescentia cujete</i> Linn.	<i>B. phoenicis</i>
<i>Crossandra undulaefolia</i> Salisb.	<i>T. neocaledonicus</i> , <i>Calacarus citrifolii</i>
<i>Crotalaria</i> sp.	<i>A. (Typhlodromips) crotalariae</i>
<i>Crotalaria anagyroides</i> H. B. & K.	<i>P. (T.) harti</i> , <i>O. coffeae</i> *, <i>T. cinnabarinus</i>
<i>Crotalaria biflora</i> Linn.	<i>Aceria crotalariae</i>
<i>Crotalaria juncea</i> Linn.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>Aceria crotalariae</i> , <i>E. orientalis</i>
<i>Crotalaria retusa</i> Linn.	<i>Aceria crotalariae</i>
<i>Crotalaria triflora</i> Linn.	<i>Aceria crotalariae</i>

<i>Crotalaria verrucosa</i> Linn.	<i>Aceria crotalariae</i>
<i>Croton</i> sp.	<i>E. orientalis</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. euphorbiae</i>
<i>Crotoneaster</i> sp.	<i>O. biharensis</i>
<i>Crotoneaster bacillaris</i>	<i>B. praetiosa</i> *
<i>Cryptocarya</i> sp.	<i>E. neoperplexus</i> *
<i>Cucumis melo</i> Linn.	<i>T. neocaledonicus</i> , <i>T. cinnabarinus</i>
<i>Cucumis sativus</i> Linn.	<i>T. neocaledonicus</i> , <i>T. macfarlanei</i> , <i>T. cinnabarinus</i> , <i>B. californicus</i> ,
<i>Cucurbita</i> sp.	<i>Polyphagotarsonemus latus</i> , <i>A. (E.) alstoniae</i> , <i>B. phoenicis</i>
<i>Cucurbita maxima</i> Duchesne	<i>T. cinnabarinus</i> , <i>T. macfarlanei</i> , <i>T. ludeni</i> , <i>B. californicus</i> , <i>B. cucurbitae</i> , <i>Eutetranychus maximæ</i> , <i>Tetranychus angloensis</i>
<i>Cucurbita moschata</i> Duchesne	<i>T. cinnabarinus</i>
<i>Cucurbita pepo</i> Linn.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i>
<i>Cupressus</i> sp.	<i>Aegyptobia mumulus</i>
<i>Cupressus sempervirens</i> Linn.	<i>B. obovatus</i> *, <i>B. praetiosa</i> *, <i>P. abutiloni</i> *, <i>E. orientalis</i> *, <i>Aegyptobia mumulus</i> *, <i>T. (A.) divergentis</i>
<i>Cyamopsis tetragonaloba</i>	<i>T. ludeni</i> , <i>P. latus</i>
<i>Cymbopogon martini</i>	<i>Eriophyes cymbopogonis</i>
<i>Cynodon dactylon</i> Pers.	<i>P. (P.) latens</i> , <i>O. indicus</i> , <i>O. oryzae</i> , <i>Cunaxa cynodonae</i> , <i>A. (N.) cynodonae</i> , <i>Aceria dactylonae</i>
<i>Cynoglossum</i> sp.	<i>B. obovatus</i> *
<i>Cyperus</i> sp.	<i>T. neocaledonicus</i>
<i>Cyperus pangorei</i> Roxb.	<i>Phytoptus cyperi</i>
<i>Cyperus rotundus</i> Linn.	<i>Agistemus industani</i> , <i>Phytoptus cyperi</i> , <i>Anchiphytöptus giganticus</i>

D

<i>Dahlia</i> sp.	<i>T. cinnabarinus</i> , <i>T. ludeni</i> , <i>B. deleoni</i> , <i>B. phoenicis</i> , <i>P. latus</i> , <i>A. (A.) channabasavani</i> , <i>P. (P.) wainsteini</i>
<i>Dahlia pinnata</i> Cav.	<i>E. orientalis</i> *
<i>Dalbergia</i> sp.	<i>A. (E.) bambusae</i> , <i>A. (A.) largoensis</i> , <i>A. (P.) multidentatus</i> , <i>T. (T.) communis</i>

<i>Dalbergia latifolia</i> Roxb.	<i>T. (O.) rickeri</i>
<i>Dalbergia sissoo</i> (Roxb.)	<i>B. californicus</i> , <i>Aceria dalbergiae</i> , <i>E. orientalis</i> , <i>A. (E.) alstoniae</i>
<i>Daphne papyracea</i> Wall.	<i>B. praetiosa</i> *
<i>Datura alba</i> F. Muell.	<i>B. rugulosus</i>
<i>Datura metel</i> Linn.	<i>T. ludeni</i> , <i>P. latus</i> , <i>A. (T.) suknaensis</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.) neococcineae</i> , <i>A. (P.) multidentatus</i> , <i>B. obovatus</i>
<i>Daucus carota</i> Linn.	<i>A. (N.) fallacis</i>
<i>Debergeesis leucophylla</i>	<i>P. citri</i>
<i>Debergeesis hypoleuce</i>	<i>B. praetiosa</i> *, <i>P. citri</i> *
<i>Dendrobium</i> sp.	<i>B. californicus</i> *
<i>Desmodium triflorum</i> DC.	<i>Aceria crotalariae</i>
Dew gram	<i>P. latus</i>
<i>Dianthus</i> sp.	<i>B. praetiosa</i> *
<i>Dianthus caryophyllus</i> Linn.	<i>T. cinnabarinus</i>
<i>Diaspyros maritima</i>	<i>O. biharensis</i> *
<i>Diaspyros melanoxylen</i> Roxb.	<i>P. (P.) kapuri</i> , <i>P. (P.) macrosetosus</i>
<i>Dicanthium annulatum</i>	<i>S. andropogoni</i> , <i>O. indicus</i>
<i>Dichrostachys cinerea</i> W. & A.	<i>Aceria dichrostachyia</i>
<i>Dicliptera acanthaceae</i>	<i>B. obovatus</i>
<i>Dieffenbachia</i> sp.	<i>T. fijiensis</i>
<i>Dodonaea</i> sp.	<i>B. californicus</i> *
<i>Dodonaea viscosa</i> Jacq.	<i>T. neocaledonicus</i> , <i>Aegyptobia mumulus</i>
<i>Dolichos</i> sp.	<i>B. californicus</i> *
<i>Dolichos biflorus</i> Linn.	<i>T. ludeni</i> , <i>T. neocaledonicus</i>
<i>Dolichos lablab</i> Linn.	<i>T. ludeni</i> , <i>T. macfarlanei</i> , <i>P. latus</i> , <i>E. orientalis</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>A. (T.) lablabi</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.) ovalis</i> , <i>Iphiseius andamanicus</i> , <i>Aculops leguminae</i>
<i>Dolichos lanceolatus</i> R. Grah.	<i>T. neocaledonicus</i>
<i>Dryopteris</i> sp.	<i>B. obovatus</i> *

E

<i>Echinops echinatus</i> Roxb.	<i>B. obovatus</i> *
<i>Elettaria cardamomum</i> Maton	<i>B. deleoni</i> , <i>D. floridanus</i> , <i>T. neocaledonicus</i> , <i>Phytoptus eletariae</i>

Elm plant	<i>P. ulmi</i>
<i>Eleusine aegyptica</i> Desf.	<i>O. indicus</i>
<i>Eleusine indica</i> Gaertn.	<i>P. (P.) latens</i>
<i>Epidendrum</i> sp.	<i>B. californicus*</i>
<i>Eragrostis tenella</i> Nees	<i>Aceria eragrostae</i>
<i>Eranthemum</i> sp.	<i>B. phoenicis</i>
<i>Erigeron linifolius</i> Willd.	<i>T. cinnabarinus</i>
<i>Eriobotrya japonica</i> Lindl.	<i>Schizotetranychus tephrosiae</i> , <i>T. cinnabarinus</i> , <i>B. praetiosa</i> , <i>O. biharensis</i> , <i>O. mangiferus</i> , <i>B. californicus</i> , <i>B. obovatus</i> , <i>T. (A.) divergentis*</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. phoenicis</i> , <i>Eutetranychus nagai</i>
<i>Eruca sativa</i> Lamk.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>A. (E.) ovalis</i>
<i>Erythrina indica</i> Lamk.	<i>B. californicus</i> , <i>Aceria erythrinae</i>
<i>Erythrina sublobata</i> Roxb.	<i>Aceria erythreensis</i>
<i>Erythrina variegata</i> Linn.	<i>E. orientalis</i>
<i>Eucalyptus</i> sp.	<i>O. punicae</i> , <i>A. (E.) eucalypti</i> , <i>A. (T.) eucalypticus</i> , <i>A. (A.) largoensis</i> , <i>T. (T.) communis</i> , <i>T. (O.) rickeri</i> , <i>B. californicus</i>
<i>Eugenia</i> sp.	<i>O. mangiferus</i> , <i>Brevipalpus lewisi*</i> , <i>Colopodacus eugeniae</i> , <i>Floracarus eugeniaefoliae</i>
<i>Eugenia jambolana</i> Lamk.	<i>Tegonotus jambolensis</i>
<i>Eupatorium odoratum</i> Linn.	<i>A. (P.) multidentatus</i>
<i>Euphorbia</i> sp.	<i>E. orientalis</i> , <i>P. abutiloni</i>
<i>Euphorbia geniculata</i> Orteg	<i>T. neocaledonicus</i>
<i>Euphorbia hirta</i> Linn.	<i>T. neocaledonicus</i>
<i>Euphorbia japonica</i> Siebold	<i>Schizotetranychus tephrosae</i>
<i>Euphorbia longana</i>	<i>O. biharensis</i>
<i>Excoecaria agallocha</i> Linn.	<i>Aceria agallochae</i> , <i>Aculops excoecaria</i>

F

Fern	<i>A. (T.) crotalariae</i> , <i>A. (T.) suknaensis</i> , <i>A. (P.) multidentatus</i> , <i>T. (T.) neorhenanus</i> , <i>B. obovatus*</i>

<i>Ficus</i> sp.	<i>Aceria pustulatus</i> , <i>A. (A.) largoensis</i> , <i>A. (E.) ovalis</i> , <i>P. (P.) macropilis</i> , <i>P. (P.) swirskii</i> , <i>B. essigi*</i> , <i>B. californicus*</i> , <i>Eotetranychus fremonti</i> , <i>Anthopoda fici</i> , <i>Phyllocoptes ficivagrans</i> , <i>E. annecke</i>
<i>Ficus asperrima</i> Roxb.	<i>Calepitrimerus asperrimae</i>
<i>Ficus benghalensis</i> Linn.	<i>A. (A.) largoensis</i> , <i>T. (A.) homalii</i> , <i>Neotegonotus indicus</i> , <i>Colopodacus bengalensis</i> , <i>Aceria infectoriae</i> , <i>Neotegonotus fastigatus</i>
<i>Ficus carica</i> Linn.	<i>Eutetranychus caricae</i> , <i>Tenuipalpus fici</i> , <i>Rhyncaphyoptus ficifoliae</i> , <i>O. mangiferus</i> , <i>B. obovatus</i> , <i>B. phoenicis</i> , <i>E. orientalis</i> , <i>Eotetranychus irregularis</i>
<i>Ficus cunia</i> Buch.	<i>Eotetranychus hirsti</i> , <i>E. orientalis</i> , <i>P. ulmi</i> , <i>T. neocaledonicus</i> , <i>Aceria ficus</i> , <i>Leptus poonaensis</i> , <i>Cheletogenes ornatus</i> , <i>A. (A.) largoensis</i> , <i>P. (P.) punjabensis</i> , <i>P. (P.) roseus</i> , <i>Melichares fici</i>
<i>Ficus foveolata</i> Wall.	<i>Metaculus foveolatae</i>
<i>Ficus hirta</i> Vahl.	<i>P. (P.) crinitus*</i>
<i>Ficus hispida</i> Linn.	<i>Diptilomiopus jevremovici</i>
<i>Ficus infectoria</i> Roxb.	<i>Aceria infectoriae</i> , <i>Tegolophus ficusi</i> , <i>Phytoptus ficivorus</i>
<i>Ficus palmata</i> Forsk.	<i>B. praetiosa*</i> , <i>E. orientalis*</i>
<i>Ficus racemosa</i> Willd.	<i>Eotetranychus hirsti</i>
<i>Ficus religiosa</i> Linn.	<i>A. (E.) bambusae</i> , <i>E. orientalis</i>
<i>Flacourtia</i> sp.	<i>B. californicus*</i>
<i>Flaveria</i> sp.	<i>B. californicus*</i>
Fodder grass	<i>P. (P.) latens</i>
<i>Fragaria</i> sp.	<i>O. punicae*</i> ,
<i>Fragaria chiloensis</i> Duchesme	<i>E. orientalis</i>
<i>Fragaria nilgerrensis</i> Schldl.	<i>B. praetiosa*</i> , <i>P. (P.) latens*</i> , <i>Paraamblyseius fragariae</i>
<i>Fragaria vesca</i> Linn.	<i>B. obovatus</i>
Frangipini	<i>E. orientalis*</i> , <i>E. africanus*</i>
<i>Fuchsia</i> sp.	<i>B. essigi*</i>

Fumaria indica
Fungus

B. praetiosa
*P. ulmi**

G

- Gajri* *P. (P.) latens*
Garcinia sp. *B. chilensis*, *Tenuipalpus crassus*
Gardenia jasminoides Ellis *Diptilomiopus bengalensis*
Gelonium multiflorum A. Juss. *Tegolophus gelonis*
Geranium sp. *T. neocaledonicus*, *B. phoenicis*,
*B. praetiosa**
Gerbera sp. *B. deleari*, *B. phoenicis*
Gladiolus tristis Linn. *P. (P.) latens*,* *T. neocaledonicus*
Glycine max *T. cinnabarinus*, *T. neocaledonicus*
T. ludeni
Glycosmis pentaphylla Correa *Phytoptus glycosmisae*, *Anthocoptes glycosmis*
Glyricedia *E. orientalis*
Gmelia asiatica Linn. *Abacarus asiaticae*
Gmelina arborea Roxb. *Tegolophus gmelinus*
Gmelina asiatica Linn. *Tegolophus gmelinae*
Golden dew drop *Raoiella macfarlanei*
Gongor sp. *B. californicus**
Gossypium arboreum Linn. *Abacarus gossypii*
Gossypium herbaceum Linn. *E. orientalis*, *T. cinnabarinus*, *T. ludeni*, *T. neocaledonicus*, *Raoiella indica*, *Acalitus gossypii*, *Aceria puttarudriahi*, *P. latus*, *Sphaerolophus delhiensis*, *A. (E.) alstoniae*, *A. (E.) delhiensis*, *A. (P.) multidentatus*, *T. (A.) fleschneri*, *B. californicus*
Gossypium hirsutum Linn. *T. cinnabarinus*, *T. neocaledonicus*, *E. orientalis*, *T. ludeni**, *R. indica*, *B. praetiosa*,
Grass *O. iseilemae*, *Monoceronychus terpoglossiani*,
S. andropogoni, *Paraerythraeus serrato-*
ciliatus, *A. (N.) fallacis*, *A. (E.) ovalis*,
Erythraeus plumosus
Grewia asiatica Linn. *T. (A.) divergentis**, *E. orientalis*
Grewia populifolia Vahl. *E. orientalis**
Gynandropsis gynandra Briq. *E. orientalis**
Gyrocarpus sp. *Eriophyes alangii*

H

<i>Hamelia patens</i> Jacq.	<i>E. orientalis</i> *
<i>Hedera helix</i> Linn.	<i>B. praetiosa</i> *, <i>B. obovatus</i> *
<i>Helianthus annuus</i> Linn.	<i>T. cinnabarinus</i> , <i>B. californicus</i> , <i>B. obovatus</i> , <i>B. phoenicis</i> , <i>T. (Brethria) confusus</i> , <i>Bryo-</i> <i>bia praetiosa</i> *, <i>A. (P.) multidentatus</i> , <i>E.</i> <i>orientalis</i> , <i>T. (A.) divergentis</i> *
<i>Helicteres guazumaefolia</i> H. B. & K.	<i>Eotetranychus truncatus</i> *
<i>Hevea brasiliensis</i> Muell.	<i>O. coffeae</i> *
<i>Helicteres isora</i> Linn.	<i>B. pulchur</i>
<i>Heliotropium curassavicum</i> Linn.	<i>B. praetiosa</i> *
<i>Heliotropium eichwaldi</i> Steud.	<i>T. cinnabarinus</i> , <i>B. californicus</i>
<i>Hibiscus</i> sp.	<i>P. ulmi</i> , <i>B. californicus</i> *, <i>Obuloides raja-</i> <i>mohani</i> , <i>T. macfarlanei</i> *, <i>P. rachelae</i>
<i>Hibiscus abelmoschus</i> Linn.	<i>O. coffeae</i> *
<i>Hibiscus esculentus</i> Linn.	<i>B. obovatus</i> , <i>T. cinnabarinus</i>
<i>Hibiscus ficulenus</i> Cav.	<i>O. coffeae</i> *
<i>Hibiscus micranthus</i> Linn.	<i>Calacarus citrifolii</i>
<i>Hibiscus panduraeformis</i> Burn.	<i>O. coffeae</i> *
<i>Hibiscus rosa-sinensis</i> Linn.	<i>B. californicus</i> , <i>B. phoenicis</i> , <i>A. (E.)</i> <i>delhiensis</i> , <i>A. (A.) largoensis</i>
<i>Hibiscus vitifolius</i> Linn.	<i>Acalitus hibisci</i> , <i>Calacarus malvae</i>
<i>Holmskioldia sanguinea</i> Retz.	<i>B. californicus</i>
<i>Holoptelia integrifolia</i> Planch.	<i>Aceria holopteleae</i> , <i>Diptilomiopus integri-</i> <i>foliae</i> , <i>Paratetra integrifoliavagrans</i>
<i>Homalium conchinchinense</i>	<i>P. (P.) crinitus</i> *
<i>Homalium tomentosum</i> Benth.	<i>T. (A.) homalii</i>
<i>Hordeum vulgare</i> Linn.	<i>B. praetiosa</i> *, <i>P. (P.) latens</i>
Horse gram	<i>P. latus</i>
<i>Houlletia</i> sp.	<i>B. californicus</i> *

I

<i>Iberis amara</i> Linn.	<i>B. praetiosa</i> *
<i>Ichnocarpus frutescens</i>	<i>Cosella ichnocarpasia</i> , <i>Neocosella ichnocarpae</i>
R. Br.	
<i>Indigofera geradiana</i>	<i>B. praetiosa</i> *
R. Grah.	
<i>Indigofera heterantha</i> Wall.	<i>Eriophyes ladakhensis</i>
<i>Indigofera tinctoria</i> Linn.	<i>O. coffeae</i> *, <i>T. cinnabarinus</i> , <i>T. lombardini</i>
<i>Indigofera viscosa</i> Lamk.	<i>Aceria trichocnemum</i>
<i>Indigofera</i> sp.	<i>B. deleari</i>
<i>Ipomoea</i> sp.	<i>T. neocaledonicus</i> , <i>Tarsonemus krichneri</i> , <i>A. (A.) adhatodae</i> , <i>A. (A.) ipomoeae</i> , <i>A. (P.)</i> <i>multidentatus</i> , <i>E. orientalis</i> , <i>Calacarus</i> <i>citrifolii</i>
<i>Ipomoea batatas</i> Poir.	<i>Petrobia harti</i> , <i>Tegonotus convolvuli</i>
<i>Ipomoea palmata</i> Forsk.	<i>Tegonotus convolvuli</i>
<i>Ipomoea sepiaria</i> Koen.	<i>T. convolvuli</i>
<i>Ipomoea staphylina</i> Roem & Schult.	<i>Aceria gastrotrichus</i> , <i>Phyllocoptruta malligai</i>
<i>Iris</i> plant	<i>P. (P.) latens</i>
<i>Iseilema laxum</i>	<i>Oligonychus iseilemae</i>
<i>Ixora parviflora</i> Vahl	<i>Tenuipalpus ixorae</i>

J

<i>Jacaranda</i> sp.	<i>T. (A.) divergentis</i> *
<i>Jambosa vulgaris</i> DC.	<i>Raoiella macfarlanei</i>
<i>Jasminum angustifolium</i>	<i>B. chilensis</i>
Willd.	
<i>Jasminum arborescens</i> Roxb.	<i>B. obovatus</i> *
<i>Jasminum auriculatum</i> Vahl	<i>Aceria jasmini</i>
<i>Jasminum grandiflorum</i> Linn	<i>B. californicus</i> , <i>Sohizotetranychus undulatus</i>
<i>Jasminum humile</i> Linn.	<i>Tenuipalpus dimensus</i> *
<i>Jasminum multiflorum</i>	<i>A. (T.) kalimpongensis</i>
Andr.	
<i>Jasminum sambac</i> (Soland)	<i>T. neocaledonicus</i> , <i>B. californicus</i> <i>Aceria jasmini</i> , <i>Calacarus jasmini</i>
<i>Juglans</i> sp.	<i>Brevipalpus pulchur</i> *, <i>B. lewisi</i> *
<i>Juglans regia</i> Linn.	<i>E. orientalis</i> , <i>P. ulmi</i>
<i>Juniperus</i> sp.	<i>Pentamerismus oregonensis</i>

<i>Justicia betonica</i> Linn.	<i>Aceria justiciae</i> , <i>Aculops betonicae</i>
<i>Justicia glabra</i> Koen	<i>Aceria justiciae</i>

K

<i>Kentia</i> sp.	<i>B. essigi</i> *
Khandi weed	<i>P. (T.) harti</i>
<i>Kickxia ramosissima</i>	<i>B. karachiensis</i> *
Kidney bean	<i>P. latus</i>
<i>Kochia indica</i> Wight	<i>E. orientalis</i> *

L

<i>Lablab niger</i> var. <i>lignosus</i>	<i>Tetranychus ludeni</i>
<i>Lactuca sativa</i> Linn.	<i>B. praetiosa</i>
<i>Lagenaria vulgaris</i> Ser.	<i>T. cinnabarinus</i> , <i>T. macfarlanei</i>
<i>Lagerstroemia indica</i> Linn.	<i>O. mangiferus</i> , <i>B. californicus</i> , <i>B. karachiensis</i>
<i>Lagerstroemia thorelii</i>	<i>O. mangiferus</i>
Gangnep	
<i>Lamium</i> sp.	<i>B. obovatus</i> *
<i>Lannea coromandelica</i>	<i>Tetra lanneensis</i>
<i>Lantana camara</i> Linn.	<i>E. orientalis</i> *, <i>T. ludeni</i> , <i>T. cinnabarinus</i> , <i>P. (P.) macropilis</i> , <i>P. (P.) neocorniger</i> , <i>Phytoptus lantanae</i> , <i>Diptilomiopus camerae</i> , <i>Calaccarus citrifolii</i>
<i>Lathyrus odoratus</i> Linn.	<i>E. orientalis</i> *
<i>Leptadenia reticulata</i>	<i>Acalitus reticulatae</i> , <i>Calacarus citrifolii</i>
Wight	
<i>Les esculenta</i> Moench	<i>B. praetiosa</i>
<i>Leucas aspera</i> Link	<i>Aculus asperus</i> , <i>Calepitrimerus leucadis</i>
Liliaceae	<i>B. praetiosa</i> , <i>P. (T.) harti</i> , <i>P. (P.) latens</i>
<i>Limetta</i>	<i>T. neocaledonicus</i>
<i>Linum usitatissimum</i> Linn.	<i>T. cinnabarinus</i>
<i>Lippia nodiflora</i> Michx.	<i>B. obovatus</i> *
<i>Litchi chinensis</i> Sonner	<i>B. praetiosa</i> , <i>O. biharensis</i> , <i>O. punicae</i> , <i>Aceria litchii</i> , <i>A. (A.) largoensis</i> , <i>T. (A.) bakeri</i>
<i>Litsea</i> sp.	<i>Gammaphytoptus litseasis</i> , <i>Diptilomiopus sinesetus</i>

<i>Litsea wightiana</i> Benth. & Hook.	<i>Phytoptus laurae</i> , <i>Anthopoda wightianae</i> , <i>Aceria litseae</i>
<i>Lonicera</i> sp.	<i>B. praetiosa</i> *
<i>Luffa</i> sp.	<i>E. orientalis</i>
<i>Luffa acutangula</i> Roxb.	<i>E. orientalis</i> *, <i>T. ludeni</i> , <i>T. (A.) divergentis</i> *, <i>E. anneckeii</i> , <i>B. phoenicis</i>
<i>Luffa aegyptica</i> Mill.	<i>T. neocaledonicus</i> , <i>T. cinnabarinus</i> , <i>B. californicus</i> , <i>B. rugulosus</i>
<i>Luffa cylindrica</i> M. Roem.	<i>T. cinnabarinus</i>
<i>Lycaste</i> sp.	<i>B. californicus</i> *
<i>Lycium europaeum</i> Linn.	<i>B. praetiosa</i> *
<i>Lycopersicum esculentum</i> Mill.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>P. ulmi</i> , <i>Aceria lycopersici</i> , <i>Polyphagotarsonemus</i> <i>latus</i> , <i>T. ludeni</i>

M

<i>Mahonia leschenaultii</i>	<i>T. (O.) rickeri</i>
<i>Malax</i> sp.	<i>B. pulchur</i> *
<i>Mallotus</i> sp.	<i>Neocecidophyes mallotivagrans</i>
<i>Mallotus philippinensis</i> Muell.	<i>Aceria malloticola</i> , <i>Neophantacrus mallotus</i>
<i>Malus</i> sp.	<i>B. californicus</i> *
<i>Malus pumila</i> Mill.	<i>P. (P.) corniger</i> *
<i>Malva parviflora</i> Linn.	<i>B. praetiosa</i> *
<i>Malvastrum</i> sp.	<i>B. obovatus</i> *, <i>P. abutiloni</i> *, <i>T. (A.)</i> <i>divergentis</i> *
<i>Malvastrum tricuspidatum</i> A. Gray	<i>E. orientalis</i> *
<i>Mangifera indica</i> Linn.	<i>O. biharensis</i> *, <i>O. mangiferus</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>R. macfarlanei</i> , <i>A. mangiferae</i> , <i>Metaculus mangiferae</i> , <i>Neocalacarus mangiferae</i> , <i>Tegonotus mangiferae</i> , <i>Cisaberoptes kenya</i> , <i>Cheletogenes ornatus</i> , <i>A. (N.) aceriae</i> , <i>A. (E.) coccosocius</i> , <i>A. (A.) largoensis</i> , <i>A. (T.) mangiferae</i> , <i>A. (E.) ovalis</i> , <i>Indodromus meerutensis</i> , <i>T. (A.) rhenanus</i> , <i>T. (B.) roshanlali</i> , <i>T. (A.) divergentis</i> *, <i>T. (T.) nesbitti</i>
<i>Manglietia insignis</i> Blume	<i>A. (A.) largoensis</i>
<i>Manihot esculenta</i> Crantz.	<i>E. orientalis</i> , <i>T. neocaledonicus</i>

<i>Marsdenia tenuissima</i> Steud.	<i>B. phoenicis</i>
<i>Medicago sativa</i> Linn.	<i>T. cinnabarinus</i> , <i>A. medicaginis</i> ,
<i>Melia</i> sp.	<i>B. californicus</i> *
<i>Melia azedarach</i> Linn.	<i>E. orientalis</i> , <i>O. mangiferus</i> , <i>P. citri</i> *, <i>S. hindustanicus</i> , <i>B. obovatus</i> *, <i>T. mustus</i> , <i>T. ludhianaensis</i>
<i>Melilotus indica</i> All.	<i>T. cinnabarinus</i>
<i>Melilotus parviflora</i> Desf.	<i>T. neocaledonicus</i>
<i>Meliosma simplicifolia</i> Walp.	<i>Acalitus meliosmae</i> , <i>Phyllocoptes simplicifoliae</i>
<i>Melothria heterophylla</i> Cogn.	<i>E. orientalis</i>
<i>Mentha</i> sp.	<i>T. cinnabarinus</i> , <i>B. obovatus</i> , <i>B. karachiensis</i>
<i>Mentha incana</i> Willd.	<i>P. (P.) latens</i> *
<i>Mentha piperita</i> Linn.	<i>E. orientalis</i> *
<i>Michelia champaca</i> Linn.	<i>E. orientalis</i>
Milk weed	<i>P. (P.) roseus</i>
<i>Miliosma simplicifolia</i> (Roxb.)	<i>Phyllocoptes simplicifoliae</i>
<i>Millingtonia hortensis</i> Linn.	<i>Calacarus millingtoniae</i>
<i>Mitragyna tubulosa</i> Hav.	<i>Neocolopodacus mitragynae</i>
<i>Moghanis macrophylla</i>	<i>O. coffeae</i>
<i>Mollugo hirta</i> Thunb.	<i>E. orientalis</i> *
<i>Momordica charantia</i> Linn.	<i>T. cinnabarinus</i> , <i>B. californicus</i>
<i>Morinda tinctoria</i> Roxb.	<i>Phytoptus morindae</i>
<i>Moringa oleifera</i> Lamk.	<i>Aculus menoni</i> , <i>A. moringae</i> , <i>E. orientalis</i> *
<i>Moringa pterygosperma</i> Gaertn.	<i>Aculus menoni</i>
<i>Morus</i> sp.	<i>B. phoenicis</i> , <i>Eotetranychus rohila</i> , <i>Tetranychus kanzawai</i>
<i>Morus alba</i> Linn.	<i>E. orientalis</i> *, <i>Eotetranychus suginamensis</i> , <i>E. fremonti</i> , <i>O. coffeae</i> *, <i>Aceria mori</i> , <i>P. (P.) macropilis</i> , <i>P. (P.) mixtus</i> *, <i>T. (A.) mori</i> , <i>T. (T.) transtians</i> , <i>E. anneckei</i>
Moss	<i>P. ulmi</i> *
<i>Mucuna pruri</i> Hook.	<i>B. californicus</i>
<i>Murraya exotica</i> Linn.	<i>B. californicus</i>
<i>Murraya koenigii</i> Spreng.	<i>S. baltazari</i> , <i>Paratetra murrayae</i>
<i>Murraya paniculata</i> Jack.	<i>E. orientalis</i>
<i>Musa</i> sp.	<i>A. (N.) fallacis</i> , <i>A. (A.) largoensis</i>
<i>Musa paradisiaca</i> Linn.	<i>T. cinnabarinus</i> , <i>O. mangiferus</i> , <i>T. neocaledonicus</i> , <i>B. phoenicis</i> , <i>E. orientalis</i>

<i>Musa sapientum</i> Linn.	<i>O. sapienticola</i> , <i>O. indicus</i> , <i>A. (T.) eugeniae</i> , <i>A. (T.) kalimpongensis</i> , <i>A. (A.) largoensis</i> , <i>A. (E.) ovalis</i> , <i>A. (T.) sapienticola</i> ; <i>A. (P.)</i> <i>multidentatus</i> , <i>P. (P.) meyeræ</i>
<i>Mussandra corymbosa</i> Roxb.	<i>A. (A.) largoensis</i>

N

<i>Nelumbo nuciferum</i> Gaertn.	<i>O. indicus</i>
<i>Neolitsea zeylanica</i> Nerr.	<i>Calepitrimerus mysorensis</i> , <i>Keiferana neolitsea</i>
<i>Nerium indicum</i> Mill.	<i>B. praetiosa*</i> , <i>E. orientalis</i> , <i>B. obovatus*</i> , <i>T. punjabensis</i> , <i>Aceria nerii</i> , <i>A. (E.) alstoniae</i> . <i>A. (A.) largoensis</i> , <i>A. (E.) ovalis</i> , <i>P.</i> <i>abutiloni*</i> , <i>T. (A.) divergentis*</i>
<i>Nerium odorum</i> (Soland.)	<i>B. californicus</i> . <i>B. phoenicis</i> , <i>A. nerii</i> , <i>Tegolophus nerii</i>
<i>Nyctanthes arbortristis</i> Linn.	<i>B. deleoni</i> , <i>B. phoenicis</i> , <i>A. (T.) crotalariae</i>

O

<i>Ocimum</i> sp.	<i>Neophytoptus ocimæ</i>
<i>Ocimum basilicum</i> Linn.	<i>R. indica*</i> , <i>B. obovatus*</i> , <i>B. karachiensis*</i> , <i>Bakeriella ocimis</i>
<i>Ocimum sanctum</i> Linn.	<i>T. neocaledonicus</i> , <i>B. karachiensis</i>
<i>Odina wodier</i> Roxb.	<i>Phyllocoptruta odayrae</i> , <i>P. odinae</i>
<i>Odontoglossum</i> sp.	<i>B. californicus*</i>
<i>Oenothera rosea</i> (Soland)	<i>B. obovatus*</i>
Oil palm	<i>O. coffeae</i>
<i>Olea europaea</i> Linn.	<i>T. (A.) divergentis*</i>
Olive plant	<i>R. macfarlanei*</i>
Orchid plant	<i>O. sacchari*</i> , <i>B. essigi*</i>
<i>Oræxylon indicum</i> Vent.	<i>B. phoenicis</i>
<i>Oryza sativa</i> Linn.	<i>O. manishi</i> , <i>O. oryzae</i> , <i>O. indicus</i> , <i>S. andro-</i> <i>pogoni</i> , <i>S. mansonii</i> , <i>Cheiracus sulcatus</i> , <i>Chelacaropsis moorei</i> , <i>A. (N.) fallacis</i> , <i>A. (N.) indicus</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.)</i> , <i>ovalis</i> , <i>A. (P.) multidentatus</i>
<i>Otostegia limbata</i> Benth.	<i>B. obovatus*</i>
<i>Oxalis corniculata</i> Linn.	<i>P. (T.) harti</i>

P

<i>Panicum antidotale</i> Retz.	<i>Aceria antidotalae</i>
<i>Panicum distachyum</i> Linn.	<i>O. indicus</i>
<i>Panicum javanicum</i> Poir.	<i>O. indicus</i>
<i>Papaver album</i> Mill.	<i>A. (A.) largoensis</i>
<i>Parthenium hysterophorus</i> Linn.	<i>T. neocaledonicus</i>
<i>Parthenocissus</i> sp.	<i>B. lewisi*</i>
<i>Paspalum distachyum</i> Poit.	<i>B. obovatus*</i>
<i>Pavetta</i> sp.	<i>Calacarus microrostrus</i>
<i>Pavonia</i> sp.	<i>Anthocoptes pavoniae</i>
<i>Pennisetum purpureum</i> Schum.	<i>Mesobryobia jobneri</i>
<i>Pennisetum typhoideum</i> Rich.	<i>T. neocaledonicus, O. indicus</i>
<i>Pergularia extensa</i> N. E. Br.	<i>Aculops extensae</i>
<i>Periploca aphylla</i> Decne	<i>B. obovatus*, B. karachiensis*</i>
<i>Peristeria</i> sp.	<i>B. californicus*</i>
<i>Peristrophe</i> sp.	<i>B. praetiosa*</i>
<i>Peristrophe bicalyculata</i> Nees	<i>B. praetiosa*</i>
<i>Persea americana</i> Mill.	<i>O. punicae*</i>
<i>Persea</i> sp.	<i>B. californicus*</i>
<i>Peterea</i> sp.	<i>B. deleoni*</i>
<i>Petunia alba</i>	<i>P. abutiloni*</i>
<i>Petunia hybrida</i> Hort.	<i>T. cinnabarinus</i>
<i>Phaseolus</i> sp.	<i>Tetranychus afrindicus</i>
<i>Phaseolus aconitifolius</i> Jacq.	<i>T. cinnabarinus</i>
<i>Phaseolus aureus</i> Roxb.	<i>T. cinnabarinus, P. latus</i>
<i>Phaseolus lunatus</i> Linn.	<i>T. cinnabarinus, T. neocaledonicus</i>
<i>Phaseolus mungo</i> Linn.	<i>T. cinnabarinus</i>
<i>Phaseolus vulgaris</i> Linn.	<i>T. cinnabarinus, T. ludeni, T. neocaledonicus, B. californicus, B. phoenicis, Eutetranychus phaseoli, Tetranychus zaheri</i>
<i>Phoenix</i> sp.	<i>R. indica, A. (E.) alstoniae, T. (A.) gopali, E. bredini, O. coffeae*, T. neocaledonicus</i>
<i>Phoenix dactylifera</i> Linn.	<i>E. bredini*, R. indica*, E. orientalis*</i>
<i>Phyllanthus acidus</i> Skeels	<i>Calacarus channabasavannae</i>
<i>Phyllanthus distichus</i> Muell.	<i>P. ulmi</i>
<i>Physalis minima</i> Linn.	<i>B. obovatus*</i>
<i>Pilea</i> sp.	<i>B. californicus*</i>
<i>Pinus</i> sp.	<i>T. kumaonensis, A. (E.) bambusae</i>
	<i>B. praetiosa*</i>
<i>Pinus wallichiana</i>	<i>B. praetiosa*</i>

<i>Piper nigrum</i> Linn.	<i>A. (A.) largoensis</i>
<i>Pisum sativum</i> Linn.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i>
<i>Pithecolobium dulce</i> Benth.	<i>P. abutiloni</i> *
<i>Pittosporum</i> sp.	<i>B. essigi</i> *
<i>Pittosporum floribundum</i> W. & A.	<i>Aculops pittosporae</i>
<i>Plantago major</i> Linn.	<i>B. obovatus</i> *
<i>Plumeria</i> sp.	<i>B. phoenicis</i>
<i>Plumeria alba</i> Linn.	<i>B. phoenicis</i>
<i>Plumeria acutifolia</i> Poir.	<i>B. rugulosus</i>
<i>Plumbago zeylanica</i> Linn.	<i>T. granati</i>
<i>Podocarpus</i> sp.	<i>A. (A.) deleoni</i> *
<i>Poincirus trifoliata</i> Raf.	<i>E. orientalis</i>
<i>Poinsettia pulcherrima</i> R. Garh.	<i>B. californicus</i>
<i>Polyalthia longifolia</i> Benth. & Hook.	<i>E. orientalis</i> , <i>B. karachiensis</i> , <i>Calacarus polyalthiae</i>
<i>Polyanthea tuberosa</i>	<i>A. (T.) polyantheae</i>
<i>Polygala chinensis</i> Linn.	<i>Aceria polygalae</i>
<i>Polygonum aviculare</i> Linn.	<i>B. obovatus</i> *
<i>Polygonum glabrum</i> Willd.	<i>B. obovatus</i> *
<i>Polygonum molle</i> D. Don.	<i>P. (P.) woodburyi</i>
<i>Pongamia glabra</i> Vent.	<i>Eriophyes cheriani</i> , <i>Aceria pongamiae</i>
<i>Pongamia pinnata</i> Pierre	<i>E. orientalis</i> *, <i>A. pongamiae</i>
<i>Potentilla</i> sp.	<i>B. obovatus</i> *, <i>Paratetra himalayana</i>
<i>Priva leptostachya</i> Juss.	<i>Aculops privae</i> , <i>Calacarus citrifolii</i>
<i>Prosopis spicigera</i> Linn.	<i>Eriophyes prosopidis</i> , <i>Porcupinychus abutiloni</i> *
<i>Prunus</i> sp.	<i>B. pulchur</i> *, <i>T. punicae</i>
<i>Prunus amygdalus</i> Slokes.	<i>E. orientalis</i>
<i>Prunus armeniaca</i> Linn.	<i>P. ulmi</i>
<i>Prunus cerasus</i> Linn.	<i>B. praetiosa</i> *
<i>Prunus communis</i> Huds.	<i>B. praetiosa</i> *, <i>T. (A.) himalayensis</i>
<i>Prunus domestica</i> Linn.	<i>E. orientalis</i> , <i>B. praetiosa</i> , <i>P. ulmi</i> <i>A. (A.) largoensis</i>
<i>Prunus persica</i> Stokes	<i>B. praetiosa</i> , <i>E. sexmaculatus</i> , <i>P. ulmi</i> , <i>P. citri</i> , <i>O. mangiferus</i> , <i>T. cinnabarinus</i> , <i>O. coffeae</i> , <i>B. phoenicis</i> , <i>E. orientalis</i> , <i>E. anneckeii</i> , <i>T. dimensus</i>
<i>Prunus persica</i> var. <i>nucipersici</i> Benth. & Hook.	<i>B. praetiosa</i> , <i>E. orientalis</i>

*Pschscholzia californica**B. praetiosa***Psidium guajava* Linn.

T. cinnabarinus, *O. mangiferus*, *B. californicus*, *B. deleoni*, *B. phoenicis*, *B. obovatus*, *E. orientalis*, *T. yousefi*, *Terminalichus karachiensis*, *T. serratus*, *A. (E.) coccosocius*, *A. (N.) longispinosus*, *A. (A.) mcmurtryi*, *A. (T.) meghalayensis*, *A. (E.) delhiensis*, *A. (E.) finlandicus*, *A. (T.) guajavae*, *A. (T.) kalimpongensis*, *A. (A.) largoensis*, *P. (P.) crinitus**, *T. punicae*

Punica sp.*Tenuipalpus granati***Punica granatum* Linn.

O. punicae, *O. mangiferus*, *B. obovatus*, *B. californicus*, *B. phoenicis*, *T. punicae*, *T. aboharensis*, *Aceria granati*, *A. (E.) alstoniae*, *A. (A.) largoensis*, *A. (E.) ovalis*, *A. (Proprioseiopsis) peltatus*, *T. (A.) divergentis**

Pyrus sp.*B. pulchur**, *B. praetiosa***Pyrus communis* Linn.

B. praetiosa, *E. orientalis*, *A. (E.) alstoniae*, *A. (E.) bambusae*, *A. (E.) finlandicus*, *A. (E.) kodaikanalensis*, *A. (P.) multidentatus*, *T. (T.) communis*, *T. (A.) kodaikanalensis*, *T. (O.) pruni*, *T. (T.) transitans*, *Tenuipalpus pyrusae*

Pyrus malus Linn.

B. praetiosa, *P. citri**, *P. ulmi*, *Petrobia harti*, *B. obovatus**, *B. pulchur*, *T. dimensus*, *T. pyrusae*, *Neocypholaelaps pradhani*, *Typhlodromus (Amblydromella) mori*, *T. cinnabarinus*, *E. frosti*

Q

Quamoclit vulgaris Choisy*T. neocaledonicus**Quercus* sp.

*Eotetranychus suginamensis**,
*A. (A.) deleoni**

Quinx sp.*P. ulmi**Quisqualis indica* Linn.

O. mangiferus, *T. neocaledonicus*,
Calacarus quisqualis

R

<i>Ranunculus</i> sp.	<i>Georgiobia sphaeralceae</i>
<i>Ranunculus laetus</i> Salisb.	<i>B. praetiosa</i> *
<i>Raphanus sativus</i> Linn.	<i>B. praetiosa</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. karachiensis</i> , <i>B. obovatus</i> , <i>P. (T.) harti</i>
<i>Rhamnus virgata</i> Roxb.	<i>B. praetiosa</i> *
<i>Rhododendron</i> sp.	<i>B. lewisi</i> , <i>A. (E.) rhododendronis</i> , <i>T. (A.) rhododendronis</i>
<i>Rhodomyrtus tomentosa</i> Wight	<i>P. (P.) crinitus</i> *
<i>Rhynchosia capitata</i> DC.	<i>T. cinnabarinus</i>
<i>Ricinus communis</i> Linn.	<i>E. orientalis</i> , <i>T. neocaledonicus</i> , <i>T. ludeni</i> , <i>T. cinnabarinus</i> , <i>A. (A.) largoensis</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.) ovalis</i> , <i>Indoseiulus ricini</i>
<i>Rosa</i> sp.	<i>Phytoptus rosae</i>
<i>Rosa indica</i> Linn.	<i>E. orientalis</i> , <i>O. mangiferus</i> *, <i>B. praetiosa</i> , <i>E. frosti</i> *, <i>O. biharensis</i> *, <i>P. ulmi</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. phoenicis</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.) ovalis</i> , <i>A. (P.) multidentatus</i> , <i>B. rugulosus</i>
Rubiaceae	<i>Diptilomiopus knorri</i>
<i>Rubus</i> sp.	<i>A. (P.) multidentatus</i> , <i>E. frosti</i> *, <i>A. (A.) deleari</i> *
<i>Rubus racemosus</i> Roxb.	<i>Phytoptus rubifoliae</i>
<i>Ruellia patula</i> Jacq.	<i>Aceria ruelliae</i>

S

<i>Sabal palmetto</i> Lodd.	<i>A. (A.) deleari</i> *
<i>Saccharum aurandinaceum</i> Retz.	<i>O. indicus</i>
<i>Saccharum halepense</i>	<i>O. indicus</i>
<i>Saccharum munja</i> Roxb.	<i>O. indicus</i>
<i>Saccharum officinarum</i> Linn.	<i>O. sacchari</i> , <i>O. indicus</i> , <i>S. spireafolia</i> , <i>S. andropogoni</i> , <i>Aceria saccharini</i> , <i>Abacarus sacchari</i> , <i>Lupotarsonemus randsi</i> , <i>Steneotarsonemus bancrofti</i> , <i>Sphaerolophus gigas</i> , <i>Abrolophus delhiensis</i> , <i>A. (E.) alstoniae</i> , <i>A. (E.) finlandicus</i> , <i>A. (N.) dhooriai</i> , <i>A. (T.) officinaria</i> , <i>A. (E.) ovalis</i> , <i>A. (E.) sacchari</i> , <i>P. (P.) kapuri</i>

<i>Saccharum spontaneum</i> Linn.	<i>S. andropogoni</i> , <i>Abacarus delhiensis</i> ,
<i>Salix elegans</i> Wall.	<i>A. (N.) paspalivorus</i>
<i>Salix niphocladae</i>	<i>Aculops niphocladae</i>
<i>Salmalia malabarica</i> Schott	<i>Phyllocoptes salmaliae</i>
<i>Salvadora oleoides</i> Decne.	<i>E. orientalis</i> *,
<i>Salvia</i> sp.	<i>B. essigi</i> *
<i>Santalum album</i> Linn.	<i>T. neocaledonicus</i> *
<i>Sapindus emarginatus</i> Vahl	<i>Aceria sapindi</i>
<i>Sapindus saponaria</i> Linn.	<i>Aceria sapindi</i> , <i>A. (E.) alstoniae</i> , <i>Metaculus sapindiphagus</i>
<i>Sarcococca</i> sp.	<i>B. praetiosa</i> *
<i>Schefflera</i> sp.	<i>Acalitus schefflerae</i>
<i>Seakerthia</i> sp.	<i>T. fijiensis</i>
<i>Sechium edule</i> Sw.	<i>T. ludeni</i>
<i>Senebiera didyma</i> Pers.	<i>B. praetiosa</i> *
<i>Sesamum indicum</i> Linn.	<i>B. phoenicis</i> ,
<i>Sesbania sesbans</i>	<i>T. (A.) divergentis</i> *
<i>Sespedeza sericea</i>	<i>B. obovatus</i> *
<i>Setaria italica</i> Beauv.	<i>Eriophyes ladakhensis</i>
<i>Shorea</i> sp.	<i>A. (T.) kalimpongensis</i> , <i>A. (A.) largoensis</i>
<i>Shorea robusta</i> Gaertn.	<i>O. biharensis</i> , <i>A. (E.) alstoniae</i> , <i>A. (A.) shoreae</i> , <i>A. (T.) suknaensis</i> , <i>A. (P.) multidentatus</i> , <i>P. (P.) kapuri</i> , <i>P. (P.) macropilis</i> , <i>Tegonotus bengalensis</i> , <i>Rhynca-phytoptus shoreacola</i>
<i>Sida</i> sp.	<i>P. abutiloni</i> , <i>B. californicus</i> *, <i>B. lewisi</i> , <i>B. phoenicis</i>
<i>Sietgus orientalis</i>	<i>B. obovatus</i> *
<i>Silbum marianum</i> Gaertn.	<i>B. obovatus</i> *
<i>Solanum</i> sp.	<i>B. californicus</i> *
<i>Solanum melongena</i> Linn.	<i>E. bredini</i> , <i>Platytetranychus multigituli</i> , <i>T. cinnabarinus</i> , <i>T. ludeni</i> , <i>T. neocaledonicus</i> , <i>T. macfarlanei</i> , <i>T. sayedi</i> , <i>T. urticae</i> , <i>P. (T.) harti</i> , <i>B. californicus</i> , <i>B. karachiensis</i> , <i>B. phoenicis</i> , <i>B. obovatus</i> , <i>Aceria lycopersici</i> , <i>P. latus</i> , <i>A. (T.) kalimpongensis</i> , <i>A. (E.) alstoniae</i> , <i>A. (N.) rangatensis</i> , <i>A. (T.) tetranychivorus</i> , <i>A. (P.) multidentatus</i> , <i>P. (P.) kapuri</i>

<i>Solanum nigrum</i> Linn.	<i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. rugulosus</i> , <i>E. orientalis</i> *
<i>Solanum tuberosum</i> Linn.	<i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>T. cinnabarinus</i> , <i>P. latus</i> , <i>Rhizoglyphus echinopus</i> , <i>A. (N.) indicus</i>
<i>Solanum xanthocarpum</i> Schard. & Wendle.	<i>B. californicus</i> , <i>Aculops xanthocarpi</i>
<i>Solidago</i> sp.	<i>B. obovatus</i> *
<i>Solidago canadensis</i> Linn.	<i>B. rugulosus</i>
<i>Sonchus arvensis</i> Linn.	<i>T. cinnabarinus</i>
<i>Sorghum halepense</i> Pers.	<i>O. indicus</i> , <i>S. hindustanicus</i> , <i>T. neocaledonicus</i>
<i>Sorghum vulgare</i> Pers.	<i>P. (P.) latens</i> , <i>O. indicus</i> , <i>Aceria sorghi</i>
Sowank	<i>A. (N.) fallacis</i>
<i>Sphaeralcea ambigua</i>	<i>Georgiobia sphaeralceae</i> *
<i>Spinacia oleracea</i> Linn.	<i>T. cinnabarinus</i> , <i>T. ludeni</i> , <i>B. praetiosa</i>
<i>Spirea latifolia</i> Borck.	<i>Schizotetranychus spireaefolia</i> *
<i>Spondias mangifera</i> Willd.	<i>Tegolophus spondiallus</i>
<i>Stanhopea</i> sp.	<i>B. californicus</i> *
<i>Streblus asper</i> Lour.	<i>Paracaphylla streblae</i> , <i>Diptilomiopus jevremovici</i>
<i>Stroblianthus</i> sp.	<i>Aceria nandiensis</i>
<i>Strongylodon macrobotrys</i> A. Gray	<i>B. chilensis</i>
<i>Swietenia mahogani</i> Jacq.	<i>Calacarus swietensis</i>
<i>Symplocos</i> sp.	<i>Indotegolophus darjeelingensis</i>
<i>Syzygium cumini</i> Skeels.	<i>Eotetranychus frosti</i> *, <i>E. syzygium</i> , <i>B. californicus</i> , <i>A. (T.) eujeniae</i> , <i>A. (T.) syzygii</i> , <i>O. mangiferus</i> , <i>A. (A.) largoensis</i> , <i>P. (T.) harti</i>
<i>Syzygium javanicum</i> Miq.	<i>A. (E.) delhiensis</i> , <i>P. (P.) kapuri</i>
<i>Syzygium operculatum</i> Gamble	<i>Acaphylla syzygii</i>

T

<i>Tabernaemontana coronaria</i> Willd.	<i>E. orientalis</i> , <i>B. californicus</i> , <i>Cunaxa setirostris</i> , <i>A. (E.) alstoniae</i> , <i>A. (E.) coccineae</i> , <i>A. (A.) largoensis</i> , <i>A. (N.) longispinosus</i> , <i>A. (E.) ovalis</i>

<i>Tabernaemontana divaricata</i>	<i>B. rugulosus</i>
R. Br.	
<i>Tagetes erecta</i> Linn.	<i>T. mustus</i> , <i>T. neocaledonicus</i> , <i>B. rugulosus</i>
<i>Tagetes patula</i> Linn.	<i>T. cinnabarinus</i> , <i>P. latus</i> , <i>A. (E.) coccineae</i>
<i>Tagetes tenuifolia</i> Cav.	<i>B. praetiosa</i> *, <i>E. orientalis</i> *, <i>B. karachiensis</i> *
<i>Tamarix aphylla</i>	<i>E. orientalis</i> *
<i>Tamarix plumosus</i> Linn.	<i>Phyllocoptes imigrans</i>
<i>Taxus baccata</i> Linn.	<i>Pentamerismus oregonensis</i> *, <i>B. praetiosa</i> *
<i>Tecoma stans</i> Linn.	<i>B. californicus</i> , <i>T. punicea</i>
<i>Tecoma</i> sp.	<i>Calepitrimerus massanajoris</i> , <i>Disella tectona</i>
<i>Tectona</i> sp.	<i>Disella tectona</i> , <i>A. (A.) largoensis</i> ,
<i>Tectona grandis</i> Linn.	<i>A. (T.) suknaensis</i> , <i>A. (T.) swaga</i> , <i>Dipti-</i> <i>lomiopus jevremovici</i> , <i>Anthocoptes tectonae</i> , <i>Tenuipalpus tectonae</i>
<i>Tephrosia purpuria</i> Pers.	<i>Tetra tephrosiae</i>
<i>Terminalia arjuna</i> Wight & Arn.	<i>Terminalichus delhiensis</i> , <i>T. karachiensis</i> , <i>Phytoptus terminaliae</i> , <i>A. (E.) coccineae</i> , <i>A. (E.) ovalis</i> , <i>P. (P.) rugosus</i> , <i>Abacarus</i> <i>arjunalis</i>
<i>Terminalia catappa</i> Linn.	<i>Terminalichus karachiensis</i>
<i>Terminalia chebula</i> Roxb.	<i>Ectomerus chebulae</i>
<i>Terminalia entappa</i>	<i>Phytoptus terminaliae</i>
<i>Terminalia tomentosa</i>	<i>Tuckerella delhiensis</i>
Wight & Arn.	
<i>Terminalia</i> sp.	<i>Terminalichus panajiensis</i>
<i>Tetrazygia</i> sp.	<i>Tenuipalpus tertrazygae</i> *
<i>Thea</i> sp.	<i>B. californicus</i> *
<i>Thea sinensis</i> Linn.	<i>O. coffeae</i> , <i>T. cinnabarinus</i> , <i>B. californicus</i> *, <i>B. obovatus</i> , <i>B. phoenicis</i> , <i>Acaphylla indiae</i> , <i>Acaphylla theae</i> , <i>Calacarus carinatus</i> <i>P. latus</i> , <i>A. (A.) rhabdus</i> . <i>T. (O.) channa-</i> <i>basavanni</i> , <i>T. (C.) neotransvaalensis</i> , <i>Acaphylla steinwedeni</i> , <i>Acaphyllisa parindiae</i> <i>Acaphylla theae</i>
<i>Theobroma cacao</i> Linn.	<i>B. phoenicis</i> , <i>O. biharensis</i>
<i>Thevetia nucifolia</i> Juss.	<i>B. californicus</i>
<i>Thevetia peruviana</i> Merr.	<i>E. orientalis</i> *
<i>Thuja orientalis</i> Linn.	<i>Aegyptobia mumulus</i> , <i>T. (A.) divergentis</i> *, <i>Bakerina aculus</i>

<i>Thunbergia</i> sp.	<i>B. californicus</i> *
<i>Thunbergia alata</i> Boj.	<i>B. phoenicis</i>
<i>Ticome</i> sp.	<i>B. californicus</i>
<i>Tillandsia usneoides</i> Linn.	<i>A. (A.) deleoni</i> *
<i>Trema orientalis</i> Bl.	<i>Tegolophus kalyanii</i>
<i>Trevesia</i> sp.	<i>B. californicus</i> *
<i>Trianthema microphylla</i>	<i>Tenuipalpus pernicious</i>
<i>Trianthema monogyna</i> Linn.	<i>E. orientalis</i> *
<i>Trichopila</i> sp.	<i>B. californicus</i> *
<i>Trichosanthes anguina</i> Linn.	<i>B. californicus</i>
<i>Triticum aestivum</i> Linn.	<i>B. praetiosa</i> , <i>P. (P.) latens</i> , <i>P. ulmi</i> , <i>A. (N.) indicus</i> , <i>Lasioseius terrestris</i>
<i>Triumfetta neglecta</i>	<i>O. coffeae</i>
Wight & Arn.	

U

Undet. plants

	<i>Floracarus pollachiensis</i> , <i>Aculus atturensis</i> , <i>Phytoptus subbaraoi</i> , <i>Indonotalox sudarsani</i> , <i>Calacarus channabasavannae</i> , <i>Aculus</i> <i>yelagiriensis</i> , <i>Phytoptus karnatakaensis</i> , <i>Neodiptilomiopus vishakantai</i> , <i>Neorhynacus</i> <i>rajendrani</i> , <i>Colopodacus gynalaxtae</i> <i>Colo-</i> <i>podacus walayarensis</i> , <i>Anthopoda deviarensis</i> , <i>Nothopoda kallarensis</i> <i>Floracarus siruvan-</i> <i>iensis</i> , <i>F. sivakumarii</i> , <i>Anthocoptes ayya-</i> <i>nari</i> , <i>Anthocoptes walayarensis</i> , <i>Aceria</i> , <i>delhiensis</i> , <i>Tenuipalpus malligai</i> , <i>T. coimba-</i> <i>torensis</i> , <i>T. laminasetae</i> , <i>T. gharii</i> , <i>E.</i> <i>ladakhensis</i> , <i>Procalacarus aliyarensis</i> , <i>Tegonotus coimbatorensis</i> , <i>Epitrimerus</i> <i>chandramohani</i> , <i>Phyllocoptes aliyamagaren-</i> <i>sis</i> , <i>Phyllocoptes asperaevagrans</i> , <i>Abacarus</i> <i>goaensis</i> , <i>Aculops kumari</i> , <i>Aculus kolengii</i> , <i>Ditrymacus keiferi</i> , <i>Metaculus londaensis</i> , <i>Neomesalox kallarensis</i> , <i>Hyboderus globulus</i> <i>Garhwalicus himalayensis</i> , <i>Platyseiella</i> <i>mumai</i> , <i>Tenuipalpus hastaligni</i> <i>A. (A.)</i> <i>orientalis</i>
<i>Urena lobata</i> Linn.	<i>O. coffeae</i>

V

<i>Valaris solanacea</i>	<i>B. rugulosus</i>
<i>Verbascum thapsus</i> Linn.	<i>B. obovatus*</i> , <i>B. praetiosa*</i>
<i>Verbena</i> sp.	<i>B. obovatus*</i>
<i>Verbena brasiliensis</i> Vell.	<i>E. orientalis*</i>
<i>Verbena bonariensis</i> Linn.	<i>B. karachiensis*</i>
<i>Verbena officinalis</i> Linn.	<i>B. obovatus*</i>
<i>Vernonia</i> sp.	<i>T. (A.) divergentis*</i>
<i>Veronica</i> sp.	<i>B. essigi*</i> ,
<i>Viburnum</i> sp.	<i>Tenuipalpus caudatus*</i>
<i>Vicia sativa</i> Linn.	<i>P. (P.) latens*</i>
<i>Vigna catjang</i> Endl.	<i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>P. latus</i> ,
<i>Vigna cylindrica</i>	<i>E. orientalis*</i>
<i>Vinga radiata</i>	<i>T. ludeni</i>
<i>Vigna unguiculata</i> Walp.	<i>T. ludeni</i>
<i>Vitex negundo</i> Linn.	<i>B. deleoni</i> , <i>B. phoenicis</i> , <i>Anthocoptes vitexae</i> , <i>Tegolophus vitexis</i>
<i>Vitex pubescens</i> Vahl.	<i>A. (E.) ovalis</i>
<i>Vitis</i> sp.	<i>B. californicus</i> , <i>B. chilensis</i> , <i>B. lewisi</i> <i>T. granati</i>
<i>Vitis vinifera</i> Linn.	<i>B. praetiosa*</i> , <i>Eotetranychus truncatus</i> , <i>O. coffeae</i> , <i>O. mangiferus</i> , <i>O. oryzae</i> , <i>O. punicae</i> , <i>T. cinnabarinus</i> , <i>T. neocaledonicus</i> , <i>B. californicus</i> , <i>B. chilensis*</i> , <i>B. phoenicis</i> , <i>Colomerus vitis</i> , <i>Pronematus elongatus</i> , <i>A. (E.) delhiensis</i> , <i>T. (A.) bakeri</i> , <i>B. californicus</i> , <i>E. orientalis</i> , <i>Oligonychus vitis</i>

W

Wander beans	<i>T. ludeni</i>
<i>Withania somnifera</i> Dun.	<i>T. cinnabarinus</i> , <i>E. orientalis*</i> , <i>T. (A.) divergentis*</i>

X

<i>Xanthium</i> sp.	<i>Tenuipalpus mustus</i>
Xerophyte	<i>Proneotegonotus antiquorae</i>

Z

Zea mays Linn.*P. (P.) latens*, *O. indicus*, *E. orientalis*, *B. californicus*, *A. (E.) delhiensis*, *A. (E.) finlandicus*, *A. (N.) indicus*, *A. (T.) sorghumae**Zinia* sp.*B. phoenicis*, *P. latus*, *A. (E.) alstoniae*, *A. (N.) longispinosus*, *B. karachiensis*, *B. rugulosus*,*Zizyphus* sp.*Eotetranychus rajouriensis*, *P. (P.) roseus*, *T. (A.) homalii*, *B. obovatus*, *E. bilobatus**Zizyphus jujuba* Lamk.*B. praetiosa*, *E. orientalis*, *Larvacarus transitans*, *Eriophyes cernuus*, *P. (P.) jujuba*, *Eotetranychus fremonti**Zizyphus sativa* Gaertn.*E. orientalis*

STATEWISE DISTRIBUTION OF PLANT MITES IN INDIA

ASSAM

Fam. Tetranychidae

1. *Petrobia harti*, *Eutetranychus africanus*, *E. orientalis*, *Aponychus corpuzae*, *Eoteranychus pamela*, *Oligonychus coffeae*, *O. sacchari*, *Panonychus citri*, *Schizotetranychus baltazari*, *Tetranychus fijiensis*, *T. lombardini*, *T. neocaledonicus*,

Fam. Tenuipalpidae

Brevipalpus californicus, *B. phoenicis*, *Phytoptipalpus albizziae*,

Fam. Eriophyidae

Acaphylla indiae, *A. theae*, *Calacarus carinatus*, *Diptilomiopus assamica*

Fam. Ascidae

Lasioseius quadrisetosus

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *kulini*, *A. (A.) largoensis*, *A. (A.) mcmurtryi*, *A. (A.) orientalis*, *A. (A.) paraaerialis*, *A. (Euseius) alstoniae*, *A. (E.) pruni*, *A. (Neoseiulus) assamensis*, *A. (N.) fallacis*, *A. (Paraphytoseius) multidentatus*, *A. (Phytoscutella) salebrosus*, *A. (Typhlodromalus) kalimpongensis*, *A. (T.) swaga*, *A. (Typhlodromips) crotalariae*, *A. (T.) suknaensis*, *Phytoseius* (*Pennaseius*) *kapuri*, *P. (Phytoseius) crinitus*, *A. (P.) meyeriae*, *Typhlodromus* (*Amblydromella*) *bambusicolus*, *T. (A.) fleschneri*.

ANDHRA PRADESH

Fam. Tetranychidae

Eotetranychus hirsti, *Oligonychus indicus*,

Fam. Eriophyidae

Aceria saccharini

Fam. Phytoseiidae

Amblyseius (*Euseius*) *bambusae*, *A. (E.) coccineae*, *A. (E.) coccosocius*, *A. (E.) ovalis*, *A. (Paraphytoseius) multidentatus*, *A. (Typhlodromalus) kalimpongensis*, *Typhlodromus* (*Orientiseius*) *rickeri*.

ANDAMAN AND NICOBAR ISLANDS

- Fam. Tetranychidae
Aponychus corpuzae, *A. sarjui*, *Oligonychus iseilemae*, *Oligonychus biharensis*, *O. oryzae*, *O. manishi*, *Panonychus citri*, *Schizotetranychus masoni*, *Tetranychus fljiensis*, *T. macfarlanei*
- Fam. Tenuipalpidae
Brevipalpus essigi, *Tenuipalpus hastaligni*, *T. micheli*, *T. quadrisetosus*, *T. tetrazygae*
- Fam. Cheyletidae
Chelacaropsis moorei
- Fam. Stigmaeidae
Indostigmaeus rangatensis
- Fam. Tydeidae
Parapronematus acaciae, *Lorryia africana*
- Fam. Cunaxidae
Cunaxa bambusae, *C. cynodona*, *C. myabunderensis*, *C. setirostris*, *Cunaxoides nicobarensis*, *Indocunaxa smileyi*, *Neocunaxoides pradhani*
- Fam. Bdellidae
Bdellodes (Hoploscirus) affinis
- Fam. Phytoseiidae
Amblyseius (Amblyseius) largoensis, *A. (E.) ovalis*, *A. (Neoseiulus) cynodona*, *A. (N.) fallacis*, *A. (N.) longispinosus*, *A. (N.) rangatensis*, *A. (Paraphytoseius) multidentatus*, *A. (Typhlodromalus) jarooa*, *A. (T.) sorghumae*, *A. (Typhlodromips) arecae*, *A. (T.) eujeniae*, *A. (T.) sapienticola*, *A. (T.) suknaensis*, *Iphiseius andamanicus*, *I. bakeri*, *Phytoseius (Pennaseius) kapuri*.

BIHAR

- Fam. Tetranychidae
Petrobia latens, *Aponychus (Stylophoronicus) baghensis*, *A. (S.) lalii*, *Eotetranychus hirsti*, *Oligonychus biharensis*, *O. indicus*, *O. mangiferus*, *Schizotetranychus andropogoni*, *Tetranychus cinabarinus*, *T. neocaledonicus*
- Fam. Tenuipalpidae
Brevipalpus phoenicis, *Laryvacarus transitans*

- Fam. Eriophyidae
Disella tectona, *Aceria cordiae*, *A. litchii*, *A. mangiferae*, *Tegonotus bassius*, *Calepitrimerus massanjoris*, *Abacarus sacchari*, *Tegolophus cordis*, *T. gmelinus*,
- Fam. Tarsonemidae
Polyphagotarsonemus latus, *Lupotarsonemus randsi*
- Fam. Tydeidae
Pronematus fleschneri
- Fam. Phytoseiidae
Amblyseius (*Amblyseius*) *largoensis*, *A.* (*Euseius*) *alstoniae*, *A.* (*Neoseiulus*) *longispinosus*, *A.* (*Paraphytoseius*) *multidentatus*, *A.* (*Typhlodromips*) *tetranychivorus*, *A.* (*E.*) *ovalis*
- Fam. Acaridae
Tyrophagus putrescentiae.

DELHI

- Fam. Tetranychidae
Bryobia eharai, *B. praetiosa*, *Monoceronychus terpogossiani*, *Petrobia harti*, *P. latens*, *Eutetranychus orientalis*, *Eutetranychus bilobatus*, *E. citri*, *E. maximae*, *E. phaseoli*, *E. caricae*, *E. nagai*, *E. anneckei*, *Eotetranychus hirsti*, *E. irregularis*, *E. rohilaie*, *E. rajouriensis*, *E. suginamensis*, *Oligonychus biharensis*, *O. coffeae*, *O. indicus*, *O. mangiferus*, *O. vitis*, *Schizotetranychus andropogoni*, *S. tephrosiae*, *Tetranychus angloensis*, *T. afrindicus*, *T. kanzawai*, *T. ludeni*, *T. macfarlanei*, *T. neocaledonicus*, *T. papayae*, *T. sayedi*, *T. zaheri*
- Fam. Tenuipalpidae
Brevipalpus californicus, *B. obovatus*, *B. pulchur*, *B. phoenicis*, *Tenuipalpus acacii*, *T. cissampelosa*, *T. dimensus*, *T. faresianus*, *T. fici*, *T. granati*, *T. pernecis*, *T. punicae*, *T. pyrusae*, *T. yousefi*, *Terminalichus delhiensis*, *T. karachiensis*, *T. serratus*,
- Fam. Eriophyidae
Aceria balanitis, *A. dalbergiae*, *A. delhiensis*, *A. cajani*, *A. ficus*, *A. granati*, *A. infectoriae*, *A. lycopersici*, *A. mangiferae*, *A. mori*, *A. nerii*, *A. sorghi*, *Eriophyes prosopides*, *Paraphytoptus chrysanthemi*, *Phytoptus ficivorus*, *P. terminaliae*, *Acaphylla syzygii*, *Abacarus delhiensis*, *A. saccharini*, *Aculops kumari*, *Anthocoptes adhatodae*, *Neocalacarus mangiferae*, *Rhyncaphytoptus ficifoliae*,

- Fam. Tuckerellidae
Tuckerella delhiensis
- Fam. Tydeidae
Pronematus fleschneri, *P. sextoni*
- Fam. Erythraeidae
Sphaerolophus gigas, *S. delhiensis*, *Abrolophus delhiensis*, *Abrolophus ripicola*, *Erythraeus plumosus*, *Paraerythraeus serratociliatus*
- Fam. Ascidae
Melichares fici, *Lasioseius terrestris*
- Fam. Phytoseiidae
A. (E.) alstoniae, *A. (E.) delhiensis*, *A. (N.) indicus*, *A. (Typhlodromips) mangiferae*, *Phytoseius (Pennaseius) minutus*, *P. (Phytoseius) macropilis*, *Typhlodromus (Amblydromella) bakeri*, *T. (A.) rhenanus*, *T. (Brethria) confusus*, *T. (B.) roshanlali*, *T. (Typhloctomus) nesbitti*,
- Fam. Acaridae
Rhizoglyphus echinopus.

GUJARAT

- Fam. Tetranychidae
Eutetranychus orientalis, *Eotetranychus frosti*, *Oligonychus sacchari*, *Platytetranychus multidentatus*, *Tetranychus cinnabarinus*, *T. neocaledonicus*, *T. macfarlanei*
- Fam. Eriophyidae
Acalitus gossypii
- Fam. Phytoseiidae
A. (A.) largoensis, *A. (E.) ovalis*, *A. (E.) sacchari*, *A. (N.) aceriae*, *A. (T.) kalimpongensis*, *Indoseiulus ricini*, *P. (Pennaseius) kapuri*, *P. (P.) jujuba*, *P. (P.) roseus*, *Typhlodromus (Amblydromella) chrysanthemi*.

GOA, DAMAN & DIEU

- Fam. Tenuipalpidae
Terminalichus panajiensis
- Fam. Eriophyidae
Calacarus polyalthiae, *Abacarus goaensis*

HARYANA

- Fam. Tetranychidae
Petrobia latens, *Eutetranychus orientalis*, *Oligonychus indicus*,
O. mangiferus, *Tetranychus cinnabarinus*, *T. neocaledonicus*
- Fam. Tenuipalpidae
Tenuipalpus indicus
- Fam. Eriophyidae
Aceria mangiferae
- Fam. Phytoseiidae
Amblyseius (*Neoseiulus*) *fallacis*.

HIMACHAL PRADESH

- Fam. Tetranychidae
Bryobia praetiosa, *Neopetrobia simlaensis*, *Oligonychus mangiferus*,
Panonychus ulmi
- Fam. Tenuipalpidae
Brevipalpus obovatus, *B. phoenicis*, *Tenuipalpus pruni*
- Fam. Eriophyidae
Aceria ficus, *Eriophyes cheriani*, *Calacarus carinatus*
- Fam. Phytoseiidae
Amblyseius (*Amblyseius*) *largoensis*, *Typhlodromus* (*Amblydromella*)
himalayensis
- Fam. Tydeidae
Pronematus elongatus.

JAMMU AND KASHMIR

- Fam. Tetranychidae
Bryobia eharai, *B. praetiosa*, *Petrobia harti*, *P. latens*, *Eutetranychus orientalis*, *Eotetranychus frosti*, *E. ladakhensis*, *Panonychus citri*, *P. ulmi*
- Fam. Eriophyidae
Eriophyes ladakhensis
- Fam. Phytoseiidae
Amblyseius (*Paraphytoseius*) *multidentatus*, *A. (T.) potentillae*,
P. (P.) corniger, *P. (P.) wainsteini*, *T. (A.) mori*, *T. (O.) kashmiricus*,
T. (Paraseiulus) neosoleiger, *T. (Typhloctomus) transitans*.

KARNATAKA

Fam. Tetranychidae

Bryobia eharai, *Petrobia harti*, *Eutetranychus africanus*, *Tenuipalponychus citri*, *Eotetranychus hirsti*, *E. mandensis*, *E. sexmaculatus*, *O. biharensis*, *O. indicus*, *O. mangiferus*, *Schizotetranychus baltazari*, *Tetranychus cinnabarinus*, *T. fijiensis*, *T. ludeni*, *T. neocaledonicus*

Fam. Tenuipalpidae

Brevipalpus californicus, *B. chilensis*, *B. phoenicis*, *Dolichotetranychus floridanus*, *Pentamerismus oregonensis*, *Raoiella indica*, *R. macfarlanei*, *Tenuipalpus crassus*, *T. californicus*, *T. micheli*

Fam. Eriophyidae

Neocosella ichnocarpae, *Aceria bambusae*, *A. barleriae*, *A. cajani*, *A. clerodendronis*, *A. cordiae*, *A. crotalariae*, *A. erythrinae*, *A. gastrotrichus*, *A. granati*, *A. jasmini*, *A. litchii*, *A. lycopersici*, *A. macfarlanei*, *A. medicaginis*, *A. nandiensis*, *A. nerii*, *A. pongamiae*, *A. puttarudriahi*, *A. saccharini*, *A. sapindi*, *A. sheldoni*, *A. tulipae*, *Eriophyes cernuus*, *Paraphytoptus chrysanthemi*, *Phytoptus canthii*, *P. cyperi*, *P. casuarinae*, *P. karnatakaensis*, *Calacarus channabasavannae*, *Tegonotus convolvuli*, *Calepitrimerus azadirachtae*, *C. leucadis*, *C. mysorensis*, *Abacarus sacchari*, *Aculops acanthae*, *A. asperus*, *A. indicus*, *A. mckenziei*, *A. menoni*, *A. moringae*, *Keiferana neolitsea*, *Metaculus mangiferae*, *Neocalacarus mangiferae*, *Neometaculus bauhiniae*, *Tegolophus gmelinae*, *Tetra bauhiniae*, *Tetra tephrosae*, *Thamnacus euphorbiae*, *Neodip-tilomiopus vishakantai*

Fam. Tarsonemidae

Polyphagotarsonemus latus

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *aerialis*, *A. (A.) largoensis*, *A. (E.) bambusae*, *A. (E.) cocosocius*, *A. (E.) eucalypti*, *A. (E.) finlandicus*, *A. (E.) ovalis*, *A. (E.) sacchari*, *A. (Typhlodromalus) eucalypticus*, *A. (T.) kalimpongensis*, *A. (T.) lablabi*, *A. (Typhlodromips) tetranychivorus*, *Phytoseius* (*Phytoseius*) *bandipurensis*, *P. (P.) rachelae*, *Typhlodromus* (*Amblydromella*) *eharai*, *T. (A.) fleschneri*, *T. (A.) rhododendronis*, *T. (O.) rickeri*, *T. (T.) communis*

KERALA

- Fam. Tetranychidae
Oligonychus biharensis, *O. mangiferus*, *Schizotetranychus hindustanicus*, *Tetranychus cinnabarinus*, *T. fijiensis*, *T. neocaledonicus*
- Fam. Tenuipalpidae
Raoiella macfarlanei
- Fam. Eriophyidae
Phytoptus carissae, *Metaculus foveolatae*, *Neorhynacus rajendrani*,
- Fam. Ameroseiidae
Neocypholaelaps stridulans
- Fam. Phytoseiidae
Amblyseius (*Amblyseius*) *channabasavanni*, *A. (A.) largoensis*, *A. (A.) paraaerialis*, *A. (Asperoseius) nucifera*, *A. (Euseius) bambusae*, *A. (E.) cocosocius*, *A. (E.) ovalis*, *A. (Typhlodromips) suknaensis*, *A. (T.) tetranychivorus*, *Typhlodromus* (*Amblydromella*) *homalii*, *T. (Orientiseius) rickeri*.

MAHARASHTRA

- Fam. Tetranychidae
Bryobia eharai, *Eutetranychus orientalis*, *Tetranychus neocaledonicus*,
- Fam. Tenuipalpidae
Brevipalpus phoenicis, *Tenuipalpus amygdalusae*
- Fam. Eriophyidae
Aceria cajani, *Aceria jasmini*, *Epitrimerus chandramohani*, *Metaculus londaensis*,
- Fam. Tarsonemidae
Polyphagotarsonemus latus
- Fam. Erythraeidae
Leptus poonaensis
- Fam. Phytoseiidae
Amblyseius (*Amblyseius*) *adhatodae*, *A. (A.) ipomoeae*, *A. (E.) ovalis*, *A. (Paraphytoseius) multidentatus*, *A. (Typhlodromalus) havu*.

MANIPUR

- Fam. Phytoseiidae
Amblyseius (*A.*) *largoensis*, *A. (E.) ovalis*, *A. (T.) manipurensis*, *Paraamblyseius formosanus*, *Typhlodromus manipurensis*.

MEGHALAYA

Fam. Tetranychidae

Bryobia praetiosa, *Aponychus corpuzae*, *Eotetranychus kankitus*, *E. sexmaculatus*, *Panonychus citri*, *Tetranychus cinnabarinus*, *T. neocaledonicus*

Fam. Tenuipalpidae

Brevipalpus phoenicis, *Tenuipalpus punicae*

Fam. Eriophyidae

Cosella fleschneri

Fam. Phytoseiidae

A. (A.) largoensis, *A. (A.) mcmurtryi*, *A. (A.) paraaerialis*, *A. (E.) alstoniae*, *A. (E.) coccineae*, *A. (E.) ovalis*, *A. (E.) pruni*, *A. (N.) fallacis*, *A. (P.) multidentatus*, *A. (T.) crotalariae*, *A. (T.) guajavae*, *A. (T.) meghalayensis*, *A. (T.) suknaensis*, *Paraamblyseius mumi*, *P. (P.) kapuri*, *P. (P.) meyeri*, *T. (A.) fleschneri*, *T. (A.) homalii*, *T. (O.) rickeri*, *T. (T.) neorhenanus*.

MIZORAM

NIL

MADHYA PRADESH

Fam. Tetranychidae

Petrobia latens, *Eotetranychus syzygii*, *Tetranychus macfarlanei*, *P. (P.) macrosetosus*.

NAGALAND

Fam. Phytoseiidae

Amblyseius (A.) largoensis, *Typhlodromus (Orientiseius) rickeri*.

ORISSA

Fam. Tetranychidae

Eutetranychus orientalis, *Aponychus corpuzae*, *Bakerina orissaensis*, *Eotetranychus broodrykei*, *Oligonychus indicus*, *O. mangiferus*, *O. oryzae*, *Schizotetranychus andropogoni*, *Tetranychus cinnabarinus*, *T. neocaledonicus*

Fam. Tenuipalpidae

Brevipalpus phoenicis

Fam. Phytoseiidae

A. (A.) largoensis, *A. (E.) alstoniae*, *A. (E.) coccineae*, *A. (E.) finlandicus*, *A. (E.) delhiensis*, *A. (N.) longispinosus*, *A. (P.) multidentatus*, *A. (T.) kalimpongensis*, *A. (P.) macropilis*, *P. (P.) rugosus*, *T. (A.) homalii*, *T. (O.) orissaensis*, *A. (T.) suknaensis*, *A. (T.) syzygii*, *P. (P.) kapuri*.

PONDICHERRY

Fam. Phytoseiidae

A. (A.) largoensis, *A. (E.) coccineae*, *A. (E.) coccosocius*, *A. (E.) ovalis*, *A. (N.) longispinosus*.

PUNJAB

Fam. Tetranychidae

Bryobia eharai, *B. praetiosa*, *Bryobiella punjabensis*, *Georgiobia sphaeralceae*, *Petrobia harti*, *P. latens*, *Eutetranychus orientalis*, *Aponychus sulcatus*, *Bakerina aculus*, *Eotetranychus hirsti*, *E. suginamensis*, *E. neoperplexus*, *E. truncatus*, *Oligonychus indicus*, *O. mangiferus*, *O. oryzae*, *O. punicae*, *Panonychus citri*, *Schizotetranychus andropogoni*, *S. fluvialis*, *S. spireaefolia*, *S. undulatus*, *Tetranychus cinnabarinus*, *T. neocaledonicus*

Fam. Tenuipalpidae

Aegyptobia mumulus, *Brevipalpus californicus*, *B. deleoni*, *B. obovatus*, *B. karachiensis*, *B. phoenicis*, *B. rugulosus*, *Raoiella indica*, *Tenuipalpus aboharensis*, *T. caudatus*, *T. ludhianaensis*, *T. mustus*, *T. punicae*, *T. punjabensis*

Fam. Eriophyidae

Colomerus vitis, *Aceria lycopersici*, *A. mangiferae*, *A. nerii*, *A. sheldoni*, *A. saccharini*, *E. cernuus*, *E. cheriani*, *Phytoptus terminaliae*

Fam. Tarsonemidae

Polyphagotarsonemus latus, *Steneotarsonemus bancrofti*

Fam. Phytoseiidae

A. (E.) alstoniae, *A. (E.) sacchari*, *A. (E.) coccosocius*, *A. (E.) delhiensis*, *A. (E.) finlandicus*, *A. (N.) fallacis*, *A. (N.) indicus*, *A. (P.) multidentatus*, *P. (P.) kapuri*, *P. (P.) punjabensis*, *P. (P.) roseus*, *T. (A.) divergentis*, *T. (A.) homalii*, *T. (A.) rhenanus*, *A. (N.) dhooriai*, *A. (A.) largoensis*

Fam. Tydeidae

Pronematus fleschneri, *P. elongatus*

Fam. Cheyletidae
Cheletogenes ornatus

Fam. Stigmaeidae
Agistemus fleschneri.

RAJASTHAN

Fam. Tetranychidae
Mesobryobia jobneri, *Petrobia latens*, *T. cinnabarinus*

Fam. Eriophyidae
Aceria cordiae

Fam. Phytoseiidae
A. (E.) alstoniae, *P. (P.) neocorniger*.

SIKKIM

NIL

TAMIL NADU

Fam. Tetranychidae
Porcupinychus abutiloni, *Eotetranychus hirsti*, *Oligonychus indicus*, *O. iseilemae*, *O. oryzae*, *O. punicae*, *Schizotetranychus andropogoni*, *S. hindustanicus*, *Tetranychus cinnabarinus*, *T. fijiensis*

Fam. Tenuipalpidae
Brevipalpus cucurbitae, *B. euphorbiae*, *B. phoenicis*, *Obuloides rajamohani*, *Raoiella indica*, *Tenuipalpus coimbatorensis*, *T. laminasetae*, *T. gharii*, *T. malligai*, *T. tectonae*

Fam. Nalepellidae
Neophantacrus mallotus, *Anchiphytoptus giganticus*, *Mackiella borasis*

Fam. Eriophyidae
Anthopoda fici, *A. deviarensis*, *A. wightianae*, *Colopodacus bengalensis*, *C. cinnamomae*, *C. eugeniae*, *C. gynalaxtae*, *C. walayarensis*, *Floracarus eugenifoliae*, *F. pollachiensis*, *F. salviifoliae*, *F. siruvaniensis*, *F. sivakumarii*, *Neocolopodacus mitragynae*, *Nothopoda kallarensis*, *Ectomerus chebulae*, *Neocecidophyes mallotivagrans*, *Acalitus gossypii*, *A. meliosmae*, *A. reticulatae*, *A. schefflerae*, *Aceria bambusae*, *A. agallochae*, *A. justiciae*, *A. antidotalae*, *A. boraginae*, *A. commelinae*, *A. dactylonae*, *A. dichotomae*, *A. donacis*, *A. crotalariae*, *A. dalbergiae*, *A. erythrinae*,

A. granati, *A. infectoriae*, *A. jasmini*, *A. mangiferae*, *A. medicaginis*, *A. nerii*, *A. pongamiae*, *A. sapindi*, *A. sorghi*, *A. dichorostachya*, *A. eragrostae*, *A. gastrotrichus*, *A. holopteleae*, *A. litsea*, *A. mallotica*, *A. polygalae*, *A. pustulatus*, *A. ruelliae*, *A. saccharini*, *A. setaceus*, *A. trichocnemum*, *A. lycopersici*, *A. viddhagiriensis*, *Eriophyes acaciae*, *E. alangii*, *E. cernuus*, *E. cheriani*, *E. cymbopogonis*, *Keiferophyes avicenniae*, *Paraphytoptus chrysanthemi*, *Neophytoptus ocimae*, *Phytoptus breyniae*, *P. eletariae*, *P. glycosmisae*, *P. lantanae*, *P. laurae*, *P. morindae*, *P. rosae*, *P. subbaraoi*, *P. rubifoliae*, *Acaphylla steinwedeni*, *A. theae*, *Acaphyllisa parindiae*, *Paracaphylla streblae*, *Calacarus carinatus*, *C. jasmini*, *C. quisqualis*, *Calacarus brionesae*, *C. citrifolii*, *C. malvae*, *C. millingtoniae*, *Procalacarus aliyarensis*, *Tegonotus cardiavagrans*, *T. coimbatorensis*, *T. convolvuli*, *T. parviflorae*, *Calepitrimerus azadirachtae*, *C. asperrimae*, *Epitrimerus azimae*, *Notostrix flabelliferae*, *Phyllocoptes aliyamagarensis*, *P. asperaevagrans*, *P. ficivagrans*, *P. immigrans*, *P. indicae*, *P. simplicifoliae*, *Phyllocoptruta malligai*, *P. odayarae*, *P. odinae*, *P. oleivora*, *Vasates cassiae*, *V. dhodabettaensis*, *Abacarus anacardiae*, *A. asiaticae*, *A. delhiensis*, *A. gossypii*, *A. sacchari*, *Aculops betonicae*, *A. boerhaeviae*, *A. extensae*, *A. leguminae*, *A. pittosporae*, *A. privae*, *Aculus colei*, *A. kolengii*, *A. menoni*, *A. yelagiriensis*, *Anthocoptes ayyanari*, *A. adhatodae*, *A. pavoniae*, *A. tectonae*, *A. vitexae*, *A. walayarensis*, *Ditrymacus integrifoliae*, *D. keiferi*, *Metaculus mangiferae*, *M. sapindiphagus*, *Neocalacarus mangiferae*, *Monotrimacus quadrangulari*, *Neomesalox kallarensis*, *Neotegonotus fastigatus*, *Paratetra elephantae*, *P. albizziae*, *P. integrifoliavagrans*, *Proneotegonotus antiquorae*, *Cisaberoptes kenya*, *Hyboderus globulus*

Fam. Rhyncaphytoptidae

Diptilomiopus alangii, *D. artocarpae*, *D. camerae*, *D. cocculae*, *D. integrifoliae*, *D. jevremovici*, *D. knorri*, *Neodialox palmyrae*, *Cheiracus sulcatus*

Fam. Tarsonemidae

Tarsonemus krichneri

Fam. Tuckerellidae

Tuckerella indica

Fam. Stigmaeidae

Agistemus industani

Fam. Ameroseiidae

Neocypholaelaps pradhani

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *largoensis*, *A.* (*A.*) *rhabdus*, *A.* (*A.*) *deleoni*, *A.* (*A.*) *channabasavanni*, *A.* (*Euseius*) *alstoniae*, *A.* (*E.*) *bambusae*, *A.* (*E.*) *coccineae*, *A.* (*E.*) *cocosocius*, *A.* (*E.*) *kodaikanalensis*, *A.* (*E.*) *neococcineae*, *A.* (*E.*) *ovalis*, *A.* (*E.*) *sacchari*, *A.* (*Neoseiulus*) *fallacis*, *A.* (*N.*) *longispinosus*, *A.* (*N.*) *fraterculus*, *A.* (*N.*) *indicus*, *A.* (*Typhlodromalus*) *kalimpongensis*, *A.* (*Typhlodromips*) *suknaensis*, *A.* (*T.*) *neocrotalariae*, *Indoseiulus* *ricini*, *Typhlodromus* (*Amblydromella*) *eharai*, *T.* (*A.*) *homalii*, *T.* (*A.*) *kodaikanalensis*, *T.* (*Clavidromus*) *neotransvaalensis* *T.* (*Orientiseius*) *channabasavanni*, *T.* (*O.*) *rickeri*, *Typhlodromus* (*Typhlodromus*) *communis*.

TRIPURA

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *deleoni*, *A.* (*A.*) *largoensis*, *A.* (*Euseius*) *alstoniae*, *A.* (*E.*) *pruni*, *A.* (*Neoseiulus*) *fallacis*, *A.* (*Paraphytoseius*) *multidentatus*, *A.* (*Typhlodromips*) *crotalariae*, *A.* (*T.*) *suknaensis*, *A.* (*T.*) *syzygii*, *Platyseiella* *mumai*.

UTTAR PRADESH

Fam. Tetranychidae

Bryobia *eharai*, *Petrobia* *latens*, *Eutetranychus* *bredini*, *E.* *orientalis*, *E.* *uncatus*, *O.* *indicus*, *Panonychus* *ulmi*, *Tetranychus* *neocaledonicus*, *T.* *urticae*

Fam. Tenuipalpidae

Brevipalpus *lewisi*, *Tenuipalpus* *ixorae*

Fam. Eriophyidae

Aculops *niphocladae*, *Paratetra* *murrayae*

Fam. Tarsonemidae

Polyphagotarsonemus *latus*

Fam. Tuckerellidae

Tuckerella *kumaonensis*

Fam. Erythraeidae

Leptus *giganticus*

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *deleoni*, A. (P.) *multidentatus*, A. (P.) *scleroticus*, A. (*Proprioseius*) *kumaonensis*, *Indodromus meerutensis*, *Phytoseius* (*Phytoseius*) *jaunpurensis*, P. (P.) *mixtus*, T. (T.) *garhwalicus*, *Garhwalicus himalayensis*

Fam. Acaridae

Tyrophagus putrescentiae.

WEST BENGAL

Fam. Tetranychidae

Bryobia praetiosa, *Petrobia harti*, *Eutetranychus orientalis*, *Eotetranychus hirsti*, *Oligonychus coffeae*, O. *indicus*, O. *mangiferus*, O. *sacchari*, O. *sapienticola*, *Panonychus citri*, *Schizotetranychus andropogoni*, S. *cajani*, S. *spireaefolia*, *Tetranychus hypogaeae*, T. *urticae*

Fam. Tenuipalpidae

Brevipalpus deleoni, B. *californicus*, B. *obovatus*

Fam. Eriophyidae

Colopodacus combretus, *Cosella ichnocarpasia*, *Epicecidophyes clerodendris*, E. *indica*, *Phytoptus terminaliae*, *Gammaphytoptus litseasis*, *Acalitus hibisci*, *Aceria erythrensis*, *Aceria cordiae*, A. *crotalariae*, A. *infectoriae*, A. *mangiferae*, A. *nerii*, A. *pongamiae*, A. *litchii*, A. *lycopersici*, *Calacarus araliae*, *Calacarus capsica*, C. *jasmini*, C. *keiferi*, C. *microrostrus*, C. *quisqualis*, C. *swietensis*, *Scolocenus spiniferus*, *Tegonotus bengalensis*, T. *jambolensis*, T. *mangiferae*, *Calepitrimerus antedesmae*, C. *cordiae*, *Indonotalox sudarsani*, *Phyllocoptes salmaliae*, *Phyllocoptura oleivora*, *Abacarus arjunalis*, *Aculops abutiloni*, A. *excoecaria*, A. *xanthocarpi*, *Aculus cassiae*, *Anthocoptes glycosmis*, *Bakeriella ocimis*, *Indotegolophus darjeelingensis*, *Neotegonotus indicus*, *Paratetra himlayana*, *Tegolophus calotropi*, T. *gelonis*, T. *ficusi*, T. *indica*, T. *kalyanii*, T. *vitexis*, T. *nerii*, T. *spondiallus*, *Tetra lanneansis*

Fam. Rhyncaphytoptidae

Rhyncaphytoptus shoreacola, *Diptilomiopus bengalensis*, *Diptilorhynacus sinusetus*, *Neorhynacus combretis*

Fam. Tarsonemidae

Polyphagotarsonemus latus

Fam. Cheyletidae

Cheyletus fortis

Fam. Ameroseiidae

Neocypholaelaps stridulans

Fam. Phytoseiidae

Amblyseius (*Amblyseius*) *largoensis*, *A.* (*A.*) *neorykei*, *A.* (*A.*) *shoreae*, *A.* (*E.*) *alstoniae*, *A.* (*E.*) *coccineae*, *A.* (*E.*) *coccosocius*, *A.* (*E.*) *delhiensis*, *A.* (*E.*) *finlandicus*, *A.* (*E.*) *ovalis*, *A.* (*E.*) *pruni*, *A.* (*E.*) *rhododendronis*, *A.* (*E.*) *sacchari*, *A.* (*Neoseiulus*) *aceriae*, *A.* (*N.*) *fallacis*, *A.* (*N.*) *indicus*, *A.* (*N.*) *longispinosus*, *A.* (*N.*) *paspalivorus*, *A.* (*P.*) *multidentatus*, *A.* (*Proprioseiopsis*) *peltatus*, *A.* (*Typhlodromalus*) *kalimpongensis*, *A.* (*Trphlodromips*) *crotalariae*, *A.* (*T.*) *officinaria*, *A.* (*T.*) *polyanthaeae*, *A.* (*T.*) *potentillae*, *A.* (*T.*) *suknaensis*, *A.* (*T.*) *syzygii*, *Indoseiulus ricini*, *Paraamblyseius fragariae*, *P.* (*P.*) *kapuri*, *P.* (*P.*) *minutus*, *P.* (*P.*) *intermedius*, *P.* (*P.*) *neglecta*, *P.* (*P.*) *roseus*, *P.* (*P.*) *swirskii*, *P.* (*P.*) *woodburyi*, *Typhlodromus* (*Amblydromella*) *bakeri*, *T.* (*A.*) *eharai*, *T.* (*A.*) *fleschneri*, *T.* (*A.*) *gopali*, *T.* (*A.*) *homalii*, *T.* (*Orientiseius*) *pruni*, *T.* (*T.*) *communis*

Fam. Acaridae

Tyrophagus putrescentiae.

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GLOSSARY

ACARI-ACTINOCHAETA : Acari with two types of setae : solenidion which lack actinochitin and distributed over distal segments of legs and palps and true seta having a core of actinochitin and hence, birefringent. Pedipalp lacks apotele (eg. Cryptostigmata, Astigmata and Prostigmata).

ACARI-ANACTINOCHAETA : Acari with setae lacking actinochitin and, hence, being optically isotropic. Pedipalp with apotele represented by paired tarsal claws or by one or two setae-like structures present at the inner basal angles of tarsus (eg. Mesostigmata, Metastigmata, Notostigmata and Tetrastigmata).

ACETABULAR CAVITY : It is a socket or cavity of the prosomatic exoskeleton in which the base of an appendage is articulated.

ADMEDIAN LINES : These are longitudinal lines present one on either side of median line on eriophyid cephalothoracic shield.

ADORAL SETA : The seta present on adoral region, ie. near the mouth.

AEDEAGUS : It refers to penis.

ANAL SHIELD : It is a sclerotized shield surrounding the anus and is provided with three setae (two para-anals and a post-anal).

ANISOTROPIC : It pertains to substance representing different physical properties according to directions. Anisotropic substances are birefringent.

APODEME : It is the internal sclerotized projection of the exoskeleton often in the shape of blade or ridge and serves as place for insertions of muscles.

APOPHYSIS : In arachnids, it refers to spine-line structure on the male chelicera or leg and usually has a sexual function.

APOTELE : This is the terminal eudesmatic segment of the appendages generally possess two tendons and two articulation points. Cheliceral apotele consists of two movable jaws, leg apotele bears ungues.

ARRHENOTOKY : This is a type of parthenogenesis which is characterised by productions of males from unfertilized eggs. Males are haploid while females are produced from fertilized eggs only.

ATRIUM : It is a slightly swollen structure at the junction of major and minor ducts in spermatheca of Mesostigmata. It may be varying in size and complexity.

BALOONING : In Tetranychidae, this is a process of achieving dispersal. Females lower themselves from host plants with a fine silken thread and then are blown away by wind.

BASIFEMUR : This is the proximal part of the division of arachnid femur and is separated from telofemur by a basifemoral ring.

BASIS CAPITULI : It is the sclerotized tube enclosing the chelicerae, its dorsal wall is formed by tectum, and its lateral and ventral walls are formed by pedipalpal coxae.

CAMEROSTOME : It is the cavity situated anteroventrally for receiving the gnathosoma. It is common in uropodid mites.

CEPHALOTHORAX : It refers to anterior segments of body in case of crustacea and arachnids which fuse to form this compact structure. It is not homologous with chelicerate prosoma.

CAPITULUM : It is same as gnathosoma.

CERVIX : This is a heavily sclerotized part in spermatheca which may be contiguous or slightly removed from artium.

CHAETOTAXY : This refers to arrangement, number and disposition of setae on body and appendages.

CHELICERA : It is the first pair of appendage and is originally composed of three segments, a trochanter, a principal segment and apotele. In mite, the apotele and distal part of chelicerel segment form a pincer-like organ. It is movably articulated with chelicerel frame by chelicerel sheath. Chelicera, which is normally a prehensile organ, may be modified for performing specialised function.

CHELICERA CHELATE : It refers to chelicera which is modified for prehensile function.

CHELICERAL RETAINER : It refers to a spine-like structure curving centrally over chelicerae (eg. in Eriophyidae).

CHELICERAL SHEATH : It is a membranous sheath covering the chelicerel stylets in Eriophyoidea.

COPROPHAGOUS : It refers to dung feeding organisms.

COPULATORY SUCKERS : In male of many astigmatid mites, a pair of adhesive suckers present on either side of anal slit and a pair of small suckers on the fourth tarsus. They perform special copulatory function.

CORNICULI : It is a paired horn-like structure associated with rostrum.

CRISTA METOPICA : It refers to a dorsal structure on the median portion of propodosoma with one or two pairs of sensillae on lateral expansion of scutum.

DEFORMATION : It refers to disturbing or disfiguring the normal shape.

DENTATE : It is same as toothed.

DEUTEROGYNY : It refers to a species having two different kinds of females.

DEUTOGYNE : It refers to two different structural types of females within a species. Many eriophyid species has this phenomena. It applies only to adults. This is also called the secondary female having no male counterpart. Deutogyne females differ from protogyne females in having reduced microtuberculation.

DEUTONYMPH : It is the third stage in postembryonic developmental cycle of Acarina having 8 legs.

DIAPAUSE : It is the dormant stage when development and reproduction are arrested. Diapause may be obligatory or facultative and may be induced endogenously at a definite stage or it may be under the influence of photoperiod, temperature or nutrition.

DISTITARSUS : It is the distal subdivision of leg tarsus.

DORSAL SHIELD : It is a sclerotized plate covering the dorsum of idiosoma and often bears a various number of setae.

DORSOCENTRAL SETAE : It refers to one of the four longitudinal rows of setae present on dorsal shield. This row is the innermost row situated on mid-dorsal region.

DORSUM : This pertains to the uppermost surface of body or of an appendage.

DUPLEX SETAE : It refers to a pair of intimately associated setae present on dorsum of tarsus of first and second pairs of legs in many tetranychid mites.

ECTOSTRACUM : This is the outer layer of chitinostracum. It stains with acid dyes.

EMPODIAL CLAW : In Actinedida, the empodium, which is more or less a soft structure, is modified into claw-like structure. It is homologous with central unguis (=curved organ).

EPIOSTRACUM : This refers to the superficial layer of cuticle covering the ectostracum. It is thin nonchitinous, colourless and elastic layer completely enveloping the mites.

EUPATHIDIUM : It is a modified seta of which the solid axis and root are pierced by canal. It is spine-like but never with pointed tip. it is known in Actinotrichida (eg Acaridida, oribatida).

EXTERNAL HUMERAL : It refers to the outermost pair of the two pairs of setae present on each side of body on anterior lateral edge of hysterosoma between legs II and III.

EXTERNAL SCAPULAR : The outermost pair of the two pairs of setae across the posterior dorsal region of propodosoma.

FAMULUS : It is like a small pointed hollow seta and present on dorsal or antiaxial part of tarsus I and sometimes on tarsus II. The central canal sometimes has a continuation inside.

FEATHER CLAW : This is a specialised type of claw present on tarsus of Eriophyoidea. It may be simple with single rachis having a number of rays on either side of it or the rachis may split into two branches each having rays on either side.

FUNCTIONAL RESPONSE : This pertains to the ability of the predator in consuming prey.

GENITAL COVERFLAP : It is flap-like structure covering the female genital opening in Eriophyoidea.

GENITAL PAPILLA : It refers to the endite of opisthosomatic appendage in the shape of an evaginable papilla. In many Actinotrichida, it is present on genital region. The number of genital papilla may vary in different life stages.

GENITAL PLATE : This is a sclerotized shield covering genital opening in female. It may have anterior hyaline extension and the shield may or may not have setae.

GENITAL SETAE : This refers to setae present on genital shield.

GNATHOSOMA : It refers to a division of body anterior to circumcapitular furrow and is attached to idiosoma. It bears two appendages, chelicerae and pedipalpi and constitutes the whole mouthparts.

GUARD SETA : It refers to a fine seta associated with solenidion of tarsus I in Cheyletidae.

HALLER'S ORGAN : This is a chemosensory organ present on tarsus I in Metastigmata. It consists of a pit having specialised sensory bristles.

HEINZE'S MEDIUM : It is a mounting medium of polyvinyl alcohol, distilled water, lactic acid, glycerol, phenol and chloral hydrate. Both preserved and life specimens can be mounted in this medium directly.

HETEROMORPHIC : It refers to dissimilar forms.

HETEROMORPHIC LARVA : It refers to larva having dissimilar forms.

HOLODORSAL SHIELD : This is the complete fusion of podonotal (anterior region of idiosoma) and opisthonotal (fusion of mesonotal and pygidial shields) shields in some Mesostigmata.

HOLOGASTRIC SHIELD : This is a compound shield formed by fusion of opisthogenital and anal shields.

HOLOVENTRAL SHIELD : This is compound shield formed by fusion of sternitigenital shield and ventrianal shields in males of some Mesostigmata.

HOLOMORPHIC LARVA : It refers to larvae of similar forms.

HOYER'S MEDIUM : It is a mounting medium made of chloral hydrate, gum arabic, distilled water and glycerol. Specimens both preserved and live can be mounted in this medium.

HYPOGNATHUM : It is constituted of subcheliceral plate and the pharyngeo-hypostomatic region of the gnathosoma.

HYPOPIAL STAGE : It refers to nonfeeding active or inactive stage between protonymph and tritonymph for withstanding unfavourable condition or for dispersal.

HYPOSTOME : This is a part of gnathosoma separating ventrally the coxae of the pedipalpi.

HYPOSTRACUM : It is the innermost layer (endocuticle). It is made of chitin and takes basic dyes.

HYSTEROSOMA : It refers to division of body posterior to sejugal furrow. It is composed of opisthosoma along with two posterior segments of podosoma.

IDIOSOMA : It refers to the division of body posterior to the circumcapitular furrow. Body minus gnathosoma is idiosoma.

INFRACAPITULUM : It refers to inferior part of gnathosoma having lips and palpi and containing mouth and pharynx. It is comprised of the part of palpal segment and elements of precheliceral origin. The posterior dorsal border of infracapitulum is constituted by the line of attachment of cheliceral frame.

INTERNAL APODEME : It is same as internal genitalia.

INTERNAL GENITALIA : It is a structure present internally where the spermatheca appears to be attached in Eriophyoidea.

INTERNAL HUMERAL : It refers to the innermost pair of the two pairs of setae present on each side of body anterolaterally of hysterosoma between legs I and II.

INTERNAL SCAPULAR : This is the innermost of the two pairs of setae present across the posterior dorsal region of propodosoma.

INTERSCUTAL MEMBRANE : It refers to the smooth, striated or granular cuticle connecting the sclerotized shields.

ISOTROPIC : It pertains to substance presenting same physical properties in all directions.

KONO'S MEDIUM : It is a mounting medium made of chloral hydrate, glycerine, water and concentrated hydrochloric acid.

LABRUM : It is lobe-like process representing the anterior extension of the dorsal wall of pharynx. It is of precheliceral origin.

LATERED : It refers to a structure placed posteriorly.

LATERAL INTEGUMENT : It is the sclerotized part present laterally around dorsal shield.

LARVA : This is the first postembryonic stage in developmental cycle of Acari and is provided with 6 legs.

MACROSETA : It refers to seta which is larger than others and normally present on leg segments (eg. in Phytoseiidae, macrosetae normally present on genu, tibia and basitarsus of leg IV).

MAJOR DUCT : This is the relatively thickened duct in spermatheca through which the spermatheca opens outside and receives spermatophores.

MALFORMATION : This refers to anomalous formation and is characterised by abnormal change in overall shape of body.

MEDIAN : It pertains to middle.

MEDIAN LINE : It refers to a single line present on eriophyid cephalo-thoracic shield and divides the shield into right and left halves.

MESAD : It refers to a structure placed near the middle.

METAPODAL SHIELD : It refers to one or more shields situated posterior to coxae IV. Sometimes they may be fused with peritrematal shield.

METAPODOSOMA : This refers to division of podosoma posterior to sejugal furrow. It is present in Actinotrichida.

METASTERNAL SHIELD : It refers to a pair of shields present posterior to sternal shield in some Mesostigmata. It often bears the fourth pair of sternal setae.

MICROTUBERCULATE STERNITES : This refers to sternites ornamented with minute tubercles. The latter may vary in shape, size and nature of arrangement in different species.

MINOR DUCT : This refers to an exceedingly fine duct in spermatheca through which the spermatophores lead to ovary.

MYCETORHAGOUS : This refers to species feeding on fungus.

NUMERICAL RESPONSE : This pertains to ability of predator in multiplication.

OPISTHONOTAL SHIELD : It is a shield formed by fusion of pygidial and mesonotal shields.

OPISTHOSOMA : This refers to division of body posterior to sejugal furrow. It extends from segment VII and upto or including anus.

OPTICALLY ISOTROPIC : It pertains to substance presenting same optical properties in all directions.

ORAL STYLET : In Eriophyoidea, it refers to curved stylet-like organ arising from upper anterior end of pharyngeal pump. It extends anteriorly upward and recurves downward.

PARAGENITAL setae : It refers to setae present ventrally above the genital orifice (eg. Stigmaeidae).

PARTHENOGENESIS : This is the production of embryo from female gamete without any genetic contribution from male gamet. Three types of parthenogenesis are found in mites : arrhenotoky, thelytoky and deuterotoky.

PATELLA : It refers to knee segment of palp and leg in Chelicerata. It is also termed genu in mites.

PEDIPALP : This is the second pair of preoral appendage. Typically it is sensory in function but may be modified for special type of function like clasping or anchoring. It is normally six-segmented but the number of segment may vary.

PEDIPALPAL COXAE : It refers to coxae of pedipalp.

PERITREMATAL PLATE : It is a plate supporting the peritreme.

PHARYNGEAL PUMP : In Eriophyoidea, a pump-like structure is present above and ahead of anterior coxae.

PHOTOTROPHIC : It is the response of the organism towards light.

PHYTOPHAGOUS : It refers to organisms feeding on plants.

PILUS DENTILIS : This is a fine seta-like structure on distal part of the fixed digit of chelicera. It may be well developed or may be lacking. It is a chemoreceptor.

PODOCEPHALIC CANAL : This refers to a paired canal generally present in Actinotrichida where several glands emit their secretions. The canal extends from base of leg I to dorsal surface of infracapitulum.

PODOMERES : These are the segments bearing legs.

PODONOTAL SHIELD : This indicates the part of dorsal shield covering anterior part of idiosoma.

PODOSOMA ; It refers to anterior part of idiosoma bearing legs.

POLYPHAGOUS : This refers to those organisms feeding on various kinds of food.

POSTANAL-SETA : It is an unpaired seta present at anal region posterior to anus.

POSTOCULAR BODY : This is the imperfectly round structure situated on propodosomal plate in Stigmaeidae.

PRECHELICERAL SEGMENT : This refers to segments originally present anterior to chelicerae.

PRE-ANAL SETAE : These are the paired setae present at the anal region.

PRE-ANAL PORES : These are the pores present on ventrianal shield at preanal region.

PRETARSUS : THIS refers to adesmatic segment (ie. segment of an appendage or an articulation between segments of an appendage) and is termed part of tarsus in several groups of mites. It is normally small with less sclerotization than remaining part of tarsus. It forms part of ambulacrum.

PROPodosoma : It is the anterior part of Actinotrichid podosoma in front of sejugal furrow.

PROTEGMEN : It is the part of stylophore occurring in front of peritreme.

PROTOGYNE : This is considered as the primary type in many eriophyid mites comprising of both males and females. This primary type is capable of feeding and breeding throughout spring and summer and die at the begining of winter.

PROTONYMPH : It is the second stage in postembryonic developmental cycle of Acarina having 8 legs as in adult.

PSEUDOSTIGMATA : This is a specialised sensory organ arising from a depression in the propodosomal plate or in region of this plate where it is lacking. The depression is known as pseudostigmata which may have sclerotized spiral frame work. A maximum of two pairs may occur on propodosoma. In oribatid mites, it may be connected with air sacs for helping in respiration.

PTEROMORPHAE : This is the wing-like projection from the antero-lateral edges of hysterosoma, ensheathing the base of hinder part of legs.

PULVILLUS : It is a soft, cushion-like, lobate, hyaline structure situated ventrally of and between the claws forming part of ambulacrum.

PUMP BRACES : These refer to two arms, which hold the pumps in front and rear in Eriophyoidea.

QUIESCENT STAGE : It is the inactive stage between two post embryonic stages. Often during this period the concerned stage remains covered with a waxy covering (eg. Tetranychidae).

ROSTRUM : It is a beak-like structure of gnathosoma.

RUTELLA : This is the hypertrophid infracapitulum seta inserted laterally at the anterior extremity of the metapophysis.

SCHIZODORSAL SHIELD : This is a compound shield formed by fusion of podonotal and opisthonotal shields in the median region only. The unfused regions are represented as lateral incisions.

SERRATE : It refers to saw-like structure.

SETA : This is a bristle-like outgrowth from hypodermal layer and is supported by nerve. It may be simple or modified. The root is lodged in a cavity of cuticle. Setae may have tactile or other specialised function.

SOLEPIDION : It refers to a hollow phanere (often piliform, baculiform or claviform) which is situated on palps and legs in the way as seta with short or largely open root. They are thin-walled and, in Actinotrichida, they are without actinopilin. They are probably chemoreceptors.

SPERMATOPHORAL PROCESS : It is a simple or complicated process arising from proximal half of the movable digit of chelicera in males of many mesostigmatid mites. It helps in transferring spermatophores from male genital opening into female genital opening.

STERNAL SHIELD : This is a shield formed by fusion of coxal shields. It often bears various number of setae.

STERNITIGENITAL SHIELD : It is a compound shield formed by fusion of sternal and genital shields.

STIGMATA : This is the external opening of respiratory system. It may be associated with peritreme. Its position is extremely variable.

STYLOPHORE : It is formed by fusion of the basal segments of chelicerae. It is a large bulbous structure and is movable along dorsal surface of rostrum. It is composed of two segments, a thicker basal segment and narrower distal segment.

SUBLATERAL SETAE : These are the additional longitudinal series of setae on dorsal shield of mesostigmatid mites and is restricted to opisthonotal region.

SUBMEDIAN LINE : It refers to one or more longitudinal lines on erio-phyid cephalothoracic shield on the either side and lateral to median line.

SUPRACOXAL SETAE : These are the setae associated with base of appendages like palp, leg I, leg II and more or less recognised by their place of insertion and shape.

TECTOSTRACUM : This refers to outermost layer of cuticle and probably represents the water proofing wax-cement layer of insects. It is thin and unpigmented.

TECTUM : It is the external prolongation of exoskeleton to form the wall of gnathosoma. It extends anteriorly to roof the rostrum and often its anterior margin may extend to form simple or complicated process.

TEGMEN : This is the part of stylophore in Cheyletidae lying proximal to peritreme.

TELOFEMUR : This refers to distal part of the division of femur in Actinotrichid mites.

TELOSOMAL TERGITE : These are the tergites of telosomal part of abdomen, ie. those present from the last ventral seta to the terminal lobes.

TENENT HAIRS : These are the special type of setae characterised by having knob or hook at the distal end and are present on tarsal appendage (eg. Tetranychidae).

THANOSOME : It is the anterior part of eriophyid abdomen from the rear shield edge to the third or last ventral seta.

THELYTOKY : It pertains to a type of parthenogenesis characterised by production of females (males absent or occurring very rarely). In this, the meiosis is avoided and the diploid chromosome number is achieved by some other mechanism. Males, if present, do not mate.

THUMB-CLAW COMPLEX : It is a compound structure formed by tibial claw and tarsus of pedipalp and is adapted for holding. It is common in many families of Prostigmata (eg. Cheyletidae).

TIBIOTARSUS : This is the integration of tibial and tarsal segments into a compound structure.

TRICHOBOTHRUM : It is a complex type of sensory organ consisting of a cavity (bothridium) and a variously shaped seta (bothridial seta). It is vibro or anemoreceptor organ.

TRITONYMPH : It refers to third nymphal stage, ie. stage after deutonymphal stage.

TRITOSTERNUM : It is the remnant of the sternite of 3rd segment and is present posterior to gnathosoma between or under coxae I. It consists of a rectangular basal part terminating in a pair of pilose lacinae. It functions in conjunction with hypognathal groove in fluid transport system during feeding.

TRUNCATE : It refers to squarish rather than rounded or pointed structure.

TOTAL RESPONSE : It refers to some total of numerical and functional responses.

TUBERCLE : It is a small, fixed, usually rounded structure arising from the body wall.

VENTRIANAL SHIELD : This is a compound shield formed by fusion of ventral and anal shields and is characterised by bearing preanal setae.

VENTROLATERAL SETAE : This refers to setae present on interscutal membrane on either side of ventrianal shield.

VESICLE : This is a thin walled sac-like structure forming a part of spermatheca for storage of spermatophores.

URSTIGMA : This is a variously shaped special organ present on coxae I or II or between them in oribatid mites and also in many Actinida and Acaridida.

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ERRATA

<i>Page</i>	<i>Line</i>	<i>Printed as</i>	<i>Read as</i>
9	7th line from top & 12th line from top	Order Acarina	Subclass Acari
12	3rd line from bottom		F. Tarsus
20	4th line from top	reporduction	reproduction
26	last line	<i>sacchari</i>	<i>saccharini</i>
27	10th line from bottom	<i>sacchari</i>	<i>saccharini</i>
31	7th line from top	familes	families
31	11th line from top	<i>oicipes</i>	<i>picipes</i>
34	26th line from top	dorsaliy	dorsally
34	31st line from top	membraneous	membranous
35	1st line from top	wiih	with
42	1st line from top	tetrantchid	tetranychid
47	last line	<i>Lectica</i>	<i>Lactuca</i>
56	2nd line from top	<i>angyroides</i>	<i>anagyroides</i>
62	Against couplet 5	<i>bredin</i>	<i>bredini</i>
71	3rd line from bottom	Acarl	Acar
74	8th line from top	<i>cunea</i>	<i>cunia</i>
83	20th line from top	<i>trumpheta</i>	<i>triumfetta</i>
83	21st line from top	<i>panderiformes</i>	<i>panduraeformis</i>
83	21st line from top	<i>angyroides</i>	<i>anagyroides</i>
85	14th line from top	<i>Elusine</i>	<i>Eleusine</i>
87	10th line from bottom	<i>Lagestroemia</i>	<i>Lagerstroemia</i>
87	9th line from bottom	<i>paradisica</i>	<i>paradisiaca</i>
91	11th line from top	Gupta, 1979	Gupta, 1980
106	18th line from top	<i>Canabis</i>	<i>Cannabis</i>
106	20th line from top	<i>Coriandurm</i>	<i>Coriandrum</i>
106	20th line from top	dalhia	dahlia
106	22nd line from top	<i>Cleone</i>	<i>Cleome</i>
106	10th line from bottom	<i>angyroides</i>	<i>anagyroides</i>
106	9th line from bottom	<i>paradisica</i>	<i>paradisiaca</i>
108	19th line from top	<i>Stethorus</i>	<i>Scolothrips</i>
		<i>sexmaculatus</i>	<i>sexmaculatus</i>
110	10th line from bottom	dalhia	dahlia
110	6th line from bottom	<i>Lycopersicon</i>	<i>Lycopersicum</i>
112	6th line from bottom	<i>hypogaeae</i>	<i>hypogaea</i>
112	12th line from top	<i>Calosporium</i>	<i>Cladosporium</i>
123	Against alternative of couplet 9	<i>deleon</i>	<i>deleoni</i>

<i>Page</i>	<i>Line</i>	<i>Printed as</i>	<i>Read as</i>
125	21st line from bottom	<i>noctrum</i>	<i>nocturnum</i>
125	20th line from bottom	<i>Lagestroemia</i>	<i>Lagerstroemia</i>
125	5th line from bottom	<i>Trichophila</i>	<i>Trichopila</i>
128	1st line from top	<i>Dalhia</i>	<i>Dahlia</i>
128	3rd line from top	<i>Eletaria</i>	<i>Elettaria</i>
129	18th line from bottom	<i>halex</i>	<i>helix</i>
130	20th line from bottom	<i>cujeta</i>	<i>cujete</i>
130	20th line from bottom	<i>Dalhia</i>	<i>Dahlia</i>
130	13th line from bottom	<i>paradisica</i>	<i>paradisiaca</i>
166	3rd line from top	<i>bengalensis</i>	<i>benghalensis</i>
166	10th line from bottom	<i>decundrum</i>	<i>decandrum</i>
172	5th line from top	1981	1980
178	Against alternative of couplet 3	<i>meleosmae</i>	<i>meliosmae</i>
180	2nd line from bottom	Boczek, 1979	Lindquist, 1977
182	Against couplet 14	<i>setaceous</i>	<i>setaceus</i>
182	Against couplet 17	<i>sapindae</i>	<i>sapindi</i>
182	Against alternative of couplet 18	<i>balanitis</i>	<i>balanites</i>
184	Against alternative of couplet 35	<i>fastigatus</i>	<i>justiciae</i>
189	2nd line from bottom	<i>Eragrastis</i>	<i>Eragrostis</i>
192	6th line from top	link	like
192	12th line from top	warthy	warty
193	1st line from top	<i>Desmodicum</i>	<i>Desmodium</i>
205	2nd line from bottom	<i>setaceae</i>	<i>setacea</i>
214	7th line from top	<i>pangorii</i>	<i>pangorei</i>
214	14th line from top	<i>Eletaria</i>	<i>Elettaria</i>
216	11th line from top	<i>camera</i>	<i>camara</i>
223	8th line from bottom	Green, 1890	Cherian, 1938
225	15th line from top	<i>camera</i>	<i>camara</i>
227	6th line from bottom	<i>mahogoni</i>	<i>mahogani</i>
229	Against alternative of couplet 4	<i>convolvulus</i>	<i>convolvuli</i>
231	15th line from top	<i>batatus</i>	<i>batatas</i>
233	Against alternative of couplet 2	<i>asperimae</i>	<i>asperrimae</i>
233	Against alternative of couplet 3	<i>lucadis</i>	<i>leucadis</i>

<i>Page</i>	<i>Line</i>	<i>Printed as</i>	<i>Bead as</i>
238	11th line from bottom	<i>decundrum</i>	<i>decandrum</i>
239	1st line from top	<i>Borasus</i>	<i>Borassus</i>
252	7th line from bottom	<i>aquallocha</i>	<i>agallocha</i>
256	5th line from bottom	<i>Casia</i>	<i>Cassia</i>
256	5th line from bottom	<i>sophora</i>	<i>sophera</i>
270	3rd and 13th line from top	<i>bengalensis</i>	<i>benghalensis</i>
278	Against alternative of couplet 2	<i>tephrosae</i>	<i>tephrosiae</i>
285	4th line from bottom	<i>camera</i>	<i>camara</i>
286	2nd line from bottom	<i>coramandaliana</i>	<i>coromandeliana</i>
289	5th line from bottom	<i>decundrum</i>	<i>decandrum</i>
292	Against alternative of couplet 3	<i>Leptotarsonemus</i>	<i>Lupotarsonemus</i>
292	14th line from bottom	<i>dalhia</i>	<i>dahlia</i>
332	11th line from top	<i>whicn</i>	<i>which</i>
338	13th line from top	<i>Trillandria</i>	<i>Tillandsia</i>
366	9th line from bottom	<i>Amblyseiys</i>	<i>Amblyseius</i>
381	7th line from top	<i>Adantheria</i>	<i>Adenanthera</i>
400	Species No. 543	<i>Typhlodromus</i> <i>kashmiricus</i>	<i>Typhlodromus</i> (<i>Orientiseius</i>) <i>kashmiricus</i>
402	8th line from top	<i>Mahonea</i>	<i>Mahonia</i>
409	13th line from bottom	<i>Venugopalrao</i>	<i>Venugopalarao</i>
441	5th line from top	<i>lombardini</i>	<i>lombardinii</i>
451	12th line from bottom	<i>Cisaberoptes</i>	<i>Cisaberoptus</i>
459	15th line from top	<i>Estern</i>	<i>Eastern</i>
468	21st line from top	355-337	335-337

ADDENDA

Page No. 84 : Natural enemies of *Oligonychus coffeae* :—

Chilomenes sexmaculata, *Scymnus* sp., *Stethorus* sp., *Verania vincta*, *Jauravia* sp., *Chrysopa* sp., *Scolothrips indicus*, *Orius* sp., *Micromus timidus*, *Chrysopa madestes*, *Semidalis* sp., *Oligota* sp., *Apsectus indicus*, *Orphinus jucundus*, *Cybocephalus* sp., *Stethorus gilvifrons*, *Jauravia soror*, *Menochilus sexmaculatus*, *Stictobura* sp., *Cryptogonus bimaculatus*, *Scymnus nubilus*, *Coelophora* sp., *Amblyseius* (*Euseius*) *ovalis*, Undet spp. of Cunaxidae, Bdellidae, Stigmaeidae, Cheyletidae, Anystidae, Erythraeidae, (Rao et al., 1970) ; *A. (A.) largoensis*, *Typhlodromus* (*Clavidromus*) *neotransvaalensis*.

Page No. 333 : Key to the subfamilies of Phytoseiidae :

1. Prolateral setae 4 pairs, in all 6-9 pairs of lateral setae ; preanal setae 3 pairs.....Amblyseiinae
- Prolateral setae 5 or more pairs, in all 9-12 pairs of lateral setae ; preanal setae 3-7 pairs.....2
2. Sublateral setae 3 pairs, lateral setae 12 pairs ; preanal setae 6-7 pairs.....Gnoriminae
- Sublateral setae 1-2 pairs, lateral setae 8-11 pairs ; preanal setae 2-4 pairs.....Phytoseiinae



