

THREE NEW GENERA OF WHITEFLIES *MOHANASUNDARAMIELLA*, *SHANTHINIAE* AND *VASANTHARAJIELLA* (ALEYRODIDAE : HOMOPTERA) FROM INDIA¹

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(With three text-figures)

Key words : Whiteflies, Aleyrodidae, Homoptera, *Mohanasundaramiella*, *Shanthinia*,
Vasantharajiella

In a survey conducted in the southern districts of Tamil Nadu and the adjoining forests of Kerala during 1991-1994, 84 species of aleyrodids under 34 genera were collected and studied. Of the 34 genera three, viz., *Mohanasundaramiella*, *Shanthinia* and *Vasantharajiella* were found to be new and are described and illustrated.

Genus *Mohanasundaramiella* gen. nov.

Type-species: *Mohanasundaramiella rubiae* sp. nov.

Pupal case oval in outline, pale with no wax secretion; margin lobulate to serrulate; marginal setae present; tracheal pores and combs absent; submargin characteristically separated from dorsal disc by a well defined furrow; submarginal transverse ridges and furrows conspicuous; subdorsal fold-like suture extending between meso-metathoracic suture and third-fourth abdominal suture; submarginal setae present; cephalic, mesothoracic, metathoracic, first abdominal, eighth abdominal and caudal setae present; first abdominal setae located laterad of subdorsal fold-like suture. Vasiform orifice subcordate, operculum filling orifice, lingula tip exposed but included. Caudal furrow and ridges absent. Tracheal folds discernible.

Diagnosis. This genus is strikingly different from the known genera of Aleyrodini in having a well defined submarginal furrow that distinguishes submargin from dorsal disc. It resembles some species of *Crenidorsum* Russell in the furrow in inner subdorsal area of

cephalothorax and abdomen, but differs from them in the presence of first abdominal setae and conspicuous submargin. Other distinguishing characters include presence of fewer than 19-21 pairs of dorsal setae that separate it from *Aleuromarginatus* Corbett, presence of first abdominal setae on subdorsum that are absent in *Aleyrodes* Latreille, presence of submedian meso- and metathoracic setae that are lacking in *Aleurocybotus* Quaintance & Baker, oval shape of pupal case that is typically elongate, parallel-sided and slightly square anteriorly and posteriorly in *Aleurotulus* Quaintance & Baker, and presence of minute submarginal setae that do not occur in *Aleurotrachelus* Quaintance & Baker.

Etymology: This genus is named in honour of Dr. M. Mohanasundaram, Professor of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, the renowned acarologist, who taught the author the science of taxonomy, and suggested this study.

Mohanasundaramiella rubiae gen. et sp. nov.
(Fig. 1)

Pupal case: Oval in shape, 1.03-1.05 mm long and 0.87-0.89 mm wide, widest across abdominal segment III. Pale white with no wax secretion. Living on either surface of leaves.

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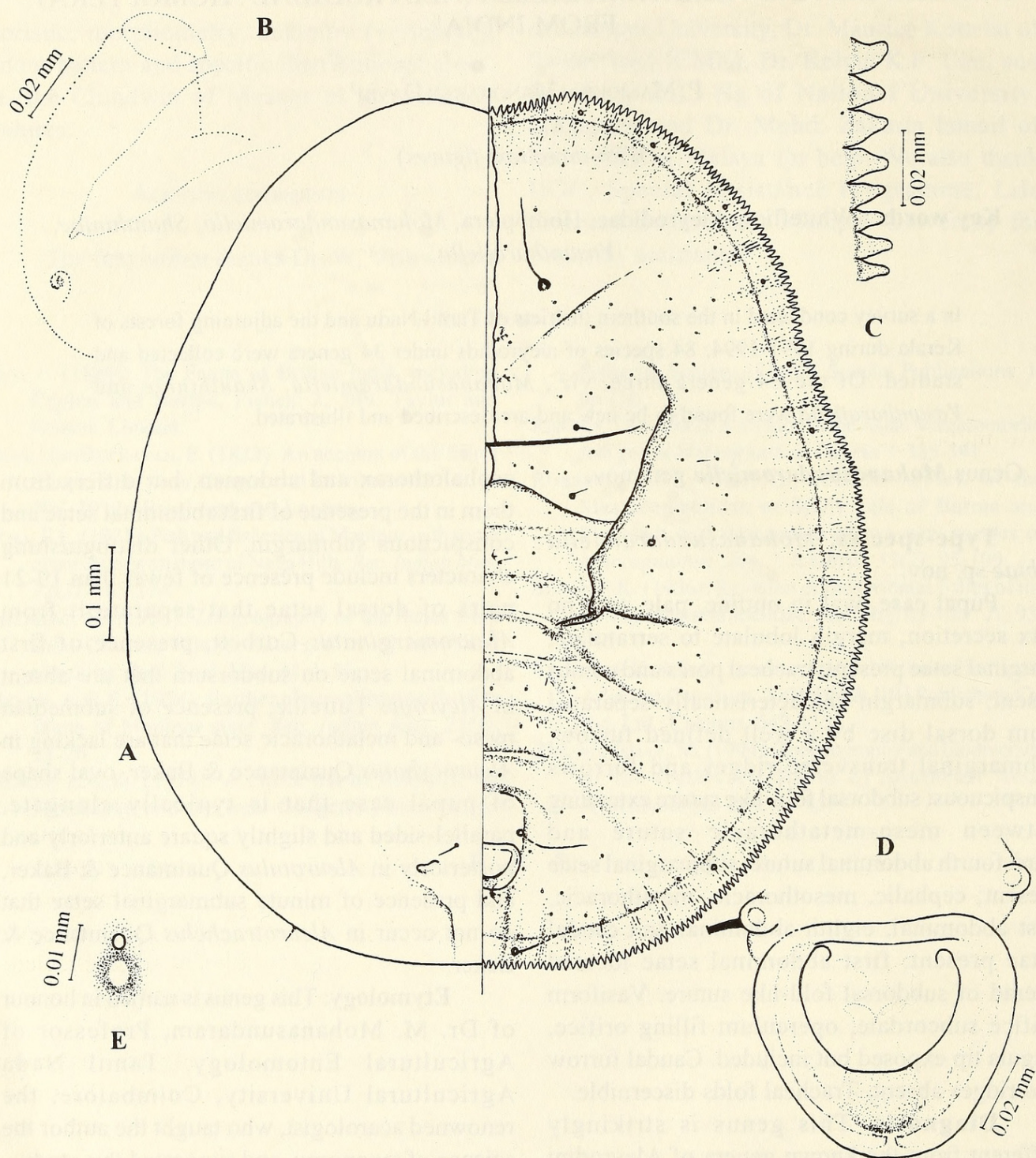


Fig. 1: *Mohanasundaramiella rubiae* gen. et sp. nov. : A. pupal case; B. prothoracic leg and antenna; C. margin; D. vasiform orifice; E. disc pore and porette

Margin: Lobulate to serratulate, about 14 teeth occupying 0.1 mm length of margin; teeth each longer than wide; margin slightly indented at cephalic and caudal ends medially and at thoracic tracheal pore areas. Tracheal pores and

combs wanting. Anterior marginal setae $18.6\ \mu\text{m}$ long, posterior marginal setae $38.0\ \mu\text{m}$ long.

Dorsum: Dorsal disc separated from submargin by a distinct furrow. Submargin rather uniformly wide. Well defined transverse ridges

and furrows running mesad from margin to outer subdorsum; adjoining 2-3 furrows more sclerotized, alternating every 3-4 less prominent ridges and furrows. Minute submarginal setae in 8 pairs, 6 on cephalothorax and 2 on abdomen, 6.2-12.4 μm long. Dorsal disc with numerous disc pores and porettes, one row in submarginal fold, one each at the darker transverse furrows. Transverse moulting suture reaching margin, curved caudad from its midpoint, terminating slightly anterior to the first-second abdominal suture at the longitudinal subdorsal fold-like suture which characteristically extends between meso-metathoracic suture and third-fourth abdominal suture. Meso-metathoracic suture much pronounced. Abdominal segmentation distinct. Abdominal segments IV-VI with a weak rachis, their sutures running lateral into subdorsum. Median length of abdominal segment VII slightly shorter than that of VI. Submedian cephalic setae long, tapered with a prominent base, 86.8 μm long. Two pairs of submedian thoracic setae present: one pair on mesothorax 18.6 μm long, the other on metathorax 34.1 μm long. First abdominal setae transpositioned on subdorsum laterad of longitudinal fold-like suture, 6.2 μm long. Eighth abdominal setae 65.1 μm to at least 114.7 μm long, their bases anterocephalad of vasiform orifice. Caudal setae 28.0-74.4 μm long, located on submargin. Submedian abdominal depressions weak.

Vasiform orifice subcordate with a broader rim, 46.5 μm long, 62.0 μm wide, posterior margin notched inside. Operculum of identical shape, filling three-fourths of orifice, 34.1 μm long and 46.5 μm wide. Lingula tip setose, exposed but included. Caudal furrow and caudal ridges absent.

Venter: Thoracic tracheal folds faint, caudal fold distinct. Anterior thoracic and posterior abdominal spiracles evident. Adhesive sacs present. Antennae reaching anterior thoracic spiracles, their tips with a finger-like projection. Ventral abdominal setae 37.2 μm long.

Host: *Morinda* sp. (Rubiaceae)

Holotype: One pupal case mounted on slide, on *Morinda* sp., INDIA: Kerala: Walayar forest, 24.ix.1992, coll. M. Mohanasundaram (No.58 A.1.).

Paratypes: Six pupal cases on slides, same data as holotype.

Etymology: Species name derived from Rubiaceae, the host plant family.

Remarks. Two out of the seven pupal cases are parasitised.

Genus *Shanthinia* gen. nov.

Type-species: *Shanthinia sheryli* sp. nov.

Pupal case rather uniquely polyhedral in outline with lateral evaginations at six places on either side; margin very finely crenulate and crenate-looking, margin at pore area cleft; marginal setae present; thoracic tracheal pores well defined, inset with a single not very conspicuous tooth; dorsum ornamental with spots, reticulations; transverse moulting suture reaching margin; bases of cephalic, first abdominal and eighth abdominal setae distinct, caudal setae not discernible; abdominal segments VI and VII equally long, porettes with typically sclerotized rims; vasiform orifice cordate, with posterior margin toothed, operculum filling the orifice, lingula concealed; caudal furrow and ridges distinct; thoracic and caudal tracheal folds defined.

Diagnosis: Pupal case outline of this genus is extraordinarily unique in being a 12-sided polyhedron with six corners on either side. This shape is not seen in any other whitefly species or genera of the world. However, *Shanthinia* is related to *Dialeurodes* Cockerell, *Dialeurolonga* Dozier, and *Dialeuronomanda* Quaintance & Baker in the distinct structure of thoracic tracheal pore with tooth and in the presence of a comb of teeth in the inner margin of vasiform orifice, especially posteriorly. It shows affinity to *Dialeurolonga* in lacking subdorsal or

submarginal row of setae but can be distinguished by the absence of small papillae in a row on the submarginal area. Its abdominal segments I-IV are subequal in length, similar to those in *Dialeurodes*, but are distinctive in the absence of a row of subdorsal setae. In both, *Shanthinia* and *Dialeuronomada*, medium length of abdominal segment VII is shorter than that of VIII. Presence of a row of 12 marginal setae and a peripheral row of characteristic papillae on the submarginal area readily separate the latter from the former. The new genus differs from all the above three genera in the characteristic sclerotic pattern on the dorsum, in the transverse moulting suture typically reaching margin, in the location of vasiform orifice not greater than its length from posterior body margin, and in the absence of stipples in the tracheal folds as well.

Etymology: This genus is named after the author's wife Mrs. Shanthini David.

***Shanthinia sheryli* gen. et sp. nov. (Fig. 2)**

Pupal case: Typically polyhedral, with six corners on either side. 0.68 mm long and 0.56 mm wide, widest across abdominal segment I. Black in colour with no wax secretion.

Margin: Very finely crenulate and crenate-looking, with about 4 crenulations in 0.1 mm length of margin; crenulations each much wider than long, their apices subconical to rounded or rather straight. Margin at pore area cleft. Thoracic tracheal pores well defined, inset with a single tooth-like projection. Caudal tracheal pore area not inset. Anterior marginal setae 9.3 μ m long, posterior marginal setae 12.4 μ m long.

Dorsum: Ornamented with spots, reticulations and minute tubercles. Submargin narrowly marked by a weak furrow. Transverse ridges and furrows running mesad from margin and submargin to anastomose in the dorsal disc area, giving a leopard skin-like appearance to the

dorsum. Marginal furrows each alternated with 2-4 submarginal ones. Subdorsum granulated. Submedian area on cephalothorax and median area on abdominal segments densely spotted. Longitudinal and transverse moulting sutures reaching margin, the ends of the latter opposite meso-metathoracic suture. Base of cephalic, first and eighth abdominal setae distinct, setae very minute; bases of eighth abdominal setae located laterad of top of vasiform orifice. Caudal setae not discernible. Segmentation distinct in submedian area; sutures each with anterior and posterior branches, their ends anastomosing with subdorsal reticulation. Median length of abdominal segments subequal, median length gradually decreasing from abdominal segment I-VII; that of VII as long as that of VI and shorter than VIII. Disc pores and porettes present on dorsal disc; porettes dark-rimmed and characteristically sclerotized laterad.

Vasiform orifice cordate, located about its length from posterior body margin, its sides prominent; its inner margin with teeth, especially posteriorly; 37.2 μ m long and 34.1 μ m wide. Operculum cordate, nearly filling the orifice; 24.8 μ m long and 27.9 μ m wide. Lingula concealed. Caudal furrow well defined. Caudal ridges distinct.

Venter: Thoracic and caudal tracheal folds well defined. Ventral abdominal setae 9.3 μ m long. All four pairs of spiracles evident, anterior thoracic spiracles larger than others. Setae or spines on legs not discernible. Antennae reaching the base of prothoracic legs. Adhesive sacs not discernible. Rostrum distinctly segmented, setae at base absent.

Host: An unidentified plant.

Holotype: A pupal case mounted on slide, on an unidentified plant, INDIA: Tamil Nadu: Karaiyar Dam (Papanasam), 14.iv.1993. Coll: P.M.M. David (No. 180.A.).

Etymology: This species is named after the author's son D. Sheryl who often accompanied him during the survey.

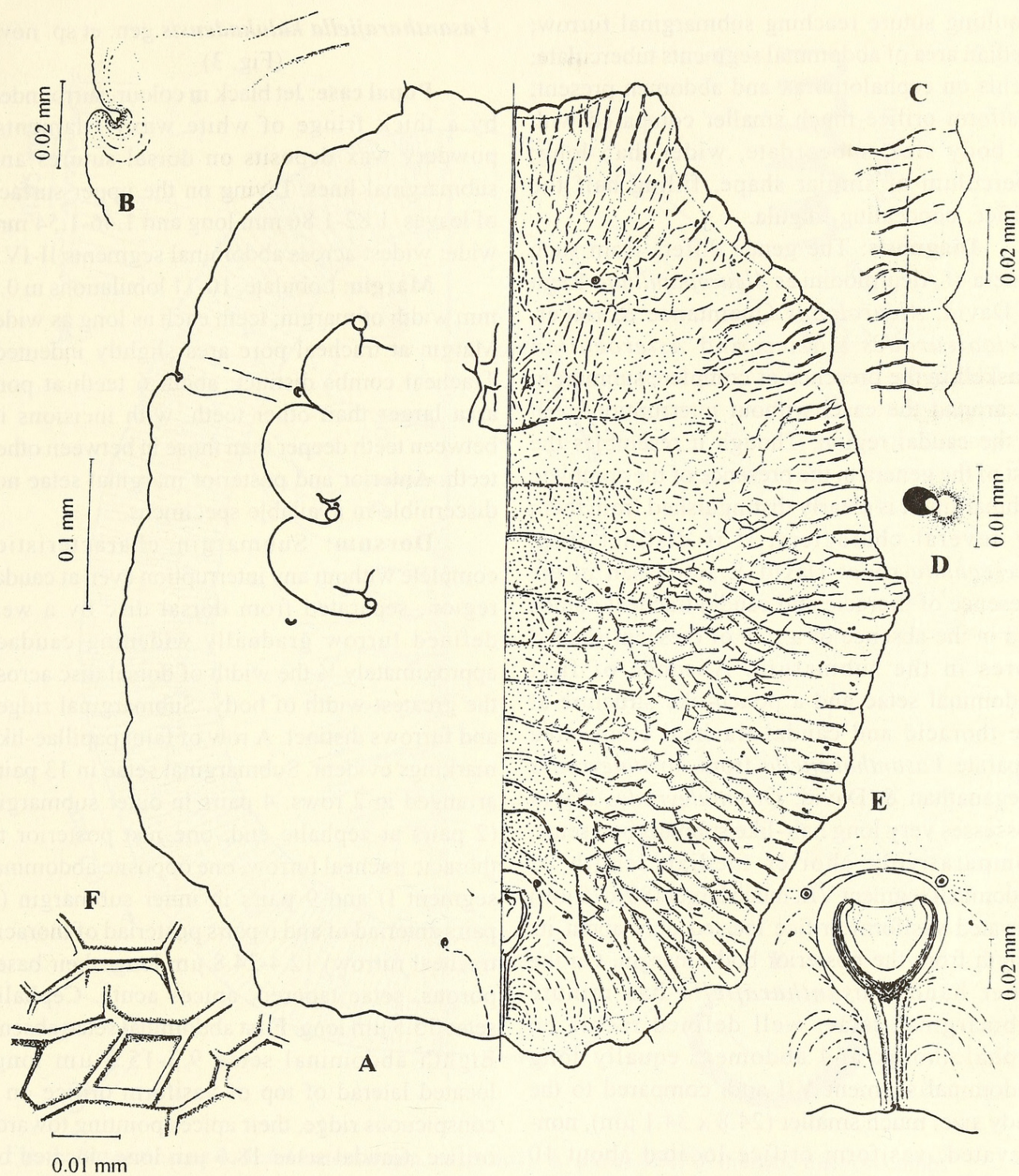


Fig. 2: *Shanthinia sheryli* gen. et sp. nov. : A. pupal case; B. thoracic tracheal comb; C. section of margin and submargin; D. disc pore and porette; E. vasiiform orifice; F. dorsal markings.

Genus *Vasantharajiella* gen. nov.

Type-species: *Vasantharajiella kalakadensis* sp. nov.

Pupal case oval, jet black in colour; margin

lobulate; tracheal combs distinct; submargin separated from the dorsal disc by a distinct furrow not interrupted even at caudal region; marginal setae absent; submarginal setae present; first abdominal setae absent; transverse

moulting suture reaching submarginal furrow; median area of abdominal segments tuberculate; rachis on cephalothorax and abdomen present; vasiform orifice much smaller compared with its body size, subcordate, wider than long; operculum of similar shape, filling half the orifice, concealing lingula.

Diagnosis: The genus differs from such genera of Aleurolodini as *Aleuropapillatus* Regu & David, *Aleurolobus* Quaintance & Baker, *Africaleurodes* Dozier, and *Asterochiton* Maskell in the presence of complete submargin all around the case, without interruption even in the caudal region. Though it resembles the rest of the genera in the presence of the complete submargin, it is clearly distinguished from them by several characters. It is distinct from *Crescentaleyrodes* David & Jesudasan in the presence of thoracic and caudal tracheal combs and in the absence of a row of crescent-shaped pores in the submargin. Absence of first abdominal setae and a pouch-like structure at the thoracic and caudal tracheal comb area separate *Vasantharajiella* from *Rositaleyrodes* Meganathan & David. *Orientalleyrodes* David possesses very long hair-like submarginal setae, comparatively shorter median length of abdominal segment VII, much larger ($80 \times 75 \mu\text{m}$) elevated vasiform orifice located only about its length from the posterior body margin. On the other hand, *Vasantharajiella* has minute submarginal setae, well defined rachis on cephalothorax and abdomen, equally long abdominal segment VII and, compared to the body size, much smaller ($24.8 \times 34.1 \mu\text{m}$), non-elevated, vasiform orifice located about 10 times its length from posterior body margin. The genus also differs from all these genera in lacking anterior and posterior marginal setae.

Etymology: Named in honour of Dr. B. Vasantharaj David, Director, Jai Research Foundation, Valvada, Gujarat, as a mark of respect.

Vasantharajiella kalakadensis gen. et sp. nov.
(Fig. 3)

Pupal case: Jet black in colour, surrounded by a thick fringe of white waxy filaments; powdery wax deposits on dorsal sutures and submarginal lines. Living on the upper surface of leaves. 1.82-1.86 mm long and 1.46-1.54 mm wide; widest across abdominal segments II-IV.

Margin: Lobulate, 10-11 lobulations in 0.1 mm width of margin; teeth each as long as wide. Margin at tracheal pore area slightly indented. Tracheal combs distinct; about 6 teeth at pore area larger than other teeth, with incisions in between teeth deeper than those in between other teeth. Anterior and posterior marginal setae not discernible in available specimens.

Dorsum: Submargin characteristic; complete without any interruption even at caudal region; separated from dorsal disc by a well defined furrow gradually widening caudad; approximately $\frac{1}{2}$ the width of dorsal disc across the greatest width of body. Submarginal ridges and furrows distinct. A row of faint papillae-like markings evident. Submarginal setae in 13 pairs arranged in 2 rows: 4 pairs in outer submargin (2 pairs at cephalic end, one just posterior to thoracic tracheal furrow, one opposite abdominal segment I) and 9 pairs in inner submargin (3 pairs anterior of and 6 pairs posterior of thoracic tracheal furrow) $12.4\text{-}24.8 \mu\text{m}$ long, their bases porous, setae tapered, apices acute. Cephalic setae $15.5 \mu\text{m}$ long. First abdominal setae absent. Eighth abdominal setae $9.3\text{-}15.5 \mu\text{m}$ long, located laterad of top of vasiform orifice on a conspicuous ridge, their apices pointing towards orifice. Caudal setae $18.6 \mu\text{m}$ long, located on outer submargin anterior to the lateral tooth of tracheal comb. Longitudinal transverse moulting suture reaching margin. Transverse moulting suture curved caudad from its midpoint, recurved cephalad, terminating at submarginal furrow opposite meso-metathoracic suture. Segmentation well defined in submedian area. Median length of abdominal segments I-VI equal and of

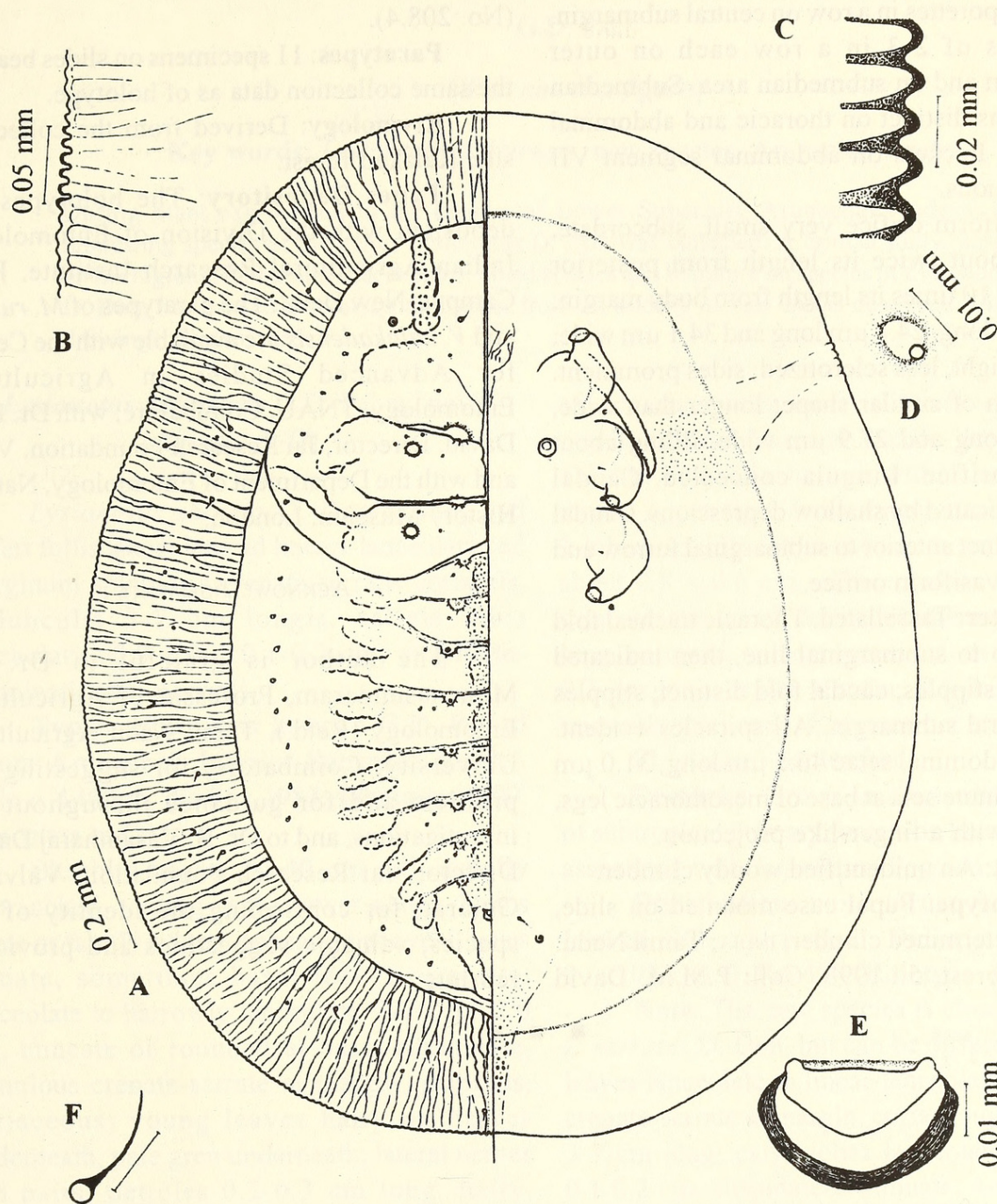


Fig. 3: *Vasantharajiella kalakkadensis* gen. et sp. nov.: A. pupal case; B. thoracic tracheal comb; C. margin; D. disc pore and porette; E. vasiform orifice; F. submarginal seta

VII shorter than that of other segments. Median area of abdominal segments I-VIII finely tuberculate. Rachis on cephalothorax and abdomen characteristic; promesothoracic suture bifurcated, each curved cephalad and caudad, recurving mesad with chain-like designs all

along in subdorsal area; meso-metathoracic suture bifurcated. A somewhat transverse rachis laterad of meso-metathoracic suture; abdominal rachis III-VII each bifurcated, finger-like in inner subdorsum with chain-like designs along sutures; minute striations inside abdominal rachis. Disc

pores and porettes in a row on central submargin, in groups of 2-3 in a row each on outer subdorsum and on submedian area. Submedian depressions distinct on thoracic and abdominal segments. Pockets on abdominal segment VII inconspicuous.

Vasiform orifice very small, subcordate, located about twice its length from posterior suture and 10 times its length from body margin; wider than long, 24.8 μm long and 34.1 μm wide; its top straight, less sclerotized; sides prominent. Operculum of similar shape; longer than wide, 12.4 μm long and 27.9 μm wide, filling about half the orifice. Lingula concealed. Caudal furrow indicated by shallow depressions. Caudal ridges distinct anterior to submarginal furrow and laterad of vasiform orifice.

Venter: Tassellated. Thoracic tracheal fold marked up to submarginal line, then indicated by minute stipples; caudal fold distinct; stipples up to central submargin. All spiracles evident. Ventral abdominal setae 46.5 μm long, 31.0 μm apart. A minute seta at base of mesothoracic legs, their tips with a finger-like projection.

Host: An unidentified woody climber.

Holotype: Pupal case mounted on slide, on an undetermined climber, INDIA; Tamil Nadu: Kalakad forest, 5.i.1993. Coll: P.M.M. David

(No. 208.4).

Paratypes: 11 specimens on slides bearing the same collection data as of holotype.

Etymology: Derived from the collection site, Kalakad forest.

Types Depository: The holotypes are deposited with the Division of Entomology, Indian Agricultural Research Institute, Pusa Campus, New Delhi. The paratypes of *M. rubiae* and *V. kalakadensis* are available with the Centre for Advanced Studies in Agricultural Entomology, TNAU, Coimbatore; with Dr. B.V. David, Director, Jai Research Foundation, Vapi; and with the Department of Entomology, Natural History Museum, London.

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