A NEW GENUS AND SPECIES MANGALAUS BKAPUS
(ACARI: ERIOPHYIDAE) FROM INDIA

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ABSTRACT – Mangalaus bkapus n. gen., n. sp. (Acari: Prostigmata: Eriophyidae: Eriophyinae:
Aceriini), collected from erineum on the underside of leaves of Cordia dichotoma G. Forster (Boragi-
naceae), is described and illustrated from specimens collected at the Indian Agricultural Research
Institute (IARI) in New Delhi, India.

Key words – Systematics, Mangalaus bkapus, new genus, new species, Cordia dichotoma, erineum,
Eriophyidae, Aceriini, India.

INTRODUCTION

Cordia dichotoma G. Forster (Boraginaceae), commonly known as Indian cherry or fragrant manjack,
is a small to medium-sized deciduous tree found in tropical and subtropical regions of Asia. Mangalaus
bkapus n. gen., n. sp. (Prostigmata: Eriophyidae: Eriophyinae: Aceriini) from erineum on C. dichotoma
is described here. The mites were seen in the whitish erineum having no particular shape, formed primarily
on the undersurface of leaf, which gradually becomes brownish as it ages (Figs. 11 and 11a). Sometimes, on
tender leaves, the erineum spreads across the entire leaf as a soft white hairy layer. Twenty eriophyid spp.
have been recorded so far on Cordia spp. and these are listed in Table 1.

MATERIALS AND METHODS

Leaves of Cordia dichotoma with erineum were collected and screened in the laboratory, using Leica
MZ6 stereozoom microscope. The mites were mounted in a drop of Hoyer’s medium and heated at 45–55°C for
10–12 hours. The cleared and dried specimen-slides were examined using a Leica DM1000 phase contrast compo-
und microscope fitted with a drawing tube. Classification and terminology of Amrine et al. (2003) and
Lindquist (1996) are used. The measurement of the holotype is followed by the mean, standard deviation,
and range of 10 specimens, in parentheses. Body length was measured from the apical tip of the palpi to
the posterior opisthosomal apex. Leg length was measured from the base of the trochanter to the apical
tip of the tarsus, not including the tarsal appendages (solenidion and empodium). The number of ventral
opisthosomal annuli was counted from the first anterior incomplete annulus ending at the lateral margin of
coxa II, at level of setae 2a.

Low-temperature scanning electron microscopy – Some mite specimens were studied with Low-Tem-
perature Scanning Electron Microscopy (LT-SEM) at the United States Department of Agriculture (USDA),
Agricultural Research Service (ARS), Electron and Confocal Microscopy Unit (Beltsville, Maryland,
USA) essentially as in Wergin et al. (2000) with the following exceptions: a S-4700 field emission scanning
Table 1. Eriophyds associated with *Cordia* spp.

<table>
<thead>
<tr>
<th>Name</th>
<th>Author/year/type locality</th>
<th>Host</th>
<th>Symptoms</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aceria boraginae</em></td>
<td>Mohanasundaram, 1982, India</td>
<td><em>Cordia</em> sp.</td>
<td>Erineum on lower side of the leaf with protuberances on the upper side</td>
<td></td>
</tr>
<tr>
<td><em>A. cordiae</em></td>
<td>(Cook, 1909), Java, Indonesia</td>
<td><em>Cordia</em> sp.</td>
<td>Fleshy erineum on small papillae on leaf underside</td>
<td></td>
</tr>
<tr>
<td><em>A. cordiae</em></td>
<td>(Nalepa, 1914), Java, Indonesia</td>
<td><em>C. dichotoma</em></td>
<td>Small irregular erineum on the upper leaf surface</td>
<td>Possible junior homonym</td>
</tr>
<tr>
<td><em>A. dichotomae</em></td>
<td>Mohanasundaram, 1982, India</td>
<td><em>C. dichotoma</em></td>
<td>Causing tightly rolled edges of the leaves</td>
<td></td>
</tr>
<tr>
<td><em>A. gallae</em></td>
<td>Huang, 1996, Taiwan</td>
<td><em>C. dichotoma</em></td>
<td>Conical or cylindrical galls on both sides of the leaves, cylindrical galls on upper surface with opening on lower surface</td>
<td></td>
</tr>
<tr>
<td><em>A. mixacordiae</em></td>
<td>(Nalepa, 1929), Java, Indonesia</td>
<td><em>C. myxa</em></td>
<td>Erineum</td>
<td></td>
</tr>
<tr>
<td><em>A. neocardiae</em></td>
<td>Wilson, 1970, Mexico</td>
<td><em>Cordia</em> sp.</td>
<td>Galls</td>
<td></td>
</tr>
<tr>
<td><em>A. obliquae</em></td>
<td>Mohanasundaram, 1990, India</td>
<td><em>C. obliqua</em></td>
<td>Erineum, both leaf surface</td>
<td></td>
</tr>
<tr>
<td><em>A. pobuzii</em></td>
<td>Huang, 1996, Taiwan</td>
<td><em>C. dichotoma</em></td>
<td>Same symptoms as galls formed by <em>A. gallae</em></td>
<td></td>
</tr>
<tr>
<td><em>Calepttrimerus cordiae</em></td>
<td>Chakrabarti and Das, 1982, India</td>
<td><em>C. myxa</em></td>
<td>Vagrant on ventral surface of leaf causing brown patches, discoloration</td>
<td></td>
</tr>
<tr>
<td><em>Cosetacus sharadi</em></td>
<td>Menon, Joshi and Ramamurthy, 2009, India</td>
<td><em>C. dichotoma</em></td>
<td>Whitish erineum mostly on the leaf under surface, gradually becoming brown as it matures</td>
<td></td>
</tr>
<tr>
<td><em>Eriophyes cordiae</em></td>
<td>(Channabasavanna, 1966), India</td>
<td><em>C. myxa</em></td>
<td>Whitish warty patches on the leaf under surface</td>
<td>Chakrabarti <em>et al.</em> (1981) suggested new combination for <em>Aceria cordiae</em> Channabasavanna 1966, and revised the description with respect to body length and genital setae</td>
</tr>
<tr>
<td><em>Floracarus claviger</em></td>
<td>Flechtmann, 1996, Brazil</td>
<td><em>Cordia</em> sp.</td>
<td>Leaf vagrants, no apparent symptom of damage</td>
<td></td>
</tr>
<tr>
<td><em>Neodichopelmus cordiae</em></td>
<td>Chakrabarti and Pandit, 1997, India</td>
<td><em>C. myxa</em></td>
<td>Occur on lower leaf surface under thin white web with no apparent damage to plant</td>
<td></td>
</tr>
<tr>
<td><em>Notaceria tetrandrae</em></td>
<td>Mohanasundaram and Muniappan, 1990, Guyana</td>
<td><em>C. tetrandra</em></td>
<td>Occur on undersurface of tender leaf as vagrants</td>
<td></td>
</tr>
<tr>
<td><em>Paraphytoptella arnaudi</em></td>
<td>Keifer, 1959, Mexico</td>
<td><em>C. parviflora</em></td>
<td>Galls</td>
<td></td>
</tr>
<tr>
<td><em>P. secunda</em></td>
<td>Flechtmann and Etienne, 2001, Guadeloupe</td>
<td><em>C. polypephala</em></td>
<td>Erineum patches on both sides of leaf</td>
<td></td>
</tr>
<tr>
<td><em>Shevtchenkella cardiavagrans</em></td>
<td>Mohanasundaram, 1982, India</td>
<td><em>Cordia</em> sp.</td>
<td>Undersurface leaf vagrant</td>
<td></td>
</tr>
<tr>
<td><em>Tegolophus cordis</em></td>
<td>Das and Chakrabarti, 1982, India</td>
<td><em>C. myxa</em></td>
<td>Vagrant on leaf undersurface, no damage</td>
<td></td>
</tr>
<tr>
<td><em>Mangalaus bkapus</em></td>
<td>Menon, P., present study, India</td>
<td><em>C. dichotoma</em></td>
<td>Whitish erineum mostly on the leaf under surface, gradually becoming brown as it matures</td>
<td></td>
</tr>
</tbody>
</table>
family ERIOPHYIDAE Nalepa, 1898
subfamily ERIOPHYINAE Nalepa, 1898
Tribe ACERINI Amrine and Stasny, 1994

Mangalaus Menon, n. gen.

diagnosis – Mangalaus bkapus, n. sp.

description – Body vermiform, annuli subequal dorsoventrally and both surfaces microtuberculate; prodorsal shield subtriangular, without a frontal lobe; scapular tubercles and setae on or very near posterior margin of the shield, usually scapular setae (sc) directed divergently back; empodia entire; legs with the usual segments, tibiae separate from tarsi; fastigial tarsal setae (ft, ft") present; solenidion elongate, slightly curved, rod-like; paraxial tibial setae (p) absent; antaxial genual seta (g) present; basiventral femoral setae (bv) present; all coxisternal setae, 1b, 1a and 2a present; prosternal apodeme present; opisthosomal setae h1 minute; female genitalia not appressed to or separating the coxae; female genital coverflap with one rank of longitudinal ridges; anterior apodeme of the internal female genitalia folded up, appearing as a transverse line under phase contrast microscope in ventral view; opisthosoma evenly arched with all standard setae, dorsal annuli becoming broader towards the rear.

Assignment – Eriophyidae, Eriophyinae, Acerini

Etymology – The generic name Mangalaus is masculine and is derived from the first name of Dr. Mangala Rai, under whose vision and direction, the Indian Council of Agricultural Research (ICAR) funds the Network Project on Insect Biosystematics; it is assigned in his honor and to recognize his interest and commitment towards this basic area of research.

Remarks – The new genus is assigned to the family Eriophyidae, subfamily Eriophyinae and tribe Acerini, based on the characters as used in the key to genera by Amrine et al. (2003). Accordingly, Mangalaus can be separated from other genera of Acerini as follows: from Acaradox Keifer, 1966 by the absence of a dorsal furrow on the opisthosoma; from Distaceria Flechtmann et al., 1995 by the absence of smooth flat areas with crenulations on the dorsal annuli, although the prodorsal shield of Mangalaus has eye-like structures; from Tetrameracarus Huang, 2001, Baileyyna Keifer, 1954 and Phytoptochetus Nalepa, 1917 by the lack of any ridges on opisthosoma; from Acunda Keifer, 1965b by the absence of mid-dorsal humps or annular thickenings on the opisthosoma; from Keiferophyes Mohanasundaram, 1983, Aceria Keifer, 1944, Paraphytoptella Nalepa, 1896 and Paraphytoptella Keifer, 1959 by the absence of paraxial tibial setae (p); from Acerimina Keifer, 1957, Ramaculus Manson, 1984, Scoletoptus Meyer, 1992 and Cenaca Keifer, 1972 by the presence of the anterolateral seta on coxisternum I (1b); and from Acalitus Keifer, 1965a by the presence of basiventral femoral setae (bv). Following this key, the new genus, Mangalaus is regarded to be more closely related to the genus Notaceria Mohanasundaram and Muniappan, 1990 and Cymoptus Keifer, 1946. The genus Notaceria is characterized by the presence of a minute basiventral femoral setae (bv) and antaxial genual setae (g), lacks paraxial tibial setae (p), has very minute or nearly absent fastigial tarsal setae (ft, ft"), tarsal solenidion (o) near mid-tarsus on leg I and basally on leg II. In contrast, basiventral

type species – Mangalaus bkapus, n. sp.

diagnosis – Mangalaus n. gen. is characterized by presence of an evenly arched opisthosoma without any furrows, ridges, humps, or crenulations; dorsal annuli semi-circular, with distinct microtubercles; dorsoventrally and both surfaces microtuberculate; prodorsal shield subtriangular, without a frontal lobe; scapular tubercles and setae on or very near posterior margin of the shield, usually scapular setae (sc)
femoral setae (bv), antaxial genual setae (f”) and fastigial tarsal setae (ft’, ft”) are conspicuous and of normal length in *Mangalaus* and tarsal solenidion (ω) of both legs are placed near tarsal apex. In comparison to *Cymoptus*, *Mangalaus* is similar in the presence of fastigial tarsal setae (ft’, ft”), cylindrical tarsal solenidion (ω), absence of paraxial tibial setae (ft’), presence of antaxial genual setae (f”) and basiventral femoral setae (bv), and all opisthosomal setae; however, differs in the presence of a well-defined ocellar region on prodorsal shield and distinct microtubercles on dorsal annuli.

Interestingly, another eriophyid mite, *Cosetacus sharadi* Menon et al., 2009, of the subfamily Cecidophyinae was observed in the same erineum along with *Mangalaus*. While, the new genus has been placed in the subfamily Eriophyinae broadly based on the external morphological characters as defined in the key to genera by Amrine et al. (2003), the occurrence of another cecidophyid mite, in the same erineum is also suggestive of these mites possibly being alternate forms of each other. Considering the fact that both male and female forms of both these eriophyid mites exist and have been described and that they all occur in the same erineum simultaneously and not alternately, the presumption that these could be alternate forms of each other does not hold true. Also, *Mangalaus* distinctively differs from *Cosetacus* in the presence of a well-defined ocellar region on the prodorsal shield, female genital cover flap with longitudinal ridges in a single rank and the shape of the internal female apodeme, thus substantiating its placement in subfamily Eriophyinae. However, in view of the fact that these key characters have known not to hold true for all the genera defined under these subfamilies, a detailed phylogenetic analysis to confirm this placement becomes pertinent.

**Mangalaus bkapus Menon n. sp.**

(Figs. 1–31)

**Diagnosis** — Empodia on tarsae I and II four-rayed; coxisternal plates I and II microtuberculated; coxisternal area with microtuberculated annuli; female genital cover flap with longitudinal ridges, central longitudinal ridges longer than those on sides. Setae c2 just reaching base of setae d, which is 6 times longer than shortest setae e; very stout setae f; setae h2 nearly 12 times as long as setae h1. Prodorsal shield with median line present, some specimens with anterior half of median line weak. Admedian lines outwardly concave, almost encasing median line, sometimes with forked terminal apices, and extending posteriorly and meeting median line in posterior region. First submedian line usually reaching tip of shield anteriorly and posteriorly; second submedian divided anteriorly and extending into the shield, submedian lines 3–5 present at anterior half of the shield. Ocellar structures present on the prodorsal shield (Figs. 15 and 17). Live mites are transparent to white.

**FEMALE (n = 10)** — Body vermiform, 191 (189.3 ± 23.5; 161–245) long, 36 (41.1 ± 1.5; 38–43) wide (Figs. 1, 13 and 14).

**Gnathosoma** — Projecting downward; dorsal pedipalp genual seta (d) present 3 (3.5 ± 0.5; 3–4); chelicerae 12 (12.6 ± 1.3; 10–15); gnathosoma 14 (11.7 ± 1.1; 10–14) (Figs. 15 and 24).

**Prodorsal shield** — Subtriangular; 21 (23.8 ± 1.2; 22–25) long, 32 (34.8 ± 2.4; 32–38) wide; shield design with median line prominent from middle to posterior margin of shield, admedian lines concave outwardly, vase-like, bifurcate anteriorly and nearly meeting posteriorly, first submedian lines slightly curved, subscribing both median and admedian lines and converging to shield margin anteriorly and posteriorly, submedians(sm) 2–5 arising from the anterior shield margin: sm2 forked at the anterior end, sm3 extending diagonally into the shield outlining the inner edges of the ocellar structure, joined by sm4 midway, sm5 running laterally ending a little ahead of the ocellar region. Ocellar structures present on the lateral margins of shield (Figs. 2, 15–17). Scapular tubercles present near posterior margin of shield 15 (15.6 ± 0.8; 14–17) apart, scapular setae (sc) directed posteriorly and divergent, sc 20 (21.6 ± 0.9; 20–23), spanning 10 (11 ± 1.2; 10–13) annuli behind the shield.

**Legs** — Lacking paraxial tibial setae (ft’). Leg I 22 (24.5 ± 1.9; 22–29); femur 6 (7.2 ± 0.6; 6–8), basiventral femoral seta (bv) 6 (6 ± 1.8; 5–10); genu 3 (3.3 ± 0.6; 3–5), antaxial genual seta (ft”) 12 (14.5 ± 1.9; 12–18); tibia 4 (4.3 ± 0.4; 4–5), paraxial tibial seta (ft’) absent; tarsus 5 (5.5 ± 0.8; 4–7), solenidion (ω) 6 (6.9 ± 0.7; 6–8), slightly curved, without knob; empodium 4 (3.8 ± 0.4; 3–4), four-rayed, each ray further branched- third and fourth ray with three branches each and first and second ray with two branches each, of which one has a spatula-like distal end (Figs. 7, 8, 18, 19 and 21), paraxial fastigial tarsal seta (ft”) 4 (4.5 ± 1.1; 3–7), antaxial fastigial tarsal seta (ft”) 14 (15.7 ± 2.5; 10–18), paraxial unguinal seta (u”) 3 (2.5 ± 0.5; 2–3) (Figs. 9, 18–21). Leg II 21 (21.8 ± 1.6; 19–25); femur 6 (6.6 ± 1.0; 5–8); basiventral femoral setae (bv) 6 (5.9 ± 0.6; 5–7); genu 3 (3.1 ± 0.3; 3–4), antaxial genual seta (ft”) 5 (6.3 ± 1.4; 5–10); tibia 3 (3.6 ± 0.3; 3–4); tarsus 5 (5.1 ± 0.5; 4–6), solenidion (ω) 9 (9 ± 1.1; 9–10), slightly curved, without knob, empodium 4 (3.6 ± 0.6; 3–5), four-rayed, paraxial fastigial tarsal seta (ft”) 4 (4.5 ± 0.5; 4–5), antaxial fastigial
Figs. 1–10. *Mangalaus bkapus* n. gen. n. sp. – 1. lateral view, ♀; 2. dorsal shield design; 3. coxisternal area and genitalia, ♂; 4. coxisternal area and genitalia, ♀; 5. genital apodeme, ♂; 6. close up of genitalia, ♂; 7. empodium (as seen in light microscope); 8. empodium (as seen in SEM photos); 9. leg I; 10. leg II. Scale. All figures are 10 µm except for Fig. 8 scale = 5 µm.
tarsal seta (ft) 13 (15.5 ± 1.9; 12–18), paraxial unguinal seta (u) 3 (3 ± 1; 2–4) (Figs. 10, 18–20). Legs I and II: Short spur-like structures are present on the ventral side of the distal area of the tarsus (I, II) (Figs. 19 and 21). Femora and genua with 3–5 short spines, while tibiae with 2–4 short spines (Figs. 18–21); these structures visible only in the LT-SEM micrographs. Coxisternal apodeme present; coxal area microtuberculated with very few short lines; anterolateral seta on coxisternum I (1b) 7 (7.5 ± 1.2; 5–9), 7 (6.7 ± 1.1; 5–9) apart; proximal seta on coxisternum I (1a) 21 (20.9 ± 2.4; 18–26), 8 (7.8 ± 0.4; 7–8) apart; proximal seta on coxisternum II (2a) 30 (32.6 ± 2.8; 29–36), 18 (17.2 ± 1.1; 16–20) apart (Figs. 3 and 18). Coxisternal area with five to six annuli separating coxae from genital coverflap (Figs. 3, 18, 22 and 23).

Genitalia – Coverflap 12 (10.2 ± 2.7; 8–17), 16 (17 ± 1.3; 15–18) wide, with a transverse irregular row of large microtubercle-like nodules forming a pseudo-annulus at coverflap base, distal coverflap with 10–12 longitudinal ridges in a single rank; proximal seta on coxisternum III (3a) 6 (5.2 ± 1; 3–6) (Figs. 3, 18, 22 and 23). Genital apodeme transverse (Fig. 5).

Opisthosoma – Annuli subequal and continuous dorsoventrally (Figs. 1, 13 and 14). Opisthosomal setae (c2) 17 (17 ± 0.9; 15–18) on annulus 9 (9.2 ± 0.4; 9–10) from the first complete ventral ring. Opisthosomal setae (d) 45 (48.4 ± 3.3; 41–53), 30 (29.5 ± 1.9; 26–32) apart, on annulus 21 (21.1 ± 1.5; 20–24); opisthosomal setae (e) 10 (9.1 ± 0.9; 8–10), 18 (17.5 ± 1.1; 16–19) apart, on annulus 34 (34.7 ± 2.8; 32–40); opisthosomal setae (f) 19 (16.3 ± 1.4; 16–19), 13 (15 ± 1.7; 13–19) apart, on
annulus 56 (55.9 ± 4.6; 52–65). Dorsal and ventral annuli semi-circular and subequal. Total ventral annuli 60 (59.2 ± 5.3; 54–69), microtuberculate, microtubercles more or less oval; total dorsal annuli 64 (64.2 ± 4.7; 59–76), microtuberculate, microtubercles elongate and narrow with distal sharp edge (Figs. 26 and 27). Beyond setae / with annuli 52–59 wider, with narrowing microtubercles, widely spaced, fewer in

Figs. 12–17. Mangalaus bkapus n. gen. n. sp. – 12. erineum, arrows point to mites; 13. erineum with mite; 14. body, dorsum; 15. shield design, m = median line, ad = admedian line, sm = submedian line, c.r. = cheliceral retainer, ep = pedipalp coxal dorsal seta, d = dorsal pedipalp genual seta; 16. lateral shield with ocellar region, p = pit; 17. ocellar region, lateral view, B = boundary of prodorsal shield, Sc. Tub. = base tubercle of scapular seta.
number and six rear annuli mostly without microtубercles; opisthosomal seta \((h_2)\) 85 (85.1 ± 4.9; 78–90), opisthosomal seta \((h_1)\) 6 (6.5 ± 0.8; 5–8) (Fig. 25).

**MALE** \((n = 10)\) – Similar to female, except for genitalia. 155 ± 19.9 (124–158) long, 38.4 ± 5.1 (31–45) wide (Fig. 28).

Gnathosoma – Downward projecting; dorsal pedipalp genual seta present; chelicerae 12.2 ± 0.4 (12–13); gnathosoma 11.2 ± 0.7 (10–12).

Prodorsal shield – 20.6 ± 1.3 (19–22), 29.8 ± 4.2 (24–37) wide; scapular tubercles present 15 ± 1.4 (13–17) apart, scapular seta (sc) divergent and posteriorly directed; sc 17.2 ± 1.9 (15–20), spanning 9.4 ± 0.4 (9–10) annuli. Prodorsal shield with pattern similar to that of female.

Legs – Paraxial tibial seta (l) lacking. Leg I 22.4 ± 1.3 (20–24); femur 5.6 ± 0.8 (4–6), basiventral...

Figs. 24–29. Mangalaus bkapus n. gen. n. sp. – 24. palpi, lateral view; 25. opisthosoma, posterior end, ♂; 26. and 27. dorsal microtubercles; 28. ventral body, lateral view, ♂; 29. genitalia, lateral view, ♂, es = eugenital seta, g.r. = genital ridge, g.s. = genital shield, bearing seta 3a. ♂.
femoral seta (bv) 4.6 ± 0.4 (4–5); genu 3 ± 0 (3), antaxial genual seta (ft') 11.8 ± 1.6 (10–14); tibia 3.8 ± 0.4 (3–5), tarsus 4.4 ± 0.4 (4–5), solenidion (ω) 6.8 ± 0.9 (5–8), slightly curved, without knob, empodium 4 ± 0 (4), four-rayed, paraxial fastigial seta (ft') 3.8 ± 0.7 (3–5), antaxial fastigial seta (ft') 12.6 ± 1.6 (10–15), paraxial unguinal seta (u') 2.2 ± 0.4 (2–3). Leg II 16 ± 0.8 (15–17); femur 5.2 ± 0.4 (5–6); basiventral femoral seta (bv) 5 ± 0.8 (4–6); genu 2.2 ± 0.4 (2–3), antaxial genual seta (ft') 6.5 ± 3.6 (2–12); tibia 3.2 ± 0.4 (3–4); tarsus 4.2 ± 0.4 (4–5), solenidion (ω) 9.4 ± 0.8 (8–10), slightly curved, without knob, empodium 3.8 ± 0.4 (3–4), four-rayed, paraxial fastigial seta (ft') 2.7 ± 0.4 (2–3), antaxial fastigial seta (ft') 13 ± 1.6 (11–15), paraxial unguinal seta (u') 2 ± 0.7 (1–3). Coxae I apparently fused; anterolateral seta on coxisternum I (1a) 5.2 ± 1.6 (4–8), 7.2 ± 0.8 (6–8) apart; proximal seta on coxisternum I (1a) 12.4 ± 1.9 (10–16), 7.2 ± 0.7 (6–8) apart; proximal seta on coxisternum II (2a) 23.8 ± 5.1 (16–30), 15.4 ± 0.08 (14–16) apart (Figs. 4 and 28).

Genitalia – 15.4 ± 1.3 (6–11) wide, 8.8 ± 1.9 (7–11) long; proximal seta on coxisternum III (3a) 3.6 ± 0.8 (3–5). A pair of egumental setae (es) just posterior to the genital ridge within the genital cavity, setae short and rounded apically, set on broad, flexible tubercles; cuticle between bases of setae 3a sculptured with numerous nodules (ca. 85) resembling microtubercles of annuli; size range is variable (Figs. 4, 6, 28 and 29).

Opisthosoma – Opisthosomal setae (c2) 13 ± 2.3 (10–17), on annulus 8.4 ± 1 (7–10) from the first complete ventral annulus. Opisthosomal seta (d) 31.8 ± 3.6 (25–35); 30.4 ± 3.6 (25–36) apart, on annulus 17.6 ± 1 (16–19); opisthosomal seta (e) 5.2 ± 1.1 (4–7), 18 ± 1.8 (16–21) apart, on annulus 29 ± 1.4 (27–31); opisthosomal seta (f) 11 ± 1.5 (10–14), 12.4 ± 1.3 (10–14) apart, on annulus 48.4 ± 1.8 (46–51) (Fig. 28). Total ventral annuli 52.8 ± 2.6 (50–57), microtuberculate; total dorsal annuli 55 ± 5.2 (48–61), microtuberculate. Opisthosomal seta (h2) 51.6 ± 4 (47–57); opisthosomal seta (h1) 5 ± 1 (4–7) (Fig. 28).

**NYMPH** (n = 5) – 145 ± 16 (126–165) long, 42 ± 3 (40–46) wide (Fig. 30).

Genitalia – Chelicerae 13 ± 1 (12–14); gnathosoma 8.8 ± 1 (8–10).

**Prodorsal shield** – 20 ± 1 (18–20) long, 30 ± 1 (28–30) wide; scapular tubercles present near posterior margin of shield on nearly 2nd and 3rd annuli, scapular seta (sc) divergent and posteriorly directed; sc 14 ± 0.5 (14–15). Ocellar structures absent.

**Legs** – Leg I 15 ± 0.5 (15–16); femur 4.5 ± 0.6 (4–5), basiventral femoral seta (bv) 2 ± 0.2 (2); genu 2 ± 0 (2), antaxial genual seta (ft') 9 ± 1.2 (8–10); tibia 2.5 ± 0.6 (2–3), paraxial tibial seta (ft') absent; tarsus 3.5 ± 0.6 (3–4), solenidion (ω) 4.8 ± 0.5 (4–5), without knob, empodium 3.8 ± 0.5 (3–4), four-rayed, paraxial fastigial seta (ft') 3.3 ± 0.6 (4–5), antaxial fastigial seta (ft') 8.8 ± 1 (8–10), paraxial unguinal seta (u') not visible. Leg II 15 ± 0.6 (14–15); femur 4.5 ± 0.6 (4–5); basiventral femoral seta (bv) 1.8 ± 0.5 (1–2); genu 2.8 ± 0.5 (2–3), antaxial genual seta (ft') 3.8 ± 0.5 (3–4); tibia 2.8 ± 0.6 (2–3); tarsus 3 ± 0.8 (2–4), solenidion (ω) 6 ± 0 (6), without knob, empodium 4 ± 0 (4), four-rayed, paraxial fastigial seta (ft') minute, antaxial fastigial seta (ft') 7.5 ± 1 (6–8), paraxial unguinal seta (u') minute, anterolateral seta on coxisternum I (1b) not visible; proximal seta on coxisternum I (1a) 9.3 ± 2.5 (8–13); proximal seta on coxisternum II (2a) 18 ± 3.3 (15–22).

Genitalia – Absent.

Opisthosoma – Opisthosomal setae (c2) 8.5 ± 2.6 (5–11), on annulus 10 ± 1 (9–11). Opisthosomal setae (d) 23 ± 1.9 (20–24), on annulus 21 ± 2 (18–23); opisthosomal setae (e) inconspicuous, 1 ± 0 (0.5–1.5), on annulus 30 ± 1 (29–31); opisthosomal setae (f) just posterior to the genital ridge within the genital cavity, setae short and rounded apically, set on broad, flexible tubercles; cuticle between bases of setae 3a sculptured with numerous nodules (ca. 85) resembling microtubercles of annuli; size range is variable (Figs. 4, 6, 28 and 29).
10 ± 1.3 (9–12), on annulus 50 ± 4 (46–53). Total ventral annuli 53 ± 3.9 (50–58), microtuberculate; total dorsal annuli 61 ± 1 (60–62), microtuberculate. Opisthosomal setae (h2) 28 ± 4.8 (25–35); opisthosomal setae (h1) 2.3 ± 1 (2–4).

**LARVA** (*n* = 5) – Similar to nymph, 60–70 long (Fig. 31). Prodorsal shield without ocellar structures. First 2–3 annuli absent dorsally, the area dorsally behind the posterior shield margin of the prodorsum smooth. Microtubercles slightly rounded and less condensed than the nymph.

**Type material** – Holotype female, 50 female, 15 male paratypes, 5 nymphs and 5 larvae from *Cordia dichotoma* (Boraginaceae), Indian Agricultural Research Institute (IARI), New Delhi, India, coll. Pratibha Menon, 7 March 2008, mounted on 15 microscopic slides deposited in the National Pusa Collection (NPC), IARI. The holotype is marked with a circle on the slide. Additionally, six paratypes on five slides will be deposited in the Insect and Mite National Collection, National Museum of Natural History (NMNH), Smithsonian Institution located at USDA, ARS, SEL, Beltsville, Maryland, USA.

**Relation to host** – *Mangalaus bkapus* has been observed in large numbers along with *Cosetacus sharadi* in erineum. *Mangalaus bkapus* is considered the principle cause of the production of erineum, however, further study is necessary to prove this conclusively. The erineum first appears in small patches of no particular shape, on both surface of leaf, though more abundant on the ventral surface, expanding progressively in area and depth, with a corresponding bulge on the opposite leaf surface. It is whitish, gradually turning brown as it ages. The mites were observed in large numbers along with *Cosetacus sharadi* in erineum.

**Etymology** – The specific name *bkapus* is masculine and derived from Bhartiya Krishi Anusandhan Parishad (BKAP) also called the Indian Council of Agricultural Research (ICAR), which funds the Network Project on Insect Biosystematics, at the Division of Entomology, IARI, New Delhi, India. The senior author, Pratibha Menon, is the sole authority for the genus and species.

**DISCUSSION**

Many eriophyid mites are associated with *Cordia* spp., and confusion exists about the distinctness of the species. A total of 20 eriophyid species have been described, most of them are associated with some gall-erineum. However, there is a high possibility that many of these species are synonyms, particularly those described in the genus *Aceria* (Table 1).

The key characters which separates *M. bkapus* from all known described species for *Cordia* spp. are the absence of tibial setae on legs I and II and the presence of an ocular region on the prodorsum shield of the adults. A comprehensive collection of the many eriophyid species which occur on *Cordia* spp. is needed with a detailed study of the morphology of the mites in addition to a careful documentation of the host-plant data.

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