The spider mites of the genus *Eutetranychus* Banks (Acari, Trombidiformes, Tetranychidae) from Saudi Arabia: two new species, a re-description, and a key to the world species

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Abstract

Two new species of the genus *Eutetranychus* Banks are described and illustrated based on adult females and males, *E. spinosus* sp. n. from *Indigofera spinosa* Forrsk (Leguminosae), *E. neotransversus* sp. n. from *Juniperus procera* Hochst. ex Endl. (Cupressaceae), and *E. palmatus* Attiah, 1967 is redescribed from *Washingtonia robusta* H. Wendl. (Arecaceae). Additionally, the intraspecific morphological variations within *E. orientalis* populations, collected from 28 various host plants and 80 different localities from six regions of Saudi Arabia from 2009 to 2017, are discussed and presented. The genus *Eutetranychus* is divided into two species groups based on the presence of one seta (*orientalis* group) or two setae (*banksi* group) on coxa II. In addition, seven *Eutetranychus* species are suggested as synonyms of *E. orientalis* (Klein, 1936) and *E. papayensis* Iqbal & Ali, 2008 is considered as species inquirenda. A key to all known species of the genus *Eutetranychus* is provided.

Keywords

Key, morphological variations, new species, *palmatus*, phytophagous mites
**Introduction**

The spider mites belonging to the genus *Eutetranychus* (Acari: Tetranychidae) mostly feed on shrub and tree leaves (Jeppson et al. 1975, Bolland et al. 1998) and make little webs on plant leaves (Saito 2010, Vacante 2010). Among *Eutetranychus* species, the Oriental red spider mite, *E. orientalis* (Klein) and African red spider mite, *E. banksi* (McGregor) have been recorded as major pests of citrus in many tropical and subtropical countries (Vacante 2010). Recently, *E. palmatus* Attiah was considered as a pest of date palms in Israel (Palevsky et al. 2010). Previously it has been reported from different palms (Arecaceae) from Egypt, Israel, Jordan, and Iran (Attiah 1967, Gerson et al. 1983, Kamali 1990, Ben-David et al. 2013).

The genus *Eutetryanchus* belongs to the tribe of Eurytetranychini Reck of the subfamily Tetranychinae. Banks (1917) considered *Eutetranychus* as subgenus of the *Neotetranychus* Trägårdh. Later, McGregor (1950) proposed *Eutetranychus* as valid and separated genus with type species *Tetranychus banksi*. Baker and Pritchard (1960) provided a key to the world with eight species of *Eutetranychus*. Later, only two regional keys of *Eutetranychus* species have been constructed from India and Africa including nine and 16 species, respectively (Nassar and Ghai 1981, Meyer 1987). To date, *Eutetranychus* includes 34 nominal species, mostly reported from Africa and Asia (Migeon and Dorkeld 2006–2017). Prior to this study, no diagnostic key to those world *Eutetranychus* species is available. Only four *Eutetranychus* species viz. *E. africanus* (Tucker), *E. banksi*, *E. orientalis* and *E. palmatus* have been reported from Saudi Arabia (SA) so far (Martin 1972, Alatawi 2011).

The two species *E. orientalis* and *E. banksi* are widely distributed over the world and have been reported from approximately 223 and 84 various host plants, respectively (Bolland et al. 1998, Migeon and Dorkeld 2006–2017, Mattos and Feres 2009, Vacante 2010). Morphological variations in shape and length of dorsal setae, striation pattern between setae *d1* and *e1* and legs chaetotaxy have been reported in these two species (Baker and Pritchard 1960, Chaudhri et al. 1974, Meyer 1974, Meyer 1987, Khanjani et al. 2017). Because of such variations, some *Eutetryanchus* species have been synonymized with *E. orientalis* (Baker and Pritchard 1960, Meyer 1987) and others with *E. banksi* (Pritchard and Baker 1955, Bolland et al. 1998).

The aims of the present study were to explore *Eutetranychus* species from Saudi Arabia, to develop a key to the world species of this genus and to discuss the morphological intraspecific variations in *E. orientalis* populations collected from different hosts and localities from Saudi Arabia. In this study, two new species of *Eutetranychus*: *E. spinosus* sp. n. and *E. neotransversus* sp. n. are described and illustrated based on adult females and males (Figs 1–30). Also, *E. palmatus* is redescribed and illustrated based on adult female and male (Figs 31–46) because its original description was brief and incomplete from date palm trees in Egypt (Attiah 1967). Two previous recorded species, *E. africanus* and *E. banksi*, from SA were not found in this comprehensive collection. The intraspecific morphological variations within *E. orientalis* populations collected from 28 various host plants and 80 different localities in six regions of SA during 2009 to 2017, are discussed and presented (Figs 47A–H, 48, 49).
Materials and methods

*Eutetranychus* spider mites were collected from diverse host plants from different localities in six regions (Al–Ula, Madina, Nijran, Riyadh, Tabuk, and Taif) of SA during 2009–2017. The mite specimens were collected by shaking the aerial parts of plants over a white piece of paper. The mites moving on paper were picked with camel hair brush and preserved in small vials containing 70% alcohol, then mounted in Hoyer's medium under a stereomicroscope (SZX10, Olympus, Tokyo, Japan). The specimens were examined and identified under a phase contrast microscope (BX51, Olympus®, Japan) using keys and available literature. Different mite body parts were pictured by using an auto-montage software system (Syncroscopy, Cambridge, UK) and then drawn with Adobe Illustrator (Adobe SystemInc., San Jose, CA, USA). All measurements are given in micrometers. The lengths of the legs were measured from the base of the trochanter to the tip of tarsus. The measurements are presented for the holotype followed by the range of paratypes in parenthesis. The morphological terminology used in this study follows that of Lindquist (1985). All collected specimens including type specimens of the new species have been deposited at King Saud University Museum of Arthropods (KSMA, Acarology section), Department of Plant Protection, College of Food and Agriculture Sciences, King Saud University, Riyadh, SA.

Family TETYRANYCHIDAE Donnadieu
Subfamily Tetranychinae Berlese
Tribe Eurytetranychini Reck

Genus Eutetranychus Banks

*Neotetranychus (Eutetranychus)* Banks, 1917: 197.
*Anychus* McGregor, 1919: 644.
*Eutetranychus* Banks, McGregor 1950: 267.

Type species. *Tetranychus banksi* McGregor, 1914.

Diagnosis. Based on Meyer 1987. The genus *Eutetranychus* can be recognized by the combination of following characters: Propodosomal setae three pairs (*v2, sc1* and *sc2*); opisthosomal setae 10 pairs (*c1–3, d1–2, e1–2, f1–2, h1*); setae *f1* either normally or widely spaced; anal setae (*ps1–2*) and para anal setae (*h2–3*) each two pairs; empodium absent or reduced to small rounded tiny knob; true claws pad-like; tarsi I with two or three solenidia (two solenidia closely associated with fastigial setae *f3*), tarsi II with one or two solenidia; coxa II with either one or two setae.

Species group banksi

Diagnosis. Coxa II with two setae.
\textbf{Eutetranychus spinosus} sp. n.
http://zoobank.org/DA81A602-25EC-458E-86B9-C029405EDEC4
Figures 1–15

\textbf{Diagnosis.} (Based on female). Dorsal body setae long, slender, serrate, all set on small tubercles except \(v2\) and \(sc1\), dorsocentral setae \(c1\), \(e1\) and \(f1\) longer than the distance between their base and the bases of next consecutive setae; setae \(c1\) and \(f1\) shorter than distances between \(c1−c1\) and \(f1−f1\) respectively, setae \(e1\) almost as long as distance \(e1−e1\); dorsum with simple striae except area anterior to setae \(sc1\) with lobed striae, striae between setae \(d1\) “\(V\)” shaped, genua and tibiae I–IV 5–5–3–3; 9(1)–7–8–8, respectively.

\textbf{Description.} Female \((n = 12)\) (Figures 1–7).

Body oval, color in life greenish yellow. Length of body (excluding gnathosoma) 315 (312–325), (including gnathosoma) 396 (390–405), maximum width 221 (218–231).

\textbf{Dorsum} (Figure 1). Propodosoma medially with longitudinal striae; hysterosoma medially with transverse striae except area between setae \(d1\) and \(e1\) forming a \(V\)-shaped pattern; dorsal striae simple except anterior of setae \(sc1\) with small lobes; all dorsal setae slender, serrated and sub-equal in length, setae \(sc2\) and hysterosomal setae set on small tubercles; setae \(v2\) almost reaching 2/3 to the distance \(v2−v2\); dorsocentral setae \(c1\), and \(f1\) reaching to past bases of next consecutive setae; setae \(e1\) almost as long as distance \(e1−f1\); setae \(f1\) slightly more widely spaced than \(e1\). Length of dorsal setae: \(v2\) 44 (41–45), \(sc1\) 56 (53–58), \(sc2\) 44 (42–46), \(c1\) 50 (47–52), \(c2\) 44 (42–45), \(c3\) 46 (45–48), \(d1\) 53 (51–55), \(d2\) 47 (45–49), \(e1\) 47 (46–48), \(e2\) 44 (42–45), \(f1\) 48 (47–50), \(f2\) 42 (40–44), \(h1\) 42 (40–44); distance between dorsal setae: \(v2−v2\) 66 (63–68), \(sc1−sc1\) 95 (91–97), \(sc2−sc2\) 165 (162–170), \(c1−c1\) 63 (60–67), \(c2−c2\) 147 (142–150), \(c3−c3\) 200 (195–210), \(d1−d1\) 95 (92–97), \(d2−d2\) 189 (186–191), \(e1−e1\) 53 (50–55), \(e2−e2\) 158 (155–160), \(f1−f1\) 58 (55–64), \(f2−f2\) 79 (77–82), \(h1−h1\) 34 (33–36), \(v2−sc1\) 42 (40–44), \(sc1−sc2\) 50 (48–53), \(sc2−c3\) 45 (44–47), \(sc2−c2\) 53 (52–55), \(sc2−c1\) 95 (93–98), \(e1−c2\) 44 (42–46), \(c2−c3\) 33 (32–36), \(c1−d1\) 37 (36–39), \(c2−d2\) 68 (66–70), \(d1−e1\) 51 (49–52), \(d2−e2\) 59 (57–60), \(e1−f1\) 42 (40–44), \(e2−f2\) 48 (46–50), \(f1−h1\) 39 (36–41), \(f2−h1\) 25 (22–27).

\textbf{Venter} (Figure 2). Ventral cuticle medially with transverse striae from setae \(1a\) to setae \(g1\), length of ventral setae: \(1a\) 50 (48–53), \(3a\) 42 (41–44), \(4a\) 44 (43–46), \(1b\) 42 (40–45), \(1c\) 45 (41–46), \(2b\) 42 (40–43), \(2c\) 39 (37–41), \(3b\) 47 (45–49), \(4b\) 42 (41–43); distance between intercoxal and coxae setae: \(1a−1a\) 37 (35–38), \(1b−1c\) 17 (17–18), \(3a−3a\) 79 (77–80), \(4a−4a\) 75 (73–78); aggenital setae: \(ag\) 37 (37–38), \(ag−ag\) 54 (49–57); genital setae: \(g1\) 31 (30–33), \(g2\) 32 (31–34), \(g1−g1\) 26 (23–28), \(g2−g2\) 60 (57–61); anal setae two pairs: \(ps1\) 12 (12–13), \(ps2\) 12 (11–13), \(ps1−ps2\) 8 (8–9), \(ps1−ps1\) 21 (20–23), \(ps2−ps2\) 17 (17–18); para-anal setae two pairs \(h2\) 21 (19–22), \(h3\) 19 (18–19), \(h2−h2\) 25 (23–26), \(h3−h3\) 45 (40–45). All ventral setae simple except \(h2\) and \(h3\) barbed. Spermatheca elongated and sacculus terminally rounded (Figure 2C).

\textbf{Gnathosoma} (Figure 3). Subcapitular setae \(m\) 41 (39–43), \(m−m\) 31 (29–32) (Figure 2). Palp femur and genu each with one setae \(d1\) 51 (49–55), \(l”\) 43 (40–45); palp tibia with three setae \(d\) 34 (31–34), \(l”\) 21 (20–22), \(l’\) 13 (13–14) and a palp tibial claw; palp tarsus 17 (17–18) long, 13 wide, with 3 simple setae \(a\) 13 (12–13), \(b\) 9 (9–10), \(c\) 13
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Figure 1. *Eutetranychus spinosus* sp. n. Female, Dorsum (A, B).
Figure 2. Eutetranychus spinosus sp. n. Female A genito-anal region B Venter C Spermatheca.
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**Figure 3.** *Eutetranychus spinosus* sp. n. Female, Palp.

(13–14), 3 eupathidia *suζ* 7.5 (7.5–8), width 1.3 (1–1.5), *ul′ζ* = *ul′ζ* 6.5 (6.5–7) width 1.2 (1–1.3), a solenidion *ω* 5 long width 2 (1.8–2.3) (Figure 3). Stylophore anteriorly rounded; peritremes ending with simple bulb (Figure 1).

**Legs** (Figures 4–7). Length of legs I–IV (trochanter to pretarsus): 320 (313–323), 263 (255–270), 294 (288–300), 336 (325–340) respectively; leg I: trochanter 21 (19–21), femur 105 (100–109), genu 53 (51–55), tibia 63 (60–68), tarsus 79 (74–82); leg II: trochanter 16 (15–17), femur 95 (91–99), genu 42 (41–44), tibia 53 (51–55), tarsus 58 (54–60); leg III: trochanter 17 (17–18), femur 86 (84–90), genu 44 (42–47), tibia 71 (68–75), tarsus 76 (74–79); leg IV: trochanter 19 (18–20), femur 105 (102–108), genu 47 (45–50), tibia 79 (76–83), tarsus 86 (83–90); legs chaetotaxy I–IV (eupathidia and solenidia in parenthesis): coxae 2–2–1–1; trochanters 1–1–1–1; femora 7–6–2–1; genua 5–5–3–3; tibiae 9(1)–7–8–8; tarsi 12(3ζ, 3ω)–10(3ζ, 2ω)–10(1ω)–10(1ω).

**Male** (n = 3) (Figures 8–15).

Length of body (excluding gnathosoma) 300–310, (including gnathosoma) 350–361, maximum width 237–246.

**Dorsum** (Figure 8). Propodosoma medially with longitudinal striae; hysterosoma medially with transverse to irregular striae and forming a V-shaped pattern in between setae *d1* and *e1*; all dorsal body setae slender, serrated and sub-equal in length, hysterosomal setae set on small tubercles. Length of dorsal setae: *v2* 34–38, *sc1* 35–40, *sc2* 32–37, *c1* 31–35, *c2* 36–39, *c3* 32–35, *d1* 29–32, *d2* 33–35, *e1* 33–38, *e2* 32–35, *f1* 28–33, *f2* 33–37, *h1* 23–26, *h2* 15–19, *h3* 13–16; distance between dorsal setae: *v2–v2* 45–50, *sc1–sc1* 73–80, *sc2–sc2* 162–173, *c1–c1* 44–47, *c2–c2* 112–120, *c3–c3* 150–162, *d1–d1* 65–70, *d2–d2* 136–151, *e1–e1* 37–41, *e2–e2* 90–100, *f1–f1* 35–40, *f2–f2* 55–60, *h1–h1* 14–17, *h2–h2* 10–13, *h3–h3* 32–36, *v2–sc1* 28–32, *sc1–sc2* 32–33, *sc2–c3* 55–60, *sc2–
c2 45–50, sc2-c1 55–60, c1-c2 30–34, c2-c3 22–26, c1-d1 39–43, c2-d2 50–56, d1-e1 42–46, d2-e2 35–40, e1-f1 20–24, e2-f2 35–40, f1-h1 36–41, f2-h1 25–30.

Venter (Figure 9). Area between setae 1a to ag with transverse striae; length of ventral setae: 1a 30–33, 3a 31–35, 4a 32–37, 1b 40–45, 1c 40–45, 2b 30–33, 2c 37–41, 3b 36–39, 4b 36–41; distance between setae: 1a-1a 30–36, 1b-1c 17–18, 3a-3a 62–68, 4a-4a 51–58; aggenital setae: ag 15–18, ag-ag 49–54; genital setae: g1 9–13, g2 8–10, g1-g1 14–17, g2-g2 15–18; anal setae two pairs: ps1 10–12, ps2 11–13, ps1-ps2 3–4, ps1-ps1 24–28, ps2-ps2 22–26.

Gnathosoma (Figure 10). Subcapitular setae m 30–34, m-m 27–31 (Figure 9); palp femur and genu each with one setae d 35–41, l" 31–35; palp tibia with three setae d

Figures 4–7. Eutetranychus spinosus sp. n. Female, 4 Leg 1 4A Leg 1 tarsus 5 Leg 2 6 Legs 3 7 Leg 4.
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Figure 8. *Eutetranychus spinosus* sp. n. Male, Dorsum.

18−22, *l*″ 21−25, *l*′ 13–14 and a palp tibial claw; palp tarsus 11–14 long, 10 wide, with 3 simple setae *a* 9–11, *b* 7–10, *c* 8–10, 3 eupathidia *suζ* 6.5–7, width 0.9 (0.8–1), *ulζ* = *ulζ* 6–7, width 0.8 (0.7–1) a solenidion ω 4 long width 1 (0.9–1.2) (Figure 10). Stylophore anteriorly rounded; peritremes ending with simple bulb (Figure 8).

*Aedeagus* (Figure 11) Aedeagus bends dorsad at an angle of 90°; the bent portion narrowly rounded toward tip and blunt distally, shaft 18 long, 7 wide, bent portion 3 long.

*Legs* (Figures 12−15). Length of legs I−IV (trochanter to pretarsus): 313–328, 235–250, 263–280, 278–295 respectively; legs I−IV chaetotaxy (eupathidia and solenidia in parenthesis): coxae 2−2−1−1; trochanters 1−1−1−1; femora 8−7−4−3; genua 5−5−4−4; tibiae 8(4)−7(3)−8−8; tarsi 11(3ζ, 2ω)−11(3ζ, 2ω)−10(1ω)−10(1ω).

**Immature stages.** unknown.

**Etymology.** The species name is derived from name of the host plant species, *Indigofera spinosa*, of which type specimens were collected.
**Figure 9.** Eutetranychus spinosus sp. n. Male, Venter.

**Type material.** Holotype female and four paratype females, Indigofera spinosa (Leguminosae), Al- Shifa road, Taif, 21°05.824’N, 040°19.111’E, elevation 2102 m, 11 Oct 2016, leg. M Kamran and M Rehman; five paratype females, Indigofera spinosa (Leguminosae), As Sayl Saghir, Taif, 21°30.521’N, 040°28.202’E, elevation 1516 m, 10 Sept 2017, leg. Eid M Khan and M Rehman; two paratype females, Indigofera spinose (Leguminosae), Al Sayl Kabeer, Taif, 21°37.371’N, 040°24.212’E, elevation 1240 m, 15 Sept 2017, leg. Eid M Khan and M Rehman.

**Remarks.** Eutetranychus spinosus sp. n. belongs to the banksi species group. It closely resembles E. namibianus Meyer 1987 because both have same legs chaetotaxy (Table 1) and dorsal striae pattern. However, the new species differs from E. namibianus by all dorsal setae slender, much longer, mostly longer than the distance between their base
and the bases of next consecutive setae vs. all dorsal setae sub-spatulate, small, far behind the bases of next consecutive setae, setae c1 and e1 crossing the bases of next consecutive setae vs. reaching less than half distance to the bases of setae next in line and all hysterosomal setae set on strong tubercles vs. only some setae on opisthosoma set on tubercles in E. namibianus. The new species also resembles E. acaciae Miller 1966 because both have all dorsal setae slender, much longer, and mostly longer than the distance between their base and the bases of next consecutive setae. The new species can be separated from E. acaciae by setae f1 slightly more widely spaced as setae e1 vs. f1 two time more widely spaced as compare to e1, differences in legs chaetotaxy, genua I–IV with 5–5–4/3–3 vs. 3–3–1–1 and femora II & III with 6 & 2 vs. 4 & 3, respectively in E. acaciae.

Species group orientalis

Diagnosis. Coxa II with one seta.
Figures 12−15. Eutetranychus spinosus sp. n. Male, 12 Leg 1 13 Leg 2 14 Leg 3 15 Leg 4.

Eutetranychus neotranversus sp. n.
http://zoobank.org/50D5AC16-EE8D-4508-8A29-103B8FA68D34
Figures 16–30

Diagnosis (Female). Dorsal body setae slender and serrate, all set on small tubercles; hysterosoma medially with transverse striae; propodosoma with lobed striae, hysterosomal striae simple (without lobes); stylophore slightly notched anteriorly; leg I shorter than body length; femora, genua, tibiae and tarsi I−IV: 5−4−2−1; 4−4−1−2; 6 (1)−5−4−4; 12(3ζ, 2ω)−11(3ζ, 1ω)−10(1ω)−10(1ω), respectively.

Description. Female (n = 8) (Figures 16−22). Body oval; length of body (excluding gnathosoma) 347 (340−355), (including gnathosoma) 425 (415−430) and maximum width 263 (255−270).

Dorsum (Figure 16). Propodosoma medially with longitudinal striae, propodosoma with lobed striae, hysterosoma medially with transverse striae, hysterosoma with simple striae; dorsal body setae slender and serrate, all dorsal setae with small tubercles, setae v2 reaching about two third to the distance v2−v2, reaching to the base of setae sc1; most hysterosomal setae distinctly shorter than distances of setae next row distance f1−f1 almost as long as d1−d1 but more widely spaced than c1−c1 and e1−e1. Length of dorsal setae: v2 34 (32−36), sc1 37 (36−38), sc2 32 (32−33), c1 24 (24−25), c2 36 (35−36), c3 23
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Figure 16. *Eutetranychus neotransversus* sp. n. Female, Dorsum (A, B).
Figure 17. *Eutetranychus neotransversus* sp. n. Female, A Genito-anal region B Venter.
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Figure 18. *Eutetranychus neotransversus* sp. n. Female, Palp.

(22–23), *d1* 33 (33–35), *d2* 38 (36–38), *e1* 37 (36–38), *e2* 42 (40–44), *f1* 39 (36–41), *f2* 26 (24–27), *b1* 28 (27–29); distances between dorsal setae: *v2—v2* 53 (51–55), *sc1—sc1* 95 (93–96), *sc2—sc2* 163 (160–165), *c1—c1* 58 (55–59), *c2—c2* 168 (160–170), *c3—c3* 263 (260–268), *d1—d1* 95 (93–97), *d2—d2* 179 (174–185), *e1—e1* 63 (61–66), *e2—e2* 168 (163–170), *f1—f1* 73 (70–75), *f2—f2* 100 (97–102), *b1—b1* 26 (25–28), *v2—sc1* 27 (26–29), *sc1—sc2* 43 (42–45), *sc2—c3* 89 (87–90), *sc2—c2* 86 (85–87), *c1—c2* 53 (52–55), *c2—c3* 50 (50–52), *d1—d2* 48 (47–49), *e1—e2* 47 (46–48), *f1—f2* 21 (20–22), *c1—d1* 63 (60–64), *c2—d2* 74 (73–75), *d1—e1* 68 (66–69), *d2—e2* 74 (73–75), *e1—f1* 42 (41–43), *e2—f2* 53 (52–54), *f1—h1* 40 (39–41), *f2—h1* 37 (36–38).

*Venter* (Figure 17). Area between setae *1a—g1* with transverse striae. Length of ventral setae: *1a* 37 (34–38), *3a* 39 (39–40), *4a* 40 (41–42), *1b* 44 (41–44), *1c* 43 (42–44), *2c* 37 (35–38), *3b* 36 (35–38), *4b* 36 (33–37); distances between intercoxal and coxae setae: *1a—1a* 53 (51–54), *3a—3a* 68 (66–70), *4a—4a* 95 (92–97); agential setae *ag* 42 (37–43), *ag—ag* 85 (83–86); genital setae: *g1* 33 (30–33), *g2* 32 (30–32), *g1—g1* 25 (24–26), *g2—g2* 81 (76–85); anal setae two pairs: *ps1= ps2* 14 (13–15), *ps1—ps1* 23 (21–23), *ps2—ps2* 23 (22–23); para–anal setae two pairs: *h2* 28 (27–28), *h3* 26 (26–28), *h2—h2* 31 (29–34), *h3—h3* 75 (72–77); all ventral setae simple except *h2* and *h3* slightly barbed. Spermatheca not clear.

*Gnathosoma* (Figure 18). Subcapitular setae *m* 23 (22–25), *m—m* 42 (39–44) (Figure 17). Palp femur and genu each with one setae, *d* 40 (39–44), *l”* 42 (40–43); palp tibia with three setae *d* 16 (14–17), *l”* 23 (21–25), *l”* 23 (21–25) and a palp tibial claw; palp tarsus 16 (16–17) long, 11 (11–12) wide at base, with three setae *a* 7 (7–8), *b* 7 (6–7) both simple, *c* 13 (12–13) slightly barbed, three eupathidia *suζ”* 7 (6.5–7) long,
1.60 wide, $ul'\zeta$ 6, $ul'\zeta$ 6 and one solenidion $\omega$ 5 width 1.7 (1.5–2) (Figure 18). Stylophore anteriorly slightly notched; peritreme ending with a simple bulb (Figure 16).

**Legs** (Figures 19–22). Length of legs I–IV (trochanter to pretarsus): 257 (250–265), 221 (216–225), 215 (210–225), 242 (235–250) respectively; leg I: trochanter 24 (23–25), femur 105 (102–107), genu 58 (54–63), tibia 57 (54–59), tarsus 68 (66–70); leg II: trochanter 30 (29–33), femur 95 (92–98), genu 53 (50–55), tibia 48 (46–50), tarsus 63 (61–65); leg III: trochanter 32 (30–34), femur 74 (71–75), genu 40 (39–41), tibia 68 (66–70), tarsus 68 (66–70); leg IV: trochanter 32 (30–35), femur 95 (91–98), genu 42 (40–45), tibia 74 (71–76), tarsus 70 (69–73); chaetotaxy of legs I–IV (eupathidia and solenidia in parenthesis): coxae 2–1–1–1, trochanters 1–1–1–1, femora 5–4–2–1, genua 4–4–1–2, tibiae 6(1)–5–4–4, tarsi 12(3\zeta, 2\omega)–11(3\zeta, 1\omega)–10(1\omega)–10(1\omega).

**Male** (n = 2) (Figures 23–30).

Body oval; Length of body (excluding gnathosoma) 236–246, (including gnathosoma) 335–353, maximum width 154–165.
Dorsum (Figure 23). Propodosoma medially with longitudinal striae; hysterosoma medially with transverse striae; all dorsal body setae slender, serrate and sub-equal in length, setae $sc2$ and hysterosomal setae with small tubercles. Length of dorsal setae: $v2$ 19–21, $sc1$ 18–20, $sc2$ 20–24, $c1$ 19–22, $c2$ 24–28, $c3$ 21–24, $d1$ 20–23, $d2$ 25–27, $e1$ 24–26, $e2$ 20–24, $f1$ 28–33, $f2$ 20–23, $h1$ 19–21, $h2$ 9–11, $h3$ 12–13; distance between dorsal setae: $v2$–$v2$ 48–54, $sc1$–$sc1$ 80–85, $sc2$–$sc2$ 143–148, $c1$–$c1$ 35–37, $c2$–$c2$ 115–120, $c3$–$c3$ 160–164, $d1$–$d1$ 63–65, $d2$–$d2$ 120–125, $e1$–$e1$ 32–36, $e2$–$e2$ 86–90, $f1$–$f1$ 42–43, $f2$–$f2$ 68–70, $h1$–$h1$ 25–27, $h2$–$h2$ 17–19, $h3$–$h3$ 38–40, $v2$–$sc1$ 32–33, $sc1$–$sc2$ 36–38, $sc2$–$c3$ 43–45, $se2$–$c2$ 32–34, $sc2$–$c1$ 60–63, $c1$–$c2$ 37–38.
Figure 24. Eutetranychus neotransversus sp. n. Male, Venter.

c2–c3 26–28, c1–d1 24–26, c2–d2 37–38, d1–e1 42–45, d2–e2 32–34, e1–f1 43–45, e2–f2 38–40, f1–h1 22–22, f2–h1 28–30.

Venter (Figure 24). Idiosoma ventrally with transverse striae from setae 1a–ag. Length of ventral setae; 1a 35–38, 3a 22–24, 4a 26–28, 1b 45–48, 1c 42–47, 2b 26–30, 3b 30–33, 4b 27–28; distance between setae: 1a–1a 55–58, 1b–1c 13–16, 3a–3a 44–47, 4a–4a 62–65; aggenital setae: ag 14–16, ag–ag 10–11; genital setae: gl 10–11, g2 11–12, g1–g1 16–17, g2–g2 24–26; anal setae two pairs: ps1 8–9, ps2 12–13, ps1–ps1 8–9, ps1–ps2 6–7.

Gnathosoma (Figure 25). Subcapitular setae m 24–28, m–m 30–31 (Figure 24); palp femur and genu each with one setae d 20–22, l” 26; palp tibia with three setae d 12–13, l” 17–19, l’8 and a palp tibial claw; palp tarsus 11 long, 8 wide, with 3 simple setae a 7–8, b 6, c 10–11, 3 eupathidia ul”ζ = ul’ζ 6–7, width 0.7 (0.6–0.9) suζ 4, 0.6 (0.5–0.7) a solenidion ω 3.5 long, width 1 (0.9–1.2) (Figure 25). Stylophore slightly notched; peritremes with simple bulb terminaly (Figure 23).
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**Aedeagus** (Figure 26) bends dorsad at an angle of 90°; the bent portion blunt distally, shaft 8 long, 4 wide, bent portion 2.5 long.

**Legs** (Figures 27–30). Length of legs I–IV (trochanter to pretarsus): 315–325, 269–275, 265–271, 268–275 respectively; chaetotaxy of legs I–IV (eupathidia and solenidia in parenthesis): coxae 2–1–1–1, trochanters 1–1–1–1, femora 8–6–4–1, genua 5–5–2–2, tibiae 9(4)–5(3)–5–4, tarsi 11(2ζ, 2ω)–11(3ζ, 2ω)–10(1ω)–10(1ω).

**Immature stages.** Unknown.

**Etymology.** The species name is derived from the transverse striations on dorsal hysterosoma.

**Type material.** Holotype female and four paratype females, *Juniperus procera* Hochst. Ex Endl. (Cupressaceae), Al-Shifa road, Ta‘if, 21°04.690’N, 040°18.928’E, elevation 2244 m, 11 Oct 2016, leg. M Kamran and M Rehman; three paratype females, *J. procera*, Ash Shifa road, Ta‘if, 21°06.481’N, 040°20.526’E, elevation 2133 m, 12 Sept 2017, leg. Eid M Khan and M Rehman.
Figures 27−30. *Eutetranychus neotransversus* sp. n. Male, 27 Leg 1 28 Leg 2 29 Leg 3 30 Leg 4.

**Remarks.** *Eutetranychus neotransversus* sp. n. belongs to *orientalis* species group. It closely resembles *E. transverstriatus* Smiley & Baker, 1995 because the entire hysterosoma dorsomedially in both bear transverse striations. The new species is different from *E. transverstriatus* by stylophore anteriorly slightly notched vs. rounded; hysterosomal striae without lobes vs. with distinct lobed striae; number of setae on femora I–IV 5–4–2–1 vs. 7–7–4–3; genu III 1 vs. 2 and tibiae I–IV 6(1)–5–4–4 vs. 10–6–6–6 in *E. transverstriatus* (Table 1).
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Eutetranychus palmatus Attiah, 1967
Figures 31−46

Eutetranychus palmatus Attiah, 1967: 12−13, Meyer 1974: 137, Meyer 1987: 78, Palevsky et al. 2010: 43–51, Ben-David et al. 2013: 129.

Material examined. Eight females, Washingtonia sp. (Arecales), Taif, 21°17.220'N, 040°21.963'E, elevation 1736 m, 11 Oct 2016, leg. M Kamran and M Rehman; seven females, Washingtonia sp., Tabuk, 28°23.754'N, 036°32.81'E.

Known Hosts. Date palm, Phoenix dactylifera L. (Attiah 1967, Palevsky et al. 2010); the desert fan palm, Washingtonia filifera Lindley, Wendland; doum palm, Hyphaene thebaica L. Martius; Canary Island palm, Phoenix canariensis Chabaud; mountain date palm, Phoenix loureiroi (Ben-David et al. 2007). Alatawi (2011) misidentified specimens of E. orientalis as E. palmatus collected from Cucurbita moschata Duchesne ex. Poiret (Cucurbitaceae).

Distribution. Egypt, Iran, Israel, and Saudi Arabia.

Redescription of female (n = 15) (Figures 31−38)

Body oval, color in life greenish yellow. Length of body (excluding gnathosoma) 414−425, (including gnathosoma) 435−455 and maximum width 325−345.

Dorsum (Figure 31). Dorsum with lobed striae, propodosoma medially with longitudinal striae, hysterosoma medially with transverse striae except area between setae d1 and e1 longitudinal or “V” shaped pattern; dorsal setae serrate, slightly lanceolate, setae c1, d1, e1 reaching less than half to the distance of next consecutive setae; all dorsal setae without tubercles, propodosomal setae v2 reaching about two third to the distance v2−v2 and reaching to the bases of setae sc1, setae c3, d2, e2, f2, h1 and all propodosomal setae relatively longer than dorsocentral setae c1, d1, e1. Length of dorsal setae: v2 47−52, sc1 30−33, sc2 30−34, c1 17−19, c2 20−22, c3 25−29, d1 20−23, d2 28−31, e1 21−25, e2 27−32, f1 25−30, f2 32−37, h1 32−37; distance between dorsal setae: v2−v2 63−70, sc1−sc1 125−133, sc2−sc2 234−245, c1−c1 67−73, c2−c2 184−195, c3−c3 280−296, d1−d1 123−140, d2−d2 245−255, e1−e1 55−62, e2−e2 172−181, f1−f1 44−47, f2−f2 116−130, h1−h1 48−52, v2−sc1 40−43, sc1−sc2 246−250, sc2−c3 79−84, sc2−e2 72−78, sc2−c1 116−127, c1−c2 57−60, c2−c3 53−57, c1−d1 59−63, c2−d2 93−97, d1−e1 66−74, d2−e2 88−94, e1−f1 47−50, e2−f2 62−66, f1−h1 62−67, f2−h1 42−45.

Venter (Figures 32, 34). Ventral integument with transverse striae between setae 1a to g1. Length of ventral setae; 1a 39−43, 3a 30−34, 4a 41−44, 1b 35−39, 1c 42−47, 2c 36−40, 3b 29−33, 4b 42−46; distance between intercoxal and coxae setae: 1a−1a 40−43, 1b−1c 10−11, 3a−3a 63−66, 4a−4a 82−88; aggenital setae: ag 29−32, ag−ag 51−55; genital setae: g1 30−34, g2 26−31, g1−g1 28−32, g2−g2 61−66; anal setae two pairs: ps1 11−13, ps2 10−11, ps1−ps1 16−18, ps1−ps2 22−26; para anal setae two pairs: b2 18−20, h3 23−27, h2−h2 16−17, b3−h3 46−50, para-anal setae h2 and h3 finely serrated. Spermatheca oval, elongated and sacculus terminally rounded or slightly pointed as shown in figure 34.

Gnathosoma (Figure 31). Subcapitular setae m 30−34, m−m 37−42 (Figure 32). Palp femur and genu each with one setae d 45−49, l” 32−37; palp tibia with three setae d
Table 1. Legs chaetotaxy of world species of the genus *Eutetranychus* (including new species).

| Species group orientalis | Species          | Femora I-IV | Genua I-IV | Tibiae I-IV | Tarsi I-IV | Reference                  |
|--------------------------|------------------|-------------|-----------|-------------|------------|----------------------------|
| neotransversus sp. n.    | 5-4-2-1          | 4-4-1-2     | 6(1)-5-4-4| 15(2)-14(1)-10(1)| Present study |
| bilobatus                | 8-5-4-1          | 5-5-2-2     | 9(1)-6-6-7| 15(2)-13(2)-10-10| Nassar and Ghai 1981 |
| caricae                  | 7-6-2-1          | 5-4-1-1     | 8-5-5-5   | 15(2)-12(1)-10(2)-10(1) | Nassar and Ghai 1981 |
| citri                    | –                | –          | 9(1)-5    | –            | Artiiah 1967   |
| maximae                  | 8-6-3-1          | 5-5-2-2     | 9(1)-6-5-7| 15(2)-13(2)-10(1)-9(1) | Nassar and Ghai 1981 |
| mirpuriensis             | 8-6-3-2          | 5-5-2-2     | 10-6-6-7  | 14-12-11-11| Chaudhri et al. 1974 |
| nagai                    | 8-5-3-1          | 5-5-2-2     | 9(1)-6-6-7| 15(2)-13(1)-9(2)-10(1) | Nassar and Ghai 1981 |
| orientalis               | 8-6-3/4-1/2      | 5-5-2-2     | 9(1-4)-6(0-2)-6(0-1)-7 | 15(3)-13(1-2)-10(1)-10(1)| Meyer 1974 |
| orientalis               | 8-6-4-2          | 5-5-2-2     | 9(1)-6-6-7| 15-13-11-11| Chaudhri et al. 1974 |
| orientalis               | 8-7/6-3-4-1/2    | 5-5-2-2     | 9(1)-6-6-7| 15(3)-13(1-1)-10(1)-10(1) | Khanji et al. 2017 |
| orientalis               | 87/-7/6/5-4/3-1/2| 5-5-2-2    | 9(1)-7/6-6/5/-7/6 | 15(3)-13(1-1)-10(1)-10(1) | Present study |
|}* fici                   | 8-6-2-1          | 5-5-2-2     | 9(2)-6(2-2)-6-7 | 15(3)-13(2)-10(1)-10(1) | Meyer 1987 |
|}* fici                   | 8-7/-4-3         | 5-5-2-2     | 9/-1-6-5-7 | 15(3)-13(1)-10(1)-10(1) | Meyer 1987 |
|}* pruni                 | 8-7/3-1          | 5-5-2-2     | 9(1)-6-6-7| 12(3)-11(1)-8(1)-8(1) | Smiley and Baker 1995 |
|}* ricinus               | 8-7/4-3/2        | 5-5-2-2     | 9(1)-6-6-7| 15(1-1)-10(1)-10(1)-10(1) | Smiley and Baker 1995 |
|}* sanaae                | 8-7/4-3-1        | 5-5-2-2     | 9(1)-7/6-6-7 | 11(1)-11(2)-10(1)-10(1) | Smiley and Baker 1995 |
|}* guangdongensis        | Mentioned in original description same as *E. orientalis* | Ma and Yau 1982 |

| Species group banksi   | Species            | Femora I-IV | Genua I-IV | Tibiae I-IV | Tarsi I-IV | Reference                  |
|------------------------|--------------------|-------------|-----------|-------------|------------|----------------------------|
|* spinosus sp. n.       | 8/7-6-2-1          | 5-5-4/3-3   | 9(1)-7-8-8| 15(2)-13(2)-10(1)-10(1) | Present study |
|* acaciae               | 6/7-4-3-1          | 3-3-1-1     | 8(1)-4/5-3-5 | 13(4)-12(5)-10(1)-10(1) | Based on pictures send by Dr. Owen D. Seeman |
|* africanus             | 8-6-3-1            | 5-5-2-2     | 9(1)-6-6-7| 15(2/3)-13(1-1)-10(1)-10(1) | Meyer 1987 |

| Species group banksi   | Species            | Femora I-IV | Genua I-IV | Tibiae I-IV | Tarsi I-IV | Reference                  |
|------------------------|--------------------|-------------|-----------|-------------|------------|----------------------------|
|* anitae                | 9-6-4-3            | 5-5-3-2     | 9(4-7)-2(6)-7-7 | 13(3)-12(2)-11(1)-10(1) | By personal communication with Dr. Elizeu Castro |
|* banksi                | 6/7-4/6-2-1        | 4-4-2-2     | 9(1)-6/4-5/-3-5 | 14(2)-12(2)-10(1)-10(1) | Mattos and Feres 2009 |
|* brendini              | 8-7-4-1            | 5-5-2-2     | 9(1)-5-5   | –           | Baker and Pritchard 1960 |
|* carinae               | 8-6-2-1            | 5-5-2-2     | 9(1)-6-5-6 | 15(2)-13(2)-10(1)-10(1) | Meyer 1987 |
|* clastus               | 8-6-3-1            | 5-5-2-2     | 9(1)-5-5-6 | 15(3)-13(1)-10(1)-10(1) | Meyer 1987 |
|* concertatus           | 7-6-2-2            | 5-5-3-3     | 9(1)-7-8-8 | 15(2)-13(2)-10(1)-10(1) | Meyer 1987 |
|* cratis                | 8-6-3-2            | 3-3-2-2     | 6(1)-5-4-5 | 14(3)-13(1)-10(1)-10(1) | Meyer 1987 |
|* eliei                 | 8-6-2-1            | 5-5-2-2     | 9(1)-6-5-6 | 15(1)-13(1)-10(1)-10(1) | Meyer 1987 |
|* enodes                | 8-6-3-1            | 5-5-2-2     | 9(1)-6-5-7 | 15(2)-13(2)-10(1)-10(1) | Meyer 1987 |
|* namibians             | 7-6-2-1            | 5-5-3-3     | 9(1)-7-8-8 | 15(2)-13(1)-10(1)-10(1) | Meyer 1987 |
|* nomuraei              | 6-6-2-1            | 5-5-2-2     | 9(1)-8/-7/-7/-7/-7/-7 | 12/13/14(3)-12/13(1-2)-12/13(1-2)-10(1) | Flechtmann 1997 |
|* rhusi                 | 7-6-2-1            | 5-5-3-3     | 9(1)-7-7-8 | 15(2)-13(1)-10(1)-10(1) | Meyer and Ueckermann 1988 |
|* swazilandicus        | 8-6-2-2            | 5-5-3-3     | 9(1)-7-8-8 | 15(3)-13(2)-10(1)-10(1) | Meyer 1987 |

* Suggested synonyms of *E. orientalis*

All missing characters/values in the table were not described or illustrated in the original descriptions/re-descriptions.
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Figure 31. *Eutetranychus palmatus*, Female, Dorsum (A–C).
Figure 32. *Eutetranychus palmatus*, Female, A Genito-anal region B Venter.
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Figure 33. *Eutetranychus palmatus*, Female, Palp.

Figure 34. *Eutetranychus palmatus*, Female, Spermatheca.
24–27, l" 21–24, l' 15–16 and a palp tibial claw; palp tarsus 19 long, 14 wide, with 3 simple setae a 10–11, b 9–10, c 13–14, 3 eupathidia $\eta \xi \zeta$, width 1.35–1.7, $ul'' \xi = ul' \xi 7–8$, width 1.3–1.6 a solenidion $\omega$ 5 long, width 1.9–2.2 (Figure 33). Stylophore anteriorly slightly notched; peritremes ending with simple bulb (Figure 31).

**Legs** (Figures 35–38). Length of legs I–IV (trochanter to pretarsus): 320–340, 285–300, 280–295, 335–350 respectively; leg I 320–340: trochanter 30–33, femur 112–125, genu 61–68, tibia 63–72, tarsus 61–67; leg II 285–300: trochanter 30–33, femur 88–93, genu 50–55, tibia 46–50, tarsus 67–72; leg III 280–295: trochanter 25–30, femur 95 93–99, genu 30–33, tibia 58–63, tarsus 76–80; leg IV 335—350: trochanter 25–29, femur 110–117, genu 48–55, tibia 73–79, tarsi 77–82; legs chaetotaxy I–IV (solenidia in parenthesis): coxae 2–1–1–1, trochanter% s 1–1–1–1; femora 8–7–4–1; genua 5–5–2–2; tibiae 9(1) –6–6–7; tarsi 12 (3$\xi$, 3$\omega$) –10(3$\xi$, 1$\omega$) –10(1$\omega$) –10(1$\omega$).
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Figure 39. Eutetranychus palmatus, Male, Dorsum.

**Male** (n= 4) (Figures 39−46)

*Body* oval, length of body (excluding gnathosoma) 340−355, (including gnathosoma) 405−425 and maximum width 206−220.

*Dorsum* (Figure 39). Propodosoma medially with longitudinal striae, area between setae c1−d1 with transverse striae and e1−h1 with oblique striae; all dorsal setae short and slightly lanceolate, and without tubercles; length of dorsal setae: v2 30−32, sc1 28−33, sc2 21−24, c1 15−17, c2 19−22, c3 20−24, d1 14−16, d2 14−17, e1 16−19, e2 19−22, f1 16−18, f2 19−22, h1 25−28, h2 9−12, h3 11−13; distance between dorsal setae: v2−v2 60−68, sc1−sc1 90−103, sc2−sc2 180−195, c1−c1 45−52, c2−c2 115−125, c3−c3 180−196, d1−d1 80−89, d2−d2 130−142, e1−e1 38−44, e2−e2 80−89, f1−f1 35−40, f2−f2 65−70, h1−h1 25−30, h2−h2 11−13, h3−h3 41−48, v2−sc1 36−42, sc1−sc2 30−34, sc2−c3 75−84, sc2−c2 64−70, sc2−c1 86−96, c1−c2 38−42, c2−c3 33−37,
Figure 40. *Eutetranychus palmatus*, Male, Venter.

\[c1-d1\ 45-50,\ c2-d2\ 55-61,\ d1-e1\ 46-54,\ d2-e2\ 55-60,\ e1-f1\ 39-45,\ e2-f2\ 38-43,\ f1-h1\ 32-35,\ f2-h1\ 25-31.\]

Venter (Figure 40). Idiosoma ventrally with transverse striae; length of ventral setae; \(1a\ 30-32,\ 3a\ 20-24,\ 4a\ 24-28,\ 1b\ 35-39,\ 1c\ 42-47,\ 2b\ 28-30,\ 3b\ 39-43,\ 4b\ 42-46,\) distance between setae: \(1a-1a\ 34-38,\ 1b-1c\ 10-11,\ 3a-3a\ 38-45,\ 4a-4a\ 38-42;\) agenital setae: \(ag\ 20-22,\ ag-ag\ 6-7;\) genital setae: \(g1\ 9-11,\ g2\ 10-11,\ g1-g1\ 16-17,\ g2-g2\ 25-28;\) anal setae two pairs: \(ps1\ 9-11,\ ps2\ 11-12,\ ps1-ps1\ 19-21,\ ps1-ps2\ 7.\)

Gnathosoma (Figure 41). Subcapitular setae \(m\ 27-29,\ m-m\ 30-33\) (Figure 40); palp femur and genu each with one setae \(de\ 38-41,\ l"\ 21-25;\) palp tibia with three setae \(d\ 16-20,\ l"\ 21-25,\ l'\ 13-14\) and a palp tibial claw; palp tarsus 9-10 long, 12 wide, with 3 simple setae \(a\ 7-8,\ b\ 8,\ c\ 9-10,\ 3\) eupathidia \(ul'\zeta = ul'\zeta\ 6.5-7,\) width 1 (0.9-1)
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Figure 41. Eutetranychus palmatus, Male, Palp.

Figure 42. Eutetranychus palmatus, Male, Aedeagus.

$su \zeta$, width 0.7–0.9 a solenidion $\omega$ 3 long, width 1.2–1.7 (Figure 41). Stylophore notched; peritremes ending with simple bulb (Figure 39).

Aedeagus (Figure 42) bends dorsad at an angle of 70°; aedeagal knob pointed distally, shaft 10 long, 3.4 wide, bent portion 2.8 long.

Legs (Figures 43–46). Length of legs I–IV (trochanter to pretarsus): 470–485, 385–400, 402–425, 399–420 respectively; legs I–IV chaetotaxy (solenidia in parenthesis): coxae 2–1–1–1, trochanters 1–1–1–1; femora 8–7–4–1/2; genua 5–5–2–2; tibiae 9(3)–6(2)–6(1)–7; tarsi 12 (2$\zeta$, 3$\omega$)–10(3$\zeta$, 2$\omega$)–10(1$\omega$)–10(1$\omega$).
Remarks. *Eutetranychus palmatus* Attiah, 1967 is different from all other species of the genus *Eutetranychus* by having all dorsal body setae without tubercles. It was described and illustrated from date palm trees in Egypt (Attiah 1967), but its original description was briefly and incomplete i.e. leg chaetotaxy, length and distance of dorsal setae were not provided. Meyer (1987) identified some specimens as *E. palmatus* from date palms from Israel and provided legs chaetotaxy without illustrations. Chaetotaxy of *E. palmatus* specimens collected from *Washingtonia* sp. from Saudi Arabia is same as mentioned by Meyer (1987) except differences on femora II and III 7–4 vs. 6–2 in the specimens from Israel. However, femur III with three setae was illustrated in original illustrations (Attiah 1967). Moreover, Attiah (1967) and Meyer (1987) observed striations of prodorsum longitudinal and undulating in this species. Undulation in prodorsal striations usually happened during mounting is not important diagnostic character to differentiate the species of the genus *Eutetranychus*. Also, in this species striae between setae *d1* and *e1* were either longitudinal (Figure 31A) or “V” shaped (Figure 31B).
Eutetranychus orientalis (Klein)
Figures 47, 48, 49

Anychus latus Klein, 1936: 3.
Eutetranychus orientalis (Klein): Baker and Pritchard 1960: 464–467.
Eutetranychus monodi Andre, 1954: 859.
Eutetranychus anneckei Meyer, 1974: 148–149.
Eutetranychus sudanicus Elbadry, 1970: 301–305.

Previous records from Saudi Arabia. Martin 1972, Alatawi 2011.

Material examined. Twenty seven females, Citrus sp., Education Farm, King Saud University, Riyadh, 24°44.253’N, 46°37.225’E, 01 Feb 02 Apr 2009, 26 Oct 01 Nov 2010, 14, 24 Apr 2011, leg. J Basahih, and T Martibi; one female, Citrus sp., Dariyah, Riyadh, 24°44.866’N, 46°34.624’E, 02 Feb 2009, leg. J Basahih; seven females, Vitis vinifera and Citrus sp., Ammariya, Riyadh, 24°49.194’N, 46°28.163’E, 12 Apr 2009, 10 Mar 2011, leg. W Negm; five females, Hayer, Riyadh, 24°23.611’N, 46°49.464’E, 28 Apr 2009, leg. J Basahih; two females, Rhodat ul Khoraim, Riyadh, 03, 9 May 2009, leg. J Basahih; three females, Citrus sp., Waseel, Riyadh, 24°48.786’N, 46°31.180’E, 11 Oct 2009, 23 Apr 2010, leg. J Basahih; four females, Citrus sp., Juniperus sp., and Grasses under P. dactylifera, near students housing King Saud University, Riyadh, 24°43.484’N, 46°36.985’E, 20 Sep 2010, 28 Mar 2011, leg. J Basahih; eight females, P. dactylifera, Imam Muhammad Ibn Saud University, Riyadh, 24°48.759’N, 46°42.735’E, 13, 27 Dec 2010, 01, 25 Jan 25, 23 Mar 2011, leg. J Basahih; twelve females, Citrus sp., Nijran, 18 Apr 28 Sept 2011, leg. Jaid; six females, Citrus sp. Qassim, 26°00.612’N, 044°00.166’E, 26 May 2011, leg. J Basahih and A. Majeed; two females, Acacia sp., and soil under P. dactylifera Al-Madina, 24°26.335’N, 39°36.866’E, 19 Jun 13 Oct 2011, leg. M Kamran and W Negm; eleven females, Datura sp., and Citrus sp., Wadi Namar, Riyadh, 24°34’18.9N, 46°40’40.4E, 14 Oct 2012, leg. M Kamran; two females, Nerium oleander, Dariyah, Riyadh, 24°44.866’N, 46°34.624’E, 5 Apr 2014, 18 Mar 2015 leg. M Kamran; two females, Tamarix sp. and Saccharum sp., Deesa valley, Tabuk, 27°36’049N, 36°25’785E, 17, 18 Oct 2015, leg. M Kamran; two females, P. dactylifera, Al-Sail Kabeer, Taif, 21°33.882’N, 040°18.048’E, 15 Oct 2016, leg. M Kamran and M Rehman; two females, Citrus sp., Khayber, 25°34.563’N, 39°19.375’E, 1 Nov 2016, leg. M Kamran and E M Khan; nine females, Citrus sp., Ziziphus sp., and Albizia sp., Al-Ula, 26°48.757’N, 37°58.241’E, 2 Nov 2016, leg. M Kamran and E M Khan; twenty five females, Citrus sp., Mangifera sp., P. dactylifera, Olea sp., Psidium sp., Azadirachta sp., and Ficus sp., Al-Ula, 26°39.923’N, 37°55.032’E, 3, 4, 5, 6, 7 May 2017, leg. E M Khan and M Rehman.

Discussion. Variations within the different populations of Eutetranychus orientalis.

Morphological variations of Eutetranychus orientalis in 91 female specimens that were collected from 28 various host plants and 80 different localities in six regions of Saudi Arabia during 2009 to 2017 are shown in Figures 47A–H, 48, and 49. The
Figure 47. *Eutetranychus orientalis* (Klein), Females, Variation in shape of setae and striations pattern between setae *e1* on dorsum; host plants and regions, **A** Date palms, Riyadh **B** Fig, Al-Ula **C** Guava, Taif **D** Citrus, Riyadh **E** Lemon, Al-Ula **F** Citrus, Riyadh **G** Citrus, Najran **H** Citrus, Riyadh.
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**Figure 48. A, B** *Eutetranychus orientalis* Female, Variation in shape of spermatheca. Pointed distally.

Lengths and shapes of dorsal body setae, striation patterns between setae *d1* and *e1*, and chaetotaxy of leg segments including femora and tibiae have been presented in Table 1. The most prominent variations within in *E. orientalis* populations are in the length and shape of dorsal setae. These variations including, dorsocentral setae length [*c1* (10–51), *d1* (12–50), *e1* (14–41) and *f1* (10–45)] and shape [oblanceolate, ovate, obovate, subspatulate and spatulate] (Figure 47A–H). Also, these setae were either very short far behind the bases of next consecutive setae (Figure 47B, D, E, G), reaching one third to half (Figure 47A, F) or almost extending to the bases of next consecutive...
setae (Figure 47C, F, H). Dorsal setae sc1, sc2, c2, c3, d2, e2, f2, and h1 were also varied in shape (oblanceolate, subspatulate, spatulate, slender), mostly among the specimens of different populations. The same variations in these dorsal setae have been recorded in populations of this species collected from different countries (Baker and Pritchard 1960, Chaudhri et al. 1974, Meyer 1974, Meyer 1987, Khanjani et al. 2017).

Striations patterns between the dorsocentral setae d1 and e1 varied either forming “V” shaped pattern (n = 80; Figure 47A-E, G, H) or a longitudinal pattern (n = 11;
Table 2. Variable morphological characters used to differentiate some *Eutetranychus* species suggested as synonyms of *E. orientalis* in the current study.

| Suggested synonyms of *E. orientalis* | Characters used to differentiate in original descriptions | Reference |
|--------------------------------------|---------------------------------------------------------|------------|
|                                      | Dorso-central setae, short, medium or long               |            |
|                                      | Shape of dorsal setae | Setae on femur II | Setae on femur IV | Striations pattern b/w e1 and d1 | Spermatheca distally | Length of palp spinneret as compared to width |
|                                      |                                                           |            |                |                                 |                       |                                         |
| *E. fici*                            | long, extending to the bases of next setae in line       | Spatulate to subspatulate | 6 | 2 | V shaped | rounded | 4 times | Meyer 1987 |
| *E. pruni*                           | Short to medium                                          | Slender | 7 | 1 | longitudinal | -* | -* | Smiley and Baker 1995 |
| *E. ricianus*                        | Short to medium                                          | Oblanceolate to subspatulate | 7 | 2 | longitudinal | -* | - | Smiley and Baker 1995 |
| *E. sanaae*                          | Short to medium                                          | Slender | 7 | 1 | V shaped | -* | -* | Smiley and Baker 1995 |
| *E. phaseoli*                        | Short                                                   | Subspatulate | 7 | 1 | V shaped | -* | -* | Nasser and Ghai 1981 |
| *E. guangdongensis*                  | Short to medium                                          | Spatulate to Subspatulate | Mentioned the same as in *E. orientalis* | -* | -* | Ma and Yau 1981 |
| *E. xianensis***                     | Short                                                   | Spatulate to Subspatulate |              | -* | -* | Ma and Yau 1981 |
| *E. orientalis*                      | Short, medium and long almost extending to the bases of next setae in line | Slender, Spatulate, subspatulate, oblanceolate | 6, 6/7, 7 Variable | 1, 2, 1/2 Variable | V shaped or longitudinal | Pointed or rounded | 3 to 4 times | Khanjani et al. 2017; Present study |

*Information not available in the original descriptions  
**Distinguished from *E. banksi* in the original description
Figure 47F) and varied even among the specimens of the same population. Similar variations in dorsal striation patterns have also been observed by Chaudhri et al. (1974), Meyer (1987), and Khanjani et al. (2017).

Moreover, all dorsal setae in *E. orientalis* collected in this study are set on tubercles; lateral setae are on prominent tubercles as compared to dorsocentral setae (*c1*, *d1*, and *e1*) which are mostly set on relatively smaller tubercles (*n* = 73). However, in some specimens setae *c1*, *d1*, and *e1* are without distinct tubercles (*n* = 19) as shown in Figure 47D, G. This variation was observed even among the individuals of a single population collected in the current study. A similar variation has been illustrated by Chaudhri et al. (1974). However, *E. orientalis* dorsocentral setae *c1*, *d1*, and *e1* were described and illustrated only on small tubercles (Meyer 1987, Khanjani et al. 2017).

Our observations also showed that legs setal count was fixed in *E. orientalis* on coxae, trochanters, and genua I−IV (2−1−1−1, 1−1−1−1 and 5−5−2−2), respectively (see Table 1). Chaetotaxy on leg femora and tibiae were observed mostly as I−IV (8−6−3−1) and (9(1)−6−6−7), respectively. The differences in legs chaetotaxy of the specimens of *E. orientalis* belonging to the same and different populations were observed on femora I 7 (n = 3), 7/8 (n = 10); femora II 5/6 (n = 2), 6/7 (n = 2); femora III 3/4 (n = 10), 3 (n = 40); 4 (n = 23), 2/3 (n = 3); femora IV 1/2 (n = 8); on tibiae I 8/9 (1) (n = 7), 8 (1); tibia II 6/7 (n = 3); tibia III 6/5 (n = 2); tibia IV 7/6 setae (n = 2) in the current study, similar to the variations on femora and tibiae documented by Khanjani et al. (2017) in *E. orientalis* populations collected from Iran and Australia.

The spermathecal sacculus terminally varied from rounded to slightly pointed in some specimens of this study (Figures 48A, 49A). Also, the length of the spinneret on the palp tarsus varied from three to four times compared to its width. Similarly, Khanjani et al. (2017) reported that shape of spermathecal sacculus varied distally from rounded to pointed and that spinneret length also varied in *E. orientalis*. However, Meyer (1987) considered variations in shape of spermathecal sacculus (rounded or pointed distally) and length of spinneret (3 to 4 times as long as its width) as a method to differentiate *E. fici* Meyer from *E. orientalis*.

The morphological variations in *E. orientalis* have resulted in misidentifications and additions of new species in the genus *Eutetranychus*. Because some morphological variations have now been reported in *E. orientalis*, four species *Anychus ricini* Rahman & Sapra, 1940, *E. monodi* André, 1954, *E. sudanicus* El Badry, 1970, and *E. annecki* Meyer, 1974 were synonymized with *E. orientalis* by Meyer (1987) and Bolland et al. (1998).

*Eutetranychus fici* Meyer, reported from Africa, was separated from *E. orientalis* by the slightly longer dorsocentral setae, shape of spermathecal sacculus, and length of palp spinneret (Table 2; Meyer 1987). The three species *E. pruni*, *E. ricinus*, and *E. sanaee* reported from Yemen were differentiated from *E. orientalis* by variation in the number of setae on femora I and IV, shapes of dorsal setae, and striation pattern between setae *d1* and *e1* (Smiley and Baker 1995). *Eutetranychus phaseoli* Nassar & Ghai, 1981 reported from India was separated from *E. orientalis* based on the difference in numbers of setae on femur I and distances between dorsal setae *e1* and *f1* (see also Table 2). The two species *E. guangdongensis* and *E. xianensis*, reported from China, were distinguished from *E. orientalis* and *E. banksi*, respectively, based only on differences in lengths of dorsal setae (Ma and
Yuan 1982) (Table 2). However, the leg chaetotaxy of these two species were mentioned in the original descriptions as being similar in E. orientalis (Ma and Yuan 1982) (Table 2).

Because these seven species have been differentiated in their original descriptions by only one or more variable characters which have also been observed in E. orientalis populations (Chaudhri et al. 1974, Meyer 1987, Khanjani et al. 2017) as well as this study (see Table 2), these seven Eutetranychus species (E. phaseoli, E. guangdongensis, E. xianensis, E. fici, E. pruni, E. ricinus, and E. sananee) are suggested as synonyms of E. orientalis in this study.

Species Inquirenda

Eutetranychus papayensis Iqbal & Ali, 2008

Eutetranychus papayensis Iqbal & Ali, 2008: 125–130.

Host and Distribution. Female, from Carica papaya L. (Caricaceae), Abbottabad, Pakistan.

Eutetranychus papayensis was described with coxae I–IV 2–2–1–1 (whereas they illustrate 2–2–1–1 setae) and three pairs of anal setae. Also, the empodium of this species were neither described nor illustrated. So, based on these characters together, E. papayensis can neither be placed in Eutetranychus nor even in other genera of the family Tetranychidae. The first author has informed us that type specimens of this species have been lost. Therefore, E. papayensis is considered as a species inquirenda.

After excluding those seven species which we suggest as synonyms and one species inquirenda, the genus Eutetranychus includes 28 species (including the new species described herein) and is divided into two species groups based on the number of setae (one or two) on coxae II: the species group orientalis has one seta on coxa II (12 species) and the species group banksi has two setae on coxa II (16 species). The number of setae on coxae II has been considered as a solid morphometric character founded to be strongly constant in all specimens of each Eutetranychus species (Pritchard and Baker 1955, Baker and Pritchard 1960, Chaudhri et al. 1974, Meyer 1974, 1987, Khanjani et al. 2017).

Key to the world species of the genus Eutetranychus (females)

1 Coxa II with 2 setae ............................................................................................................ species group banksi–2
– Coxa II with 1 seta..................................................................................................... species group orientalis–17
2 Setae fl two times more widely spaced as setae e1 or marginal in position ..........3
– Setae fl equally spaced or slightly more widely spaced as setae e1 .................5
3 Hysterosoma with elliptical elevations in between dorsocentral setae c1 and e1; dorsal setae set on strong tubercles ...cratis Baker & Pritchard, 1960 (Congo)
– Hysterosoma without elliptical elevations in between dorsocentral setae c1 and e1, dorsal setae set on small tubercles .................................................................................4
Genua I and II with 5 setae, setae \( f_1 \) marginal in position ................................................\textit{anitae} Estebanes-Gonzalez & Baker, 1968 (Mexico)
- Genua I and II with 4 setae, setae \( f_1 \) in normal position ................................................\textit{banksi} (McGregor, 1914) (USA)
5 Hysterosoma dorsomedially with transverse striations ........................................................\textit{nomurai} Flechtmann, 1997 (Brazil)
- Hysterosoma dorsomedially with a band of “V” shaped or longitudinal striae between setae \( d_1 \) and \( e_1 \) ..........................................................6
6 Genua III and IV with 1 seta \textit{acacae} Miller, 1966 (Tasmania)
- Genua III and IV with more than 1 setae ................................................7
7 Genua III with 5 setae ................................................\textit{concertativus} Meyer, 1974 (Namibia)
- Genua III with 2 or 3 setae ................................................8
8 Genua III and IV with 3 or 4 setae ................................................9
- Genua III and IV with 2 setae ................................................12
9 All dorsal body setae slender, much longer; dorsocentral setae \( c_1 \), \( e_1 \) and \( f_1 \) reaching past bases of next consecutive setae ................................\textit{spinosus} sp. n.
- All dorsal body setae short, oblanceolate to subspatulate, dorsocentral setae \( c_1 \), \( d_1 \) and \( f_1 \) reaching at least half distance of next consecutive setae ................................................10
10 Femur I with 7 setae, femur IV with 1 setae ................................................11
- Femur I with 8 setae, femur IV with 2 setae ................................................11
11 Tibia III with 7 setae \textit{rhusi} Meyer & Ueckermann, 1988 (South Africa)
- Tibia III with 8 setae \textit{namibanus} Meyer, 1987 (Namibia)
12 Tibia II with 5 setae ..................................................13
- Tibia II with 6 setae ..................................................14
13 Setae \( v_2 \) as long as to the distance \( v_2-v_2 \), setae \( f_2 \) reaching past bases of setae \( h \); dorsal setae slender; all setae with tubercles ................................................\textit{bredini} Baker & Pritchard, 1960 (Rwanda)
- Setae \( v_2 \) and \( f_2 \) reaching one third to the distances \( v_2-v_2 \) and \( f_2-h_1 \) respectively; dorsal setae oblanceolate to subspatulate; only few opisthosomal setae set on tubercles ........................................................\textit{clastus} Baker & Pritchard, 1960 (Congo)
14 Tibia III with 6 setae, dorsocentral (\( c_1 \), \( d_1 \), \( e_1 \)) setae on prominent tubercles ................................\textit{africanus} (Tucker, 1926) (South Africa)
- Tibia III with 5 setae, dorsocentral (\( c_1 \), \( d_1 \), \( e_1 \)) setae with small tubercles ................................................15
15 Tibia IV with 7 setae, femur III with 3 setae ................................................\textit{enodes} Baker & Pritchard, 1960 (Congo)
- Tibia IV with 6 setae, femur III with 2 setae ................................................16
16 Tarsus I with solenidion of loosely associated setae about two third as long as proximal tactile seta, tarsus II with this solenidion slightly longer than proximal tactile seta ................................................\textit{carinae} Meyer, 1974 (South Africa)
- Tarsus I with solenidion of loosely associated setae about less than half as long as proximal tactile seta, tarsus II with this solenidion about two third as long as than proximal tactile seta ................................................\textit{eliei} Gutierrez & Helle, 1971 (Madagascar)
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17. Entire hysterosoma dorsomedially with transverse striations ...................................................................... 18
   - Hysterosoma dorsomedially in between setae d1 and e1 with longitudinal or “V” shaped band of striations ................................................................. 19
18. Femora I–IV with 5–4–2–1 .................................................. neotransversus sp. n.
   - Femora I–V with 7–7–4–3 .. transverstriatus Smiley & Baker, 1995 (Yemen)

19. Idiosoma with none of dorsal setae set on tubercles .................................................................................
   - Idiosoma with most of the dorsal body setae set on tubercles ................................................................. 20
20. Tibia II with 5 setae ................................................................................................................................. 21
   - Tibia II with 6/7 setae .......................................................................................................................... 24
21. Most of dorsal setae set on strong tubercles; striae on prodorsum medially tortuous forming crescentic pattern ................................................ pyri Attiah, 1982 (Egypt)
   - Dorsal setae set on relatively small tubercles; striae on prodorsum medially longitudinal and lobed .............................................................................. 22
22. Dorsal body setae slender tapering towards tips, most of dorsal setae longer than the distance between their base and the bases of the next consecutive setae ...... ................................................ pantopus (Berlese, 1910) (Australia)
   - Dorsal body setae sub-spatulate to oblanceolate with blunt tips; most of setae especially dorsocentrals (c1, d1, e1, f1) short far behind the next consecutive setae ................................................................. 23
23. Tibia I with 8 setae, all dorsal setae set on tubercles ..................................................................................
   - Tibia I with 9 setae, setae c1, d1, e1, f1, sc2 and c3 without tubercles.......................................................... citri Attiah 1967 (Egypt)
24. Tibia III with 5 setae .................................................. maximae Nassar & Ghai, 1981 (India)
   - Tibia III usually with 6/7 setae or (sometime 5 setae on one side while on other side of tibia in same specimen of E. orientalis) ................................................. 25
25. Femur II with 5 setae ................................................................................................................................. 26
   - Femur II usually with 6/7 except 5 setae on femur II in some specimens of E.orientalis) ......................................................... 27
26. Peritremes ending in bilobed bulb; setae e2 short reaching half to the bases of setae e1 and f1 .................. bilobatus Nassar & Ghai, 1981 (India)
   - Peritremes ending in a simple bulb-like structure; setae e2 long reaching the bases of setae e1 and f1 ................. nagai Nassar & Ghai, 1981 (India)
27. All dorsal setae long slender with tapering tips, dorsocentral setae c1, e1, f1 crossing the bases of next consecutive setae; setae e1 crossing the bases of h1 .............................................................. mirpuriensis Chaudhri, Akbar & Rasool, 1974 (Pakistan)
   - Most of dorsal setae oblanceolate to subspatulate; setae e1 far behind the bases of h1 .................................. orientalis (Klein, 1936)
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