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A NEW SPECIES OF LINOTETRANUS (ACARIFORMES: TETRANYCHOIDEA: LINOTETRANIDAE) FROM THE SOUTHEAST OF IRAN

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ABSTRACT — A new species Linotetanus eghbaliani n. sp. was collected from soil under apricot and almond trees, in the vicinity of Rafsanjan, Kerman province. A key to all known species of the world is provided.

KEYWORDS — mite; phytophagous; Tetranychoidea; soil; apricot; almond; Acari; Kerman

INTRODUCTION

The family Linotetranidae Baker and Pritchard, currently contains four genera namely: Afrolinotus Meyer and Ueckermann, Anoplopalpus Meyer and Ueckermann, Austrothinus Beard and Walter and Linotetranus Berlese (Khanjani et al., 2011). Linotetranid mites usually are colorless, slender and mostly inhabit soil (Bagheri et al. 2008). The genus Linotetanus was described by Berlese (1910) and to date has 12 species, namely: Linotetanus achrus Baker and Pritchard, 1953; L. ramosus Meyer and Ueckermann, 1997; L. protractus Athias-Henriot, 1961; L. cylindricus Berlese, 1910; L. amicus Meyer and Ueckermann, 1997; L. edewillensis Meyer and Ueckermann, 1997; L. mirabebensis Andre, 1996; L. annae Meyer and Ueckermann, 1997; L. niknami Bagheri et al., 2008; L. anatolicus Dogan and Donel, 2010; L. iranensis Khanjani et al., 2011 and L. astragalusi Khanjani et al., 2011. In this paper the thirteenth species is described from Iran.

MATERIALS AND METHODS

Mites were mounted directly on slides in Hoyer’s medium (Krantz and Walter 2009). The slides were then dried in an oven 50°C, sealed with nail polish and examined under a means of phase contrast Olympus BX51 microscope 400-1000X magnification. Drawings were made with a camera lucida. Body width was measured at the broadest point of idiosoma, just before coxa III or at the level of setae c4-c4. The terminology and setal notations follow that of Lindquist (1985).

All measurements are given in micrometers (µm) and the measurements of paratype are given in brackets. Leg setal formulas are presented as the
number of tactile setae followed by number of sensory setae in parentheses.

**FAMILY LINOTETRANIDAE BAKER AND PRITCHARD, 1953**

**Genus Linotetranus Berlese, 1910**

Type species: *Linotetranus cylindricus* Berlese, 1910

Diagnosis — Eyes absent; Prodorsum with four pairs of setae (*v*, *v*, *sc*1 and *sc*2), opisthosomal dorsum with 17 or 18 pairs of setae (*d*, *e*1 and *f*1 always present); palp five segmented, palptarsus with six phaners, palptibia with a claw and 1 or 2 setae, palpigen with or without setae; palpemur with 1 seta; coxa I with 2 setae, tibia II and IV with 4 setae, tarsus I with 2, tarsus II with 1 spindle-shaped solenidion distally, tarsi without forked setae.

**Linotetranus eghballi** n. sp.  (Figs. 1-2)

Diagnosis — Setae *v*1 bifurcate, palptarsus with one eupathidium and four simple setae, palptibia with two setae, palpigen without setae; seate *e*4 present, genital shields with three pairs of setae (*g*1–3).

Material examined — Two females, holotype female collected from soil beneath apricot trees, *Prunus armeniaca* (L.) (Rosaceae), and one paratype female collected from soil under almond trees, *Amygdalus communis* (L.) (Rosaceae), Rafsanjan (29° 58’ N, 55° 53’ E and altitude 2600 m a.s.l), Kerman Province, Iran, 19, April 2010, Elham Mohammadi. The holotype female is deposited as slide-mounted specimens in the Collection of Aracology Laboratory, University of Bu-Ali Sina, Hamadan, Iran; one paratype female will be deposited in the mite collection of ARC-Plant Protection Research Institute, Pretoria, South Africa.

Description

Female (*n = 2*) — Idiosoma elongate. Dimensions: Length of body (including gnathosoma) 432 (405) (excluding gnathosoma 351 (322); width 142 (145); length of leg I 147 (141); leg II 103 (102); leg III 93 (92); leg IV 93 (97).

Dorsum (Figure 1A) — Dorsal idiosoma reticulate and with 22 pairs of setae; all dorsal setae serrate; *v*1 pinnate and bifurcate distally (Fig. 1B). Eyes absent. Caudal area anteriorly reticulate. Setae *f*3 and *h*2 is the longest seta on the dorsum. Length of dorsal setae as follows (measurements of paratype in parentheses): *v*1 17 (19), *v*2 39 (38), *sc*1 72 (79), *sc*2 75 (79); hyposoma with 18 pairs of setae: *c*1 22 (23), *c*2 48 (50), *c*3 79 (86), *c*4 89 (94), *d*1 25 (24), *d*2 57 (50), *d*3 89 (87), *e*1 13 (12), *e*2 55 (60), *e*3 71 (72), *e*4 51 (47), *f*1 17 (16), *f*2 34 (32), *f*3 124 (118), *h*1 45 (41), *h*2 132 (142), *h*3 64 (63), *h*4 43 (41). Distances between setae: *v*1-*v*2 4 (5), *v*1-*v*3 28 (29), *v*2-*v*3 39 (39), *v*2-*sc*1 36 (37), *sc*1-*sc*2 85 (85), *sc*1-*sc*3 24 (24), *sc*2-*sc*3 120 (115), *c*1-*c*1 61 (60), *c*2-*c*2 95 (99), *c*1-*c*2 18 (21), *c*2-*c*3 16 (16), *c*1-*c*3 124 (130), *c*1-*c*4 31 (35), *c*1-*c*4 110 (105), *d*1-*d*3 94 (88), *d*1-*d*1 95 (89), *d*1-*d*1 15 (16), *d*2-*d*2 31 (29), *d*2-*d*2 73 (78), *d*2-*d*3 12 (10), *d*3-*d*3 94 (88), *d*3-*e*3 54 (50), *e*1-*e*1 52 (51), *e*1-*e*2 20 (20), *e*2-*e*2 26 (26), *e*2-*e*3 66 (69), *e*2-*e*3 12 (10), *e*3-*e*3 85 (84), *e*3-*e*4 12 (13), *e*3-*e*4 87 (89), *e*1-*f*1 39 (37), *f*2-*f*1 31 (34), *f*2-*f*1 14 (13), *f*2-*f*3 54 (55), *f*2-*f*5 6 (f)*, f*2-*f*3 65 (69), *f*1-*h*1 28 (30), *h*1-*h*1 15 (13), *h*1-*h*2 5 (6), *h*2-*h*2 24 (24), *h*2-*h*3 4 (4), *h*2-*h*3 29 (37), *h*2-*h*4 44 (43).

Venter (Figure 1C) — Ventral sculpturing reticulate-areolate. Area between setae *2a* and *3a* with transverse striae. Intercostal area with four pairs of setae (*1a*, *2a*, *3a*, *4a*); setae *1a* two times longer than *3a* and *4a*; 2a serrate; two pairs aggenital setae (*ag*1–2); *ag*1 on posterior part of aggenital shield, *ag*2 situated on integument. Genital shields with three pairs of setae (*g*1–3), *g*2 longer than others; Pseudanal shields with three pairs of setae (*ps*1–3).

Measurements of setae: *1a* 86 (85), *1b* 23 (24), *1c* 13 (14), *2a* 63 (68), *2b* 29 (28), *3a* 45 (40), *3b* 22 (21), *4a* 43 (42), *4b* 22 (21), *ag*1 37 (32), *ag*2 16 (20), *g*1 8 (7), *g*2 14 (21), *g*3 7 (9), *ps*1 11 (12), *ps*2 12 (14), *ps*3 17 (15). Distances between setae: *1a-1b* 24 (24), *1a-2a* 34 (35), *2a-2a* 71 (74), *2a-3a* 78 (61), *3a-3a* 56 (55), *3a-4a* 115 (116), *4a-4a* 28 (25), *ag*1-*ag*1 30 (29), *ag*2-*ag*2 68 (64), *g*1-*g*1 13 (14), *g*1-*g*2 10 (9), *g*3-*g*3 20 (21), *g*2-*g*3 9 (9), *g*2-*g*2 12 (15), *ps*1-*ps*1 21 (21), *ps*2-*ps*2 18 (19), *ps*3-*ps*3 15 (13), *ps*1-*ps*2 6 (7), *ps*3-*ps*3 8 (8).

Gnathosoma (Figures 1D-F) — Palp five segmented; palp coxa longer than other segments. Palptarsus with four simple setae, one solenidion 3 (5) and one eupathidium 5 (5); tibia 8 (10) with two
FIGURE 1: *Linotetranus eghbaliani* n. sp. (female): A – Dorsal view; B – prodorsal seta v1; C – Ventral view; D – Ventral infracapitulum; E – Chelicera; F – Palp.
FIGURE 2: Linotetrans eghbaliani n. sp. (female): A – leg I; B – leg II; C – leg III; D – leg IV.
setae and a dorsal claw; genua 10 (12) without setae; femora 12 (13) with one dorsal seta (Fig. 1F). Preoral setae or1 3 (3), or2 8 (10); hypostomal setae m 14 (18) (Fig. 1D). Length of chelicerae from the base to their tips 114 (121), stylophore as in figure 1E.

Legs (Figures 2A-D) — Setal formulae for legs I-IV: coxae 2-1-1-1; trochanters 1-1-1-0; femora 5-3-2-1; genua 5-2-1-0; tibiae 5[1 \omega 3 (3)]-4-3-4; tarsi 11(2\omega)-7(1\omega)-4-4; solenidia on tarsus I-II and tibia I spindle shape Lω 1 5(6), Lω 2 7(9), IIω 7(8).

Remarks — Linoterranus eggbaliani sp. nov. resembles L. anatolicus Doğan and Dönel, 2010 in having the same dorsal and ventral pattern and palp setae without seta. However it differs from the latter by: setae v1 bifurcate instead of simple in L. anatolicus, setae h1 longest dorsal setae in the former but f3 longest in the latter; palp tarsus with one eupathidium versus four eupathidia in L. anatolicus and setae e2 55 (56) opposite to e3 33 (27-35).

Also the new species closely resembles Linoterranus astragalusi Khanjani et al., 2011 from Iran, in having the same leg setal formula, dorsal pattern and palp setae without seta; however it differs from L. astragalusi by: area between 1a-2a with transverse striae (rectangular reticulations in L. astragalusi); caudal area anteriorly reticulate (smooth in L. astragalusi), setae v1 bifurcate (simple in L. astragalusi) and there are some dorsal setal length differences: d3 57 (50) vs. 28 (27) in L. astragalusi; e2 29 (27) vs. 55 (56) in L. astragalusi, e4 51 (47) vs. 28 (29) in L. astragalusi.

Male and immature stages — Unknown

Etymology — This species is named in honor of Dr. Amir Hosein Eggbalian, close friend of senior author at the department of Plant Protection, College of Agriculture, Bu-Ali Sina University, Hamedan, Iran.

**Key to the world species of Linoterranus Berlese based on adult females (modified from Beard and Walter (2004) and Khanjani et al., 2011)**

1. Posterior dorsal opisthosomal setae e4 absent ........... L. achrous Baker and Pritchard, 1953 — Posterior dorsal opisthosomal setae e4 present ........................................... 2

2. With 2 pairs of genital setae (g1,2) ....................... L. ramosus Meyer and Ueckermann, 1997 — With 3 pairs of genital setae (g1,3) .................. 3

3. Posterior dorsal opisthosoma with transverse striae ........ L. protractulus Athias-Henriot, 1961 — Posterior dorsal opisthosoma smooth or with irregular striae....................... 4

4. Palp tibia with 1 seta .................................. 5 — Palp tibia with 2 setae ......................... 6

5. Palp genu with 1 seta ................................ 7 — Palp genu without setae ........................... 8


7. Dorsal setae d3 shorter than distance between d3-e3 .......... L. mirabebensis André, 1996 — Dorsal setae d3 longer than distance between d3-e3 ............................................. 8

8. Palp genu without setae ............................. 9 — Palp genu with 1 seta ............................ 12

9. Setae f3 are the longest dorsal setae; ventral setae 3a about as long as distance 3a-3a .................... L. annae Meyer and Ueckermann, 1997 — Setae h2 or h3 are the longest dorsal setae; ventral setae 3a shorter than distance 3a-3a .......................... 10

10. Setae h2 the longest dorsal setae; palp tarsus with 1 eupathidium ............................................. 11 — Setae h3 the longest dorsal setae; palp tarsus with 4 eupathidia . . . . L. anatolicus Doğan and Dönel, 2010

11. Setae e2 55 (56), setae v1 bifurcate .................... L. eggbaliani n. sp.
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