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ERYNGIOPUS LANGROUDIENSIS N. SP. (ACARI: STIGMAEIDAE) FROM GUILAN, IRAN

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ABSTRACT — *Eryngiopus langroudiensis* **n. sp.** (Acari: Stigmaeidae) is described and illustrated, based on females collected from soil under citrus trees and on citrus leaves in the cities of Langroud, Chaboksar and Vajargan, Guilan province, Iran. The citrus trees where this species was found were also infested by pest mites *Panonychus citri* (McGregor), *Brevipalpus obovatus* Donnadieu and by scale insects.

KEYWORDS — citrus; soil; leaves infestation; predatory mites; Iran

INTRODUCTION

Members of the genus *Eryngiopus* (Acari: Stigmaeidae) were found in soil and on foliage, and are reported to feed on armoured scale crawlers and on spider mites (Ehara 1962; Vacante and Gerson 1989; Farag *et al.* 1990; Fan and Zhang 2005; Khanjani *et al.* 2013). Up to now three species of the genus *Eryngiopus* are recorded from Iran, namely: *E. gracilis* Summers, 1964, from citrus orchards in Mazandaran (Faraji and Kamali 1993), *E. harteni* Van-Dis and Ueckermann, 1993, on citrus leaves, trunk and soil under palm trees in Kerman (Dehghan-Dolati *et al.* 2011) and *E. hamedanicus* Khanjani, Mohammadi, Nazari and Khanjani, 2013 (Khanjani *et al.* 2014), from soil under pear trees, Negarkhaton Village, Famenin town, Hamedan province, Iran. The fourth species, herein described, was sampled in soil under citrus trees and on citrus leaves in Guilan province.

MATERIALS AND METHODS

The specimens were collected from soil under citrus trees and on citrus leaves infested by the citrus red mite, *Panonychus citri* (McGregor); the privet mite, *Brevipalpus obovatus* Donnadieu and by scale insects, including the yellow scale, *Aonidiella citrina* (Coquillett); western red scale, *Chrysomphalus dictyospermi* (Morgan); mussel scale *Lepidosaphes beckii* (Newman); cottony cushion scale, *Icerya purchasi* (Maskell) and the soft brown scale, *Coccus hesperidum* L. The citrus orchards were localized in the cities Langroud, Chaboksar and Vajargah, Guilan province (37°16'38.64"N, 49°35'20.4"E), Northern Iran. The mites were mounted directly in Hoyer's medium on slides, then kept in an oven (45 °C) for

5-6 days. The specimens were measured, identified and drawn by means of an Olympus BX_{51} differential interference contrast microscope (DIC), under 1000X magnification, and equipped with a drawing tube. Body length measurements represent the distance between the base of the gnathosoma and the posterior end of the idiosoma; width was measured at the level of setae *c2*. Setae were measured from the setal base to their tips; distances between setae were measured between setal bases. Leg measurements are from base of coxa to the tip of the pretarsus.

The terminology and abbreviations used in the description follow Kethley (1990). All measurements are given in micrometers and the measurements of the paratype are in parentheses.

RESULTS

Family Stigmaeidae Oudemans, 1931. Genus *Eryngiopus* Summers1964.

Type species: *Eryngiopus gracilis* Summers 1964, by original designation.

Diagnosis — female (based on Fan and Zhang, 2005): Chelicerae hinged at base. Palp tibial claw almost as long as palp tarsus; accessory claw slender, seta-like or spine-like; terminal eupathidia on palp tarsus mostly fused and split into 2-3 vestigial prongs; counts of setae and solenidia, from palp trochanter to palp tarsus: 0, 3, 1, 2+1 claw+1 accessory claw, 4+1ω+1 sub terminal spine-like eupathidium+3 eupathidia (mostly fused). Subcapitulum with two pairs of subcapitular long to short setae, *m* posterolaterad of pharynx, *n* posteromediad of *m*. Prodorsum reticulate to striate, eyes present. Dorsal hysterosomal area C-F mainly striated, setae d_1 and d_2 situated on tiny platelets; humeral shields minute or vestigial, dorsolateral, with setae c_2; intercalary shields (F) divided along midline, each side with one seta (f_1). Suranal shield (H) divided or entire, with 2 pairs of setae (h_1 and h_2), h_3 absent. Venter with 3 pairs of intercoaxal setae *1a*, *3a*, *4a* and 2-3 pairs of aggenital setae (*ag1-3* or *ag1-2*); genitoanal valves with 1 pair of genital setae (*g1*), and 3 pairs of pseudanal setae. Leg tarsal claws robust; empodial shafts branching into tenent hairs before extending beyond tips of claws, with 3 pairs of tenent hairs.

Eryngiopus langroudiensis (Figures 1-2)

Diagnosis — Ventral setae *1a*, *3a* and *4a* very long. Femora 3-3-2-2, genua 3-0-0-0, tarsi 12(ω)-10(ω)-8(ω)-8(ω).

Description — Female (n = 7). Color in life red. Idiosoma oval. Measurements of holotype with measurements of paratypes in parentheses: Length of body (excluding gnathosoma) 320 (320 – 336), (including gnathosoma) 424 (415 – 440); width 176 (184 – 208); length of leg I 140 (140 – 160); leg II 110 (110 – 120); leg III 108 (109 – 120) leg IV 120 (110 – 130).

Dorsum — (Figure 1a). Prodorsal shield reticulate longitudinally; bearing three pairs of setae (*vi*, *ve*, *sci*), setae *sce* and eyes present. Dorsal hysterosomal area between setae C-E with fine, longitudinal striae, area between setae f_1 with transverse striae, f_1 on small platelets. Suranal shield (H) entire, with 2 pairs of setae (h_1 and h_2). Dorsal hysterosoma with 8 pairs of setae, with slightly ciliated. Lengths of dorsal setae: *vi* 16 (16 – 17), *ve* 26 (21 – 24), *sci* 24 (18 – 22), *sce* 28 (24 – 26), c_1 20 (18 – 20), c_2 24 (23 – 30), d_1 20 (19 – 20), d_2 22 (21 – 22), e_1 14 (14 – 16), e_2 14 (14 – 18), f_1 16 (14 – 16), h_1 20 (20 – 21), h_2 20 (20 – 22). Distances between dorsal setae: *vi-vi* 12 (12 – 16), *ve-ve* 32 (32 – 34), *vi-ve* 14 (14 – 16), *sci-sci* 54 (56 – 58), *sce-sce* 108 (108-130), *ve-sci* 20 (22-24), *sci-sce* 30 (30-38), *sci-c1* 68 (65-70), c_1-c_1 46 (58 – 63), c_2-c_2 154 (160 – 180), c_1-d_1 74 (68 – 80), d_1-d_1 98 (90 – 104), d_1-d_2 44 (44 – 50), d_1-e_2 40 (43 – 60), d_2-e_2 72 (70 – 80), d_2-*d2* 160 (160 – 180), e_1-e_1 44 (42 – 46), d_1-e_1 60 (56 – 60), f_1-f_1 52 (48 – 50), f_1-h_1 38 (34 – 40), h_1-$h_1$18 (16 – 20), h_2-h_2 50 (56 – 59), h_1-*h2* 18 (18 – 20); ratio: *vi/vi-vi* 1.3 (1.0-1.3), c_1/c_1-c_1 0.46 (0.31-0.32), d_1/d_1-d_1 0.22 (0.19 – 0.21), e_1/e_1-e_1 0.33 (0.33 – 0.35), f_1/f_1-f_1 0.35 (0.29 – 0.31), h_1/h_1-h_1 1.11 (1.05 – 1.25), h_2/h_2-h_2 0.40 (0.36 – 0.37), h_1/h_2 1.0 (0.94 – 1.0), c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1 : 0.89 (1.21 – 1.26): 1.88 (1.88 – 2.08): 0.85 (0.88 – 0.92): 1.

Venter — (Figure 1b). Ventral cuticle striate transversely between coxisternal regions II-III; coxisternal regions I-II and III-IV are surrounded by

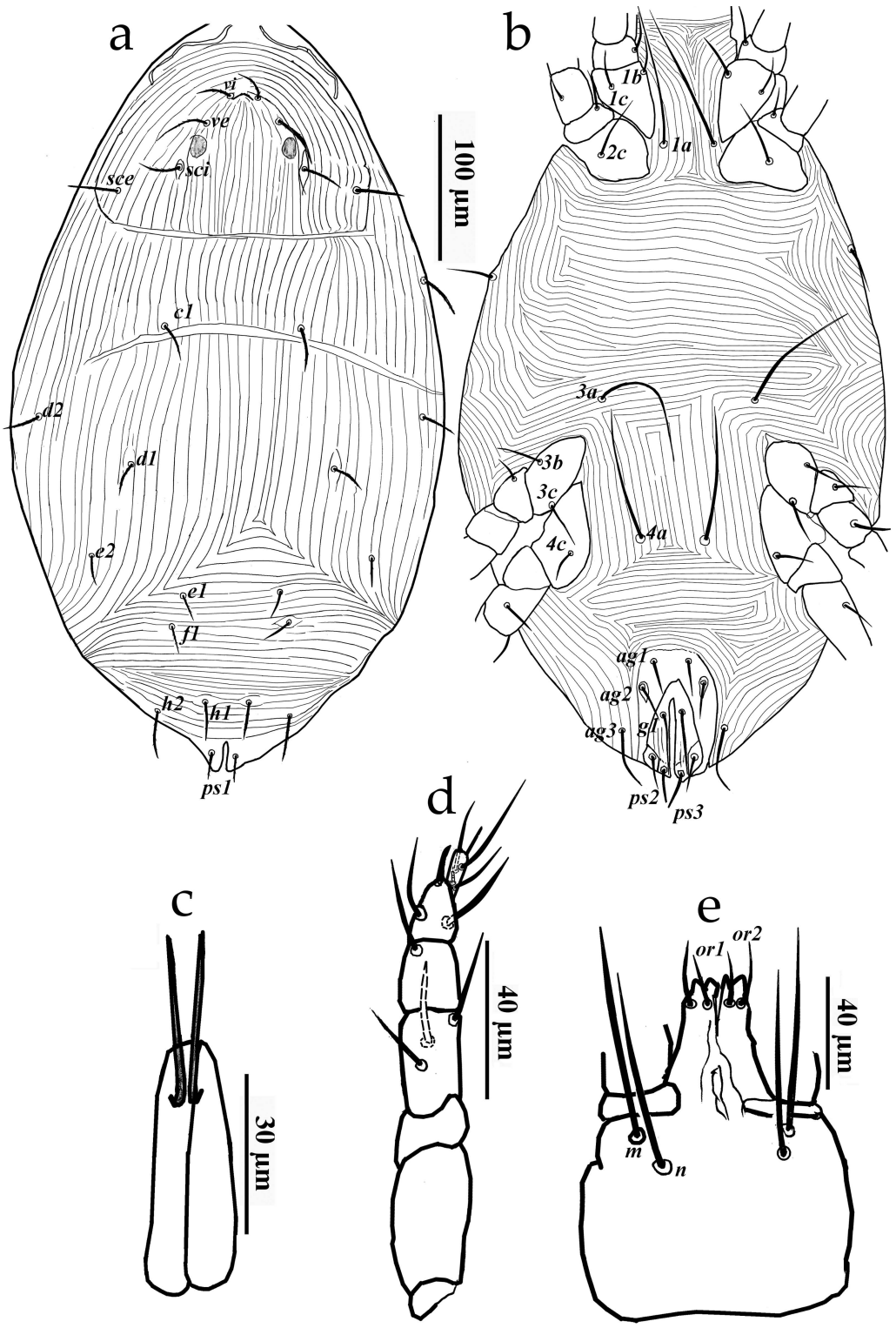

FIGURE 1: *Eryngiopus langroudiensis* **n. sp.** (female): a – Dorsal view of idiosoma; b – Ventral view of idiosoma; c – Chelicerae; d – Palp; e – Subcapitulum.

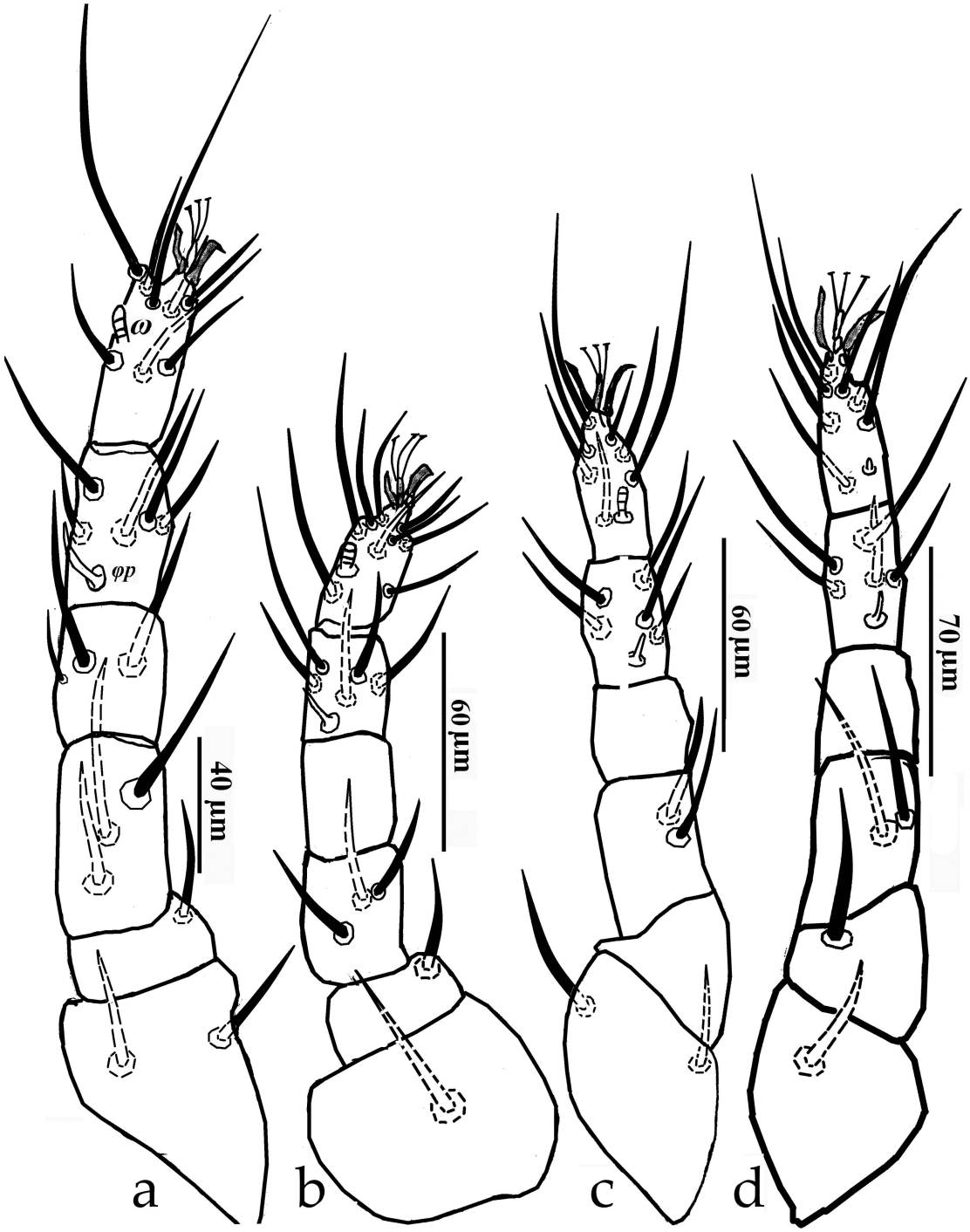

FIGURE 2: *Eryngiopus langroudiensis* **n. sp.** (female): a – Leg I; b – Leg II; c – Leg III; d – Leg IV.

longitudinal striae (Figure 2). Lengths of setae *1a* 60 (57 – 60), *1b* 14 (14 – 15), *1c* 14 (13 – 14), *2c* 20 (20 – 21), *3a* 44 (50 – 51), *3b* 16 (15 – 20), *3c* 14 (13 – 14), *4a* 40 (40 – 46) and *4c* 12 (12 – 13), ag_1 14 (14 – 16), ag_2 16 (14 – 17), ag_3 22 (24 – 28), *g1* 25 (26 – 27), *ps1* 14 (13 – 14), *ps2* 12 (14 – 15), ps_3 12 (12 – 14). Aggenital setae ag_3 longer than $ag_{1\text{-}2}$ and pseudanal seta *ps1* almost as long as setae $ps_{2\text{-}3}$. Distances: ag_1-ag_1 16 (16 – 20), ag_2-ag_2 28 (26 – 30), ag_3-ag_3 46 (44 – 54), *g1*-*g1* 10 (9 – 10).

Gnathosoma — (Figures 1c-e). Ventral infracapitulum with two pairs of subcapitular setae, *m* 32 (31-50) and *n* 30 (45-50), two pairs of adoral setae, or_1 11 (8 – 110, or_2 12 (10 – 12); distances: or_1-or_1 4 (4 – 5), or_2-or_2 10 (8 – 11), *m*-*m* 28 (25 – 29), *n*-*n* 20 (21 – 22) (Fig. 5). Chelicerae free 65 (55 – 60), movable digit 30 (30 – 32) (Figure 3). Palp five segmented, palp tarsus with 3 simple setae + one simple eupathidium + one solenidion(ω), palp tibia with two setae + one well developed claw, palp genu with one seta and palp femur with three setae (Figure 4).

Legs — (Figure 2). Legs about half length of body. Leg segments' setal formulae: coxae 2-1-2-1; trochanters 1-1-1-1; femora 3-3-2-2, genua 3-0-0-0; tibiae 5+1φρ–5+1φρ–5+1φρ–5+1φρ; tarsi 11+1ω–9+1ω–7+1ω–7+1ω. Specialized setae φρ on tibia I one and half times longer than on tibia II and two times of tibiae III-IV. Solenidion ω on tarsus I longer than on tarsi II-IV.

Etymology — The species is named after the locality where most of specimens were collected, Langroud city, in Guilan province, Iran.

Type materials — Holotype and one paratype females from the soil under of citrus trees, Chaboksar (36°58′0″N, 50°35′0″E, 216 m), 5 October 2012; 2 paratype females from citrus leaves infested by citrus red mite, *Panonychus citri* (McGregor) and scale insects, Langroud (37°11′0″N, 50°9′0″E, 25 m), 5 October 2012; 2 paratype females from citrus leaves infested by privet mite, *Brevipalpus obovatus* and scale insects, Vajargah (37°02′27″N, 50°24′31″E, –10 m), 4 November 2012; 1 paratype female from the soil under citrus trees, Langroud (37°11′0″N, 50°9′0″E, 25 m), 4 Novembers 2012, collected by J. Hajizadeh. The holotype female and one paratype are deposited as slide-mounted specimens in the Collection of the Acarology Laboratory, University of Bu-Ali Sina, Hamadan, Iran and five paratype females are deposited in the mites Collection of the Acarology Laboratory, University of Guilan, Rasht, Iran.

Remarks — The new species *Eryngiopus langroudiensis* **sp. nov.** resembles *E. citri* Rakha and McCoy 1984 by its long ventral setae and the same setal formulae on the palp segments, but differs from *E. citri* in: 1) prodorsum longitudinally striated instead of reticulated, 2) coxae II with 1 seta instead of two, 3) femora 3-3-2-2 in *E. langroudiensis* as opposed to 4-4-2-2 in *E. citri,* 4) genua I-IV 3-0-0-0 versus genua 2-0-0-0, 5) tarsi 12(ω)-10(ω)-8(ω)-8(ω) whereas 9(ω)-8(ω)-7(ω)-6(ω) in *E. citri.* Also the new species closely resembles *E. bifidus* Wood, 1967 in that the chaetotaxy of coxae, tibiae and tarsi I-IV differs from the latter by: 1) femora 3-3-2-2 in *E. langroudiensis* as opposed to 4-4-2-2 in *E. bifidus,* 2) trochanter IV with 2 seta as opposed to with 0, 3) ventral setae *1a, 3a* and *4a* longer than the latter, 4) adoral setae *or1-2* longer those of *E. bifidus.*

Male and immature stages: Unknown.

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