

A NEW SPECIES OF THE GENUS *AUSTROTENERIFFIA* (ACARI: ANYSTINA: TENERIFFIIDAE) FROM WESTERN IRAN

Mohammad Khanjani¹, Bahman Asali Fayaz¹ and Edward A. Ueckermann^{2,3}

1. Department of Plant Protection, College of Agriculture, Bu-Ali Sina University, Hamedan, Iran (email: mkhanjani@gmail.com); 2. ARC-Plant Protection Research Institute, Private Bag X134, Roodeplaat, Pretoria, 0121 South Africa (email: UeckermannE@arc.agric.za); 3. School of Environmental Sciences and Development, North-West University, Potchefstroom Campus 2520, South Africa (email: UeckermannE@arc.agric.za).

(Received 8 June 2010; accepted 20 September 2010)

ABSTRACT – A new mite species, *Austroteneriffia zamaniani* n. sp. is described and pictured based on the holotype and one paratype female collected from ground pearls, *Porphyrophora tritici* (Bodenheimer) (Homoptera: Margarodidae) vicinity of Hamedan, Hamedan Province, Iran. In this species, basifemur I with five and tibia II with nine setae, c_2 extend to setae e and prodorsal shield distinct. This is the second species of this genus known from west of Iran and for the first time the member of this genus was collected from scale insect. A key is provided to all known species of the genus.

Key words – Acari, *Austroteneriffia*, new species, Iran.

INTRODUCTION

Anystodea comprising three families, Anystidae, Teneriffiidae and Pseudocheyleidae, is a super family of mites regarded to be close to the basis of the rich and highly diverse Prostigmata species. All of them are very active predators in different and especially in humid habitats. However among them, Teneriffiidae is smaller than others and members of this family are red, yellow, or brownish long-legged predators which are capable of rapid movements. This family is defined as follows: first tarsal claws broadly bipectinate; tarsi III-IV with two or more pseudo-segment; two pairs of eyes; one pair of filiform bothridial setae on prodorsum, the base of which with a rosette pattern; adults with three pairs of genital papillae (Krantz and Walter, 2009). They have been collected from a wide range of habitats such as seashore, undersides of rock, desert habitat, sage litter (Evans, 1992) and in this work the senior author observed them on wheat root which was infested by ground pearls (M. Khanjani, per. obs.). The genus *Austroteneriffia* is a small group in the family Teneriffiidae. The members

of this genus are free living in soil, alfalfa leaf litter, sand and under rocks (Sayer *et al.*, 1992; Judson, 1995; Ueckermann and Khanjani, 2002). This genus currently contains six species, namely: *Austroteneriffia littorina* Shiba and Furukawa, 1975; *Austroteneriffia kamalii* Ueckermann and Khanjani, 2002; *Austroteneriffia hirsti* Womersley, 1935; *Austroteneriffia leei* Judson, 1994; *Austroteneriffia japonica* (Ehara, 1965)/*Austroteneriffia hojoensis* (Shiba and Furukawa, 1975); *Austroteneriffia tad-jikistanica* Wainstein, 1978; and in this article a seventh species is described: *Austroteneriffia zamaniani* n. sp. collected from ground pearls, *Porphyrophora tritici* (Bodenheimer). Ground pearls are distributed throughout the moderate to low-rainfall wheat and barley growing areas of Asia, i.e. Iran, Turkey, Iraq and Syria (Khanjani, 2009). It feeds on roots, stems and may cause withering, and subsequent death of the plant; low to moderate populations reduce yield and sometimes cause complete loss of grain (Parker *et al.*, 2001). For this reason, the *A. zamaniani* n. sp. could potentially be used for biological control of this pest.

MATERIALS AND METHODS

The infested wheat bushes with ground pearls, *Porphyrophora tritici* (Bodenheimer) (Homoptera: Margarodidae) were collected from the wheat farms and transferred to the laboratory in May 2010 by M. Khanjani. The wheat bushes which containing the samples were studied under stereomicroscope and then were separated the mites directly from ground pearls. The collected mites mounted directly in Hoyer's medium, and examined under the 1000× magnification of an Olympus BX51 phase contrast microscope. All drawings were made using a camera lucida. Body length measurements represent the distance between base of gnathosoma and posterior margin of idiosoma; width was measured at the broadest level of idiosoma, just before coxa III. Setae were measured from the setal base to the tip of the seta; distances between setae were measured between setal bases.

The terminology and setal notations used in the description of the new species follow those of Judson (1994). All measurements are given in micrometers (µm) and the measurements of the paratype follow in brackets.

Family TENERIFFIIDAE, Thor, 1911

Genus *Austroteneriffia* Womersley, 1935. 334

Type species: *Austroteneriffia hirsti* Womersley, 1935.

Member of the genus *Austroteneriffia* can easily be identified by the following characters: color in life orange to red, body oval; gnathosoma with four pairs of setae, three adoral (or_{1-3}), two (or_{1-2}) are thick and truncated distally with longitudinal ridges and one subcapitular seta, m ; palpi with or without oncopphysis; prodorsum covered with a prodorsal shield, bearing four pairs of setae (sa , na , sp and nb) and with two pairs of eyes; opisthosoma with seven pairs of setae (c_1 , c_2 , d_1 , e_1 , f_1 , h_1 , h_2), setae c_2 much longer than others; naso reduced; peritreme with numerous alveolae, reaching to coxae I; and in ventral position; coxae I, II and III, IV grouped together separately.

KEY TO SPECIES OF AUSTROTENERIFFIA OF THE WORLD (FEMALES)

1. Palpal oncopphysis present 4
Palpal oncopphysis absent 2
2. Prodorsal shield poorly defined; setae c_2 extending to d *A. littorina* Shiba & Furukawa
Prodorsal shield distinct; setae c_2 reaching to e or f 3

3. Basifemur I with five setae, tibia II nine setae *A. zamaniani* n. sp.
Basifemur I with four setae, tibia II 10 setae *A. kamalii* Ueckermann & Khanjani
4. Genu IV with a solenidion 5
Genu IV without a solenidion 6
5. Prodorsal trichobothrium sp with short barbs, sclerotized cuticle without distinct pores
..... *A. hirsti* Womersley
Prodorsal trichobothrium sp with long cilia, sclerotized cuticle with distinct pores .. *A. leei* Judson
6. Basifemur III with four setae, posterior gnathosomal setae simple *A. japonica* (Ehara)/*A. hojoensis* (Shiba & Furukawa)
Basifemur III with three or five setae, posterior gnathosomal setae barbed
..... *A. tadjikistanica* Wainstein

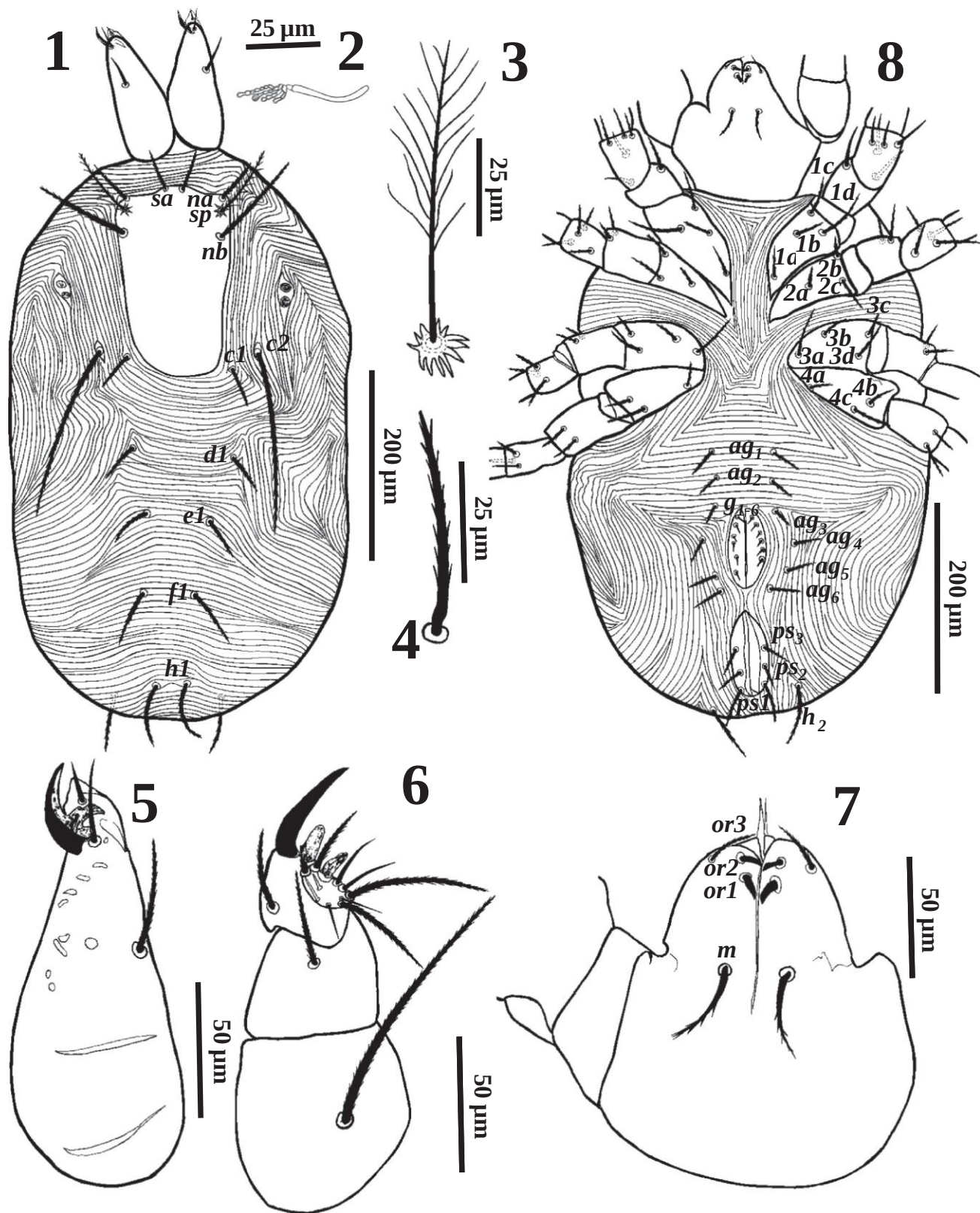
Austroteneriffia zamaniani n. sp.

(Figs. 1–12)

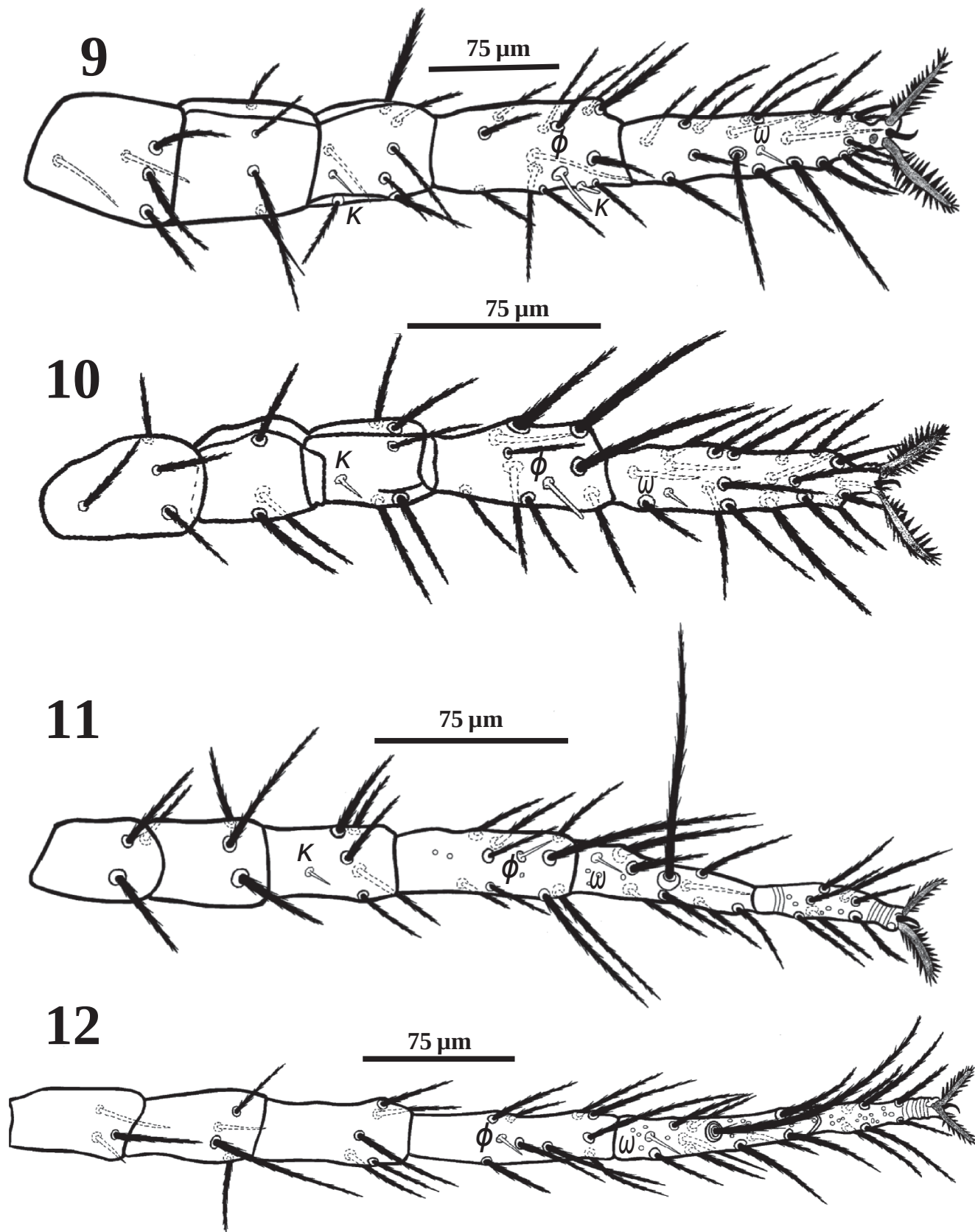
Diagnosis – Dorsal idiosomal setae are thick and with few serration, $sa/sa-sa$ 2.21 (2.36); $na/na-na$ 0.45 (0.47), $sp/sp-sp$ 0.73 (0.74) c_1/c_1-c_1 0.35 (0.38); c_2/c_2-c_2 0.95 (1.01); d_1/d_1-d_1 0.36 (0.38); e_1/e_1-e_1 0.63 (0.68); f_1/f_1-f_1 0.99 (1.0); h_1/h_1-h_1 1.91 (1.91). Basifemur I with five setae and tibia II with nine setae.

Female ($n = 2$) – Color in life orange. Idiosoma oval. Measurements of holotype with measurements of paratype in parenthesis: length of body (excluding gnathosoma) 625 (620); width 120 (118); leg measurements are from coxa to pretarsus; length of leg I 510 (508); leg II 438 (450); leg III 487 (522), leg IV 629 (626).

Dorsum (Figs. 1–4) – Prodorsal shield rectangular, 205 (203) long, 125 (123) wide, at level of setae c_2 and two pairs of eyes (Fig. 1). Prodorsal shield with four pairs of setae (sa , na , sp and nb), two pairs ordinary setae, nb , na , and two pairs trichobotria, sp and sa ; opisthosoma striated and bears seven pairs of setae (c_1 , c_2 , d_1 , e_1 , f_1 , h_1 , h_2). Two pairs of eyes anterior to setae c_2 ; peritremes anterior to setae sa . Dorsal setae strongly serrated (Figs. 1 and 4). Setae c_2 much longer than other dorsal setae; lengths of dorsal setae: na 49 (47), sp 76 (75), nb 101 (100), c_1 43 (43), c_2 195 (181), d_1 46 (43), e_1 45 (49), f_1 63 (62), h_1 65 (65), h_2 60 (59); distances between dorsal setae: $sa-sa$ 19 (17), $na-na$ 105 (105), $sp-sp$ 103 (100), $nb-nb$ 100 (105), $sa-na$ 44 (42), $sp-na$ 8 (7), $nb-sp$ 30 (30), $nb-c_1$ 138 (134) c_1-c_1 114 (114), c_1-c_2 35 (42), c_2-c_2 190 (192), c_1-d_1 95 (93), d_1-d_1 120 (119), d_1-e_1 82 (82), e_1-e_1 72 (72), e_1-f_1 95 (95), f_1-f_1 63 (63), f_1-h_1 31 (44), h_1-h_1 34 (34), h_1-h_2 40 (36), h_2-h_2 109 (109), $sa/sa-sa$ 2.21 (2.36); $na/na-na$ 0.45 (0.47),



Figs. 1–8. *Austroteneriffia zamaniani* n. sp.: 1. dorsum; 2. peritreme; 3. trichobothrial setae sp; 4. dorsal body setae (seta c_1); 5. chelicerae; 6. palp; 7. subcapitulum; 8. venter.



Figs. 9–12. *Austroteneriffia zamaniani* n. sp.: 9. leg I; 10. leg II; 11. leg III; 12. leg IV.

$sp/sp-sp$ 0.73 (0.74) c_1/c_1-c_1 0.35 (0.38); c_2/c_2-c_2 0.95 (1.01); d_1/d_1-d_1 0.36 (0.38); e_1/e_1-e_1 0.63 (0.68); f_1/f_1-f_1 0.99 (1.0); h_1/h_1-h_1 1.91 (1.91); $c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1$ 1.59 (1.61): 1.67 (1.66): 1.0 (1.0): 0.88 (0.86).

Venter (Fig. 8) – Ventral cuticle longitudinally striated between coxae I and IV. Coxisternal shields smooth (Fig. 8). Length of setae la 31 (34), $1b$ 31 (30), $1c$ 40 (40), $1d$ 60 (57), $2a$ 22 (23), $2b$ 22 (21), $2c$ 38 (36), $3a$ 52 (50), $3b$ 24 (23), $3c$ 24 (24), $3d$ 38 (35), $4a$ 24 (24), $4b$ 34 (24) and $4c$ 42 (39). Aggential area with five pairs of setae (ag_{1-5}), genital valves with six pairs of setae (g_{1-6}) and anal valves with three pairs of pseudoanal setae (ps_{1-3}). Measurements of setae: setae g_1 9 (8), g_2 9 (8), g_3 7 (7), g_4 9 (9), g_5 9 (9), g_6 9 (10), ps_1 11 (13), ps_2 12 (11), ps_3 12 (12). Distances: g_1-g_1 15 (16), g_2-g_2 23 (25), g_3-g_3 29 (28), g_4-g_4 31 (30), g_5-g_5 33 (31), g_6-g_6 14 (15); g_1-g_2 10 (10), g_2-g_3 10 (15), g_3-g_4 11 (7), g_4-g_5 14 (7), g_5-g_6 11 (11); ag_1-ag_1 65 (63), ag_2-ag_2 65 (67), ag_3-ag_3 75 (77), ag_4-ag_4 112 (110), ag_5-ag_5 111 (110), ag_6-ag_6 63 (65), ag_1-ag_2 29 (34), ag_2-ag_3 35 (36), ag_3-ag_4 44 (44), ag_4-ag_5 29 (30), ag_5-ag_6 29 (30), ps_1-ps_1 31 (30), ps_2-ps_2 30 (32), ps_3-ps_3 35 (34), ps_1-ps_2 23 (24), ps_2-ps_3 22 (23), ps_3-ps_3 35 (34). Setae ps_{1-3} smooth.

Gnathosoma (Fig. 5–7) – Palpi five segmented, palp tarsus reduced to circular plate, with eight setae (four long and serrated, four short and smooth) plus two solenidia; palp tibia with one robust terminal spur (o_1) plus two subterminal spurs (o_{2-3}) plus one serrated seta; palp genu and femur each with one seta (Fig. 6). Chelicerae 145 (145), movable digit 27 (25), with two setae, subterminal seta longer 29 (27) (Fig. 5). Subcapitum finely punctate, with four setae, m 36 (37) or 21, twice longer than n 10 (11–12, adoral setae or_1 10 (10), or_2 8 (9), or_3 36 (36); $m-m$ 22 (21) smaller than distance of or_1-or_1 10 (10) or_2-or_2 14 (15), or_2-or_3 10 (38), or_3-or_3 40 (38) $m-or_1$ 37 (38); setae or_{1-2} forked distally (Fig. 7).

Legs (Figs. 9–12) – Leg IV as long as idiosoma. Setal formulae of leg segments as follows (solenidia in parenthesis): coxae 4-3-4-3; trochanters 1-2-2-2; basifemora 5-4-3-3; telofemora 4-3-3-4, genua 7(1K)-5(1K)-5(1K)-5; tibiae 11 (ϕ)+1 famulus-9(ϕ)-9(ϕ)-9(ϕ); tarsi 20 (ω)+1tric-18 (ω)+1tric-15(ω)+1tric (1)-15 (ω)+1tric (Figs. 9–12).

Discussion – *Austroteneriffia zamaniani* n. sp. resembles *A. kamalii* Ueckermann and Khanjani in the absence of a palpal oncophysis and in having setae c_2 very long. However, it differs from the latter in that: setae c_2 extend to setae e instead of f as in *A. kamalii* c_2 ; leg chaetotaxy of basifemur I with 5, tibia II with 9 (1) and tarsus I–IV 20(1)+1tric-18 (1)+1tric-15(1)+1tric(1)-15(1)+1tric in the former but basifemur I with 4, tibia II with 10(1), and tarsus I–IV with 25(2)-21(2)-17(1)+1 tric-17 or 18(1)+1tric setae in the latter; palp tarsi with two solenidia as

opposed to one in *A. kamalii*; prodorsal shield 205 (203) long and 125 (127) wide versus 139 long, and 108 wide in *A. kamalii*; nb 101 versus 85; c_2 188 versus 170; h_1 65 versus 77; tarsi I–IV 95-93-123-153 versus 139-123-154-185; h_1/h_2 1.11 versus 1.43. It also closely resembles *A. littorina* Shiba & Furkawa but differs from it as follows: prodorsal shield distinct versus poorly defined; setae c_2 extend to setae e in the former whereas they extend to setae d in the latter.

Etymology – The species is named in honor of Mr. Ali Zamanian, Head of Department of Agriculture of Hamedan, for his kind assistance to the senior author in providing mite-collecting facilities.

Type materials – Holotype and paratype females were collected from ground pearls, *P. tritici* (Bodenheimer) (Homoptera: Margarodidae), Sorkh Abad village, Hamedan vicinity, Hamedan province (34°48'N 48°31'E, 1850 m above sea level), Iran, 4 May 2010; by M. Khanjani. The holotype is deposited in the Collection of the Acarology Laboratory, University of Bu-Ali Sina, Hamedan, Iran and the paratype will be deposited in the National Collection of Arachnida, Plant Protection Research, Pretoria, South Africa.

REFERENCES

- Ehara, S. 1965. Two new species of Teneriffiidae from Japan, with notes on the genera *Heteroteneriffia* and *Neoteneriffiola* (Acarina: Prostigmata). Publ. Seto Mar. Biol. Lab. 13: 221–229.
- Evans, G. O. 1992. Principles of Acarology. CAB International, Cambridge, xviii, 563 pp.
- Judson, M. 1994. Studies on the morphology and systematics of the Teneriffiidae (Acari: Prostigmata). 1: a new species of *Neoteneriffiola* from Namibia. Acarologia 35, 115–134.
- Judson, M. 1995. Studies on the Teneriffiidae (Acari: Anystoidea). 2: a review of the genus *Austroteneriffia*. Invertebr. Taxon 9, 827–839.
- Khanjani, M. 2009. Field crop pests in Iran (Insects and Mites). 5th ed. Bu-Ali Sina University Press, Hamedan, Iran. 731 pp.
- Krantz, G. W. and D. E. Walter. (Eds.). 2009. A Manual of Acarology. 3rd ed. Texas University, Lubbock. 807 p.
- Parker, B. L., M. El-Bouhssini and M. Skinner. 2001. Field Guide: Insect Pests of Wheat and Barley in North Africa, West and Central Asia. ICARDA Press, Syria, Aleppo, 120 pp.
- Sayer, R. M., R. L. Smiley and D. E. Walter. 1992. Report of a teneriffid mite (Acari) in Baltic

- amber and notes on recent discoveries, *Internat. J. Acarol.* 18: 303–305.
- Shiba, M. and M. Furkawa. 1975. Studies on the family Teneriffiidae (Acarina: Prostigmat) in Japan. *Rep. Res. Matsuyama Shinome Jr Coll.* 7: 111–126.
- Ueckermann, E. A. and M. Khanjani. 2002. A new species of the genus *Austroteneriffia* (Acari: Teneriffiidae). *Syst. Appl. Acarol.* 7: 167–172.
- Wainstein, B. A. 1978. Identification key of soil inhabiting mites, Trombidiformes. pp. 1–272. *In*: Gilyarov, M. S. (Ed.). *Akademiia Nauk SSR Institut Evoliutsionnoi Morfologii Ekologii Zhivotnikh im A. N. Severlova. Zoological Insitute* 7485. (In Russian).
- Womersley, H. 1935. The occurrence in Australia of Acarina of the family Teneriffiidae (Trombidioidea), *Rec. S. Aust. Mus.* 5: 333–338.