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Tenuipalpidae and Tetranychidae (Trombidiformes, Tetranychoidea) from Syria with a description of a new species of *Bryobia*

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Original research

ABSTRACT

Surveys of Tenuipalpidae and Tetranychidae were conducted at three locations in Latakia governorate, Syria, in 2021. Eight species were collected; four flat mite species of which *Aegyptobia beglarovi*, *Cenopalpus lineola*, and *Pentamerismus juniperi* were new records for Syria; and four spider mite species among which *Petrobia* (*Mesotetranychus*) *tunisiae* represented a new record. A new tetranychid species, *Bryobia* (*Lyobia*) *hadizeni* **sp. nov.**, collected from *Calicotome villosa*, is described and illustrated. The number of Tenuipalpidae species known from Syria increases to 16 and there are now 25 species of Tetranychidae.

Keywords flat mites; spider mites; new species; species diversity
Zoobank http://zoobank.org/EA7035F1-F3AF-40FF-8CAA-22DBA9F0B5B5

Introduction

With about of 2400 species, the Tenuipalpidae and Tetranychidae are considered the largest and most diversified groups of the superfamily Tetranychoidea. These two families comprise several species of major economic importance, which occur throughout the world and often cause severe injury to agricultural crops and ornamentals (Krantz and Walter, 2009; Castro *et al.*, 2021; Migeon and Dorkeld, 2021). Until 2015, data on Tetranychidae and Tenuipalpidae biodiversity were scarce in Syria and only six species were recorded: two tenuipalpids and four tetranychids (El-Hariri, 1968). Recently, these records increased to 13 and 23 species of Tenuipalpidae and Tetranychidae, respectively, within a six year period (Zriki *et al.*, 2015; Barbar, 2016; Zeity, 2017; Barbar, 2018; Zeity and Negm, 2019; Zeity and Srinivasa, 2019; Barbar and Auger, 2020; Ebraheem *et al.*, 2022).

The research herein provides new data on phytophagous diversity by identifying flat mites and spider mites species occurring on randomly sampled vegetation in Latakia governorate in 2021. In this manuscript a new species of *Bryobia* is described and illustrated and new records of Tenuipalpidae and Tetranychidae are reported.

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Material and methods

Sampling

Tetranychoid mites were randomly taken in Latakia governorate, Syria, on 5 and 20 April 2021. They were collected from leaves of wild vegetation at three different sites: i) in a public garden located at the center of Latakia city (35°51′65″ N, 35°78′18″ E); ii) in Alhafah (35°60′21″ N, 36°11′50″ E); and iii) in Slanfeh (35°60′70″ N, 36°22′17″ E). Mites were removed from leaves using the "dipping-checking-washing-filtering" method (Boller, 1984). Collected mites were cleared in lactic acid for 48 hrs, mounted on slides in Hoyer's medium, and dried in an oven at 40 °C for three days.

Mite observation and description

The specimens were examined using an Olympus® CH20 microscope at 400 and 1000x magnification. Measurements were taken using the scale of a reticle installed on the eyepiece lens. Mite body parts were documented using a mobile phone camera (13 megapixels) fixed on the eyepiece lens and images were transferred to a professional quality vector graphics (software Inkscape ® 0.92) which was installed on a computer for actual drawing.

All measurements are given in micrometers (µm) and the setal nomenclature used in the description follows Lindquist (1985). The holotype measurements are followed by measurements of the range of paratypes in parentheses. Body length represents the distance between the base of setae v_1 to the end of idiosoma and body width represents the widest transverse part of the hysterosoma. Distance between sc_2 setae members and between v_2 and h_1 setae are also given (Saito *et al.*, 1999). The distance between two setae was measured as the distance from the center of one setal base to the other. Legs were measured from coxae to the distal margin of tarsi (excluding claws and empodia). Leg setal counts are given in the order: coxa-trochanter-femur-genu-tibia-tarsus. Numbers of setae refer to tactile setae, solenidia are given in parentheses and alternative counts are given in brackets.

Systematics

Family Tenuipalpidae Berlese, 1913

Genus *Aegyptobia* Sayed, 1950

Aegyptobia beglarovi Livschitz & Mitrofanov, 1967

Three females were collected on *Juniperus oxycedrus* L., Slanfeh (35°60′70″ N, 36°22′17″ E), Latakia governorate, Syria, 20 April 2021. This is the first record of this species from Syria. It has been mainly collected on several species of *Juniperus* sp. and found in Georgia, Iran, Turkey and Ukraine (Castro *et al.*, 2021).

Genus *Cenopalpus* Pritchard & Baker, 1958

Cenopalpus lanceolatisetae (Attiah, 1956)

Four females were collected on *Crataegus azarolus* L., Alhafah (35°60′21″ N, 36°11′50″ E), Latakia governorate, Syria, 20 April 2021. This is the second record of this species from Syria (Barbar, 2018). It has been mainly collected on Rosaceae and particularly found in Mediterranean countries (Castro *et al.*, 2021).

Cenopalpus lineola (Canestrini & Fanzago, 1876)

Twenty-one females of this species were collected: one female on *J. oxycedrus*, one on *Pinus halepensis* Mill., three on *Centauria calcitrapa* L., six on *Cedrus libani* (A.Rich.), six on *Primula vulgaris* Huds., and four on *Lamium striatum* Sibth. & Sm., Slanfeh (35°60′70″ N,

36°22′17″ E), Latakia governorate, Syria, 20 April 2021. This is the first record of this species from Syria. It has been mainly collected on Pinaceae and particularly found in Europe and Asia (Castro *et al.*, 2021). The collecting of *C. lineola* on unusual host plants in this study (e.g. *C. calcitrapa*) could be due to the growing of these plants under several tree species belonging to Pinaceae or other families, which constitute a possible source of this mite in particular at the beginning of spring when the samples were taken.

Genus *Pentamerismus* McGregor, 1949

Pentamerismus juniperi (Reck, 1951)

One female of this species was collected on *J. oxycedrus*, Slanfeh (35°60′70″ N, 36°22′17″ E), Latakia governorate, Syria, 20 April 2021. This is the first record of this species from Syria. It has been collected on *Juniperus* sp. and found in Armenia, China, Georgia, Greece, Hungary and Ukraine (Castro *et al.*, 2021).

Family Tetranychidae Donnadieu, 1875

Genus *Bryobia* Koch, 1836

Bryobia (*Bryobia*) *gigas* Auger, Arabuli & Migeon, 2015

One female of this species was collected on *C. calcitrapa*, Slanfeh (35°60′70″ N, 36°22′17″ E), Latakia governorate, Syria, 20 April 2021. This species has been collected from *Bituminaria bituminosa* (L.) (Zeity and Srinivasa, 2019) and from soil litter in Syria (Barbar and Auger, 2020).

Bryobia (*Bryobia*) *vasiljevi* Reck, 1953

Two females were collected on *C. calcitrapa*, Slanfeh (35°60′70″ N, 36°22′17″ E), Latakia governorate, Syria, 20 April 2021. This species has been collected from *Trifolium* sp. and *Taraxacum campylodes* in Syria (Zriki *et al.*, 2015).

Bryobia (*Lyobia*) *hadizeni* sp. nov.

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Figures 1–5

Type material — Holotype (female) and three female paratypes from *Calicotome villosa* (Poir.) Link. (Leguminosae), Alhafah (35°60′21″ N, 36°11′50″ E), Latakia governorate, Syria, 20 April 2021, coll. Z. Barbar. Material has been deposited in the Arthropod Collection of the Department of Plant Protection, Faculty of Agriculture, Albaath University, Homs, Syria.

Diagnosis — This species belongs to the *berlesei*-group due to prodosomal lobes well developed, no duplex setae on tarsus IV and femoral interior dorsal row with four long setae (Eyndhoven and Vacante, 1985). Prodorsum with two large oval-shaped lateral depressions. Opisthosoma bearing 6 large oval-shaped depressions with elongate ribbon-shaped pattern and one triangularly rounded depression caudally. Dorsal body setae serrate spatulate, except f_2 and h_1 elongate, acute distally, f_2 and h_1 longest. Dorsocentral setae of each row with members close to each other. Femora and genua II-IV with some flattened setae.

Female description — 625 (605–616 µm) long including lobes (base of setae v_1) and 391 (381–383) wide, gnathosoma 95 (75–110) long. Distances between sc_2–sc_2 325 (294–320) and between v_2–h_1 614 (598–600).

Dorsum – Prodorsum with four pairs of setae, with rounded, oval and elongate reticulation medially surrounded by granulation, with two large oval-shaped lateral depressions containing irregular folds forming oval patterns (Figures 1 and 2A); well-developed anterior prodorsal lobes, inner lobes conical measuring 53 (50–52) high (excluding setae), separated by wide V-shaped incision 31 (15–21) in depth (measured from the bottom of the incision between the

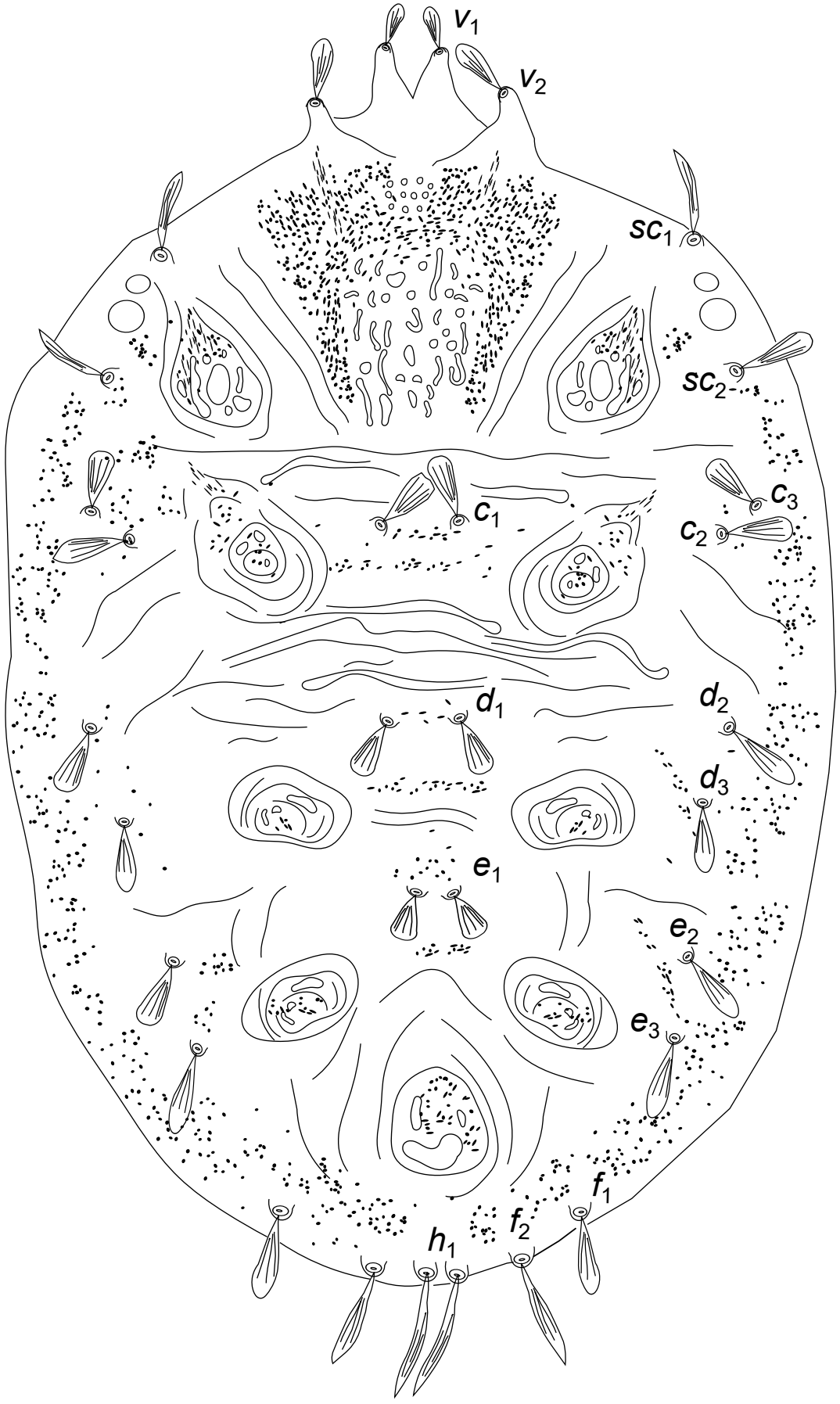

Figure 1 *Bryobia hadizeni* **n. sp**, female, dorsal aspect. Scale bar = 100 µm.

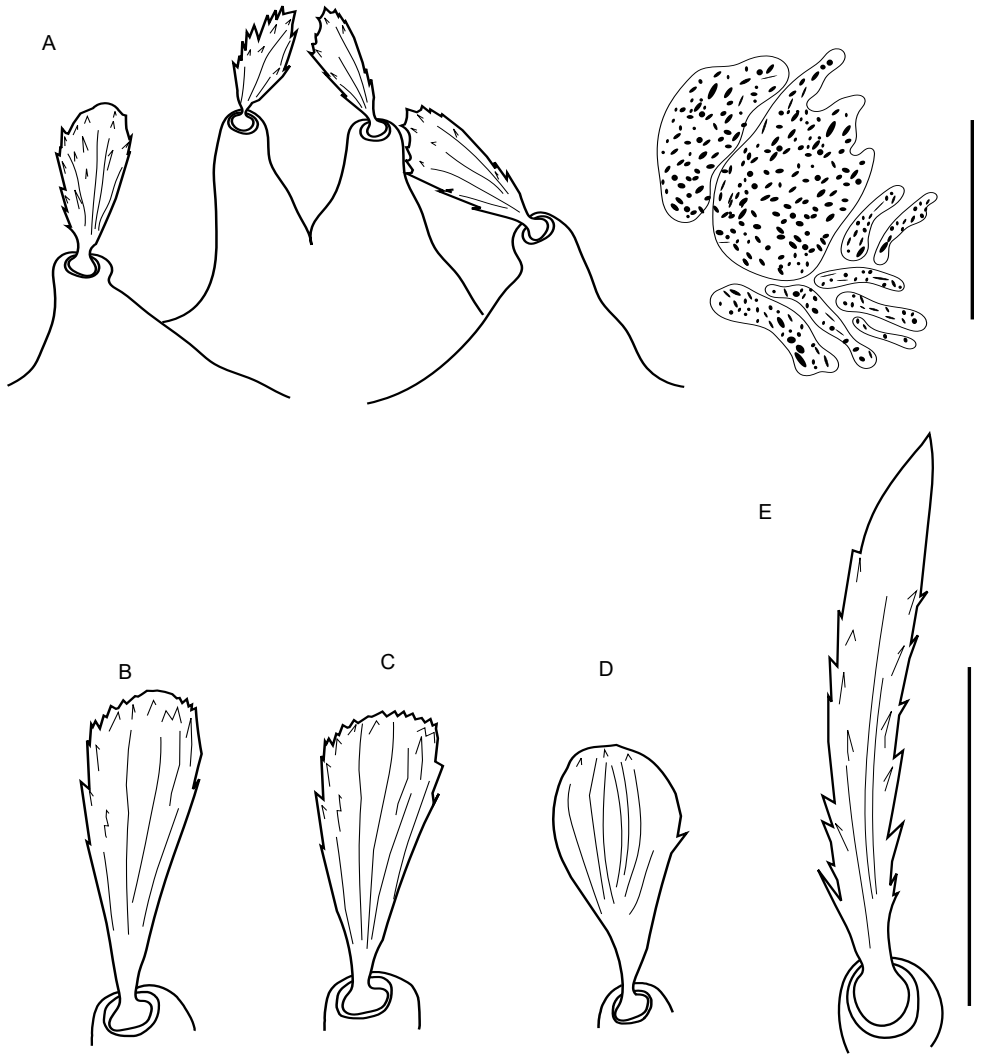

Figure 2 *Bryobia hadizeni* **n. sp**, female: A – propodosomal lobes and detail of granulated integument of prodorsum; B and C – setae c_1; D and E – setae e_1 and h_1, respectively. Scale bar = 50 µm.

inner lobes to their tip, excluding setae) (Figure 2A); outer propodosomal lobes subtriangular to conical 35 (32–33) high (excluding setae); tip of setae v_2 slightly surpasses setae v_1 insertions; setae v_1 shorter than setae v_2. Distance between members of first (v_1) and second (v_2) pair of propodosomal setae insertions 28 (28) and 103 (98), respectively. Opisthosoma with six large oval-shaped depressions containing elongate ribbon-shaped reticulations (3 pairs posterolateral to setae c_1, d_1 and e_1 and one triangularly rounded caudally; Figure 1) and with large mostly transverse folds medially. Dorsal body setae serrate spatulate, except e_3 and f_1 subspatulate, f_2 and h_1 elongate, narrower, acute distally; setae v_1 the shortest, f_2 and h_1 the longest. Among dorsocentral setae, c_1 larger and less spatulate than setae d_1 and e_1 (Figure 1 and 2B, D and E) except in one specimen (Figure 2C). All dorsal setae inserted on obvious tubercles (those of f_1, f_2 and h_1 the biggest). Measurements of dorsal setae: v_1 27 (25–26); v_2 38 (32–34); sc_1 50 (44–50); sc_2 42 (40–46); c_1 42 (35–40); c_2 40 (34–44); c_3 36 (34); d_1 34 (27–33); d_2 46 (37–42); d_3 39 (37–41); e_1 33 (25–39); e_2 44 (44–45); e_3 45 (45–52); f_1 48 (51); f_2 60 (67–69); h_1 71 (64–72); dorsal setae width v_1 9 (8–10); v_2 14 (13–14); sc_1 11 (15–18); sc_2 11 (15–16), c_1 15 (21–23), c_2 15 (14–18) , c_3 14 (17–20), d_1 13 (17–19), d_2 13 (14–19), d_3 14 (16), e_1 15 (15–17), e_2 12 (17–18), e_3 13 (11–16), f_1 12 (10–16) , f_2 10 (7–12) and h_1 9 (8–11).

Distances between setae: c_1–c_1 40 (40–45), d_1–d_1 40 (33–42), e_1–e_1 22 (22–30), f_1–f_1 155 (135–140), f_2–f_2 76 (75), h_1–h_1 15 (18–20), c_1–d_1 105 (98–104), d_1–e_1 90 (85–92).

Gnathosoma – Stylophore slightly notched anteriorly, 92 (90–101) long and 73 (74–78) wide. Tibial claw of palpus bidentate (Figure 3A). Palptarsus slightly longer (excluding setae) 18 (19–18) than tibial claw 15 (15–16), with three tactile setae, three eupathidia and one solenidion, the shortest (Figure 3A). Tip of tibial claw reaches insertion of proximal tarsal tactile seta "a". Peritreme anastomosed distally, elongate, 33 (27–32) long 7 (9–8) wide (Figure 3B).

Venter – Area immediately anterior to genital flap irregularly longitudinal. Three pairs of pseudanal setae ($ps_{1\text{-}3}$) and two pairs of ventrocaudal setae ($h_{2\text{-}3}$) present. Sacculus of

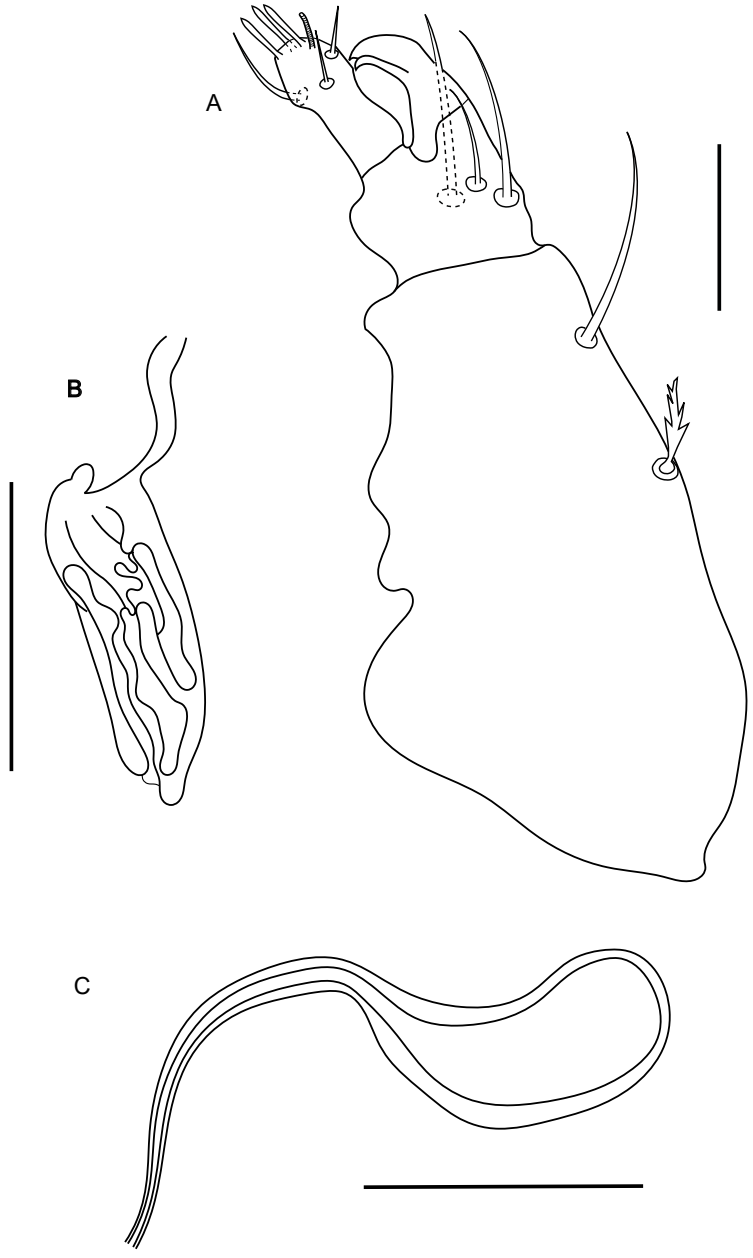

Figure 3 *Bryobia hadizeni* **n. sp**, female: A – palpal tibia and tarsus; B – peritreme; C – spermatheca. Scale bars = 20 µm (A and C), 30 µm B.

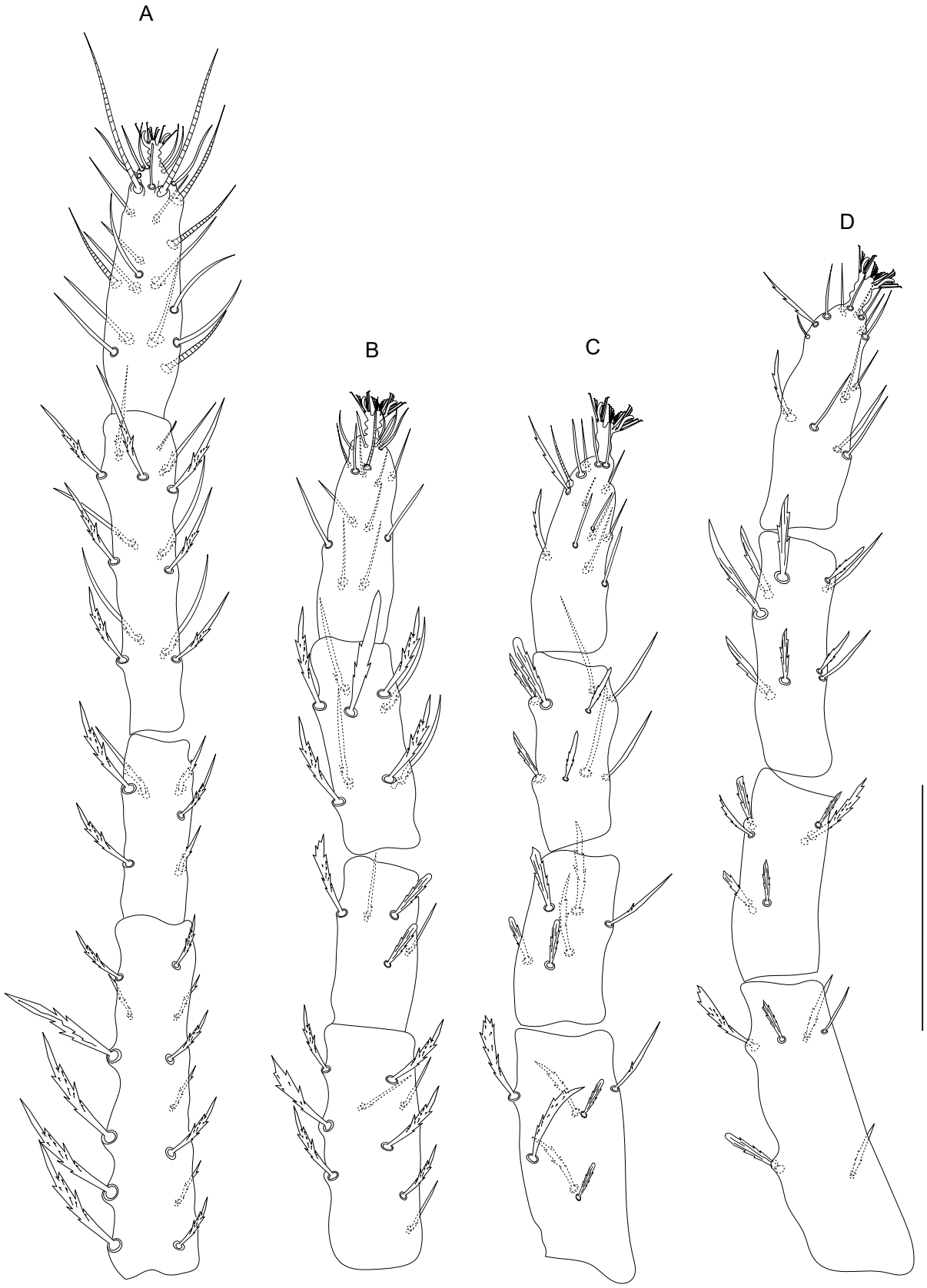

Figure 4 *Bryobia hadizeni* **n. sp**, female legs (from femur to tarsus): A, B, C, and D – legs I, II; III and IV, respectively. Scale bar = 100 μm.

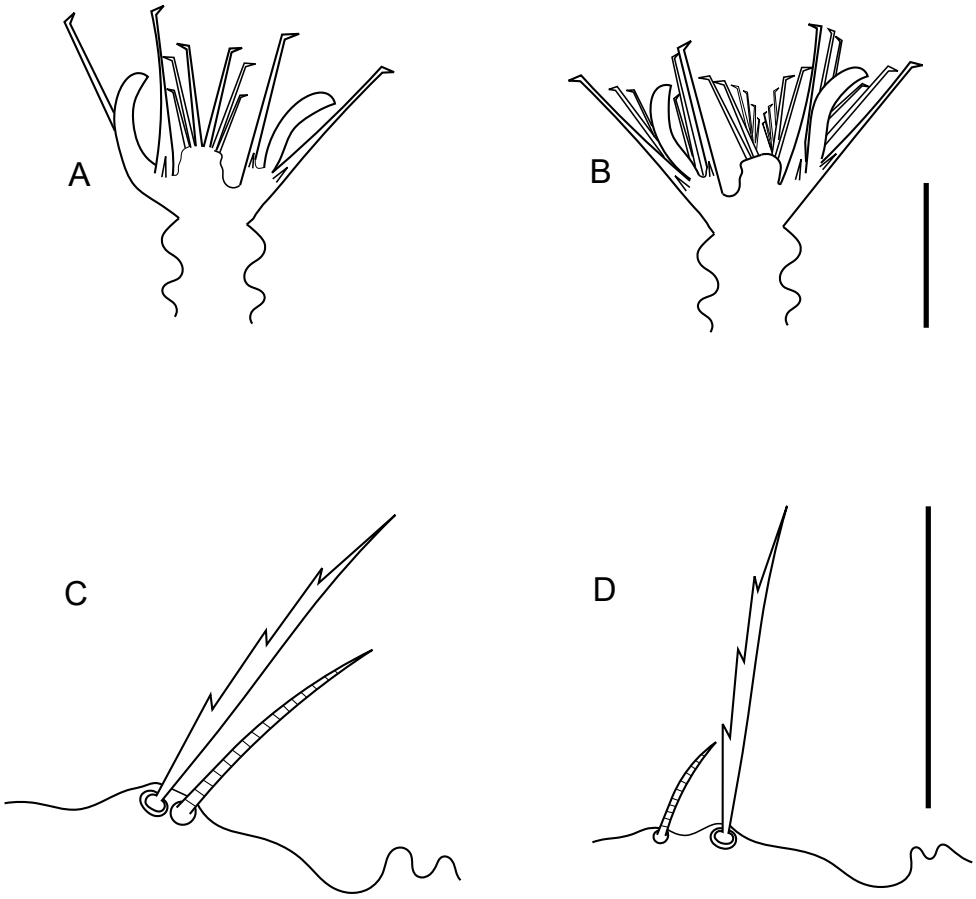

Figure 5 *Bryobia hadizeni* **n. sp**, female: A – claw and empodium I; B – claw and empodium II; C – duplex setae on tarsus III; D – solenidion and associated tactile seta on tarsus IV. Scale bars = 10 µm (A and B), 20 µm C and D.

spermatheca elongate 23 (20) long 8 (10) wide (Figure 3C).

Legs – (Figures 4 and 5). Internal dorsal row of femur I with 4 long serrate setae 53 (50–55) and one normal seta 28 (27–30). Leg I 536 (528–541) long, leg II 340 (322–333), leg III 333 (315–322), leg IV 400 (396–430). Length of segments of leg I as follows: trochanter 45 (42–50), femur 156 (142–160), genu 75 (67–75), tibia 108 (104–112), tarsus 86 (83–86). Femora and genua II-IV with some flattened setae. Leg setal counts as follows (Figure 4):

I: 2 – 1 – 12[13] – 6 – 13 + (1) – 18 + (4) + 2 duplexes

II: 1 – 1 – 10[9] – 5 – 9 – 16 + (1) + 1 duplex

III: 1 − 1 − 7 – 6 – 9 –13 + 1 duplex

IV: 1 – 1 – 6 – 5[6] – 9 − 14 + (1)

True claws uncinate. Claw and empodium I with one and three pairs of tenent hairs, respectively (Figure 5A). Claws II-IV each with three pairs of tenent hairs and empodia II-IV consist of two rows of tenent hairs (Figure 5B). Tarsus III associated tactile seta 21 (20–20) and solenidion 15 (15–20) forming duplex (Figure 5C); on tarsus IV solenidion 7 (8–10) shorter and proximal, well-separated (7) from tactile seta 22 (20–20) (Figure 5D). Coxisternal setae *1b* and *1c* smooth: *1b*, 54 (53–60), longer than setae *1c* 33 (33–40).

Etymology — The name of the new species "*hadizeni*" is composed of the first names of Hadi and Zen, sons of the first author, to whom the new species is dedicated.

Remarks — *Bryobia* (*L.*) *hadizeni* **sp. nov.** is very close to *B.* (*L.*) *cooremani* Eyndhoven and Vacante (1985), but this new species differs from it by **(1)** having obvious large dimples on

idiosoma *vs.* absent in *B.* (*L.*) *cooremani* **(2)** having setae f_2 elongate, subspatulate and longer (60–69), and h_1 elongate, narrow, acute distally and longer (64–72) *vs.* elongate spatulate: f_2 30–50, h_1 30–47 in *B.* (*L.*) *cooremani*; **(3)** having longer seta c_1 35–42 *vs.* 22–33 in *B.* (*L.*) *cooremani*; **(4)** having distances between c_1–c_1 40–45, d_1–d_1 33–42, e_1–e_1 22–30 shorter *vs.* c_1–c_1 72–90, d_1–d_1 55–70, e_1–e_1 33–50 in *B.* (*L.*) *cooremani*; **(5)** having longer setae in the internal femoral upper row of leg I: 50–55 long *vs.* about 40 in *B.* (*L.*) *cooremani*; **(6)** having some flattened setae on femora and genua II-IV *vs.* all legs with normal setae in *B.* (*L.*) *cooremani*. *Bryobia* (*L.*) *hadizeni* **sp. nov.** is easily separated from *B.* (*L.*) *pelerentsi* Eyndhoven and Vacante (1985) previously recorded from *C. villosa* by: **(1)** the lack of obvious large dimples on idiosoma in *B.* (*L.*) *pelerentsi* which also have a narrower body (300–320 µm); **(2)** differences in the shape of several dorsal setae: c_1 shell-like *vs.* spatulate elongate, f_1 and f_2 spatulate wide *vs.* elongate subspatulate and h_1 elongate spatulate *vs.* elongate narrow and acute distally in *B.* (*L.*) *pelerentsi* and *B.* (*L.*) *hadizeni* **sp. nov.**, respectively; **(3)** a different ratio between palptarsus and thumbclaw about 1.5 in *B.* (*L.*) *pelerentsi vs.* subequal in length in *B.* (*L.*) *hadizeni* **sp. nov.**; **(4)** having three pairs of tenent hairs on empodium I *vs.* two pairs in *B.* (*L.*) *pelerentsi*.

Genus *Petrobia* Murray, 1877

Petrobia (*Mesotetranychus*) *tunisiae* Manson, 1964

Six females were recorded from *Hordeum* sp., in a public garden located at the center of Latakia city (35°51′65″ N, 35°78′18″ E). This is the first record of this species from Syria. It is widely found on several species of Poaceae in Palearctic region (Migeon and Dorkeld, 2021).

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