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NENTERIA EXTREMICA N. SP., A NEW UROPODINA MITE (ACARI MESOSTIGMATA) COLLECTED ON *RHYNCHOPHORUS FERRUGINEUS* IN ITALY, WITH NOTES ON OTHER UROPODINA MITES ASSOCIATED WITH THE RED PALM WEEVIL

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Kontschán J., Mazza G., Nannelli R., Roversi P.F. – *Nenteria extremica* n. sp., a new Uropodina mites (Acari Mesostigmata) collected on *Rhynchophorus ferrugineus* in Italy, with notes on other Uropodina mites associated with the Red Palm Weevil.

A new species of Uropodina mite was collected on the body and on the cocoons of the Red Palm Weevil *Rhynchophorus ferrugineus* (Olivier, 1790) in Italy. The new species (*Nenteria extremica* n. sp.) belongs to the genus *Nenteria*, but it differs from the other species in appendages of the gnathosoma, which are unique within this genus. The new species is described on the basis of females, males and nymphs. Some notes on the association of Uropodina with the Red Palm Weevils are given. *Aegyptus rynchophorus* Elbishlawi & Allam, 2007 and *Aegypthus alhassa* Al-Dhafar & Al-Qahtani 2011 are junior synonyms of *Centrouropoda almerodai* Hiramatsu & Hirschmann, 1992.

KEY WORDS: Mites, Uropodina, new species, Red Palm Weevil, Italy.

INTRODUCTION

The Red Palm Weevil (RPW), *Rhynchophorus ferrugineus* (Olivier, 1790), is one of most important pest species of palms in the Mediterranean and Subtropical regions. This species can be found as native pest in South-Eastern Asia and Melanesia where it is the most important pest of the coconut palm (MURPHY & BRISCOE, 1999; FALEIRO, 2006). Currently RPW is distributed in North Africa, southern Europe, the Middle East, and south- and southeast Asia (FIABOE *et al.*, 2012).

The first species of Uropodina associated with RPW was described by WIŚNIEWSKI *et al.* (1992) from Philippines, as *Centrouropoda almerodai* Hiramatsu & Hirschmann, 1992. Unfortunately the description was incomplete as it referred only to the deutonymphal stage. Later, several authors mentioned this Uropodina species from RPW for the first time in Europe, from Sicily (LONGO & RAGUSA, 2006; MAZZA *et al.*, 2011) and later in Malta (PORCELLI *et al.,* 2009).

Several unknown Uropodina mites were collected on the body and on cocoons of RPW in Italy last year, and these specimens we found among a new species of *Nenteria*, which is described here.

MATERIAL AND METHODS

The specimens were collected on the body of the weevils and on the cocoons. The specimens were cleared and mounted into Hoyers medium. The holotype is deposited in the collection of Acari in the Research Centre for Agrobiology and Pedology, Firenze, Italy (CRA ABP), and paratypes are also deposited in the Hungarian Natural History Museum (HNHM). Illustrations were made by the use of a drawing tube. Measurements are given in micrometres (μm); width of idiosoma was taken at the level of coxae IV. Abbreviation: RPW: Red Palm Weevil, St: sternal setae, ad: adanal setae.

DESCRIPTION OF THE NEW SPECIES

Nenteria extremica n. sp.
(Figures I-IV)

DIAGNOSIS - Dorsal shield covered by oval pits. All setae on dorsal shield needle-like, but j1 and four pairs of setae in row J pilose. Anterior margin of female genital shield with small spine. Corniculi covered by gnathosoma, setae h1 situated laterally and on small protuberances.

MATERIAL EXAMINED - Holotype: female (CRA ABP). Italy, Catania (I), collected from cocoon of *R. ferrugineus* on palm (v39), 27 December 2012, R. Nannelli coll. Paratypes: 8 males and 9 females (CRA-ABP). Locality and date same as in holotype. One female, one deutonymph and one protonymph (CRA-ABP), Italy, Catania (I), collected from cocoon of *R. ferrugineus* on palm (v8), 30 January 2013, R. Nannelli coll. Four deutonymphs (CRA-ABP), Italy, Catania (I), collected on an adult female of *R. ferrugineus* (v6), 30 January 2013, R. Nannelli coll. Two females and four males (HNHM), Italy, Catania (I), collected from cocoon of *R. ferrugineus* on palm (V66), 8 January 2013, R. Nannelli coll. 10 protonymphs and one deuteronymph (CRA-ABP), Italy, Catania (I), collected from cocoon of *R. ferrugineus* on palm (v60), 8 January 2013, R. Nannelli coll.

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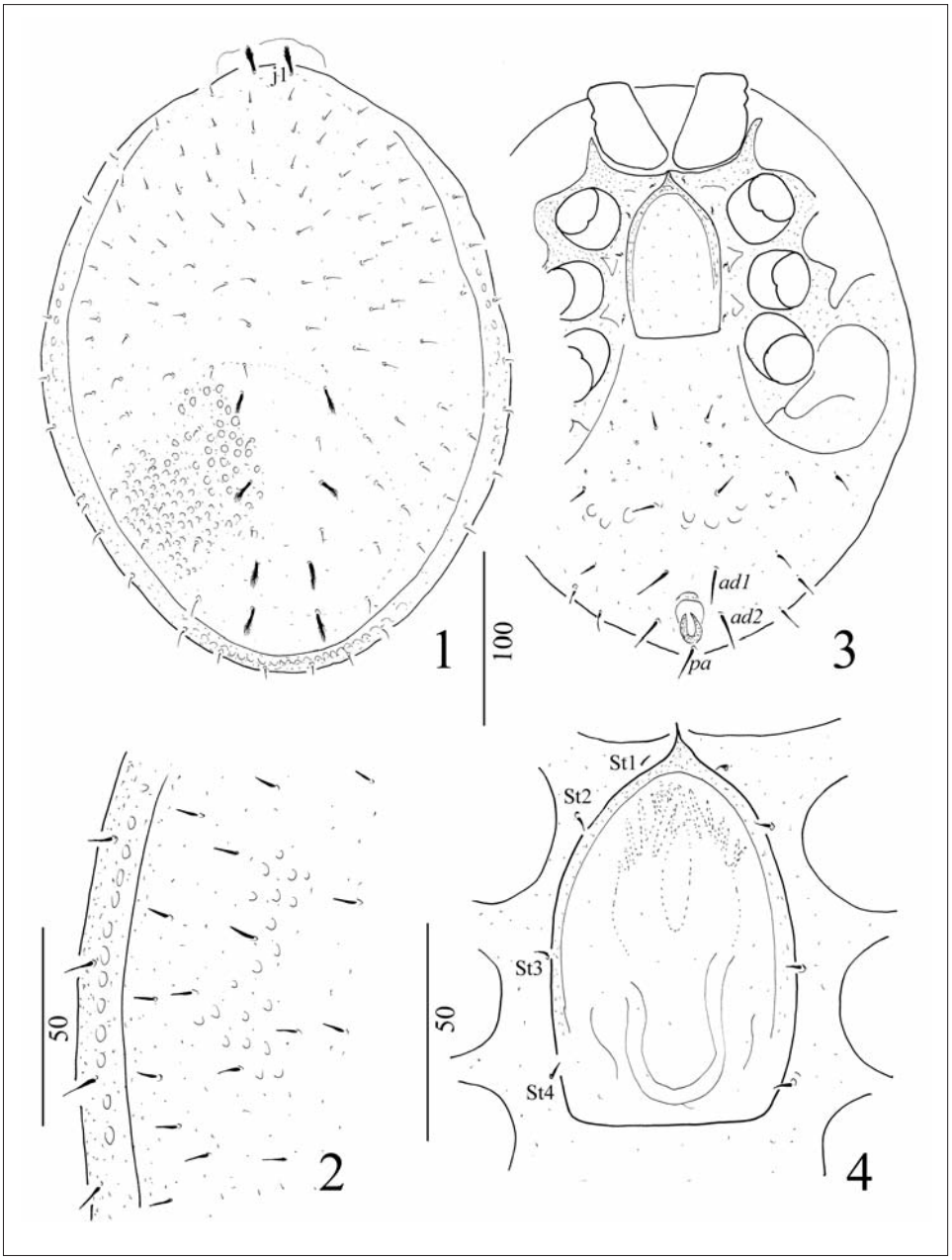

Fig. I – *Nenteria extremica* n. sp., female. 1. Dorsal view of idiosoma; 2. Ornamentation and setation of dorsal and marginal shields; 3. Ventral view of idiosoma; 4. Intercoxal area.

DESCRIPTION OF FEMALE - Length of idiosoma 410-440 µm, width 330-350 µm (n=13). Oval shape of idiosoma.

Dorsal idiosoma (Fig. I, 1) - Marginal and dorsal shields fused anteriorly. All dorsal setae smooth and needle-like (ca 7-8 µm) except five pairs of pilose (ca 15-17 µm) dorsal setae (setae j1 and four pairs of setae in row J). Marginal shield setae similar in shape and length to dorsal shield setae. Dorsal and marginal shields covered by small alveolar pits (Fig. I, 2).

Ventral idiosoma (Fig. I, 3) - Sternal setae short (ca 4-5 µm), smooth and needle-like. St1 placed near anterior margin of genital shield, St2 at level of central area of coxae II, St3 at level of anterior margin of coxae III and St4 at level of anterior margin of coxae IV, St5 absent. Surface of sternal shield smooth. Ventral shield with some shallow pits, only some muscle scars and some very short and needle-like sensory organ can be seen. Six pairs of ventral setae smooth and needle-like (ca 9-13 µm). Adanal (*ad1* and *ad2*) and postanal (*pa*) setae smooth and needle-like, but longer than ventral setae (ca. 19-22 µm). Genital shield linguliform, with short and spine-like anterior process (in some paratypes the spine-like process is apically divided into two small points) and without sculptural pattern. Genital shield placed between coxae III and IV (Fig. I, 4). Prestigmatid part of peritremes long and apically hook-shaped, poststigmatid part short and straight (Fig. II, 5). Tritosternum (Fig. II, 1) with narrow basis, tritosternal laciniae divided into three smooth branches.

Gnathosoma (Fig. II, 2) - Corniculi horn-like and covered by gnathosoma (only apical part visible), internal malae needle-like, posteriorly with wide plates, paralaciniae well developed and quadrangular. Hypostomal setae smooth and needle-like, h1 situated on lateral part of gnathosoma and on protuberances long (ca

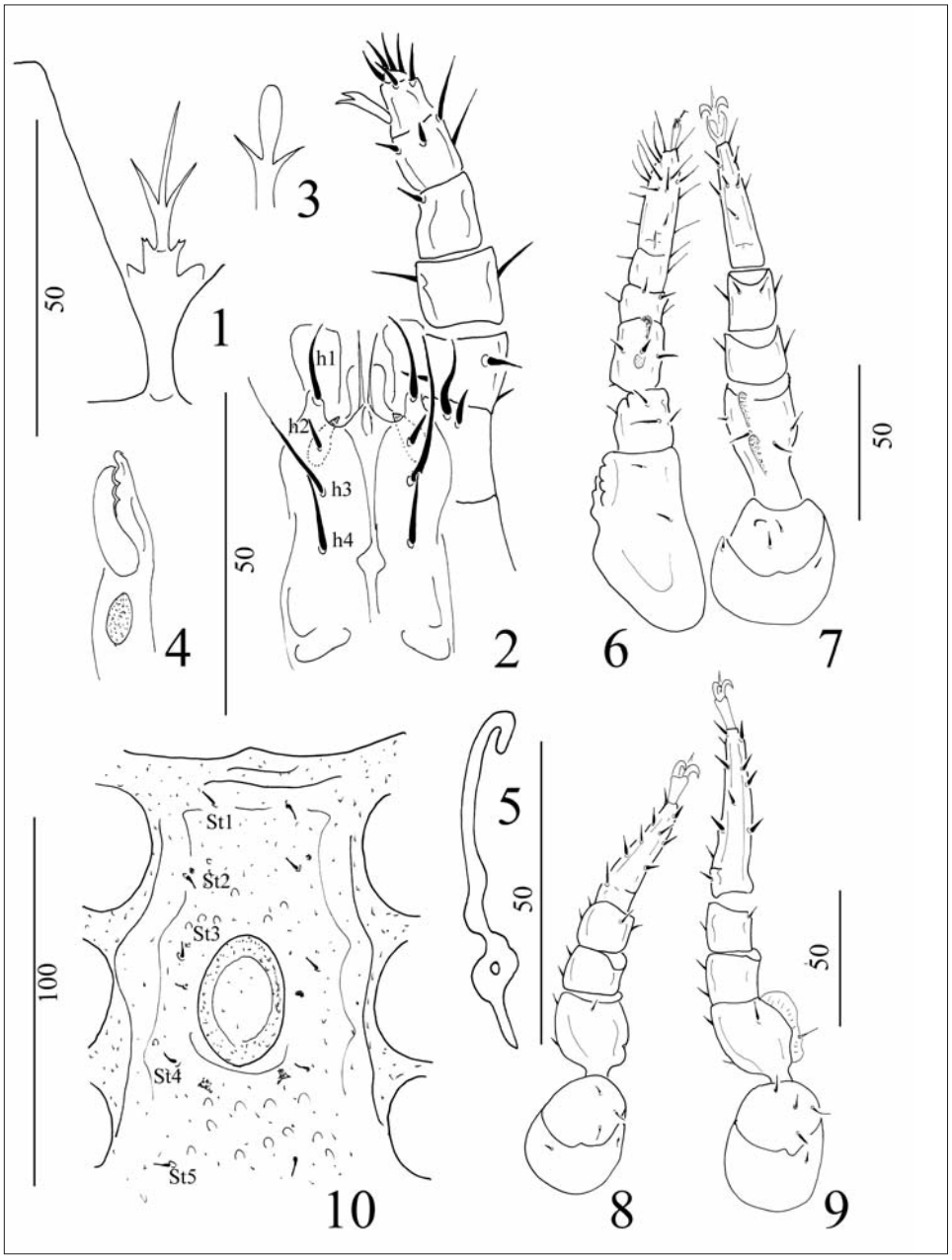

Fig. II – *Nenteria extremica* n. sp., female. 1. Tritosternum; 2. Ventral view of gnathosoma; 3. Apical part of epistome; 4. Chelicera; 5. Peritreme; 6. Leg I in ventral view; 7. Leg II in ventral view; 8. Leg III in ventral view; 9. Leg IV in ventral view; 10. Intercoxal area of male.

19 µm), h2 short (ca 9 µm), h3 (ca 29 µm) and h4 (ca 16 µm) long. Fixed digit of chelicera longer than movable digit, both digits bearing three teeth. Cheliceral internal sclerotised node present (Fig. II, 4). Palp bearing smooth and needle-like setae. Apical part of epistome spatuliform with two spine-like lateral branches (Fig. II, 3).

Legs (Fig. II, 6, 7, 8, 9): Setae smooth and simple, all legs bearing claws, but claws on leg I smaller than on others.

DESCRIPTION OF MALE - Length of idiosoma 410-420 µm, width 270-310 µm (n=12). Shape of idiosoma, ornamentation, and chaetotaxy of dorsal idiosoma, processes of the gnathosoma as in female. Five sternal setae smooth, needle-like and short (ca 4-5 µm) their position illustrated in Fig. II, 10. Surface of sternal shield covered by some oval pits between coxa II and between coxae IV. Position and shape of ventral setae same as in female. Genital shield oval, placed between coxae III.

DESCRIPTION OF DEUTONYMPH - Length of idiosoma 370-380 µm, width 280-290 µm (n=6). Shape of idiosoma oval.

Dorsal idiosoma (Fig. III, 1): Dorsal setae and ornamentation similar to that of female, but pilose setae absent. Caudal margin of body undulate.

Ventral idiosoma (Fig. III, 2): Sternal shield covered by oval pits situated in two longitudinal rows. Caudal margin of sternal shield 1.5 times as wide as apical margin. Sternal setae smooth and needle-like (ca 6-7 µm), St1 placed at level of anterior margin of coxae II, St2 at level of central area of coxae II, St3 at level of anterior margin of coxae

III, St4 at level of posterior margin of coxae III, St5 at level of posterior margin of coxae IV. Ventrianal shield covered by oval pits near anterior margin. Six pairs of smooth and needle-like setae (ca 7-8 µm) situated on ventrianal shield. Adanal setae (ca 12-13 µm) longer than ventral setae. Needle-like and smooth setae placed on platelets situated on ventral margins of body. Peritremes long with two bends. Tritosternum with narrow basis, its laciniae smooth and divided into three branches (Fig. III, 3).

Gnathosoma (Fig. III, 4): Corniculi horn-like and covered by gnathosoma, internal malae needle-like, paralaciniae well developed and rounded. Hypostomal setae smooth and needle-like, and ca 22-29 µm, h1 situated on lateral part of gnathosoma and on protuberances. Fixed digit of chelicerae with one lateral tooth and longer than movable digit, both digits bearing three teeth. Cheliceral internal sclerotised node present (Fig. III, 6). Apical part of epistome needle-like with four spine-like lateral branches (Fig. III, 5).

DESCRIPTION OF PROTONYMPH - Length of idiosoma 330-340 µm, width 220-240 µm (n=11). Shape of idiosoma oval.

Dorsal idiosoma (Fig. IV, 1): Podonotal shield, pygidial shield, and two larger, lateral shields and several marginal platelets covered by small oval pits. Podonotal shield with five pairs of smooth and needle-like setae (ca 7-8 µm), marginal platelets with one smooth and needle-like seta (ca 12-13 µm), pygidial and two lateral shields without setae.

Ventral idiosoma (Fig. IV, 2): Sternal shield without ornamentation. Sternal setae smooth and needle-like (ca 5-6 µm), St1 placed near anterior margin of sternal shield, St2 at level of posterior margin of coxae II, St3 at level of posterior margin of coxae III. Four pairs of smooth and needle-like (ca 6-7 µm) setae situated on small platelets between sternal and anal shields. Anal shield with two pairs of adanal setae (ca 6-7 µm), postanal seta absent. Peritremes 7-shaped. Tritosternum with narrow base, its laciniae smooth and divided into three branches (Fig. IV, 3).

Gnathosoma (Fig. IV, 4): Corniculi horn-like and covered by gnathosoma, internal malae needle-like, paralaciniae not visible. Hypostomal setae smooth and needle-like, and h1, h3 and h4 long (ca 9-12 µm), h2 shorter (ca 4 µm). Setae h1 situated on lateral part of gnathosoma and on protuberances.

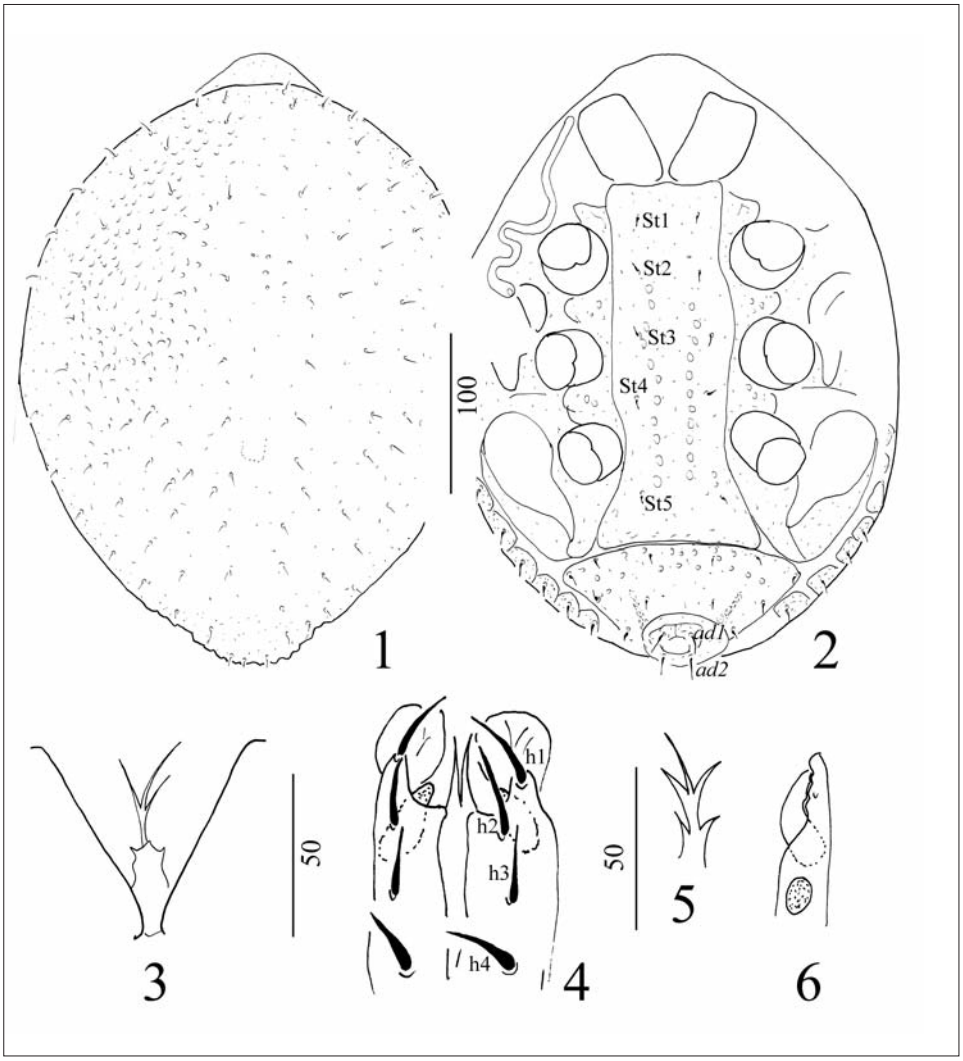

Fig. III – *Nenteria extremica* n. sp., deutonymph. 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma; 3. Tritosternum; 4. Ventral view of gnathosoma; 5. Apical part of epistome; 6. Chelicera.

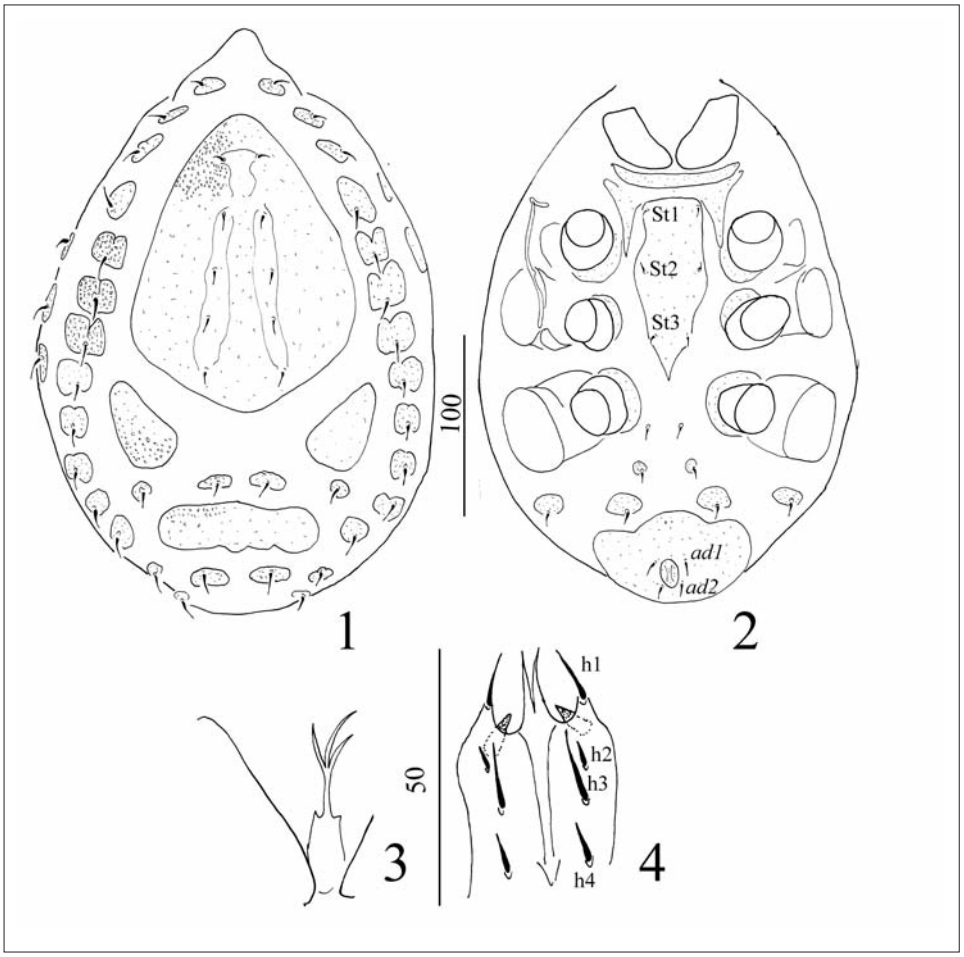

Fig. IV – *Nenteria extremica* n. sp., protonymph. 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma; 3. Tritosternum; 4. Ventral view of gnathosoma.

ETYMOLOGY – The name of the new species refers to the extreme positions of the corniculi and setae h1.

REMARKS - The new species belongs to the *Nenteria stammeri*-species-group on the basis of the presence of claws on tarsi I, the position of the genital shield of the female and the shape and length of dorsal setae. This species group contains 15 species, from Europe, South-Eastern Asia and South-America (HIRSCHMANN & WIŚNIEWSKI, 1985; WIŚNIEWSKI & HIRSCHMANN, 1993). Only one species (*N. mesoamericana* Wiśniewski & Hirschmann, 1985) is reported from an unknown Curculionid beetle species. This species was described on the basis of deutonymph; the differences between *N. mesoamericana* and *N. extremica* are summarized in Table 1. The other species of the *Nenteria stammeri*-species group were collected from soil, moss, dung, bark of trees, compost and bird nests; these species are known as adults as well. The shape of the paraliciniae and the covered corniculi in the new species are unique character states within the *N. stammeri*-group, which can be identified in all known stages.

The new species also differs from the other species of *N. stammeri* species-group on the basis of several characters.

Table 1 – Distinguishing characters between the deutonymphs of *Nenteria extremica* and *N. mesoamericana.*

	Nenteria extremica	*N. mesoamericana*
Caudal margins of dorsal idiosoma	undulate	smooth
Sculptural pattern of dorsal shield	covered by oval pits	dotted
Setae number on ventrianal shield	6	5
Setae h2	as long as h1	shorter than h1
Margins of setae h2 and h3	smooth	pilose
Paralaciniae	rounded, without incision	rectangular, apically with a wide V-shaped incision
Apical part of epistome	peaked	rounded

The surface of the female genital shield is smooth in the new species, but ornamented in the species *N. micherdzinski* Hirschmann & Zirngiebl-Nicol, 1969; *N. pilosellaoides* Hirschmann & Hiramatsu, 1978; *N. jabanica* (Vitzthum, 1931); *N. argentinensis* Hirschmann, 1978; *N. kashimensis* Hiramatsu, 1979; *N. pacifica* (Vitzthum, 1935) and *N. stammeri* Hirschmann & Zirngiebl-Nicol, 1962. Two species (*N. hyatti* Hirschmann & Wiśniewski, 1985 and *N. ritzemaisimilis* Hirschmann & Hiramatsu, 1978) have a smooth genital shield in the females, while the spatuliform apical part of epistome of *N. hyatti* is missing and the new species is ornamented by oval pits, in contrast *N. hyatti* has punctate ornamentation on dorsal shield. *N. ritzemaisimilis* has a smooth genital shield in females similar to the new species, while the dorsal shield of the known species is not ornamented, on the contrary with the new species (*N. extremica)*, where the dorsal shield is ornamented by oval pits.

Four species are described on the basis of males – *N. pilosella* has a smooth sternal shield, which is ornamented in *N. extremica*. The dorsal shield is covered by oval pits in the new species, but it is smooth in *N. ritzemai* (Oudemans, 1903). The anterior area of the sternal shield is ornamented in *N. semiporula* Hirschmann & Wiśniewski, 1985, and its peritreme has a large hook on the apical area of prestigmatid part. In contrast, the anterior area of the sternal shield is not ornamented and the apical hook on the poststigmatid part of the peritremes is small in *N. extremica*. *Nenteria uropodina* (Berlese, 1918) was collected in Tahiti; *N. uropodina* differs from the new one in the ornamentation of sternal shield. This species has rounded genital shield and setae St4 are situated at level of central area of genital shield, in contrast with the new species, where genital shield is oval and setae St4 are placed at level of posterior margin of genital shield.

The new species also differs from the previously recorded European *Nenteria* species. The shape of the paraliciniae and the covered corniculi in the new species are characters not observed within European *Nenteria* species. The new species also differs from the European species in the shape of anterior process of the genital shield (spine-like in *N. extremica* and absent or long in the European ones) and in the ornamentation of genital shield (this is absent in *N. extremica* and mostly ornamented by pits in the European species). Similar species with short and spine-like apical process on genital shield and with smooth surface on genital shield in females are not observed in the Europe.

NOTES ON BIOLOGY - Adult specimens and the immature stages were collected from cocoons of RPW; deutonymphs were collected from the body of the weevil, in particular attacked to its legs. We have little information about the biology of this mite. Because the adults were collected on the cocoons, we suppose that this species can feed nematodes, maggots, fungi or organic matter which can be lived on and around the cocoons, and therefore use the weevils as a means of transportation only. The status of this species as predator/parasite needs further studies.

NOTES ON UROPODINA MITES ASSOCIATED WITH RED PALM WEEVIL

EL-BESHLAWY & ALLAM (2007) described a new genus (*Aegyptus* EL-Beshlawy & Allam, 2007) and placed it into the family Trachyuropodidae. Subsequently ALLAM & EL-BESHLAWY (2010) added several contributions to the morphology of *Aegyptus rhynchophorus* El-Beshlawy & Allam, 2007. AL-DHAFAR & AL-QAHTANI (2011) then described a new species from this genus (*Aegyptus alhassa* Al-Dhafar & Al-Qahtani 2011), without type designation, therefore this name is unavailable. On the basis of the figures of EL-BESHLAWY & ALLAM (2007) and ALLAM & EL-BESHLAWY (2010), *Aegyptus rhynchophorus* El-Beshlawi & Allam, 2007 and the unavailable *Aegypthus alhassa* Al-Dhafar & Al-Qahtani 2011 are junior synonyms of *Centrouropoda almerodai* Hiramatsu & Hirschmann, 1992. This also means that *Aegyptus* is a junior synonym of *Centrouropoda.* Later AL-DEEB *et al.* (2011) collected *Uropoda* and *Uroobovella* species from RPW, but on the basis of the presented scanning micrographs and photos, this species of "*Uroobovella"* does not belong to this genus but is actually *C. almerodai.*

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