

A NEW AQUATIC ORIBATID MITE, *TRIMALACONOTHRUS CRASSIPES* N. SP. (FAMILY: MALACONOTHRIDAE), SOHAG, EGYPT

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The oribatid mite *Trimalaconothrus crassipes* n. sp. was described for the first time from the roots of the floating aquatic plant, *Eichhornia crassipes*, River Nile, Girga, Sohag, Egypt. The present species has the characteristic features that are in accordance with those of family Malaconothridae and genus *Trimalaconothrus*. The present species has specific characters compared with characters of other species of the same genus. These characters are summarized as follows: six dorsal plates, fifteen pairs of notogastral setae, three pairs of granulated rounded organs, three pairs of exobothridial setae (ex1, ex2, ex3), epimeral setal formula (I- IV) is (3-2-2-2) and each coxal epimerae II is characterized by presence of two lateral processes.

Key words: Water mites, oribatid, *Trimalaconothrus*, Egypt.

INTRODUCTION

Malaconothridae is a family of mites from the Suborder Oribatida of the Order Sarcopitiformes. The majority of malaconothrids are terrestrial mites in lichens as well as upper layers of soil [1]. Family Malaconothridae has two genera; *Malaconothrus* Berlese, 1904 and *Trimalaconothrus* Berlese, 1916 [2,3,4,5]. Variations between the two genera include size, body shape, the number of genital setae and claws on leg tarsi [2,6]. Very few members of Oribatida are found under the water surface [7] but one genus, *Trimalaconothrus*, is cosmopolitan in fresh water [8]. This genus occurs in both standing and running water where it likely feeds on detritus [9,10,11].

The identification and classification of *Trimalaconothrus* species were recorded from different regions all over the world i.e. Europe, South and North America, Asia, Africa [1,2,8,12,13,14,15,16]. The main purpose of the present paper is to describe a new species of aquatic oribatid mites under the name *Trimalaconothrus crassipes* n. sp.

MATERIALS AND METHODS

Specimens of the present species, *Trimalaconothrus crassipes* were collected from the roots of the floating plant, *Eichhornia crassipes*. The site of collection located on the western bank of the River Nile (26° 21' N and 31° 63' E) about 1km from Girga city, Sohag Governorate. The mites were extracted from the plant roots using the behavioural method of Baerman wet funnel. About 30 individuals of the present species were separated and preserved in small vials containing 70% alcohol. Each individual was singly mounted in a droplet of Hoyer's medium for measurements and illustration. The images were prepared using JEOL 5300 Scanning Electron Microscope.

Drawings were done with the help of a camera lucida. All measurements were taken by calibrated eye piece and presented in micrometers. The following measurements were made: total length from the tip of rostrum to the posterior edge of notogaster, width (at the widest part of notogaster). The prodorsal length from the tip of rostrum to the posterior edge of dorsal flexible scissure.

Identification:

The present species of mites was identified according to the keys of [1,2,15,16,17].

Terminology and abbreviations of oribatid mite setae are developed by [13,18].

Material examined: Holotype (female) and 29 paratypes (all females) from the same plant and habitat.

Type deposition: Holotype and paratypes are deposited in the Zoology Department, Faculty of Science, Sohag University.

Host: Roots of floating aquatic plant, *Eichhornia crassipes*, River Nile, Girga, Sohag Governorate, Egypt.

RESULTS

Trimalaconothrus crassipes n. sp.

Diagnosis of the adult: (Figs 1-2; Pls, 1-2)

The body of the present species is characterized with flexible scissure between prodorsum and notogaster and lacking bothridium and sensillus which are placed by simple seta. Genital and anal openings are contiguous. The genua and tibiae of all legs are similar in shape. The tarsus of each leg terminates with three claws (Tridactylous). Each genital plate with six moderate simple setae arranged in a row near the median margin.

Description of adult female: (Figs 1-2 A-E; Pls 1-2)

The body of alive specimen is elongated in shape and yellowish brown in colour. The body size measuring about 592 μm x 328 μm in length and width, respectively. The body consists of two regions, prodorsum and notogaster; the latter is separated from the prodorsum with flexible scissure (s). The cuticle of the body regions is confined to the small rounded pits which differ in their size (clearly visible under high magnification). The prodorsum (pr) measuring about 176 μm in length and 160 μm in width and has a rostrum, palpi and chelicerae. The rostrum consists of a rostral shield and two lateral portions. The rostral shield is distinguished by lateral S-shape ridges which covered by densely punctuate cuticle, rounded anterior tip and transverse posterior ridge. The rostral shield carries two pairs of pilose setae, two pairs of simple setae and a pair of granulated rounded organs. The first pair of pilose setae (rostral setae, ro) locates on the anterior margin of the rostral shield, while the second pair of pilose setae (lamellar setae, le) locates posterior to the first one (ro). The rostral setae (ro) are shorter than the lamellar ones (le). The first pair of simple setae (interlamellar setae, in) is very long and lies on the posterolateral margin of rostral shield, while the second pair of simple setae (exobothridial setae, ex1) is very short and situates lateral to the interlamellar setae (in). The rounded organs (go1) filled with pigmented granules, observed under the cuticle and located anterior to the transverse ridge of the rostral shield. Each lateral portion of rostrum has lateral carinae and a pair of exobothridial setae (ex2, ex3). The lateral carinae are well-developed and reach to insertions of rostral setae (ro). Each carina characterized with medially-directed transverse extension (located laterally to lamellar setae, le).

Each pedipalp (p) consists of five segments. P-1 is the longest one and rectangular in shape without setae. P-2 is triangular in shape with one pilose seta. P-3 is rectangular in shape and carries a pair of pilose setae. Palpal tibia (P-4) is rectangular in shape and bears a pair of pilose setae and a solenidion. Palpal tarsus (ta) (P-5) is nearly circular in shape and carries nine different sized solenidia (so) and three simple setae. Chelicerae (ch) are chelate-dentate with three segments, a base and two chelate digits (one fixed and the other movable). Each chela bears three teeth. Cheliceral setae (cha, chb) are distinct, simple and dorsolaterally positioned.

The notogaster (no) of the present species measuring about 416 μm in length and 328 μm in width. The notogaster is shield-shaped and characterized by straight anterior margin and parallel lateral margins in anterior half, converging in posterior half. The notogaster ridges are present which divide the notogaster into three pairs of plates (one central, two paracentral, two laterals and one opisthosomal). The plates of the notogaster

surface bear fifteen pairs of setae (12 pairs pilose and 3 pairs simple), two pairs of granulated rounded organs and three pairs of lyrifissures. The central (cp) and paracentral plates (pp) are elongated in shape and decorated with small rounded pits. The central plate (cp) carries four pairs of short pilose setae which arranged in longitudinal row (c1, d1, e1 and h1). Each paracentral plate (pp) bears one pair of short pilose seta (c2 and d2) and a single lyrifissure (ia) behind c2. Each lateral plate (lp) is slightly trapezoidal in shape, ornamented with very small rounded pits and bears five short pilose setae (c3, cp, e2, f2 and h3), a pair of very long simple setae on tubercles (e3, h2), a pair of granulated rounded organs (go2, go3) and two lyrifissures (im and ip). The opisthosomal plate (op) is semi-circular in shape, with anterior concave margin and posterior convex one. This plate decorated with densely punctuate cuticle (slightly elongated) and carries two pairs of setae (one pair pilose and the other one is simple).

The ventral side displays groups of coxal epimerae, anogenital and lateral regions. All groups and regions are ornamented with finely rounded pits. Coxal epimerae groups are distinctly chitinized laterally and divided into two groups (first and second). The first group of coxal epimerae contains epimerae I and II, while the second one includes III and IV. Each coxal epimerae I (ce1) bears three short simple setae (1a, 1b, 1c). Each coxal epimerae II (ce2) is characterized by presence of two lateral processes and bears two short simple setae (2a and 2b). The antero-lateral process of coxal epimerae II is shorter than the postero-lateral one. Each of coxal epimerae III (ce 3) and IV (ce4) carries a pair of short simple setae (3a, 3b and 4a, 4b), respectively. Setation formula of coxal epimerae (I- IV) is (3-2-2-2).

Anogenital area includes anal and genital regions. The genital region includes a genital opening, a pair of genital plates, a pair of aggenital plates and a pair of pregenital plates. The genital opening is elongated, slit-like structure and guarded by two pairs of plates (genital and aggenital plates). The genital plates (g) are elongated in shape and carry six pairs of simple setae which are directed backwardly (g1- g6). The aggenital plates (ag) are pear-like in shape and carry three pairs of genital discs and lacking setation. In addition, there is a pair of pregenital plates (pre) which are triangular in shape and decorates with finely rounded granules. The anal region overlaps with the genital region and contains anal opening, a pair of anal plates and a pair of adanal plates. The anal opening is long slit-like structure and surrounded by two pairs of plates (anal and adanal plates). The anal plates (a) are elongated and thinner than adanal ones (ad) in width and without setation. The adanal plates (ad) are oval in shape and carry three pairs of short simple setae (ad1- ad3) and a pair of lyrifissure (iad) which is located on the anterior part of adanal plates in front of ad3 setae. The lateral regions of ventral side

carry a pair of lyrifissures (ih) in the anterior half and four pairs of simple setae in the posterior half, respectively. The postero-lateral pairs of setae are the longest and borne on tubercles.

Each leg from I- IV (11-14) has five segments and carries pilose and simple setae, finger-like projection setae and solenidia. Tarsus of each leg terminates with three claws (tridactylous, tri). The median claw is thicker and shorter than the lateral ones. The tarsus setae of each leg known as (ft, ft', tc', tc'', u', u'' and pv). In addition, tarsus of leg I carries a pair of simple setae, while tarsus of leg III carries single simple seta. Leg I is the shortest of all and followed by II, III and IV. Formulae of leg setation and solenidia indicated in Table (1). Paratypes measurements are shown in Table (2).

Table (1). Leg setae and solenidia of *Trimalacnothrus crassipes* n. sp.

Leg	Trochanter		Femur		Genu		Tibia		Tarsus	
	setae	solenidia	setae	solenidia	Setae	solenidia	setae	solenidia	setae	solenidia
I	0	0	4	0	4	0	5	1	6	3
II	0	0	5	0	3	0	4	1	4	2
III	0	0	3	0	1	0	3	1	5	0
IV	0	0	1	0	1	0	2	0	4	0

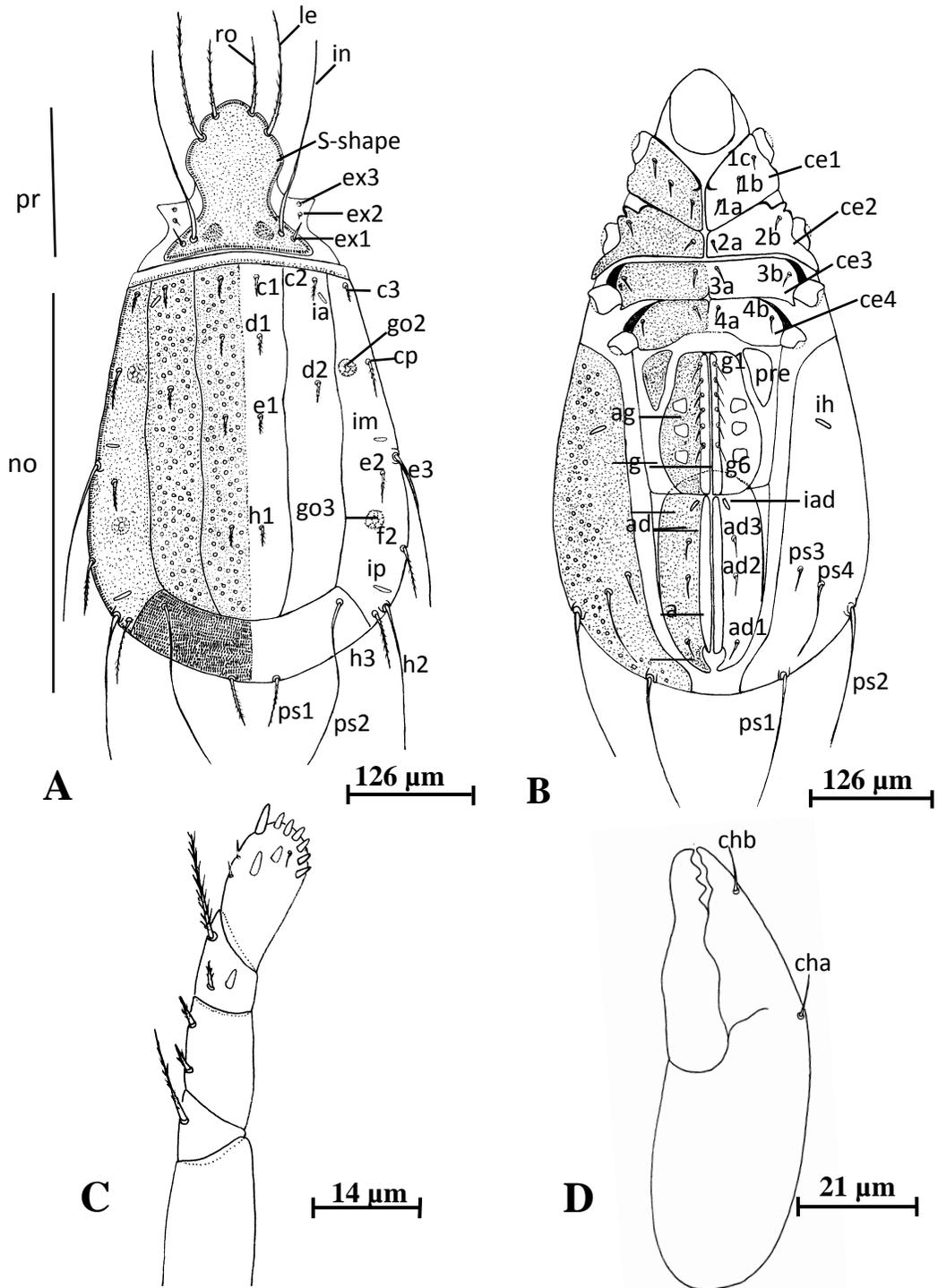


Fig. 1. Camera lucida drawings of the adult female of *Trimalaconothrus crassipes* n. sp. showing A, dorsal view; B, ventral view; C, palp; D, chelicera.

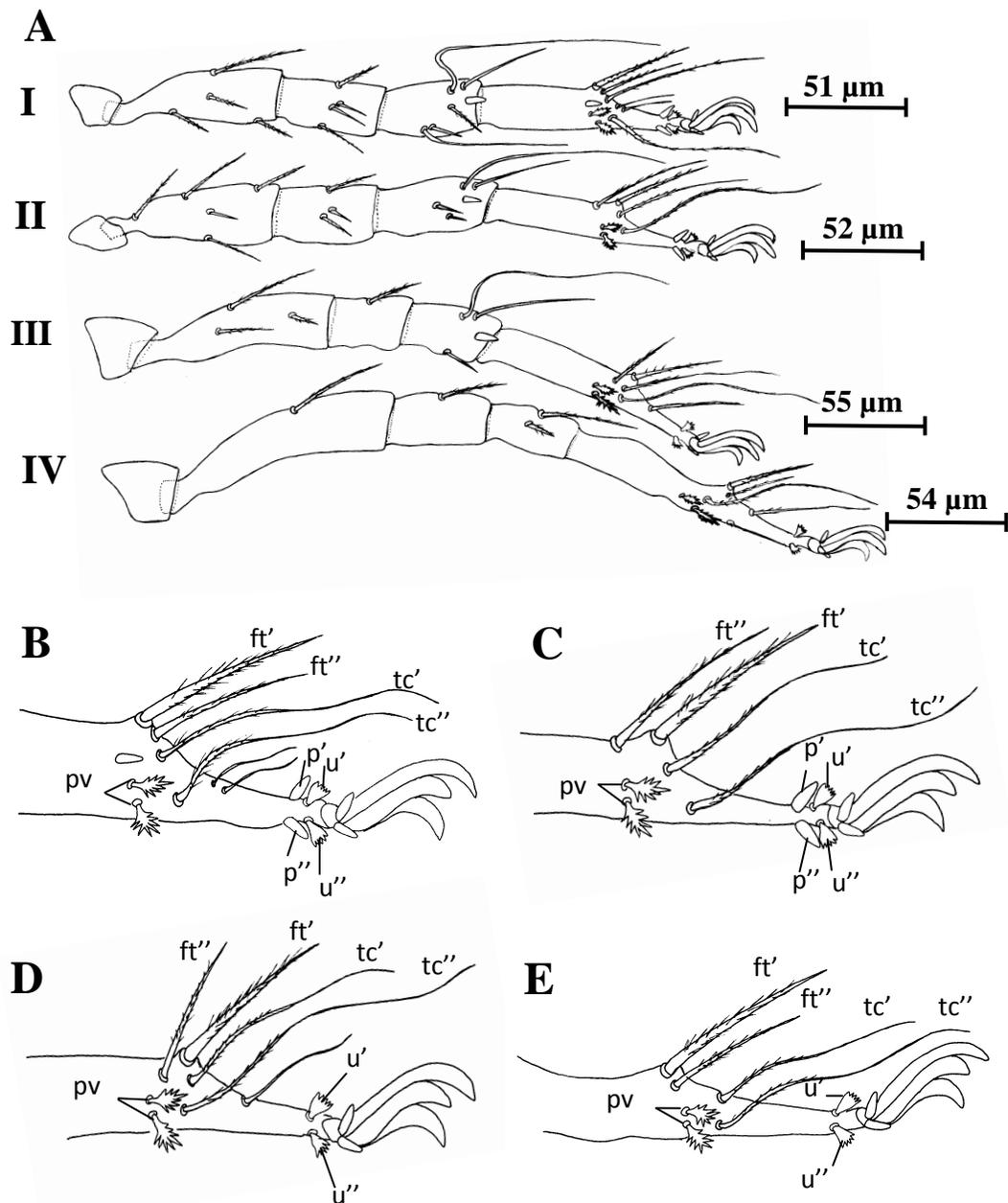


Fig. 2. Camera lucida drawings of adult female of *Trimalaconothrus crassipes* n. sp. showing A, legs (I- IV); B- E, enlarged part of (A) showing leg tarsus I, II, III and IV, respectively. Single prime (') marks setae on anterior and double prime (') marks setae on posterior side of the given leg segment.

Table (2). Paratypes measurements (μm) of different morphological characters of *Trimalaconothrus crassipes* n. sp.

Characters	Body		Prodorsum		Notogaster	
Parameters	Length	Width	Length	Width	Length	Width
Mean\pm SD	577 \pm 23	323 \pm 15	178 \pm 11	160 \pm 11	399 \pm 26	323 \pm 15
Max	600	344	200	184	432	344
Min	504	296	160	136	304	296
Characters	Coxal epimera I		Coxal epimera II		Coxal epimera III	
Parameters	Length	Width	Length	Width	Length	Width
Mean\pm SD	64 \pm 6	87 \pm 6	70 \pm 8	99 \pm 7	50 \pm 4	79 \pm 5
Max	80	104	88	112	64	88
Min	56	80	48	80	48	72
Characters	Coxal epimera IV		Genital area		Anal area	
Parameters	Length	Width	Length	Width	Length	Width
Mean\pm SD	54 \pm 4	85 \pm 6	129 \pm 6	103 \pm 8	131 \pm 7	92 \pm 8
Max	64	96	144	120	152	104
Min	48	72	112	80	112	64
Characters	Leg I	Leg II	Leg III	Leg IV		
Parameters	Length	Length	Length	Length		
Mean\pm SD	275 \pm 14	287 \pm 13	302 \pm 10	322 \pm 18		
Max	296	312	320	376		
Min	248	264	280	296		

DISCUSSION

According to the keys of families, genera and species [1,2,8,12,13,14,15,16,17] the present species has the characteristic features of family, Malaconothridae where the body of individuals is more or less dorso-ventrally flattened, typically with a flexible scissure between prodorsum and notogaster. Ventrally, the body has a complex of genital-aggenital and anal-adanal plates and pseudostigmatic organ (sensillus and bothridium) are absent and are placed by simple setae (exobothridial seta, ex1). The present species has dorsal lyrifissure (ia) which located behind c2. The distance between dorsal setae c1- c1 is similar to d1- d1. Each genital plate has 6 to 8 setae arranged in a row near the median margin. The tarsus of each leg terminates with three claws (tridactylous). These characters are in accordance with the genus *Trimalaconothrus*. The Comparison between the specific characters of the present species, *Trimalaconothrus crassipes* and those of the other related species for the same genus suggests that the present species is a new one. The present species, *Trimalaconothrus crassipes* n. sp. has the following specific characters:

- 1- Six dorsal plates (one central, two paracentral, two laterals and one opisthosomal).
- 2- The plates of the notogaster surface bear fifteen pairs of setae (12 pairs pilose and 3 pairs simple).
- 3- Three pairs of dorsal lyrifissures (ia, im and ip).
- 4- Three pairs of granulated rounded organs (go1, go2 and go3).
- 5- Three pairs of exobothridial setae (ex1, ex2 and ex3).
- 6- Setation formula of coxal epimerae (I- IV) is (3-2-2-2).
- 7- Each coxal epimerae II is characterized by the presence of two lateral processes.
- 8- Six pairs of genital setae.
- 9- Two pairs of ventral lyrifissures (ih and iad).

Finally, the systematic position of the present species is:

Phylum	: Arthropoda	von Siebold, 1848
Subphylum	: Chelicerata	Heymons, 1901
Class	: Arachnida	Cuvier, 1812
Subclass	: Acari	Leach, 1817
Superorder	: Acariformes	Zakhvatkin, 1952

Order	: Sarcoptiforms	Reuter, 1909
Suborder	: Oribatida	Van der Hammen, 1968
Superfamily	: Crotonioidea	Thorell, 1876
Family	: Malaconothridae	Berlese, 1916
Genus	: <i>Trimalaconothrus</i>	
Species	: <i>crassipes</i>	

Etymology: The specific name of the present mite species "*crassipes*" refers to the specific name of the host plant.

List of plates

- Plate 1.** Scanning electron micrographs of the adult female of *Trimalaconothrus crassipes* n. sp. showing: A, Dorsal view of prodorsum and notogaster; B, Enlarged prodorsum; C, Rostral and lamellar setae; D, Notogastral plates; E, ventral view; F, Palpal tarsus and mouth opening; G, Serrated seta of tibial pedipalp; H, Coxal epimerae (I, II, III, IV).
- Plate 2.** Scanning electron micrographs of the adult female of *Trimalaconothrus crassipes* n. sp. showing: A, Anogenital region; B- E, tarsal setae on legs I and III, respectively; F, Tridactylous claws of legs. Single prime (') marks setae on anterior and double prime ('') marks setae on posterior side of the given leg segment.

Plate 1

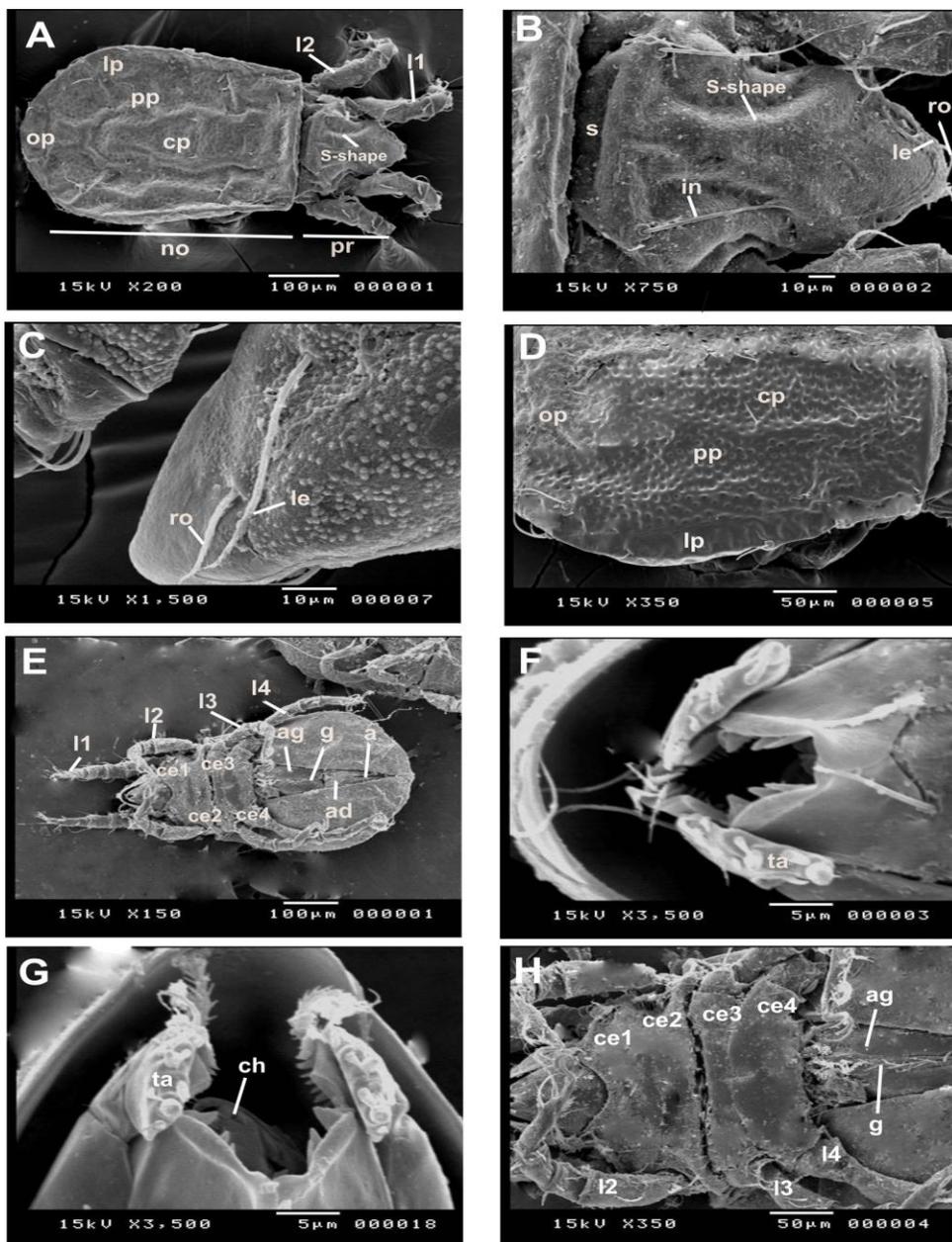
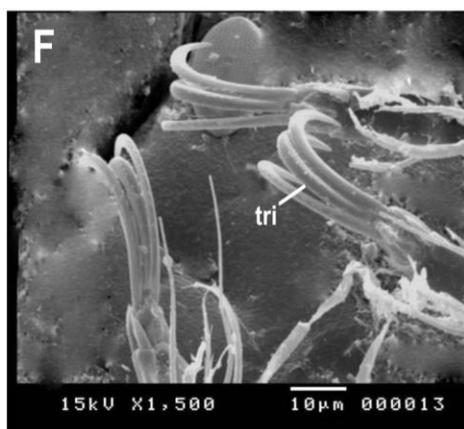
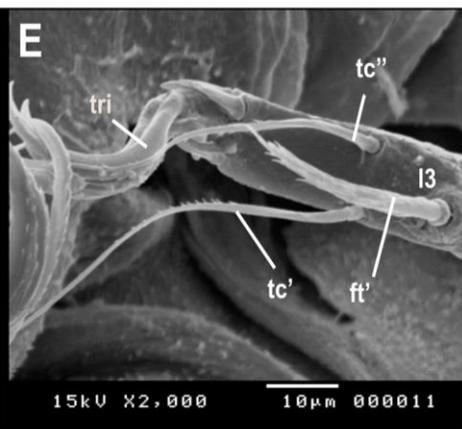
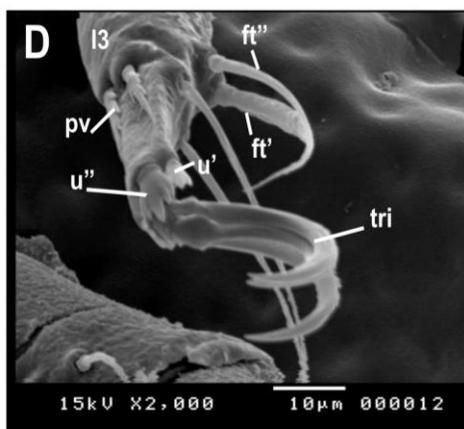
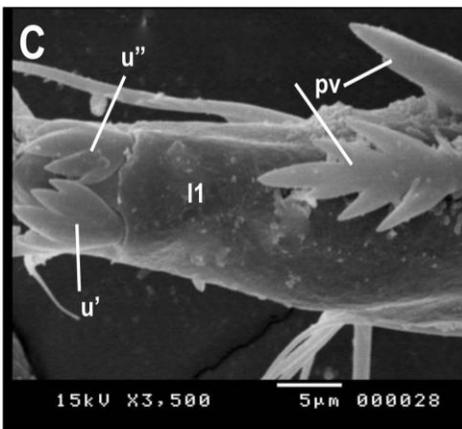
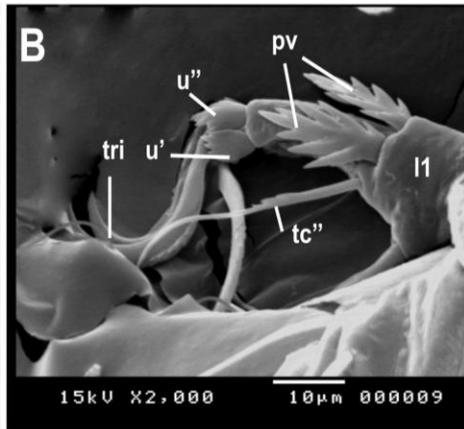
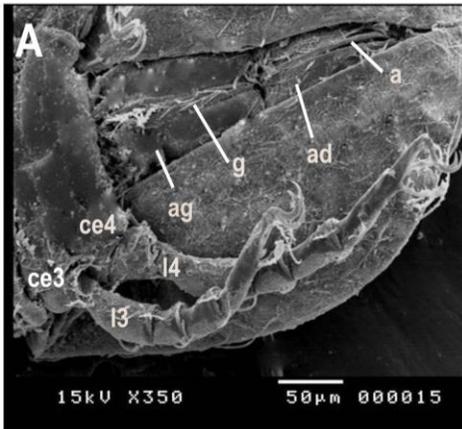


Plate 2



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نوع جديد من الأكاروس المائى الخنفسى ترأى مالاكونوترس كراسيبس

(عائله: مالاكونوتيريدى) سوهاج - مصر

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