International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Some Observation Structure of Mite (Uropods Sp., Muller, 1776) Affects the Red Palm Weevil Beetles (Rhynchopolipus Ferruginus, Oliv) (Coleoptera: Curculionidae) by Scanning Electron Microscopy

AlSaqabi, Souad M.

Department Biology, Faculty of Science and Arts, Qassim University in Genizah

Abstract: ***During 2011-2013, the results of a new study showed that Trichouropoda Sp.(Fam.:Uropdidae)Adult and deutonymphal stages was recorded in Kingdom of Saudi Arabia associated the red palm weevil, Rhynchophorusferruginous (Oliver) (Coleoptera: Curculionidae) From was observed under its elytra. Heavily infested were collected from palm farms in Eastern province (Al-Hasa and Dammam). And thestrain of bacteria was isolated from mites; Light and scanning electron microscopy were used to description some morphological structures of this recorded mite.***

Keywords: *Trichouropodapatina*(Canestrini), Deutonymphs, *Uropodidae*, *Rhynchophorus ferrugineus*, Saudi Arabia

1. Introduction

Date palm tree has great socioeconomic importance in Arab countries. It attacks by several pests and diseases which considerable damage on dates and results direct loss in date protection. The major pests that normally attack dates in the field are red Palm weevil *Rhynchophorus ferruginous* oliver (Coleoptera: Curculionidae). In Arabia, the pest recorded in the United Arab Emirates in **1986**, Saudi Arabia in **1987**, in Egypt **1993** (**Cox, 1993**), Jordan and Israel in **1999** (**Kehat, 1999**).

During the past years information gathered has revolutionized our understanding of kind of mites' taxonomy, genetic diversity, host relationship and epidemiology (**Bajerlein and Bloszyk, 2003, 2004**)

Relationships between mites and insects have been studied by many authors (**Gwiazdowicz, 2000; Bajerlein and Przewozny, 2005 and Perneke*t al.* 2008**). However, there is little information on the mites associated with RPW.

In many groups of mites from order Gamasida, Actinedida and Acaridida attach to author animal for dispersal were observed (**Binn,1973 ,1982 ; Hunter and Rosario, 1988 ; Houcck and Oconnor,1991 ; Krantz *etal*., 1991; Athias-Binche, *etal*., 1993 ;Athias-Binche,1994., Fain *etal* ., 1995 and El-Sharabasy,2010**) , According to literatures among the Uropodidae, the most common species in livestock and poultry manure is *Fuscuropoda vegetans* (DeGeer) is predacious on first-instar house fly larvae but is unable to subdue larger larvae.It is usually unable to pierce the chorion and feed on fly eggs. In addition to fly larvae, *F. vegetans* feeds on nematodes and organic matter in the manure. (**Rives and Barnes .1988**).

Recently a study of gamasid mites from bracket fungi broad-leaved forests of Europe was published (**Gwiazdowicz and Lokomy, 2002**). The ecological roles of most phoretic mites associated with *R. ferruginous* Oliver are poorly known. In recent years increased research attention has been directed towards the role of chemical information in Arthropoda biology. As hyperphoresy is rarely described especially among Uropodidae.

The present study aimed to show scanning electron microscopy of one interesting case in the palm beetle, which have been observed the uropodid mites identification and description in Saudi Arabia first time by SEM.

2. Materials and Methods

The uropodid mites were collected from Red palm beetle weevil *Rhynchopolipusferruginous*, Oliv. (Coleoptera: Curculionidae) in thethoracic segment under wings under elytra, the adults weevil were collected from damaged trunks of infested trees from palm farm, Dammam and Al-Hasa area during 2011 (Eastern area of Saudi Arabia). The weevils transferred to the laboratory carefully. Mites were stored in 70% alcohol, cleared in Nesbitt`s solution and mounted in Hoyer`s medium. Specimens were examined and identified by using keys (**Krantz ,1978 ; Zaher, 1986**) ,The characters of specimens were described (**Fashing and Chua, 2002**) in King Saud university (Research Center, Departmentsof ScienceandMedical Studiesatthe Universitystrive againstthe King Saud university in Riyadh) SEM.

3. Results

The study is showing the 6 different types of scimitar-shaped setae and feather-like on the end of the dorsal (Idiosoma). Marginal shield displays anal veolar ornamentation and covered with long scimitar- shaped setae, aspect of mites showing in (Fig9.) and different kind of setae C: setae denticulate Can be used to differentiate between species ,Sensory system of Mesostigmata mites comprises sensory organs informing mites on the state of their inner medium, on the state of the environment, and on the presence and location of food and sexual partner; the latter

receptors are concentrated in palps and fore tarsi (**Leonovich 2005**) (Figs 8).The palpal organ is situated on the tip of each palp tarsus (Figs 8 F,G). There is10 sensilla of 4 structural and functional types (Figs 9); this set is typical of the majority of Mesostigmata mites, excluding endoparasitic species (**Leonovich 1998**).The study is showing the 6 different types of scimitar-shaped setae and feather-like on the end of the dorsal (Idiosoma). Marginal shield displays anal velour ornamentation and covered with long scimitar-shaped setae, aspect of mites showing in (Figs 9, 10) and different kind of setae denticulate Can be used to distinguish between different species .

Dorsum **(Fig. 1)**
Dorsal idiosoma oval, 690 long x 550 wide, slightly narrowed anteriorly, well sclerotized, brown. Dorsal plate intact, strongly convex, its surface with weak net-likeornamentation and small circular markings. Plate surrounded by an entire marginal plate. Marginal plate narrow, finely edged with short incisions, bearing 15 pairs of setae. Dorsal plate with a large number of relatively short, simple thorn-like setae, setae not reaching insertion of following setae. Posterior half of dorsum ornamented with small rounded hollows, some of them associated with the bases of setae, others without setae; these hollows absent from anterior half of plate.

Venter **(Fig. 2 A.B.C)**
Epigynial plate 327 long and 173 wide, helmet-like, oblong, with obtusely pointe anterior margin; posterior margin behind coxae IV, anterior point between coxae I. Surfaceof plate with 6–12 circular markings in posterior half. The ventral region with 5 pairs of sternalsetae, 12–13 pairs of ventri-anal, and 27 pairs of marginal setae. Ventrianal plate ornamented with small rounded hollows, some of them associated with the bases of setae. All ventral setae simple, smooth, needle-like. Anterior end of peritremes hooklike at the level of coxae II, curved at level of coxae I–II, tip directed inward. Stigmatalopenings followed by short posterior prolongation of peritreme. Endopodal line present,reaching to coxae II. Exopodal plate with surface reticulation, metapodal plates withoutornamentation, ventral region ornamented with small circular markings. Pedofossalgrooves distinct and well developed, without net-like ornamentation, withmicropunctation. Anal opening 40 long and 27.7 wide. Anal setaeandother region setae short and thorn-like, about 13 long. Post-anal seta *U* present, similarin form to the other ventral setae.

Gnathosoma **(Fig. 3 A,B)**
Setae *C1* simple, smooth, thorn-like, almost reaching end of laciniae; setae *C2*, *C3*, *C4*branched. Setae *C2* with 3–4 sharp points apically; *C4* with 4–5 fine denticulationslaterally, *C3* longest, with 2 lateral denticles, length 3 x *C2*. Corniculus 3-pronged, with blunt ends. Hypostomal constrictions present between *C3–C4*.

Chelicerae**(Fig. 3)**
multidentate, with nodus, movable digit 18 long, fixed digit 27 long, middle part 72 extended. Tritosternum vase-shaped basally, with a mediolateral denticle, laciniaelaterally denticulate; tip trifid, lateral branches pilose and longer than medial point, medialend with two lateral denticles . Epistome with a triangular base and denticulatelateral margins.

Legs **(Fig. 4,5)**
Coxa I large, tarsi on all legs with a pair of claws at the tip of ambulacral prolongation;setae on all legs simple and thorn-like. Femora and trochanters are bearing a membranousflange.

4. Discussion

Tricouropoda sp. adults and deutonymphus recorded in Saudi Arabia phoretic on RPW. It was collected with heavily infested were collected from palm farms in Eastern province (Al-Hasa and Damam). Results recorded strain of bacteria was isolated from mites; Uropodidae is a cosmopolitan large family consisting of *fungivorous*, insect associated and occasionally predators (**Krantz, 1978**). Many uropodids occur commonly in litter, soil, moss, rotting wood and nests of insects (**Petrova *et al.*, 2004**). This mite is playing an important role in increasing dispersal of small organisms. The phenomenon is not common in the literature and other authors usually have recorded only infrequent cases of hyperphoresy among different groups of mites (**Chmielewski, 1977**). It is still unknown why most mites were found on elytra and on the underside of a beetles' body on the third pair of legs. (**Bajerlein and Bloszyk , 2004**) this kind were feeding in fungus it was full environment of inside the palm this protect the weevil alive long more time. *Trichouropoda* this is one of the largest Uropodina genera. The main characteristics of the genus *Trichoropoda* are the following (**Hirschmann,1993**) : Idiosoma: Shape oval or circular. Gnathosoma are setiform, smooth and longer than the other setae. short and with serrated margins. Corniculi horn-like. Laciniae smooth , hairs. serrated margin on the Epistome. Tritosternum with some branches. Chelicerae without nodus. The species of the genus *Uropods*are distributed all over the world, and they are known from Kenya, Chad, Tanzania, Zaire and the Republic of South Africa ,Turkey (**Kontschan,2006**; **Durmuş, 2006**).

5. Conclusions

In *Trichouropoda* sp. six types of sensillae were distinguished from scanning electron microscope investigations of the sensory organ on palps and fore tarsi. Themain distinctive receptor organ of *Trichouropoda* sp. , situated on the tarsus of each fore leg and end of dorsal Idiosoma. The organ consists of 6 types of sensillae,including four distinct ones (two types of sensilla, differing in wall thickness) .

References

[1] **Athias-Binche F. 1993.** Dispersal in varying environments: the case of phoretic uropodid mites. Can. J. Zool. 71: 1793-1798.
[2] **Athias-Binche F. 1994**. La phoresie chez les acariens. Aspects adaptatifs et evolutifs. Perpignan: 178 pp.
[3] **Athias-Binche F.; Schwarz H. H., AND Meierhofer, I. 1993**. Phoretic association of Neoseiusnovus (Ouds., 1902) (Acari: Uropodina) with Nicrophorus spp.

(Coleoptera: Silphidae): a case of sympatric speciation? Internat. J. Acarol. 19: 75-86.

[4] **Rives, D. V. and Barnes, H.J. .1988.** Pseudo parasitism of broiler chicks by mites of the Family Uropodidae, Genus Fuscuropoda ,Avain Diseases, vol.32, no.3 July- Sept, 1988

[5] **Bajerlein, D. and Bloszyk, J. 2003.**Two cases of hyperphoresy in mesostigmatic mites (Acari : Gamasida : Uropodidae, Macrochelidae). *Biol. Lett.*, 40 (2) : 135-136.

[6] **Bajerlein,D.and Bloszyk, J.2004.**Phoresy of *Uropoda orbicularis* (Acari: Mesostigmata) by beetles (Coleoptera) associated with cattle dung in Poland. *Eur. J. Entomol*. **101**: 185-188

[7] **Bajerlein, D. and Przewozny, M. 2005.** *Coprophagous hydrophilid* beetles (Coleoptera: Hydrophilidae) as carriers of phoretic deutonymphs of *Uropodaarbicularis*(Acari: Mesostigmata) in Poland. Eur. J. Entomol. 102: 119-122.

[8] **Binns E. S. 1973**. Digmasellus fallax Leitner (Mesostigmata: Digmasellidae) phoretic on mushroom sciarid flies. Acarologia 15:10-17.

[9] **Binns E. S. 1982**. Phoresy as migration . some functional aspects of phoresy in mites. Biol. Rev. 57: 571- 620.

[10] **Chmielewski W. 1977.** Wyniki obserwacji powi¹zañ roztoczy z owadami (Acari-Insecta) [Results of observations on associations of mites with insects (Acari-Insecta)]. Pol. Pismo Entomol. 47: 59-78.

[11] **Durmuş A. B.2006.***Trichouropodaturcicaovalis* sp. nov., a new uropodine mite (Acari: Mesostigmata: Trematuridae) from Turkey,ZOOTAXA 1132:31-49.

[12] **Cox, M. L. 1993**. Red palm weevil, *Rhynchophorus ferruginous*, in Egypt. FAO plant prot. Bull. 41:30-31.

[13] **El-Sharabasy, H. M. 2010**. A Survey of mite species associated with the red palm weevil,*Rhynchophorus ferruginous*,(Olivier) in Egypt. Egyptian J. of biological pest control, 20: 67-70.

[14] **Evans, G.O. , 1992**. *Principles of Acarology*. CAB International, Wallingford. 576 pp.

[15] **Fain A.;Noti M. I., and Dufrêne, M. 1995**. Observations on the mites (Acari) associated with Carabidae (Coleoptera) in Belgium. I. Annotated list of the species. Int. J. Acarol. 21: 107-122.

[16] **Fashing,N.J. and Chua, T.H. , 2002 .**systematicabd ecology of Naiadacarus Nepenthicola ,Anew species of Acaridae (Acari:Astigmata)in habiti the pitchers of Nepenthes Bicalcarata Hook.F in Barunei derussalam .international J.Acarol.vol 28(2):157-167.

[17] **Gwiazdowicz, D. J. 2000**. Mites (Acari: Gamasidae) associated with insects in the Bialowieza National Park. Acta Parasitol., 45:43-47.

[18] **Gwazdowicz,D.J. and Lakomy,P.,2002 :**Mites(Acari :Gamasida)occurring in fruiting bodies of Aphyllophorales.Fragm.Faun, vol 45: 81-89.

[19] **Houck M. A.,andOconnor M. 1991**. Ecological and evolutionary significance of phoresy in the Astigmata. Ann. Rev. Entomol. 36: 16- 36.

[20] **Hunter P. E., and Rosario, M. T. R. 1988**. Associations of Mesostigmata with other Arthropods. Ann. Rev. Entomol. 33: 393- 417.

[21] **Kehat, M. 1999.** The threat to date palms in Israel, Jordan and the Palestinian Authority by the red palm weevil,*Rhynchophorud ferruginous.* Phytoparasitica, 27:241-242.

[22] **Kontschan ,J.,2006**. Uropodina (Acari: Mesostigmata) Species From Angola,Acta Zoologica Academiae Scientiarum Hungaricae 52 (1):1–20

[23] **Krantz, G. W.; Royce L. A.; Lowry R. R., and Kelsey R. 1991**. Mechanisms of phoretic specificity in Macrocheles (Acari: Macrochelidae). In: Modern Acarology, Vol. 2 (DUSBÁBEK F., BUKVA V., Eds),:. 561.569, Prague and SPB Academic Publishing bv, The Hague.

[24] **Krantz, G.W. 1978.** A Manual Of Acarology. Corvallis, Oregon, Oregon State University Book Stores, Inc., Pp. 509

[25] **Hirschmann, W. 1993.** Bestimmungstabellen der Uropodiden der Erde Atlas der Ganggattungen der Atrichopygidiina. *Acarologie*40: 292–370.

[26] **Pernek , M.; Hrasovec, B.; Matosevic, D.; Pilas, I.; Kirists, T. and Moser, J. C. 2008.** Phoretic mites of three bark beetles (*Pityokteines* spp.) on Silver Wr. J. pest Sci., 81:35-42.

[27] **Petrova, V.; Salmane, I. and Cudare, Z. 2004.** The predatory mite (Acari: Parasitiformes: Mesostigmata) community in strawberry agrocenosis. Acta Universitatis Latviensis, Biology, 676:87-95.

[28] **Zaher, M. A. 1986**. Survey and ecological studies of phytophagous, predaceous and soil mites in Egypt. Final Report Pl 480 Programme, USA Project No. EG. ARS-30 , grant No. FG-139. Faculty of Agriculture, Cairo University.

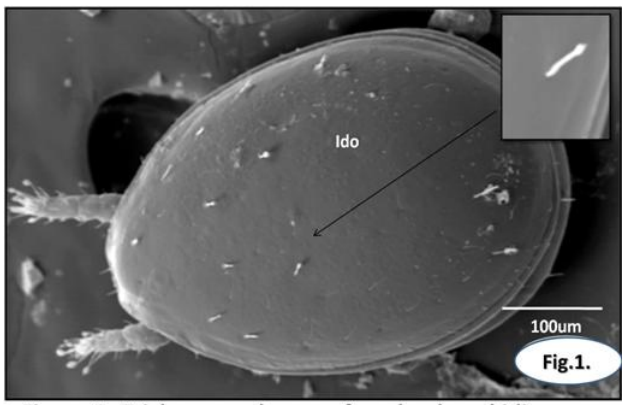


Figure 1. *Trichouropoda* sp ., female, dorsal idiosoma.

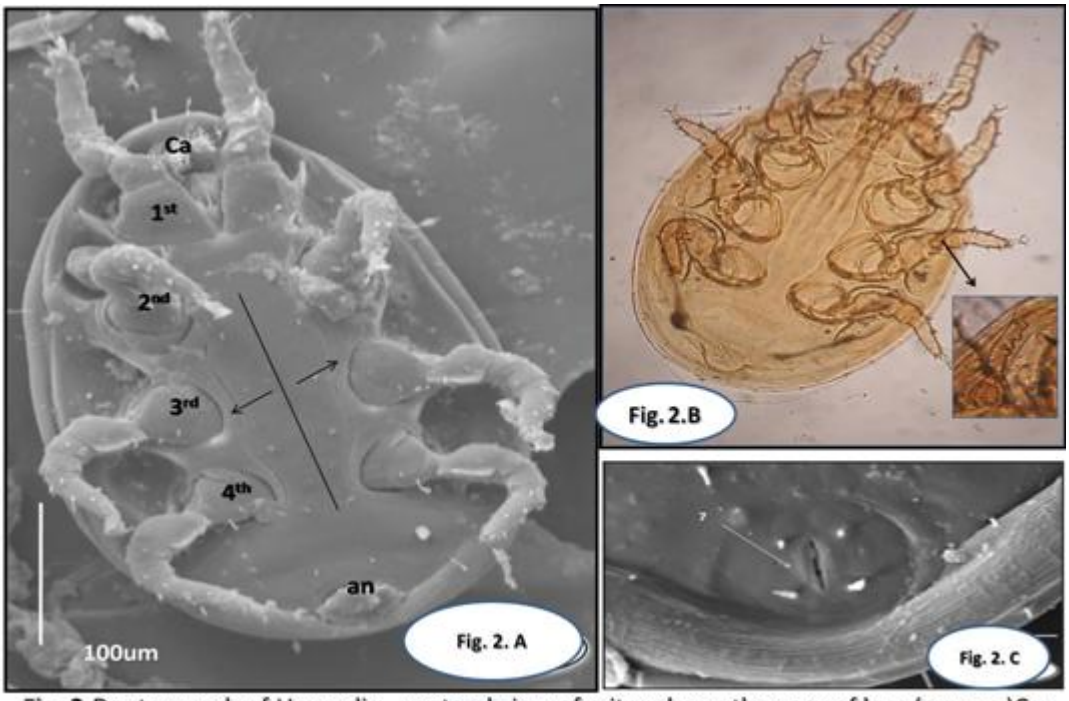


Fig -2-Deutonymph of Uropodia . venteral view of mites shows the coax of legs (arrows)Ca : Captiulum 1st :first leg ,2nd second leg , 3rd third leg ,4th forth leg .An : Anus

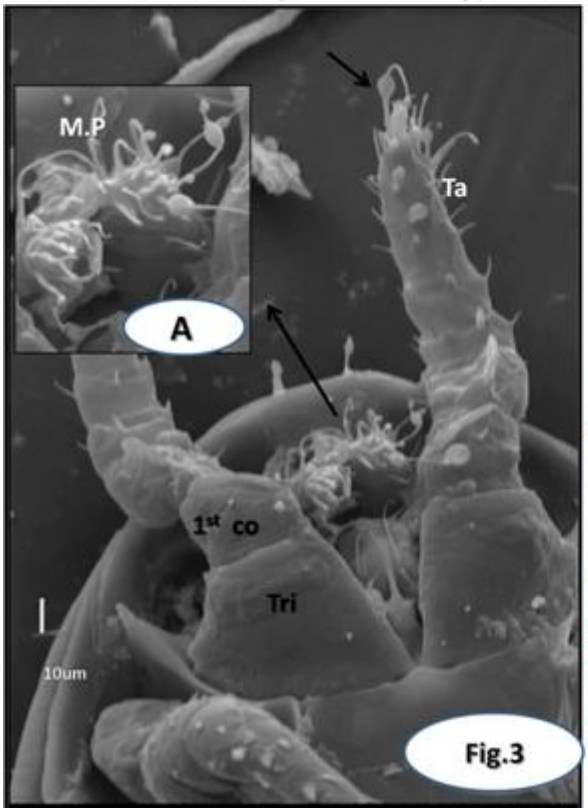
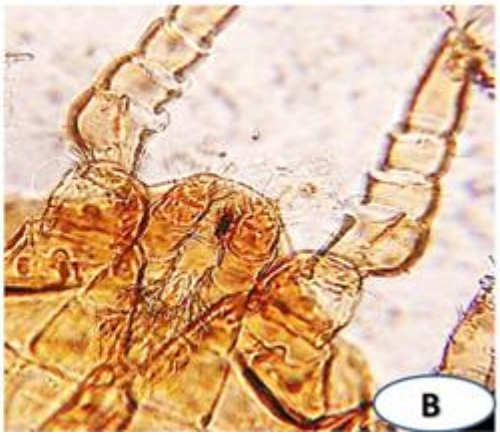


Figure 3. *Trichouropoda* up .,.,: A) Ventral view of gnathosoma, Female; B) Tritosternum, Female; C) Epistome, Female; D) Chelicera, Female; E) Palp, Female; F) Sculpture of dorsoventral plates, Adults.



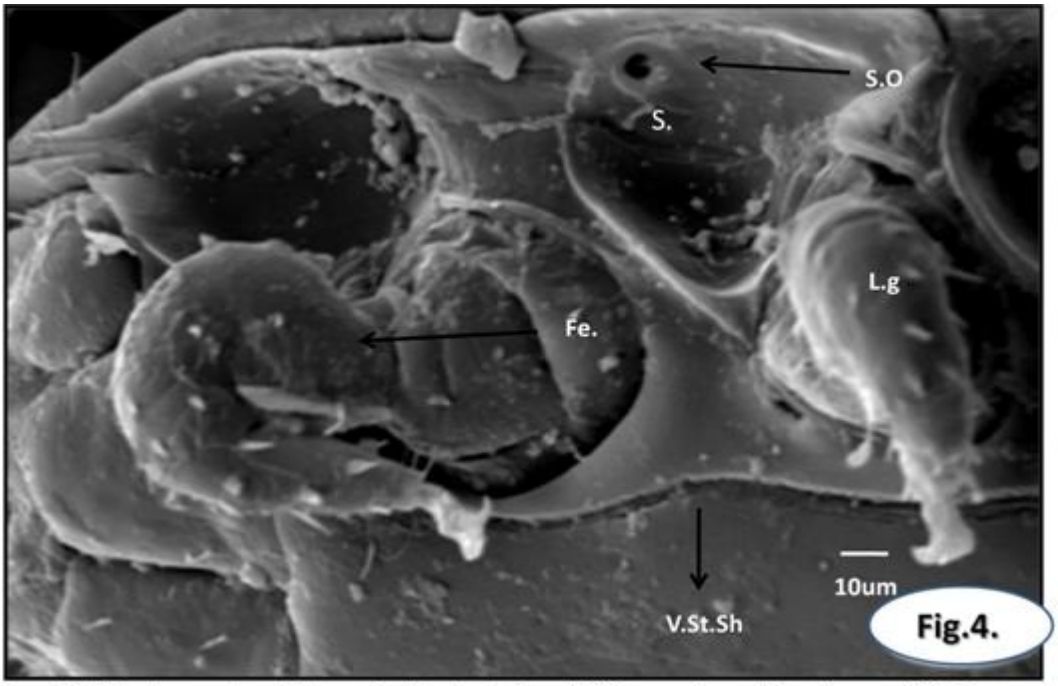


Fig-4-Deutonympha of Uropoda . Venteral view of Idiosoma show stigma (arrows) S.Stigma S.O.Stigmata Opening .L.g:legs. V.St .Sh . Venteral Sternal Shield . P.Sh Peritermal Shield Fe:Femure

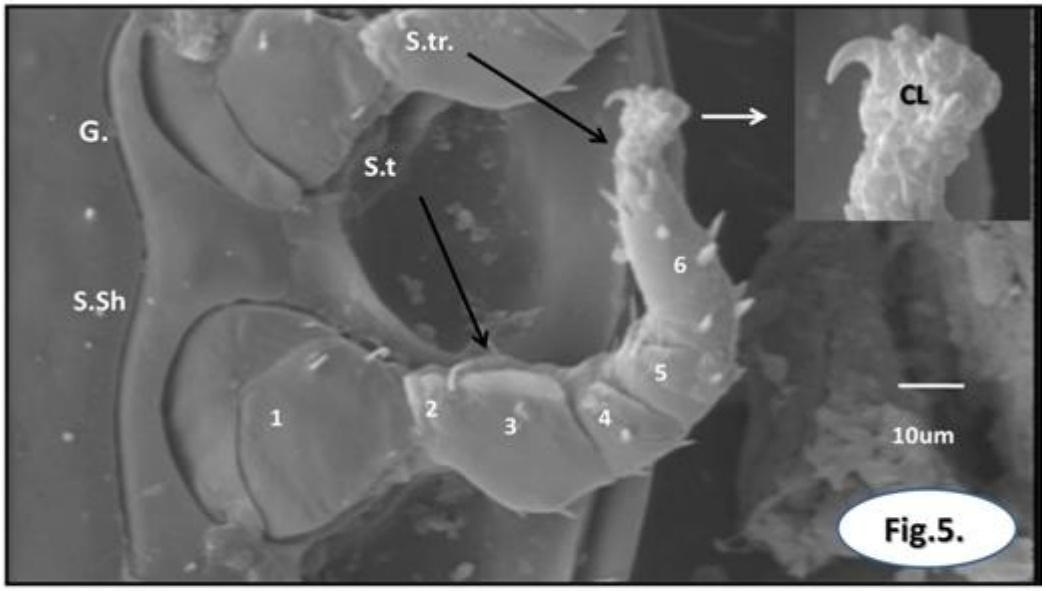


Fig-5-Deutonymph of Uropoda . Ventral view of Idiosoma show the segments of legs (1-Coxa2-Trochanter3-Femur - Tibia 5-Genu 6-Tarsus) Cl. : Claws (arrows) . S.T.- Squamosal Trotter (arrows). S.Tr. : Setae of tarsus (serreta) S.Sh. Sternal Shield .G : groove

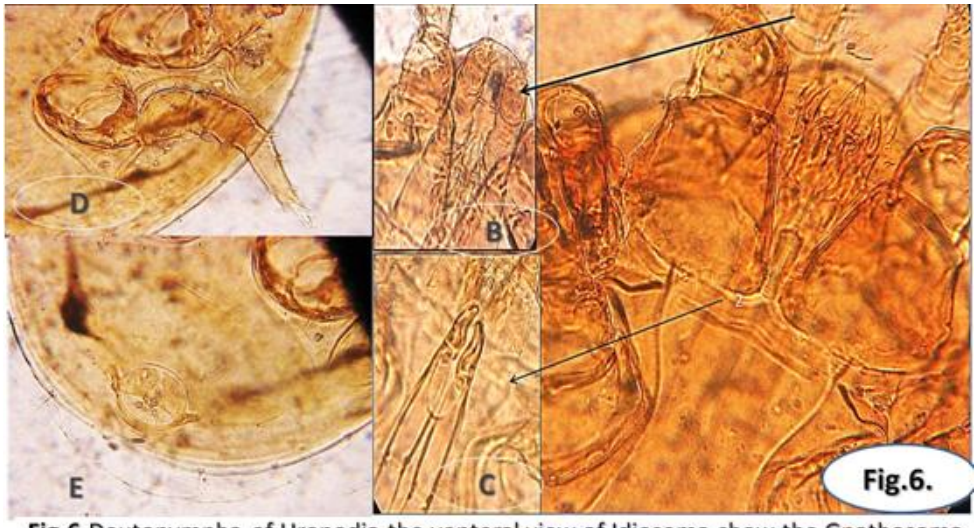


Fig-6-Deutonympha of Uropodia the venteral view of Idiosoma show the Gnathosoma (in magnification the 1-Capitulum ,2- Chelicera (arrows) Co. coxa ,1st :first leg. Tri: Tritosternum .M.P :mouth parts (L.M),(D) legs (E) Anus.

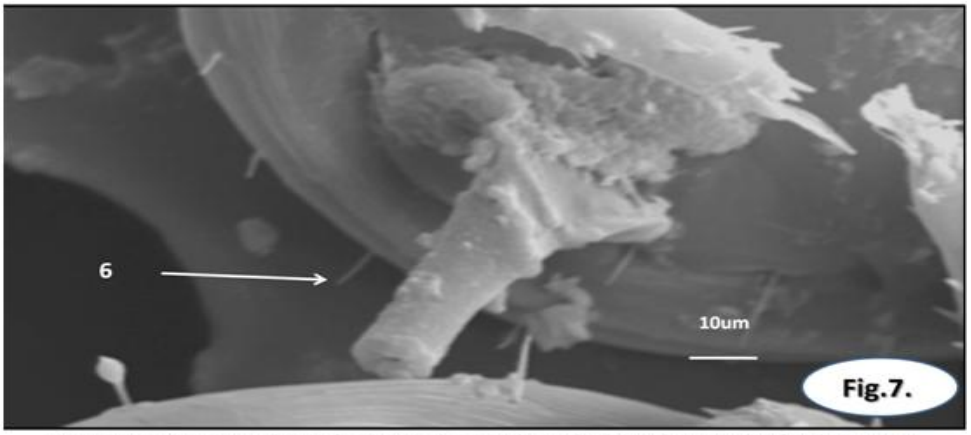


Fig-7-Deutonympha of Uropoda anal podial in the end of Idiosoma (arrows) .anal opening between 4 setae's (arrows)

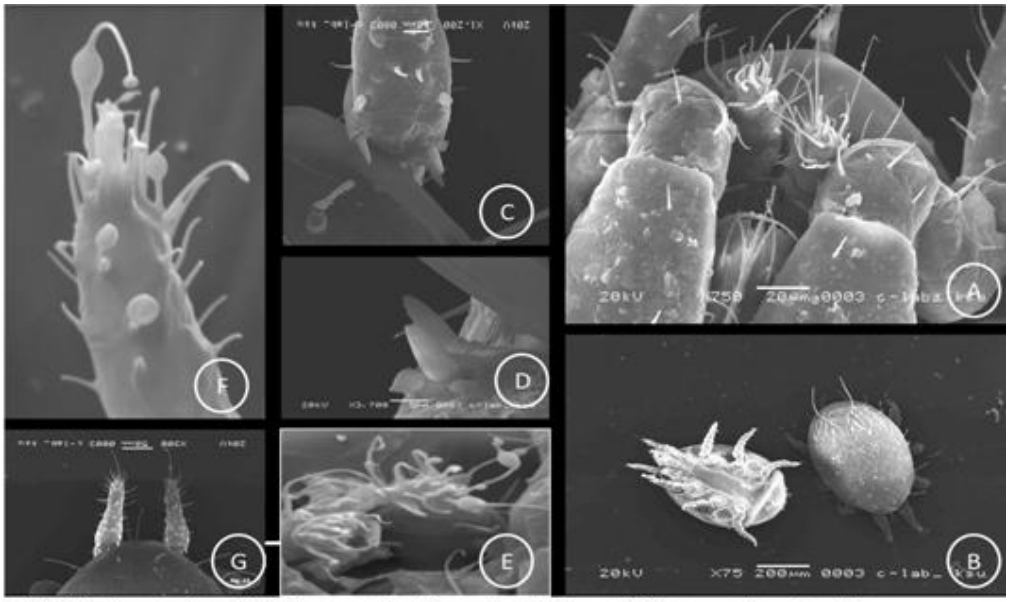


FIG-8:Protonmpha of Trichouropoda :A - venteral view of Idiosoma showing the Aganthosoma.C-Venteral view of legs showing setae .D-Venteral view of legs showing the setae. E-Gnathosoma View of mouthparts . F-Terminal of 1st leg shows the setae and many type of sensory seta. G-Terminal of 1st leg .

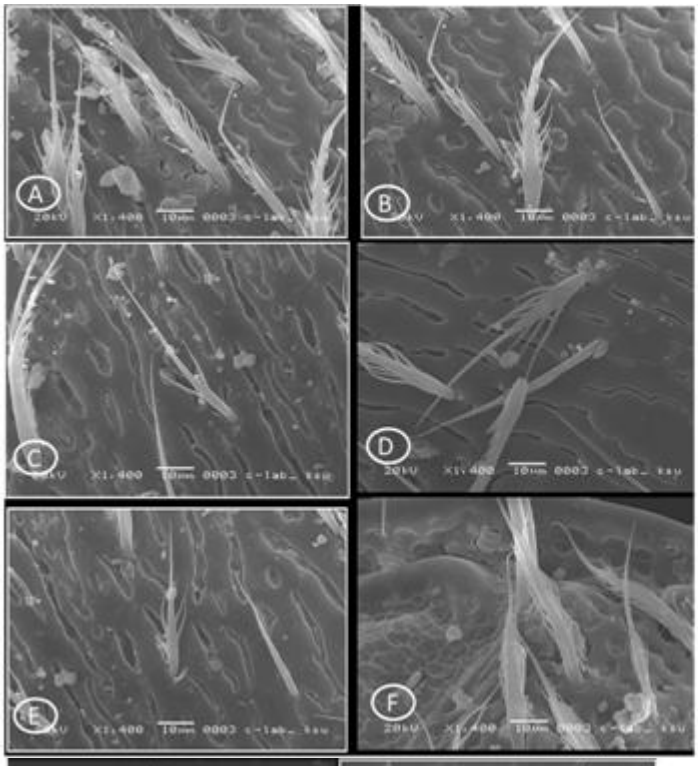


FIG 9 Types of setae Trichouropoda sp.(feather-like) .A,B:type1-C:type 2-D:type-E:type4-F:type1,2,3,4.

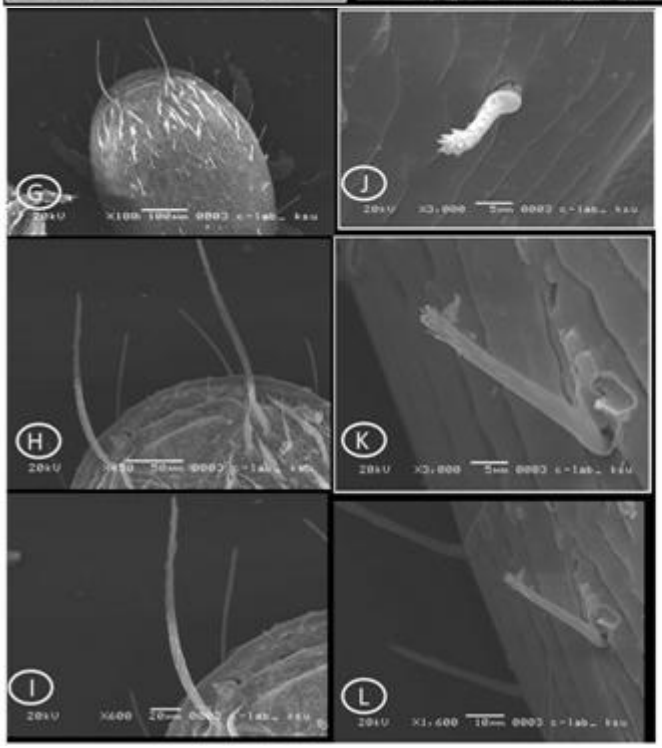


FIG 10 Idiosoma : A:,B: G: all kind of satea in the terminal Idosoma -H,I: type 5-J :type6-K,L:type6. Tectum denticulate, tapering; Corniculi divided; with 1-2 pairs of elongate posterior setae - Trematuridae, Trichouropoda