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Some nematodes parasitized on cricket *Gryllus domesticus* and Mole- cricket *Gryllotalpa gryllotalpa* in Basrah,Iraq

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Abstract:

The present study which was conducted in Basrah province,during the period from October2019 to September 2020 ; revealed that two of Orthoptera pests *G. gryllotalpa* and *G. domesticus* were found infected by four species of nematodes;These parasites are : *Binema ornate, Cameronia multiovata* , *Gryllophila skrjabini* from *G. gryllotalpa* while the *Protrellatus* sp.; was isolated from *G. domesticus* and recorded for the first time in Iraq regarding to the genus and species .The Prevalence of these nematodes are 13% , 8.6% , 8.6% and 4.6% while the mean intensity of infection are 2.3 ,5 ,5.5 and 2.2 respectively .All these species were taxonomically described and compared with the other specimens previously recorded in Iraq.

Key words: *Protrellatus* sp. *Gryllus domesticus* , *Gryllotalpa gryllotalpa*

Introduction:

Mole crickets(*G.gryllotalpa*)Species are Subterranean insects feed on roots and cause damages to crops (Alexander and Otte,2009);crickets (*G. domesticus*) are

one of the most destructive groups of vegetable field crop and grass pests distributed worldwide (Saeed,2000).They are burrowing insects and feed on an organisms in the soil; these insects do not attack plants directly; but by tunneling extended surface tunnels(Kazemi *etal*.,2010).Nematoda are one of significant organisms and most abundant diverse, ecologically and biologically group (Bongers and Ferris ,1999);parasitizing insects and known as Entomopathogenic nematodes.These organisms either obligate or facultative parasites (Koppenhofer and Kaya,2001) .Thelastomatoidea is one of the two superfamilies of the order Oxyurida parasitized on insect ;Nematodes either parasitic or commensal in saprophytic terrestrial arthropods ,live in hindgut of the host and usually feed on the bacterial microfauna there (Jex *et al*. 2005). Species of entomopathogenic nematodes of families Steinernematidae and Heterorhabditidae are being produced commercially and used as biological control agents and in agricultural systems most over the world (Hazir *etal*.,2004).Due to their effectivness in controlling on soil insects pest (Andaló *etal*.,2018).The aim of study is Isolation and diagnosis of nematode parasitized on two species of important insects *G. gryllotalpa* and *G. domesticus* in Basrah province ; and provide the taxanomic information about these species .

Materials and Methodes:

Adult of *G. domesticus* and *G. gryllotalpa* were collected from three different locatities AbuALKasib,Shatt ALArab and Karmat Ali in Basrah province .

The insects(Pictures 1-2) were killed with alcohol70%.The alimentary canals were carefully removed from the dissected insect and transferred immediately into dish contain normal saline ,opened with fine forceps and needle. Nematodes picked up in alcohol acetic acid(preserved in 70% alcohol and 5% Glycerin) and mounted on glass slides contain glycerin drop used for clearing the internal organs (Garcia and Ash,1979). Measurements were taken using ocular micrometer

and illustrations were drawn with aid of camera lucida ; and all measurements in millimeters.

The percentage of infection (Prevalence)= number of infected insect /(number of insects) ×100% (Bush et al.,1997).

Mean intensity of infection:

Number of parasites isolated from a particular species / number of insects infected with that species.

1- *Gryllotalpa gryllotalpa* 2- *Gryllus domesticus*

Results:

The results of the present study registration of four species of nematodes, one of them is recorded for the first time in Iraq and Table No.1 shows those species:

NO.	Nematodes species	Host insect	Number of infected insects/total number	Total isolated	Prevalence	Mean intensity of infection:

1	*Binemao ornate*	*Gryllotalpa gryllotalpa*	6	3/23	13%	2
2	Cameronia multiovata	*Gryllotalpa gryllotalpa*	7	2/23	8.6%	3.5
3	*Gryllophila skrjabini*	*Gryllotalpa gryllotalpa*	11	2/23	8.6%	5.5
4	*Protrellatus* sp.	*Gryllus domesticus*	11	5/107	4.6%	2.2

Table(1):Percentage of infection (Prevalence) and mean intensity of infection in *G. gryllotalpa* and *G.domesticus*.

1- *Binema ornata* (Travassos,1925):

Six females were found in the hind gut of *G. gryllotalpa*, the following is a description and measurements of two samples:

Small worm , smooth cuticle.Female 3.09 long ; width 0.3 ; nerve ring 0.2 from anterior end. Oesophagus is divided into two part, the muscular and glandular, the length of the muscular Oesophagus is 0.7, the diameter of the glandular esophagus is 0.1. Vulva 2.52 from anterior end .Eggs are oval-shaped 0.06 by 0.03; the tail is a long conical shape, 0.20 long for the end of the body(Fig1).

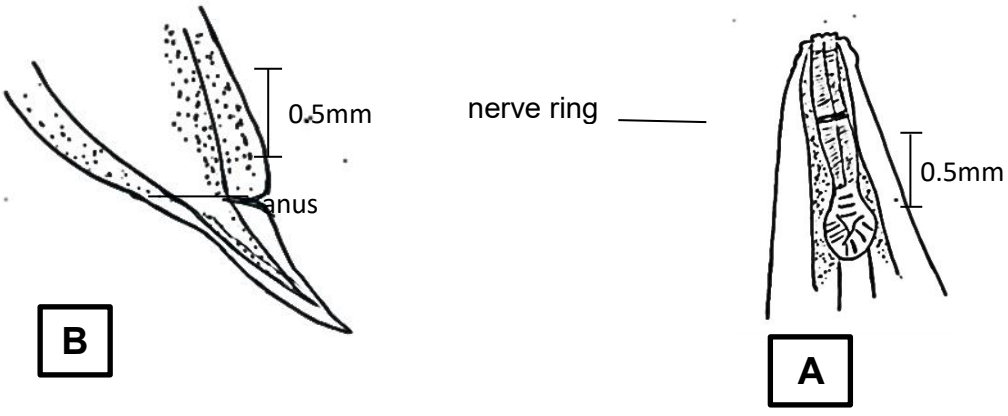

Figure1: Binema ornate A- Anterior end B- Posterior end .

2- *Cameronia multiovata* (Leibersperger,1960):

Seven females were isolated from the hind gut of *G. gryllotalpa*; the following is a description and measurements of two samples:

Short and broad-body;cuticle striated at the front end and smooth at posterior end, female length 3.3; width 0.3; nerve ring 0.1 from anterior end ; length of the muscular oesophagus is 0.24 and the diameter of the glandular 0.10 . Eggs are flat, elongated 0.11 by 0.04 .Vulva 1.03 from anterior end ; Anus 0.16 from posterior end(Fig2) .

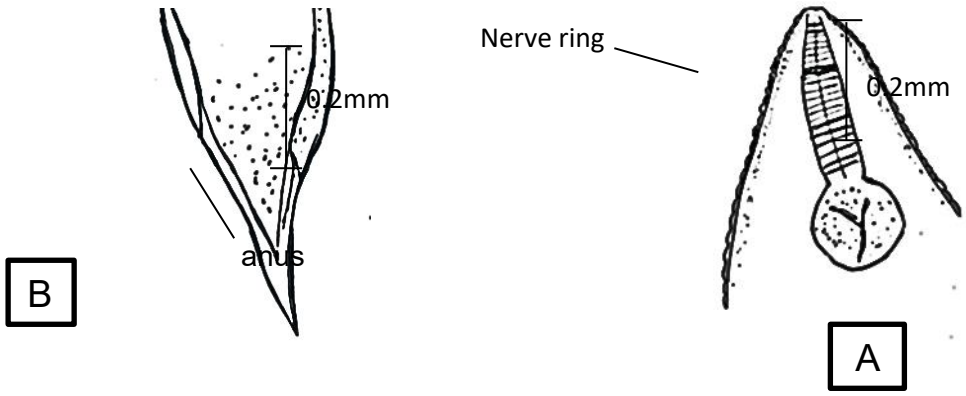

Figure2:*Cameronia multiovata* A-Anterior end B-Posterior end.

3- *Gryllophila skrjabini* (Sergiev, 1923):

Eleven females were isolated from the hind gut of *G. gryllotalpa*, the following is a description and measurements of two samples:

Female length 2.8 ; width 0.43; nerve ring 0.8 from anterior end. Oesophagus is divided into two parts muscular length 0.11 ; diameter of glandular 0.1.Vulva 0.97 from posterior end . Egg are large circular 0.16 by 0.05, Anus 0.25 from posterior end (Fig3).

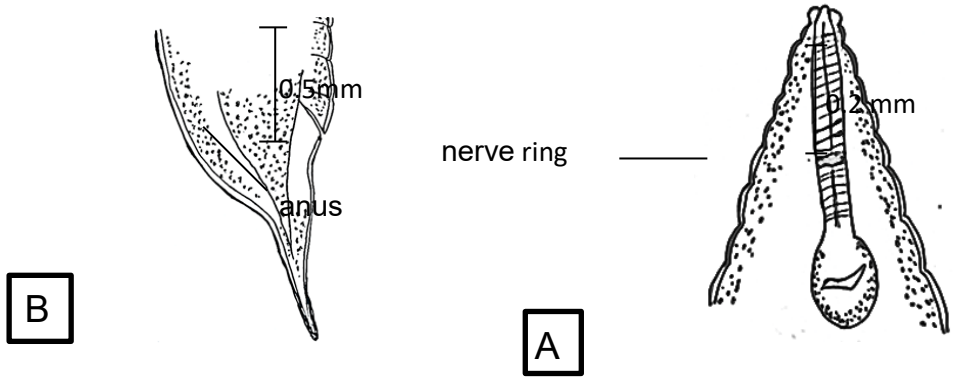

Figure3 : *Gryllophila skrjabini* A-Anterior end B-posterior end.

4-*Protrellatus* sp.:

Eleven females were found in the hind gut of *G. domesticus*, The following is a description and average measurements of three samples:

Female long almost straight to slightly curved upon fixation, 3.6 mm long ;width at front 0.13 and 0.48 at posterior end. Nerve ring 0.15 from anterior end .Vulva approximately at same the level of nerve ring, 0.21 from anterior end. Oesophagus is divided into two parts, muscular part 0.60 in long, the glandular part diameter 0.1. Eggs are elongated 0.11 by 0.05 and the posterior end is round with two small cuticular triangle projections (Fig4) .

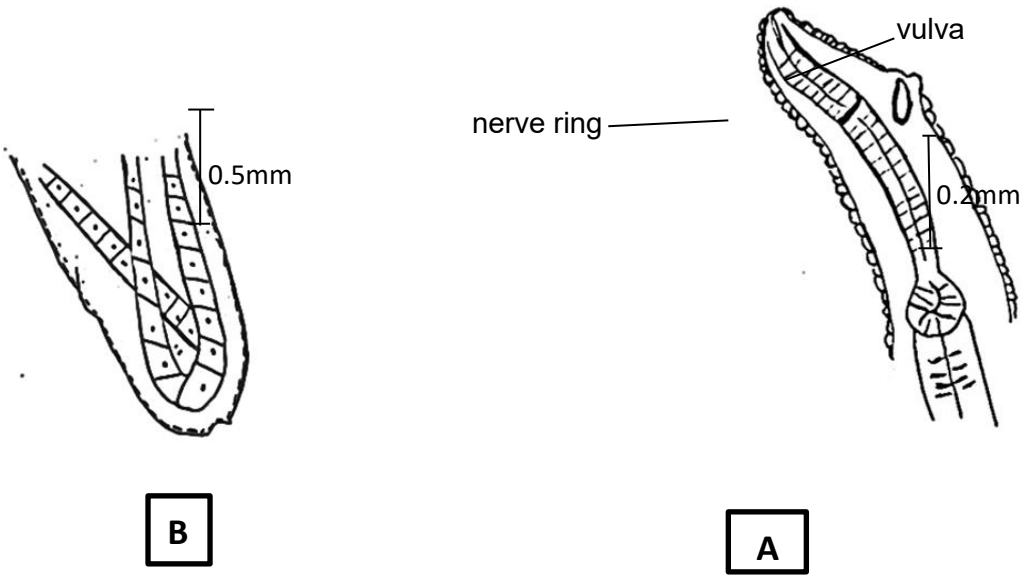

Figure4: *Protrellatus* sp . A-Anterior end B-Posterior end.

Note: No males were found in infected insects.

Discussion:

1-*Binema ornata* (Travassos, 1925):

This species globally spread ;it was recorded in different parts of the world; isolated for three times in Iraq, it was previously recorded by Annon *et al*., (1999) and Al-Saadi (2015) from the same host *G. gryllotalpa*. This species was recorded in India from *G. Africana* by Singh and Malti (2003) ; Shah *et al*., (2012); Singh *et al.,* (2013) .Furthermore Bain (1965) had recordedthis nematodes in France.Description of the present samples agrees with that isolated by Annon *et al.,*(1999) except differences in body size and are shorter than sample recorded by Shah (2003).

2- *Cameronia multiovata* (Leibersperger,1960):

This species was previously recorded in Iraq by Al-Saadi (2015) from *G. gryllotalpa* wherease ,Shah *et al*., (2012) isolated it in India from *G. africana*. It was also recorded in France by Jarry (1961,1964)from the *G. gryllotalpa* .This species has been recorded parasitizing the mole species *Mogera robusta* in Japan, and the diagnosis was mainly based on the shape of the eggs (Yokohata *et al.*,1988);the reason for these animals being infected with nematodes they have a terrestrial life and feed on the digger insects and this is called pseudo parasitism (Dogiel,1964). This species differs from *C. basiri* was described by Rizvi and Jairapuri (2002) in body width, vulva position and egg arrangement;The similarity between this species and *C. manipurensis* is eggs both of them ovoid in shape and the tail is conical in shape and joined to the parties. This species develops from fertilized eggs and no pathogenic effect on the insects has been recorded (Salmanov *et al.,* (1989); Shah,2007).

3-*Gryllophila skrjabini* (Sergiev,1923):

Nematodes is recorded for the third time in Iraq previously recorded by Annon *et al.,* (1999) and Al-Saadi (2015) from the same host *G. gryllotalpa* in the Basrah province.Futhermore,this species was reported by Rusconi (2017); Rusconi *et al.,* (2017); Rusconi Rusconi and Achinelly (2021) in Argentina from two species *Anurogryllus muticus* and *Neocurtilla claraziana* and also recored in India Shah (2007) from *G.africana* and in Vietnam by Van Luc(2009) from the same host; it is similar to *G. cephalobulata* in terms of having rings and short and cylindrical mouth opening .However ,this species and can be distinguished from other species of the genus *Gryllophila* in that the body ring-shaped, the first and second rings are without lobes, vulva is not very prominent and the tail is short (Camino and Maiztegui,2002);differs with *Gryllophila gryllotalpa* in the number and arrangement of the rectal papillae and the shape,size of the eggs (Faroouqi,1970) .

4-*Protrellatus* sp.:

This genus is recorded for first time in Iraq ; it isolated from the hind gut of *G. domesticus*. Species of this genus have already been recorded around the world from the same host (Adamson,1994),mainly in Canada and India (Vijayalakshm and Khan,1981 ; Singh and Singh(1992) ;Gantait and Venkataraman(2013) and Sharma and Gupta(1983).In the current study sample is close to sample recorded by Rizvi (1997) by having similar shape of body but different in measurments and differ from to *P. aalii* by smooth cutical in anterior end,having striated anterior region, the number of papillae, the presence of eggs inside the capsules, and the tail shape of female(Refia ,1979).

- Males represent a minority in the nematode community, if not non-existent at all because males of entomopathogenic nematode a coil around each other resulting in injuries; frequently death; the probability of death occurring between pairs of males was affected by the developmental pathway followed being much greater among males that had passed through the infective juvenile (IJ or dauer) stage than among males that had not. Post-IJ males are found only in newly hosts (Zenner *etal*.,2014).

References:

- Adamson, M. (1994). Evolutionary patterns in life histories of Oxyurida. International Journal for Parasitology.14:1167-1177.
- Alexander,R.D. and Otte,D. (2009). Crickets. in Encyclopedia of Insects (Second Edition).Academic press.
- Alsaadi,S.E.(2015).Diagnosis and Life cycle of insect *Gryllotalpa gryllotalpa*(L.) with taxonomy parasitic nematodes in the province of Missan.M.Sc.Thesis.college of education for pure sciences, University of Basrah.Iraq ,83 pp.
- Andaló, V., Rossati, K. P., Carvalho, F. J., Mieko, J., Faria, L. S. D., Assis, G. A. D., and Barbosa, L. R. (2018). Entomopathogenic nematodes for the control of *Gryllus* sp.(Orthoptera: Gryllidae) under laboratory and field conditions. Arquivos do Instituto Biológico,85.
- Annon M.R.;Kareem D.K. and Al-hadithi A.W. (1999).New record Nematodes infecting Two Orthropteran Pest from Basrah,Iraq.Basrah.J.Sciences,17(1):41-48.
- Bain, O. (1965). Oxyures parasites de l'intestin de la courtilière, *Gryllotalpa africana* Beauvais, à Madagascar. Annales de Parasitologie humaine et comparée,40(6):659-676.

- Bongers, T. and Ferris, H. (1999).Nematode community structure as a bioindicator in environmental monitoring. Trends in Ecology and Evolution,14:224-228.
- Bush, A. O.; Lafferty, K. D.; Lotz, J. M., and Shostak, A. W. (1997). Parasitology meets ecology on its own terms: Margolis *et al.* revisited. The Journal of parasitology,83: 575-583.
- Camino, N. B., and de Villalobos, C. (2013). A new species of *Protrellus Cobb*, 1920(Nematoda, Thelastomatidae) parasite of the field cockroach *Blatella vaga* Hebard,1919 (Blattodea, Blattidae) from Catamarca, Argentina. Acta parasitologica,58:98-104.
- Camino, N. B. and Maiztegui, B. (2002). A new species of Thelastomathidae (Nematoda) a parasite of *Neocurtilla claraziana* Saussure (Orthoptera, Gryllotalpidae) in Argentina. Memorias do Instituto Oswaldo Cruz,97:655-656.
- Dogiel, V. A. (1964). Types of host-parasite relationships. In: General parasitology, , Edingurgh and London: Oliver and Boyd.22-24.
- Gantait, V. V. and Venkataraman, K.(2013). Catalogue of Arthropod Parasitic of Nematodes of India. Ree. zool. Surv. India, Oee. Paper. (No.345):1-83.
- Garcia ,L.S. and Ash,L.R.(1979).Diagnostic parasitology clinical laboratory manual. 2nd edition,The C.V.Mosby Company St.Louis,147pp.
- Hazir, S.; Kaya, H. K.; Stock, S. P., and Keskin, N. (2004). Entomopathogenic nematodes (Steinernematidae and Heterorhabditidae) for biological control of soil pests. Turkish Journal of Biology, 27:181-202.
- Jarry, D. M. (1961). Un nematode parasite nouveau pour la France: *Cameronia multiovata* Leibersperger 1960 (Oxyuroidea, Thelastomatidae). Annales de parasitologie humaine et comparee, 36(5-6): 770-774.

- Jarry, D. M. and Jarry, D. T. (1963).Several Thelastomatidae (Nematodes,Oxyuridea)Parasites of Blattidae at the institut Pasteur de tunis. Archives de l'Institut Pasteur de Tunis, 40:229-234.
- Jex, A. R., Schneider, M. A., Rose, H. A., and Cribb, T. A. (2005). The Thelastomatoidea (Nematoda: Oxyurida) of two sympatric Panesthiinae (Insecta: Blattodea) from southeastern Queensland, Australia: taxonomy, species richness and host specificity. Nematology,7:543-575..
- Kareem,D.A.; Annon, M.R and AL-Hadith, I.A.W. (1999). A Preliminary Survey of Nematodes Infecting *Gryllotalpa gryllotalpa* L. (Orthoptera: Gryllotalpidae) from Basrah, Iraq. J.Basrah Reasearches,22(1):19-38.
- Kazemi, M.H.; Jafari, S.; Lotfalizadeh, H. and Jafarloo, M. (2010):Evaluation on morphological characters of European molecricket, *Gryllotalpa gryllotalpa* (Orth.: Gryllotalpidae) in the North-west of Iran. Journal of Agricultural Sciences,14:63-73.
- Koppenhofer, A.M. and Kaya, H.K.(2001). Entomopathogenic nematodes and insect pest management. In: Advancesin Biopesticide Research, Vol. (O. Koul (ed.), Harwood Academic Publishers, Amsterdam, The Netherlands.2:277-305.
- Refia, P. (1979). Some Studies on Insect Nematodes (Doctoral dissertation, Aligarh Muslim University.India.64pp.
- Rizvi.A.N.(1997). Some Studies on the Nematode Parasites of Insects.PhdThesis. Aligarh Muslim University.India.181pp.
- Rizvi, A. N., and Jairajpuri, D. S. (2002). Studies on a new and sorne known species of insect oxyurid Nernatodes. Revista Ibérica de Parasitología.62:1-7.
- Rusconi, J. M. (2017). Diversidad de entomonemátodos asociados a insectos ortópteros plaga del suelo (Gryllidae y Gryllotalpide) en el Gran La

Plata (Doctoral dissertation, Universidad Nacional de La Plata).Argentina.149pp.

- Rusconi, J., Achinelly, M. F. and Camino, N. B. (2017). First record oF *Gryllophila skrjabini* sergiev, 1923and Cephalobellus maGalhaesi schwenk, 1926(nematoda: thelastomatidae) parasites oF neoCurtilla Claraziana saussure, 1874(orthoptera: gryllotalpidae) in Argentina. Papeis avulsos de zoologia.56:473-480.
- Rusconi, M., and Achinelly, M. F. (2021). Composition of the intestinal nematofauna of *Anurogryllus muticus* and *Neocurtilla claraziana* (Orthoptera) from pastures of La Plata city, Buenos Aires, Argentina. Caldasia.43:205-207.
- Saeed,A. (2000). New species and records of some crickets (Gryllinae: Gryllidae: Orthoptera) from Pakistan. Int,J. Agri. Biol.,2: 175-182.
- Salmanov, A.A ; Rubtsov, L.E. and Mamdova, S.M.(1989).Nematodes *Gryllotalpa gryllotalpa* in the Lenkoran Natural Region,Azerbaidzhan. Biologicheskie Nauki,3:71-73.
- Shah, M. (2003). Taxonomic Studies on the Nematodes of Insects of Manipur and Adjoining Areas (Doctoral dissertation, Aligarh Muslim University).India.231 pp.
- Shah, M. M. (2007). Two new species of Cameronia Basir, 1948(Oxyurida, Thelastomatoidea, Thelastomatidae) from Manipur, North-East India. Acta Parasitologica,52:225-232.
- Shah, M. M.; Mohilal, N.; Pramodini, M., and Bina, L. (2012). Parasitic nematodes of some insects from Manipur, India. Parasitology. Rijeka, Croatia: In Tech, http://www. intechopen. com/books/parasitology/parasitic-nematodes-of-insectsfrom-manipur-india, 163-206.

- Singh, H. S. and Malti. (2003). On a known and some unknown species of nematode parasites of *Gryllotalpa africana*. Journal of Experimental Zoology,6:329-350.
- Singh, N.; Chaudhary, A.and Singh, H. S. (2013). Identification of two species of *Binema Travassos*, 1925(Oxyurida: Travassosinematidae) based on morphological and sequence analysis of genomic (18S) and mitochondrial (Cox1) gene markers. Journal of Nematode Morphology and Systematics,16:173-180.
- Sharma, R. K. and Gupta, L. N. (1983). A new entomogenous nematode, *Protrellatus striati* from *Gryllus domesticus*. Revista iberica de parasitología (1942).43:315-318.
- Singh, H. S. and Singh, K. (1992). A new species of the genus *Protrellatus* Farooqui, 1970 (Nematoda: Thelastomatidae). Indian journal of parasitology.16(2):123-125.
- Van Luc, P. (2009).parasitic nematodes species (Nematoda: Oxyurida, Thelastomatoidea) in the mole-criket (*Gryllotalpa africana*) of Vietnam. Academia Journal of Biology,31:21-26.
- Vijayalakshmi, K., and Khan, E. (1981). A new species of Protrellatus (Nematoda: Thelastomatidae) from common house cricket, *Gryllus domesticus.* Indian journal of nematology,11:88-91.
- Yokohata, Y. ; Jiang, Y. P. ; Abe, H. and Ohbayashi, M. (1988). Pseudoparasitism by thelastomatid nematodes in moles, *Mogera* spp., in Japan. Japanese Journal of Veterinary Research,36:53-67.
- Zenner, A. N. O'Callaghan, K. M. and Griffin, C. T. (2014). Lethal fighting in nematodes is dependent on developmental pathway: male-male fighting in the entomopathogenic nematode Steinernema longicaudum. PLoS One,9(2).

بعض الديدان الخيطية التي تتطفل على صرصر الحقل *Gryllus domesticus* و الحفار *Gryllotalpa gryllotalpa* في محافظة البصرة- العراق.

الخلاصة:

أظهرت الدراسة الحالية التي اجريت في محافظة البصرة خلال الفترة من تشرين الاول 2019الى تشرين الاول 2020 أن اثنين من الآفات التابعة لرتبة مستقيمة الأجنحة هما الحفار*G. gryllotalpa* و حشرة صرصر الحقل *G. domesticus* مصابة بأربع أنواع من الديدان الخيطية هي:

Binema ornate ; *Cameronia multiovata* ; *Gryllophila skrjabini* عزلت من الحفار *G. gryllotalpa* والنوع الرابع غير مسمى يعود الى جنس *Protrellatus* sp. يسجل لأول مرة في العراق للجنس والنوع عزل من حشرة صرصر الحقل *G. domesticus* ، بلغت النسبة الإصابة 13% ، 8.6% ، 8.6% ,4.6% ومتوسط شدة الاصابة 2.3 ،5 ،5.5 ، 2.2 على التوالي ؛جميع الأنواع ووصفت تصنيفيا وقورنت مع الأنواع المسجلة سابقا في العراق.