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THE ROLE OF GERMAN COCKROACHES (BLATTELLA GERMANICA,L.) IN TRANSMISSION OF TOXIGENIC FUNGI AND SOME NEMATODE PARASITES FOR MAN'S FOOD

(With One Table & 4 Fig.)

By

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(Received at 20/12/1994)

دور الصرصور الألمانى / بلاتيلا جرمانيكا فى نقل الفطريات السامه وبعض الديدان الاسطوانيه لغذاء الانسان

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وجد فى هذا البحث أن حوريات والحشرات البالغه للصرصور الألمانى تلعب دوراً أساسياً فى نقل ونمو الفطريات السامه لغذاء الانسان كما وجد أنها تنقل كذلك نوع من الديدان الاسطوانيه من جنس تلوستوموديز ووجد هذا النوع من الديدان فى الجزء الأمامى من القولون والمستقيم للقناه الهضميه للحشره . كما اتضح أن البيض المحتوى على جنين هذه الدوده الاسطوانيه يخرج مع براز الحشره ويلوث غذاء الانسان .

SUMMARY

The *Blattella germanica, L.* adults and nymphs play an important role in the development of toxigenic fungi in man's food and subsequent formation of mycotoxins. *Thelastomoids sp.* a nematode worm was found in the anterior portion of colon and rectum of german cockroaches. The infective stage (embryonated eggs) of this nematode worm pollute the food of man.

Keywords: Blattella germanica, L.; toxigenic fungi and Thelastomids species a nematode worm.

INTRODUCTION

Aspergillus and *pencilllium fungi* species which are known to be among the most common and troublesome contaminats are pathogenic to human-beings and animals *(WYLLIE and MOREHOUSE, 1977).*

Insects were investigated to play an important role in the development of toxigenic fungi in food of man and the subsequant formation of mycotoxin. Nowaday aflatoxin formation is a phenomenon of most isolates of *Aspergillus flavus* fungus group *(HESSELTINE, 1983; CLEVSTROM and LJUGGREN, 1985 and AZIZ, 1987).*

Some nematodes inhabit the gut of those insects which have well-developed digestive systems. Such digestive systems afford almost perfect digestion of the food, combined with a slow passage of the food through the gut, a comparatively long stasis of the fecal pellets in the rectum and rich bacterial flora *(FILIPJEV and STEKHOVEN, 1941).* Insects that do harbour these nematodes include species of Blattidae, Scarabaeidae and others.

MATERIAL AND METHODS

A- Fungal species isolates:

The fungal flora present in surface and internal gut of *Blattella germanica, L.* under observation were investigated in 100 adults and nymphs. Each growth stage was surface sterilized for 5 min. in 2% (wt/vol.) sodium hypochlorite solution and then were rinsed thouroughly in sterile distilled water and placed in 95% ethanol and rinsed for thirty seconds. Under aseptic conditions, adults and nymphs were dissected in sterile distilled water to obtain the different regions of alimentary

canal. Finally, adults, nymphs and their heads, wings, legs and internal guts (10 samples of each) were aseptically placed in Petri dishes containing Malf extract agar and Czapek-Dox Agar. For the isolation of fungi chloramphenicol (0.5 gm/1 in 10 ml 95% ethanol was added to the fungal media to suppress bacterial growth. The inoculated plates were incubated at 25°C for 7-10 days and moulds were later isolated and identified using the key of *RAPER and FENELL (1977)* for *Aspergillus sp. and GILMAN (1957)* for fungi in general.

B- Investigation of nematodes:

German cockroaches were put in a large tube and anaesthetized with ether. Individual insects were put in petri dish with Ringer's solution. The alimentary canal was removed from the insects by two dissecting needles. The nematodes and eggs were isolated from the anterior protion of colon and rectum under the binocular. The nematodes were preserved in 70% alcohol containing 5% glycerine. For studying, they were at first cleared in lactophenol. After fixation and clearence the worm was drawn by camera lucida.

RESULTS

Are presented in Table 1 & Fig. 1-4.

DISCUSSION

In all cases, a total of a 9 species of fungi belonging 5 genera were isolated and identified; 6 species were isolated from the fore gut, 4 species from the mid gut; 5 species from the hind gut, 2 species from the appendages and wings, 2 species from the external body (Table 1) and (Fig. 1-3). The percentage of fungal population reported from adults were high than that from nymphs. *Aspergillus* 55.55% and 11.11% for *Curvularia, Pencillium, Syncephlastrum* and *Geotrichm* were the main genera isolated *Aspergillus flavus, Aspergillus niger, Aspergillus flavipus, Aspergillus flumigatus, Aspergillus ustus, Curvularia clavatum, Pencillium Chrysonum, Syncephlastrum sp.* and *Geotrichum* candidum. These results agreed with data recorded by *ELHALFAWY and AZIZ (1991) and BULLA* et al. *(1978)* who reported that insects can be a vector of mouldy diseases and can inoculate crop plants with spoliage organisms.

These authors stat that the saprophytic fungi which include some mycotoxin producers are mechanically carried in the alimentary canal of the insects along with the food. It is

worth mention that *Aspergillus, Penicillium* species which are known to be among the most common and trublesome containing are pathogenic to human-beings and animals *(WYLLIE and MOVEHOUSE, 1977)*. From the present results of our study sugests that the *Blattella germanica, L.* adults and nymphs are good vector for carrying and transmission of toxinogenic fungi especially *Aspergillus flavus* not only outside their bodies but also in their alimentary canals along with the food.

So, the *Blattella germanica* adults and nymphs play an important role in te development of toxigenic fungi in man's food with subsequent formation of mycotoxins.

The nematode worm in the present work (Fig. 4) has been found in the anterior portion of colon and rectum of german cockroaches *Blattella germanica, L.* in Assiut city. According to *YAMAGUTI* (1961) the present species is allocated under the genus *Thelastomoides*. The characters of the present nematode species agree with the general characters of Oxyuridae *COBBOLD, 1864, OXYURINAE FALL, 1916* and *Thelastomoides WALTON, 1927*.

Mouth with lips three, each with two papillae. Pharynx short. Esophagus divided into a long tubular anterior portion and a short posterior portion ending in a trivalvate bulb.

Intestine usually dilated at its anterior end. Male tail subulated ending in a recurved spiks, provided with lateral alae which are not supported by papillae. Three preanal, two adanal and six postanal pairs of cauldal papillae are present in enotype. Spicules single, stout. Female tail conical, slender vulva at or near midde of body.

The eggs of this nematode worm *(Thelastomoids sp) passes out from the alimentary canal of german cocroaches with the faeces and undergo a short period of development* (3 ± 1/2 hours), forming a small tadpole-like larva still within the eggs.

The eggs complete the life cycle when they are ingested by man or german cockroaches and hatch the worm matures.

ACKNOWLEDGMENT

The authors will always be indebted with sincerest gratitude to professor Dr. *Refaat M. Khalifa*, head of the Department of Parasitology, Faculty of Medicine in Assiut University for reading the manuscript. We are also grateful to Dr. *Eman M. Mohamed*, Lecturer of botany department, her help in the identification of the different species of fungi.

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Table (1): Fungial species isolates from the different parts of adults and nymphs *(Blattella germanica, L.)*

No	Fungial species	Fore-gut & salivary gland	Mid-gut	Hind-gut	Apperdages	External body
1	*Aspergillus flavus*	-	+	+	+	+
2	*Aspergillus niger*	+	-	+	-	-
3	*Aspergillus flavipus*	-	+	-	-	-
4	*Aspergillus fumigatus*	+	+	-	-	-
5	*Aspergillus ustus*	+	-	-	-	-
6	*Curvularia clavatum*	+	-	+	-	-
7	*Penicillium chrysogenum*	+	-	+	-	-
8	*Syncephlastrum sp.*	+	+	+	-	-
9	*Geotrichum candidum*	-	-	-	+	+
	Total No. of fungial species	6	4	5	2	2

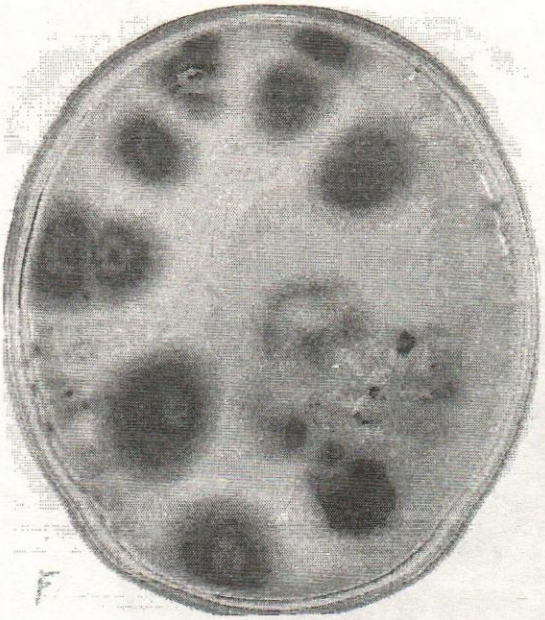

Fig. (I) Fungi in the fore-gut and salivary gland of Blattella germanica

Fig. (2) Fungi in the mid-gut

Fig. (3) Fungi in the hind-gut

Fig.(4) The nematode worm, Thelastomoides sp.