DETECTION AND IDENTIFICATION OF ENTERIC PARASITES INFESTING CAMELS

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Abstract

This study was carried out on enteric parasites infesting 121 imported camels slaughtered at Cairo abattoir and 23 native camels from El-Mansorya region in Giza. The results of examination of faecal samples revealed the presence of *Eimeria dromedarii* oocysts (31.4%), *Paragonimus sp.* eggs (0.8%), *Trichuris sp.* eggs (6.6%) and 7 species of Strongyle eggs which were: *Bunostomum sp.* (5.0%), *Chabertia sp.* (3.3%), *Ostertagia sp.* (4.1%), *Cooperia sp.* (9.1%), *Trichostrongylus sp.* (15.7%), *Strongyloides sp.* (6.6%) and *Nematodirus sp.* (3.3%), as well as, *Protostrongylus sp.* (5.0%) in imported camels. In native camels, the examination revealed *Trichostrongylus sp.* (17.4%) and *Strongyloides sp.* (8.7%). Mixed infections were encountered. The detected eggs, oocysts, 1st stage larva of lung worm, and 3rd stage larva of Strongyles were measured, illustrated and identified.

INTRODUCTION

In Egypt, camels (*Camelus dromedarius*) play a big role in our life especially in the last few years, as they attracted the attention of meat consumers. Camels are used also in transportation and in guarding borders in addition to being one of the most important sources of animal protein. Lately, camel meat has been preferred than cattle meat due to the fear from zoonotic infections as bovine spongiform encephalopathy (BSE). Thus, all visions are directed to camels after becoming the preferred source of animal protein and many people substitute beef meat by camel meat.

Camels are subjected to different parasitic infections which affect their health. Although these animals can tolerate the worst environmental conditions, yet, they are liable to various parasitic infections among which is *Eimeria sp.* Hussein *et al.* (1987), recorded Eimeria to be the most pathogenic infections to young camel-calves. Also, gastrointestinal nematodes may result in haematological and biochemical changes in infected camels (Haroun *et al.*, 1996).

Therefore, the present study was devoted to give a spotlight on some enteric parasites infesting both imported and native camels in Egypt.

MATERIALS AND METHODS

A total of 144 faecal samples from camels (3 - 5 years-old), including 121 from imported ones subjected to slaughter at Cairo abattoir, and 23 from native camels from El-Mansorya region in Giza, were separately collected in plastic bags all-over one year. Each sample was examined by sedimentation technique for the presence of any trematode eggs, by Baermann technique for the presence of 1st stage larvae (S.L.) of lung worms, by concentration flotation technique using concentrated salt solution for detection of eggs of nematodes or *Eimeria* oocysts, and by staining with Modified Zeihl Neelsen technique for the detection of *Cryptosporidium* oocysts (Soulsby, 1982). Meanwhile, faecal culture was conducted to each sample which proved to contain eggs of gastrointestinal nematodes to obtain 3rd S.L. for larval identification, by measuring the whole length, the tail sheath (if present) and detection of any characteristic features (Soulsby, 1982 and Georgi *et al.*, 1990).

In case of presence of *Eimeria* oocysts, these were collected, washed with tap water and placed in 2.5% Potassium dichromate solution then, incubated at 26°C till sporulation (Soulsby, 1982). Identification of *Eimeria* was carried out after Pellerdy (1965) and Levine (1985).

RESULTS

Table 1 showed the results of examination of 121 faecal samples from imported camels which revealed mixed infections of *Eimeria dromedarii* oocysts (31.4%), *Paragonimus* sp. (0.8% and the 1st S.L. of *Protostrongylus sp.* (5.0%). The encountered eggs were: *Nematodirus sp.* (3.3%) and *Trichuris sp.* (6.6%). After egg culture, there sppeared 3rd S.L. of *Bunostomum sp.* (5.0%), *Chabertia sp.* (3.3%), *Ostertagia sp.* (4.1%), *Cooperia sp.* (9.1%), *Trichostrongylus sp.* (15.7%) and *Strongyloides sp.* (6.6%). Examination of 23 faecal samples from native camels, revealed *Trichostrongylus sp.* (17.4%) and *Strongyloides sp.* (8.7%). No *Cryptosporidium* oocysts could be detected.

Table 1. Results of faecal examination from imported and native camels.

Parasites encountered during faecal examination	Number of infected animals		Percentage of infection	
	Imported	Native	Imported	Native
Eimeria dromedarii	38	–	31.4	–
Paragonimus sp. eggs	1	–	0.8	–
Protostrongylus sp. larvae	6	–	5	–
Nematodirus sp. eggs	4	–	3.3	–
Trichuris sp. eggs	8	–	6.6	–
Bunostomum sp. eggs	6	–	5	–
Chabertia sp. eggs	4	–	3.3	–
Ostertagia sp. eggs	5	–	4.1	–
Cooperia sp. eggs	11	–	9.1	–
Trcihostrongylus sp. eggs	19	4	15.7	17.4
Strongyloides sp. eggs	8	2	6.6	8.7
Cryptosporidia oocysts	–	–	–	–

Eimeria dromedarii oocysts were sporulated after 1 - 2 days post-incubation. The oocyst was ovoid and measured 23.1 x 19.8 µm. It was surrounded by a brown 2-layered wall which formed a cap. Polar granule and residuum were absent. The sporocysts were ovoid, without stieda or residuum and measured 8.1 x 5.8 µm. The sporozoites were comma-shaped and measured 7.6 x 1.3 µm (Fig. 1).

Paragonimus sp. egg was yellowish in colour and measured 49.5 x 29.7 µm. It was provided with a rather flattened operculum which was set into a rim at one pole (Fig. 2). *Nematodirus sp.* egg measured 168.75 x 131.25 µm and was characterized by the appearance of 8 embryonic cells (Fig. 3). *Trichuris sp.* egg was brown in colour, barrel-shaped with a transparent plug at each pole. It measured 79 x 40 µm (Fig. 4).

The 3rd S.L. of *Bunostomum sp.* measured 562.5 µm and has a wide body with sudden tapering to long thin tail. The tail sheath measured 118.8 µm (Fig. 5). The 3rd S.L. of *Chabertia sp.* measured 712.5 µm and the tail sheath measured 108.9 µm (Fig. 6).

The 3rd S.L. of *Ostertagia sp.* measured 788 µm and its tail sheath measured 70 µm (Fig. 7). The 3rd S.L. of *Cooperia sp.* measured 660.8 µm and its tail sheath measured 79.2 µm (Fig. 8). This larva was characterized by the presence of 2 conspicuous oval bodies at the anterior end of oesophagus (Fig. 9).

The 3rd S.L. of *Trichostrongylus sp.* measured 750 µm and the tail sheath measured 33 µm (Fig. 10).

The 3rd S.L. of *Strongyloides sp.* was characterized by the absence of tail sheath and the caudal extremity was truncated (Fig. 11). It was also characterized by having long oesophagus that measured 182.5 µm (Fig. 12). The whole length of larva was 512.5 µm.

The 1st S.L. of *Protostrongylus sp.* measured 337.5 µm and the tip of its tail had an undulating outline (Fig.13).

DISCUSSION

In the last few years, camels became one of the most important source of meat. Now, many people are preferring camel meat as it is safe for human consumption. Due to the increase need for camel meat, many camels are imported from African countries. The meteorological factors in such areas and the conditions of transportation make such animals being subjected to infections with various parasites.

In this study, the results of faecal examination of some imported camels showed the presence of mixed infections with different species of parasites demonstrated in *Eimeria* dromedarii oocysts, *Paragonimus sp.* eggs *Nematodirus sp.* eggs *Trichuris sp.* eggs, as well as, the 3rd S.L. of *Bunostomum sp., Chabertia sp., Ostertagia sp., Cooperia sp., Trichostrongylus sp.* and the 1st S.L. of *Protostrongylus sp.*

Fadl *et al.* (1982), stated that there was a good correlation between rainfall and prevalence and intensity of gastrointestinal nematodes infesting camels in the Sudan. The detection of various parasitic infections in this study assured this fact as the increase in humidity in countries of importation helped in flourishing up lung worm larvae, eggs of Strongyles, and oocysts of *Eimeria.* Yagoub (1989) detected *Eimeria dromedarii* in Sudanese camels.

In this study, *E. dromedarii* oocysts were identified according to Pellerdy (1965) and Levine (1985). They stated that the oocyst of this protozoon was brown, ovoid and measured 23-33 x 20-25 µm. The sporocyst measured 8-11 x 6-9 µm. These facts were in agreement with the results obtained in this study.

Concerning *Paragonimus sp.* eggs, although their small size (49.5 x 29.7 µm) compared to other species that can reach 75-118 x 49-67 µm (Soulsby, 1982), yet, their prominent operculum and their oval shape tended to identify them as *Paragonimus* that may be a new host species. Georgi *et al.* (1990), illustrated *Paragonimus* eggs with small size in dogs. From the zoonotic point of view, Urquart *et al.* (1996), stated that the pulmonary sings due to the infection with this trematode were rare in cats and dogs, but the veterinary interest of *Paragonimus* in the infected animal may be considered as reservoir for human infection. More studies are still carrying out to assure the detection of *Paragonimus* parasite.

Regarding *Nematodirus sp.,* the egg was moderately large in size when compared to other Trichostrongylid eggs.

Concerning the 3rd S.L. of Strongyles, Abdel-Gawad (1974) divided these larvae into 2 groups according to the length of the tail sheath; larvae with long tail sheath as *Chabertia sp.* and *Bunostomum sp.* and larvae with short or medium tail sheath as *Cooperia sp., Ostertagia sp.,* and *Trichostrongylus sp.* These facts were evident in the obtained results. Identification of 3rd S.L. of Strongyles was carried out according to Georgi *et al.* (1990). They stated that the 3rd S.L. of *Bunostomum sp.* measured 514 - 678 µm and its tail sheath was 85 -115 µm, whereas that of *Chabertia sp.* measured 710-789 µm and its tail sheath was 110 -150 µm. The 3rd S.L. of *Ostertagia sp.* measured 784 -928 µm and its tail sheath

was 55-75 µm, as well as, the 3rd S.L. of *Cooperia sp.* measured 666 -866 µm and the tail sheath was 47 -71µm, its anterior end was characterized by the presence of 2 clear oval bodies which represented an optical cross-sections of a bundle of fibers surrounding the buccal capsule. Also, they stated that the 3rd S.L. of *Trichostrongylus sp.* measured 619-762 µm and had a tail sheath reaching 25 -39 µm. The total length of 3rd S.L. of *Strongyloides sp.* measured 524 - 678 µ m and had no tail sheath, but it was characterized by having a long oesophagus reaching 1/3 of the body length and the caudal extremity was truncated.

These features were in agreement with the results obtained in this study. Concerning long-tailed larva, *Bunostomum sp.* 3rd S.L. *Chabertia sp.* 3rd S.L. were longer.

The 3rd S.L. of *Ostertagia sp.* and *Cooperia sp.* 3rd S.L. were of medium-sized tail larvae.

Trichostrongylus sp. 3rd S.L. and the 3rd S.L. of *Strongyloides sp.* were of short-tailed larvae.

The 1st S.L. of *Protostrongylus sp.*, was identified belonging to lung worms. It measured 337.5 µm and the tail was characterized by its undulating outline.

Cryptosporidium infection was related to deficiency of host immunity (Eckart, 1989). The absence of this zoonotic protozoan oocyst in faecal samples may be ascribed to the presence of a factor that helped in keeping the immunity of camels high, so, they can tolerate the stress factors during transportation.

In conclusion, in case of raising camels, parasitic infections must be taken into consideration, because such infections may threaten camel general condition. *Eimeria* infections in camels were pathogenic to young ones causing enteritis, and older camels were oocyst shedding carriers (Hussein *et al.*, 1987). As well, gastrointestinal Trichostrongyles may lead to serious haematological and biochemical changes (Haroun *et al.*, 1996). The presence of these parasites are of economic importance to the development of camels. Moreover, there is great probability of transmission of any of these parasites, especially the zoonotic ones, to the Egyptian environment.

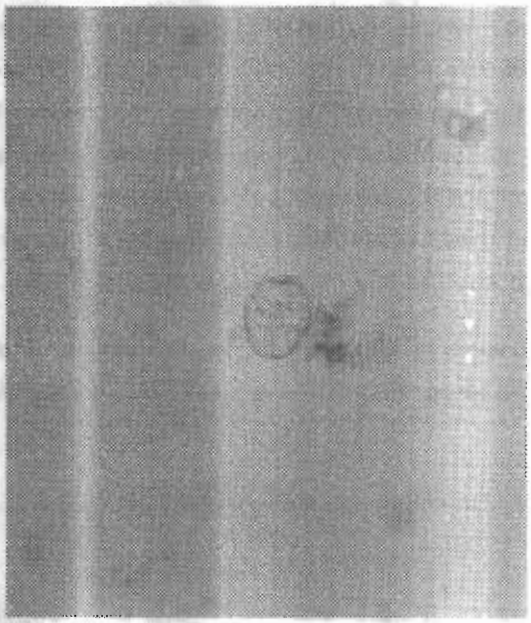

Fig 1. *Eimeria dromedarii* sporulated oocyst x 500

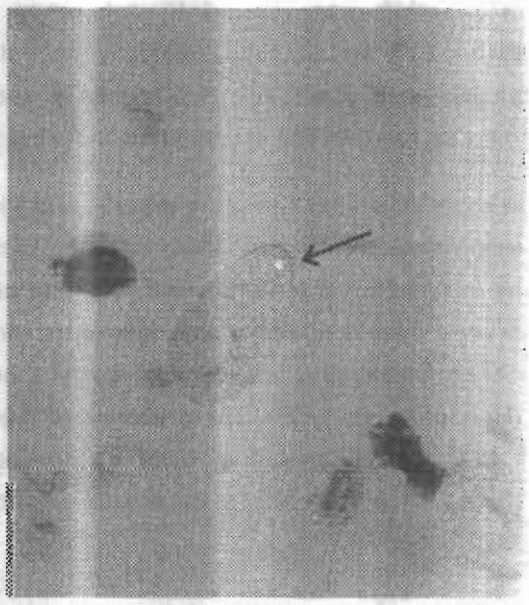

Fig 2. Paragonimus *sp.* egg showing the operculum with characteristic rim x 500

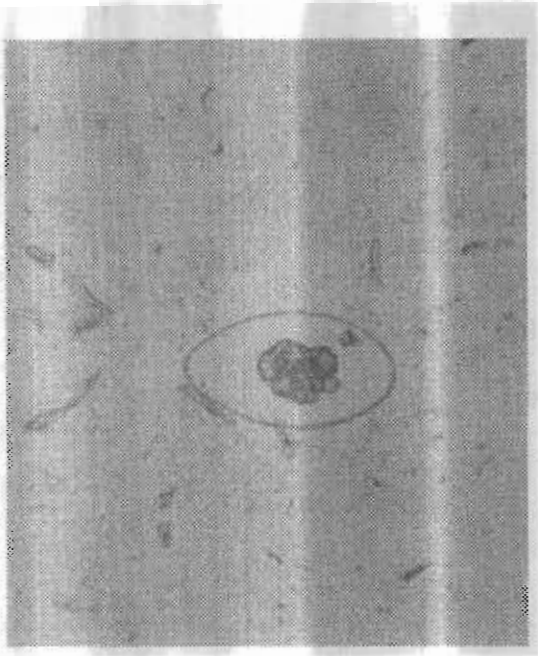

Fig 3. *Nematodirus sp.* egg x 125

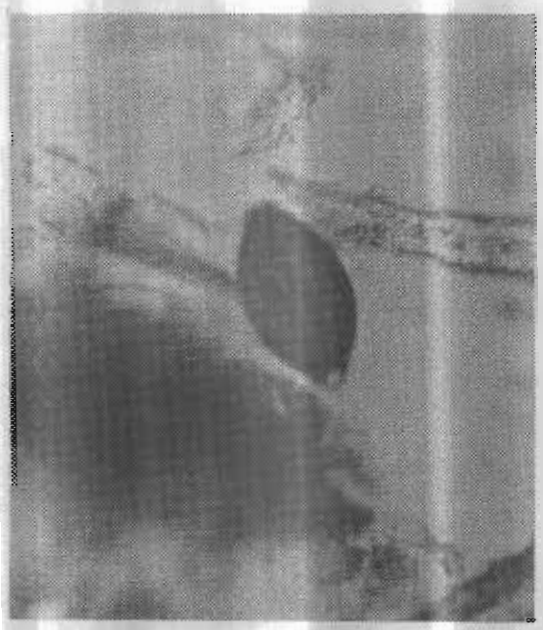

Fig 4. *Trichuris sp.* egg x 500

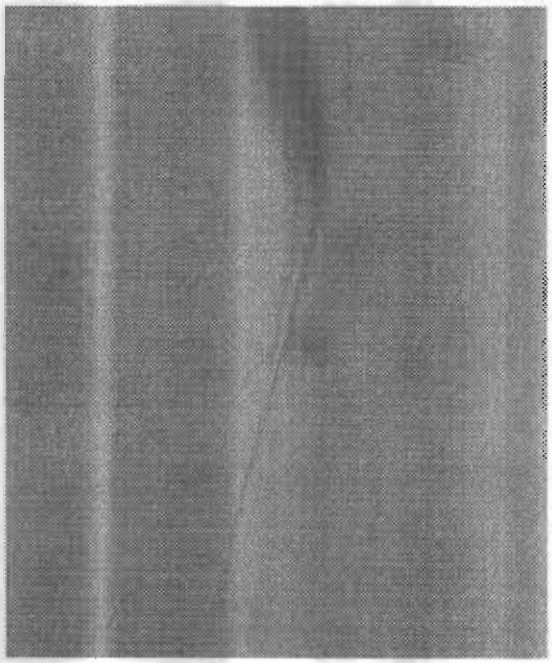

Fig 5. Posterior end of *Bunostomum sp.* 3rd S.L. x 500

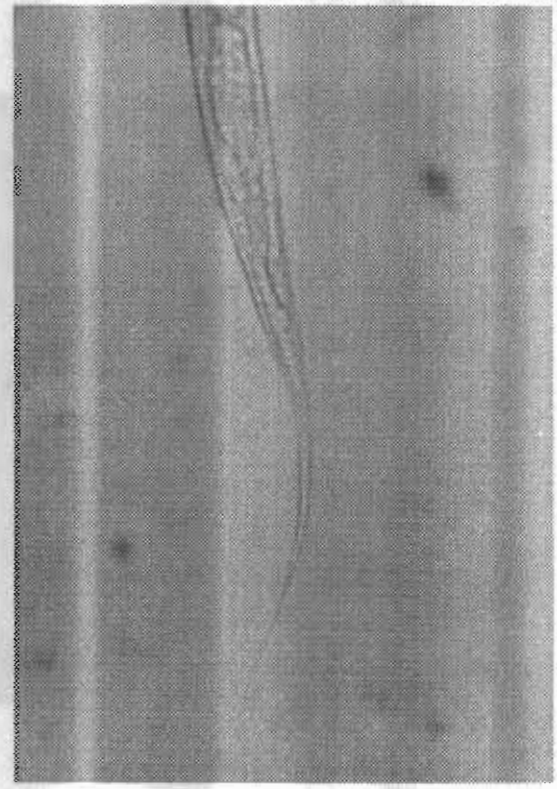

Fig 6. Posterior end of *Chabertia sp.* 3rd S.L. x 500

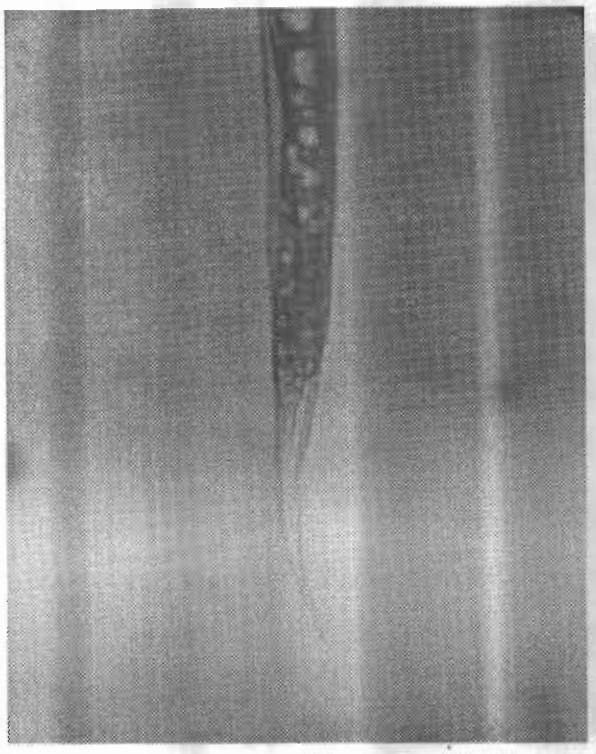

Fig 7. Posterior end of *Ostertagia sp.* 3rd S.L. x 500

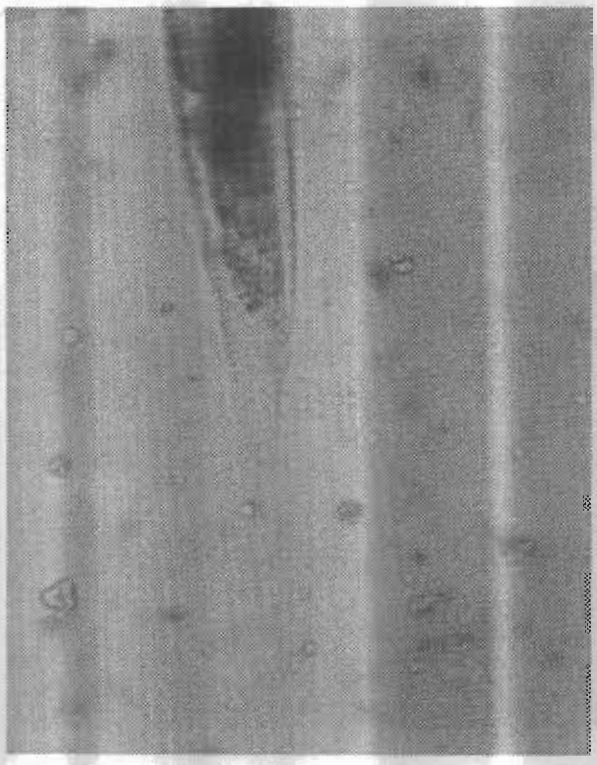

Fig 8. Posterior end of *Cooperia sp.* 3rd S.L. x 500

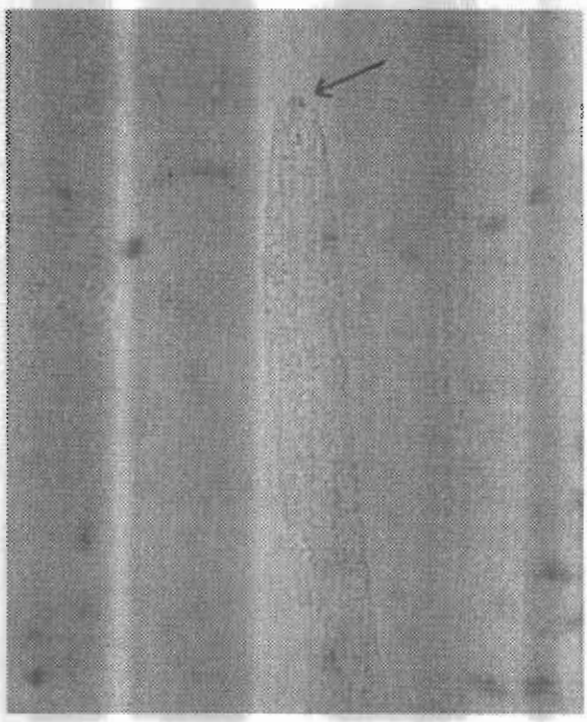

Fig 9. Anterior end of *Cooperia sp.* 3rd S.L. showing two oval bodies at the anterior end of oesophagus 500

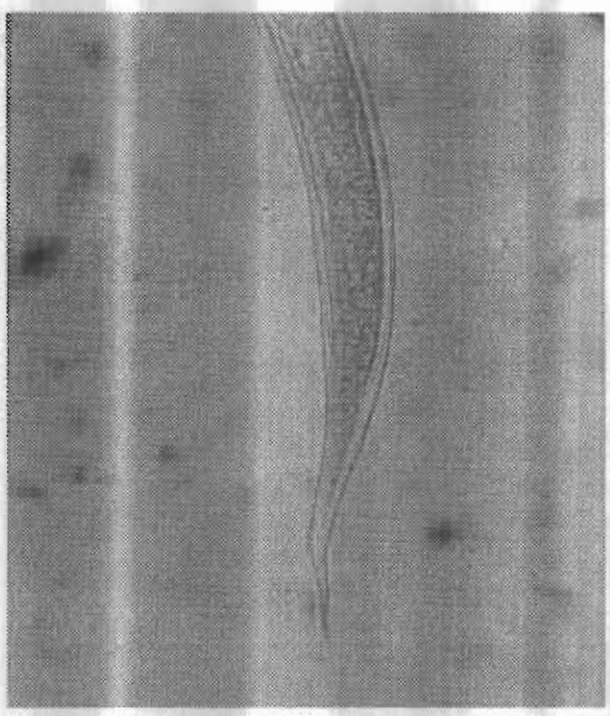

Fig 10. Posterior end of *Trichostrongylus sp.* 3rd S.L. x 500

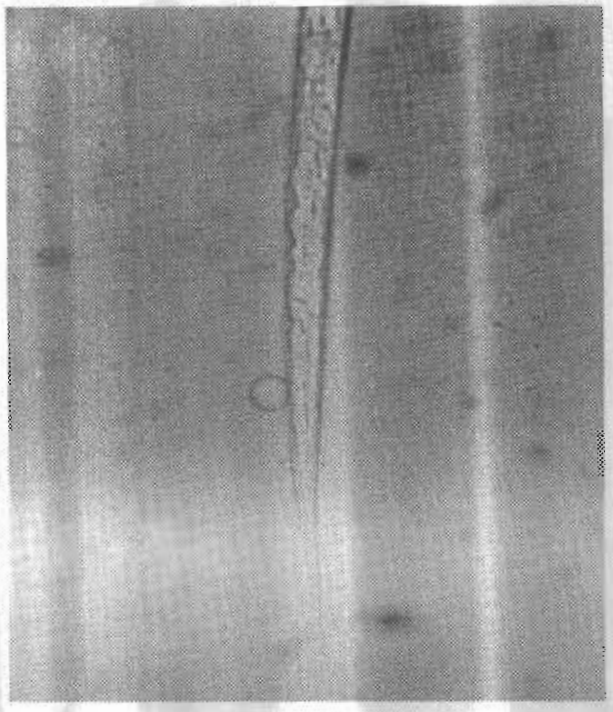

Fig 11. Posterior end of *Strongyloides sp.* 3rd S.L. showing truncated tail x 500

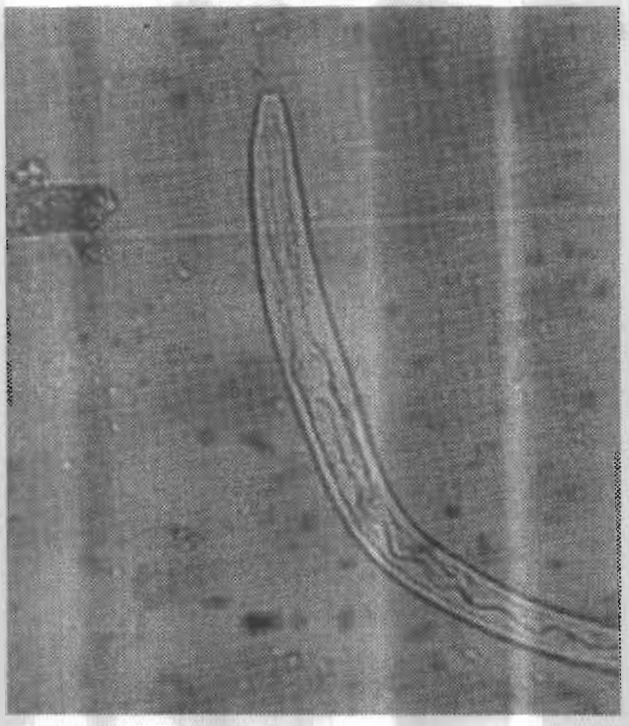

Fig. 12. Anterior end of *Strongyloides sp.* 3rd S.L. showing long oesophagus x 500

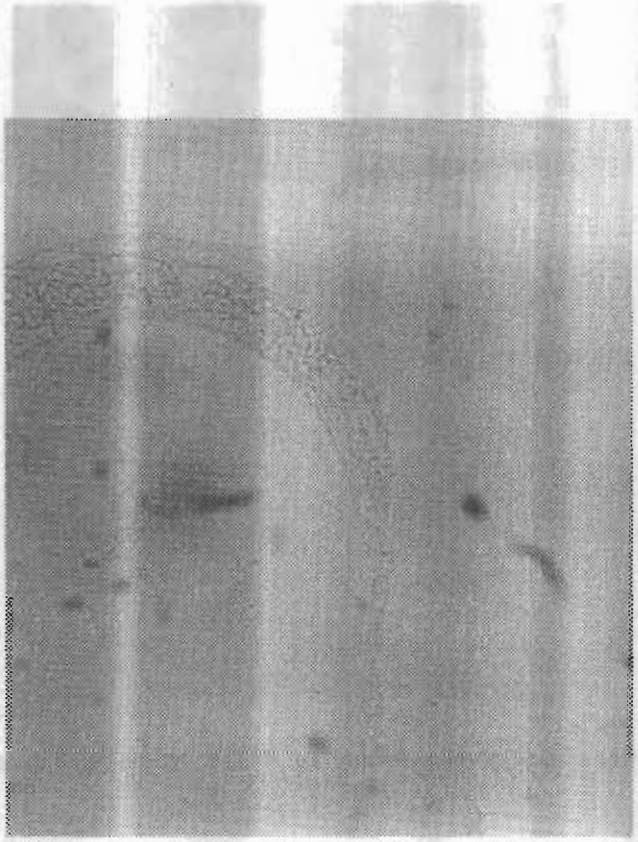

Fig 13. Posterior end of *Protostrongylus sp.* 1st S.L. showing an undulating outline x 500

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تمييز وتصنيف الطفيليات الداخلية فى الجمال

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أجريت هذه الدراسه على الطفيليات الداخلية التى تصيب الجمال المستوردة التى يتم ذبحها بمجزر القاهرة و كذلك الجمال المحلية بالنصورية وقد أسفرت نتيجة الفحص الميكروسكوبى لعينات البراز عن وجود نوع واحد من حويصلات الايمبريا و هى أيميريا دروميدارى (٣١,٤%) ، و نوع واحد من بويضات الديدان المفلطحة و هى باراجونيمس (٠,٨%) . وبويضات ترايكيورس (٦,٦%) ، و سبعة أنواع من بويضات الديدان الخيطية و هى بونوستومم (٥,٠%) ، شابرتيا (٣,٣%) ، استرتاجيا (٤,١%)، كوبريا (٩,١%) ، ترايكوسترنجيلس (١٥,٧%)، سترنجيلويدس (٦,٦%) ونيماتودايرس (٣,٣%) و بروتوسترنجيلس (٥,٠%) بالجمال المستوردة. أما الجمال المحلية فقد وجد بها ترايكوسترنجيلس (١٧,٤%) وسترنجيلويدس (٨,٧%). كما تم قياس ، تصنيف وتوصيف ، وتصوير الحويصلات ، البويضات ، الطور اليرقى الأول للديدان الرئوية و الطور اليرقى الثالث للديدان الخيطية ، و القى الضوء على مدى أهمية هذه الطفيليات بالنسبة لاقتصاديات الجمال. ولازالت الدراسات جارية لتتبع وجود طفيل الباراجونيمس.