Assiut Vet. Med. J. Vol. 42 No. 84, January 2000

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HOUSE SPARROWS (*PASSER DOMESTICUS NILOTICUS*) AS A SOURCE OF SOME PARASITIC DISEASES TO THE DOMESTICATED BIRDS AT GIZA GOVERNORATE, EGYPT

(With 3 Tables and 11 Figures)

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(Received at 28/12/1999)

العصافير كمصدر لبعض الأمراض الطفيلية للطيور المستأنسة في محافظة الجيزة – مصر

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أجريت هذه الدراسة لتحديد معدل ووصف الطفيليات التي تصيب عدد ٢٣٥ عصفور تم جمعهم من أماكن مختلفة من محافظة الجيزة . وقد كان المعدل العام للإصابة بالطفيليات في هذه العصافير ٦٤,٣ %. وأوضحت الدراسة ان الديدان الشريطية كانت أكثر الطفيليات أنتشارا (٤٠,٤ %) تليها الكريبتوسبوريديم (١٨,٣ %) ثم الأيزوسبورا (٨,٥ %) وأوليات الدم (٧.٧ %) وأخيرا الديدان الأسطوانية (٠,٨٥ %). وقد وجد أن هذه العصافير مصابة بأربعة أنواع من طفيليات الدم صنفت كالآتى : تريبانوسوما إفيم (٠,٨٥ %)، هيموبروتيس باسارز (٧.٧ %)، ليكوسيتوزون فرنجيللينم (١,٧ %) وبرقات دودة إسبلنديدوفلاريا (٠,٤٣%) . وقد سجلت أربعة انواع من الديدان الشريطية وهي رالبتينا جاليريتى (٣٠,٦%) وإيكينوبثريدا (٩,٨ %) وتيترجونا (٦,٨ %) وكينوتينيا إيفانديبيولم (٢,١ %)، إلى جانب نوع من الديدان الأسطوانية وهي الأسكاريديا جالى (٠,٤٣ %). علاوة على ذلك تم عزل نوعين من الأوليات المعوية وهى أيزوسبورا الجبتا (٨,٥ %) والكريبتوسبوريديم (١٨,٣ %). تم أيضاً محاولة عدوى عدد من الطيور والحيوانات بنوع الكريبتوسبوريديم الذي تم عزلة من العصافير. هذا وقد أسفرت الدراسة عن تسجيل الطفيليات الدموية الأربعة وكذلك الكريبتوسبوريديم التي تم عزلهم لأول في مصر، وأيضاً تسجيل العصافير في محافظة الجيزة كعائل جديد لثلاثة أنواع من الديدان الشريطية هي الرالبتينا إيكينوبثريدا وتتراجونا والكينوتينيا إيفانديبيولم .

SUMMARY

This study was done to determine the prevalence and description of parasites infecting 235 house sparrows (*Passer domesticus niloticus*) collected from different localities at Giza governorate. The overall rate of parasitic infestation among the examined sparrows was 64.3 %. The present investigation revealed that cestodes were the most prevalent parasites (40.4%), followed by *Cryptosporidium* (18.3%) , *Isospora* (8.5%), blood protozoa (7.7%) and finally nematodes (0.85%). These sparrows were found to be infested with four blood parasites identified as *Trypanosoma avium* (0.85 %), *Haemoproteus passeris* (7.7%), *Leucocytozoon fringillinarum* (1.7%) and the microflora of *Splendidofilaria* (0.43%). On the other hand, four species of cestodes were recorded as *R. galeritae* (30.6%), *R. echinobothrida* (9.8%), *R. tetragona* (6.8%) and *C. infundibulum* (2.1%) beside one nematode identified as *A. galli* (0.43%). Moreover, two species of enteric protozoa were isolated which were *Isospora aegyptia* (8.5%) and *Cryptosporidium sp.* (18.3%). A cross transmission trial to infect some domestic birds and animals with the obtained *Cryptosporidium sp.* was carried out. To the best of our knowledge, the obtained four spp. of blood parasites as well as the *Cryptosporidium sp.* were recorded for the first time in passerines in Egypt. Moreover, the house sparrows at Giza were recorded in the present study as a new host (new host record) for *R. echinobothrida*, *R. tetragona* and *C. infundibulum*.

Key words: *Sparrows, parasitic diseases*

INTRODUCTION

Free living birds are well known to live everywhere. These birds play an important role in the process of natural selection and controlling most of the agricultural and domestic life enemies such as rodents, reptiles, amphibians, mollusca and arthropods. Therefore, these birds usually feed a large numbers of arthropods, mollusca and earth worms (many of them are the intermediate hosts for helminthes) as well as they are liable to be bitten by the insect vectors and easily to be infected by direct contact with other birds. For these reasons, they often carry a high parasite burdem and may be a disseminator of parasites among wild and domesticated birds when they become in contact with them (Aly, 1985;

Desouky, 1992; Mahdy et al., 1994; 1995; Badawy and El-Sawy, 1995; El-Seify and Abd El-Fattah, 1996 and Hassan and Abd El-Aal, 1999).

House sparrows (*Passer domesticus niloticus*) are well known to be the most abundant resident free living birds in the Egyptian towns and villages. Like other birds, house sparrows could be infested with a large number of parasitic diseases. Beside their natural existence between some domestic birds outdoors and the flying ones as pigeons on trees, in grain stores and inside the pigeon lofts, they can easily enter different poultry farms by the aid of the small size of their bodies. By this way, infected house sparrows could be a source of parasitic infection to these birds by direct or indirect means.

The present investigation was achieved to study the parasites infesting house sparrows (*Passer domesticus niloticus*) at Giza governorate with regard to their prevalence, taxonomy and the possible role played by these sparrows in transmitting the recovered parasites to the domesticated birds in Egypt.

MATERIAL and METHODS

Two hundred and thirty five house sparrows (*Passer domesticus niloticus*) were randomly collected by hunting from different localities of the towns and villages belonging to Giza governorate.

For detection of any ectoparasites, the feathers and unfeathered parts of the body of each sparrow were inspected by nacked eyes with the aid of a hand lens and bright light.

Blood smears were obtained from the wing vein of each alive bird and from the heart blood of the freshly dead one. These smears were dried, fixed, stained with Giemsa stain and examined by the oil immersion lens for detection of blood (Bl) parasites. The recovered parasites were identified according to Petrak (1982); Levine (1985) and Burr (1989).

The crop, proventriculus, gizzard, intestine and trachea were thoroughly examined for the presence of helminthes either macroscopically by the nacked eye or microscopically by the binocular microscope for the detection of the minute parasites. The obtained helminthes were washed, fixed and mounted according to Kruse and Pritchard (1982). The specimens were identified according to Wardle and Mcleod (1952) and Yamaguti (1961).

Mucosal scrappings from the different parts of the intestine as well as the intestinal contents were collected from each sparrow and

examined for the detection of the enteric protozoa by preparation of unstained fresh smears either directly with one drop of normal saline or by concentration flotation technique (Levine, 1985) as well as, stained smears with iodine (iodine wet technique; Levine, 1985). Moreover, for the detection of *Cryptosporidium species*, mucosal scrapping smears from the conjunctiva, nasal sinuses, trachea different parts of the intestine (duodenum, jejunum, ileum, colon and cloaca) and bursa of Fabricius (when found) were stained with the modified Ziehl-Neelsen (MZN) staining technique (Henriksen and Pohlenz, 1981) and examined under the oil immersion lens. The muocsa of the infected organs with Cryptosporidia were scraped and stored in refrigerator at 4°C in 2.5 % potassium bichromate solution ($K_2Cr_2O_7$). The *Cryptosporidium* oocysts in this mucosal scrapings when needed for experimental infection were collected, concentrated and counted according to Lindsay et al. (1987).

The muscles of oesophagus, gizzard, heart, breast and thigh were thoroughly examined by the nacked eye for detection of macroscopic tissue cysts of protozoa. Whereas, for detection of microscopic cysts, muscle parts from the aforementioned organs were separately minced and submitted to the trypsin digestion technique (Erber, 1977). The recovered mixture was processed and examined for the presence of any liberated merozoites from the microscopic tissue cysts.

The infectivity of *Cryptosporidium* species isolated from house sparrows under investigation was determined for chickens, turkeys, pigeons, Japanese quails, mice and rabbits. The above mentioned four types of birds were chosen because a known species of *Cryptosporidium* have been reported in each of them. Likewise, mice and rabbits were chosen to determine the zoonotic potential of the parasite isolated from house sparrows as these two hosts are susceptible to the mammalian species of *Cryptosporidium*. In this attempt, fifteen coccidia free birds from each of 2-day-old chickens (*Gallus gallus*), 14-day-old turkey poults (*Meleagris gallopava*), 4-week-old squabs of domestic pigeons (*Colombia livia domestica*) and one-week-old Japanese quails (*Coturnix coturnix Japonica*) were each inoculated orally with 5×10^5 oocysts of the isolated *Cryptospordium* species. On the other hand, fifteen coccidia free animals from each of 2-week-old Swiss mice (*Mus musculus*) and one-month-old NewZealand White rabbits (*Oryctologus cuniculus*) were each inoculated orally with $5X10^5$ oocysts of *Cryptosporidium* species isolated from sparrows. An additional 6 birds and 6 animals from the same age of each type served as uninoculated control. The inoculated group and the uninoculated one of each bird and animal type were

separately housed in wire bottomed cages equipped with collecting pan and given ration and water as libitum. Chickens, turkeys and quails were given chicken starter ration while yellow corn were given for pigeons in their mouths, whereas, mice and rabbits were given commercial rodent ration. The inoculated birds and animals were observed daily for any clinical signs of disease. Likewise, daily fecal samples from each cage were obtained and examined for the presence of *Cryptosporidium* oocysts by the M.Z.N stain on day 3 – 25 PI. Three birds and three animals from each infected group and two control were sacrificed on days 3 and 7 PI, the remaining number in each group were sacrificed on day 25 PI. Mucosal smears were obtained from the duodenum, jejunum, ileum, colon, cloaca, bursa and trachea of the birds species and from the stomach and intestine of the animal one. These smears were examined also for the presence of endogenous stages of Cryptosporidia.

RESULTS

The external examination of the 235 house sparrows under investigation revealed that they were free from ectoparasites infestation.

I- Prevalence of parasitic infection:

Table (1) shows that, the overall incidence of parasitic infection in the investigated sparrows (*Passer domesticus niloticus*) was 64.3 % (151 out of 235) which was classified as 53.2 % (125 of 235) harboured single infection, while 11.06% (26 of 235) possessing mixed infection. These sparrows were found to be infected with helminthes (cestodes mainly with few nematodes) – 41.3 % and protozoa (enteric and blood parasites) – 34.5%. Additionally, cestodes constituted the highest rate of infection being 40.4% (95 out of 235) followed by *Cryptosporidium sp.* infection (18.3%), *Isospora* sp. (8.5%), blood protozoa (7.7%) and finally nematodes (0.85%).

The results as shown in Table (1) revealed that, 8.1 % (19 cases) of the examined 235 sparrows harboured blood parasites. These cases were infected with three genera of protozoa identified as *Trypanosoma*, *Haemoproteus* and *Leucocytozoon* as well as with microfilaria sp. with an infection rates of 0.85%, 7.7%, 1.7% and 0.43% respectively. From the aforementioned data, it appeared that there were mixed infection with one or more blood parasites in some sparrows.

In the present work, the rate of cestodes infection (40.4%) was the highest one among the recovered parasites of the house sparrows. The results in Table (2) show that these sparrows were infected with four

species of cestodes identified as *Raillietena (R) galeritae* (Skrjabin, 1914), *R. echinobothrida* (Megnin, 1881), *R. tetragona* (Molin, 1858) and *Choanotaenia infundibulum* (Bloch, 1779). *R. galeritae* was the predominant species being in 30.6% (72 of 235) while *C. infundibulum* was the rare one being in 2.1% (5 of 235). All the infected birds with cestodes harboured more than one species. In the present study, some females of nematodes were recovered from the small intestine of one (0.43%) out of the 235 examined sparrows, where they identified as *Ascaridia galli* (Schrank, 1788) females.

Table (2) exhibits that *Isospora* and *Cryptosporidium* species were the only enteric protozoa detected in the present inquiry with an infection rates of 8.5% and 18.3% respectively. On the other hand, no tissue parasites were found in any of the examined sparrows.

II- Description of the recovered parasites:

Trypanosoma (Danilewsky, 1885):

The morphological characters of the obtained *Trypanosoma* species in the present investigation showed that it was *Trypanosma avium* (Fig. 1). It exhibited an extreme pleomorphism , where it was found as Pyriform, fusiform or spindle-shaped parasites. The cytoplasm of the fusiform one stained much deep blue and they were longer, narrower and possessed longer flagellum than the pyriform type. The flagellum, the nucleus and the kinetoplast stained red. The kinetoplast was round in shape and lay apart from the posterior end. The posterior end may be rounded or pointed

Haemoproteus (Kruse, 1890):

Studying the morphological characteristics of the detected Haemoproteus gametes revealed that they were two different types of gametes depending on their shape and location within the host red cells. The first one was rounded or slightly elongated (Fig. 2, a) with dark pigment granules concentrated in the two poles of the gamonts. In this type, although the host cell nucleus was displaced aside, this gamont didn't encircle the host cell nucleus or cause the enlargement of the host cell . The other type of gamonts were elongated or sausage-shaped with variable numbers of dark pigment granules (Fig. 2, b), partially encircle the host cell nucleus and displaced it to some extent. The host cell didn't enlarged. The recovered *Haemoproteus sp.* suggested to be *H. passeris* (Peirce, 1976).

Leucocytozoon (Sambon, 1908):

The detected gamonts of Leucocytozoom were morphologically identical to that of *L. fringillinarum*. The gamonts (Fig. 3) were from the

armed with a single row of about 18 large hooks. Mature segment bell-shaped (Fig. 8 b). The gravid proglottid was longer than broad and easily ruptured. The uterus breaks up to egg capsules each contained single egg which characterized by two distinctive elongated filaments at two poles (Fig. 8 c) of the mature egg. The genital pore was irregularly alternate at the anterior third of the proglollid.

Ascaridia galli (Shrank, 1788):

Four *Ascaridia galli* females (Fig. 9 a, b) were the only detected nematodes from the small intestine of one sparrow. They measured 6 – 8.3 cm in length while the eggs measured 67 – 75 μ long and 40 – 60 μ wide.

Isospora sp.

The isolated oocysts of *Isopora* in the present study was identified as *I. passerum* (Scholtyseck, 1954) or what was called *I. aegyptia* by Abd El-Aal (1981). They were spherical or semispherical in shape (Fig. 10) with double wall measuring 19 – 28 μ (average 24.1 ± 0.317 μ). There were no micropyle or oocysts residual body (R.B.) in the sporulated oocysts which had two pear shaped sporocysts with 4 sporozoites / each.

Cryptosporidium sp.

Out of the examined 235 house sparrows, 43 (18.3%) were infected with *Cryptosporidium sp.* All these positive cases (100%) were infected in the ileum, colon and cloaca, whereas, the duodenum of 13 sparrows only harboured the infection and the jejunum of 8 sparrows only were infected with Cryptosporidia. On the other hand, the conjunctiva, nasal sinuses, trachea and bursa of Fabricus were negative for *Cryptosporidium* infection. The oocysts (Fig. 11) were ovoid, measuring 5.7 ± 0.210 X 4.3 ± 0.07 μ (average: 4.9 – 6.3 X 4.0 – 5.1 μ) with prominent wall. It contained 4 sporozoites and a granular residium. After the experim ental inoculation of the six types of birds and animals (on day 6 PI), the inoculated squabs developed diarrhea which persisted for 8 days resulting in poor bodily condition. No signs of respiratory diseases or deaths were recognized in all groups except two infected squabs died on PI day 10 and 11. The daily fecal examination of all the inoculated groups showed that only the pigeon squabs were infected with the isolated *Cryptosporidium sp.* from the house sparrows and began to excrete oocysts in their feces from day 6 – 22 PI with a prepatent period of 5 days and a patent period of 17 days. The oocysts size was within the same range recorded in the naturally infected sparrows. Three types of meronts and merozoites of Cryptosporidia were

recognized at the third day PI, while all the developmental stages of Cryptosporidia were detected on day 7 PI except the type III meronts and merozoites. The dimensions of all the developmental stages of the isolated *Cryptosporidium sp.* were as shown in Table (3), while their morphological characters were identical to that of *C. baileyi* in chicken (Current et al., 1986) and *Cryptosporidium sp.* isolated from pigeons (Badawy and El-Sawy, 1995). All the inoculated and uninoculated groups (except the inoculated pigeons group) remained negative for *Cryptosporidium* infection in their feces and mucosal scrappings until the end of the experiment.

DISCUSSION

House sparrows (*Passer domesticus niloticus*) are extremely common and widespread throughout the Egyptian governorates. The present investigation was conducted to study the incidence of parasites infecting house sparrows at Giza governorate with regard to their taxonomy and the role played by them in transmitting the recovered parasites to our domestic birds.

The overall incidence of parasites infecting house sparrows was 64.3%. These sparrows were parasitized with one or more parasite, where the recovered parasites were protozoa (blood and enteric protozoa) and helminthes (mainly cestodes and few nematodes) while there were no infection with ectoparasites. The incidence of protozoa infecting house sparrows in the present study (34.5%) was higher than that recorded (15.28%) by Desouky (1992) in other wild birds. Likewise, the rate of blood and enteric protozoa were 7.7 % and 26.8 % respectively. Whereas, Desouky (1992) recorded a slightly higher rate (8.33%) of blood protozoa and a lower rate (6.94%) of entertic protozoa in other wild birds. The host as well as the locality may played a role in these differences.

The results of the present work revealed that the natural infection of helminthes was 41.3% which was moderately higher than that recorded (35%) from the house sparrows by Mahdy et al. (1994) at Giza governorate. This may be due to the higher number of birds examined in the present study. Moreover, among other wild birds , the rate of helminthes infection recorded (41.8%) by Hassan and Abd El-Aal (1999) was nearly similar to that of the present study . However, higher rates (81% and 57.6%) were recorded by Borgsteede (1989) and Ahmed (1994) respectively and lower rates (32.3% and 38.4%) were obtained by

Table (1) : Infestation rates of different types of parasites detected among examined house sparrows (*Passer demosticus niloticus*).

No. of birds	Infested birds		Birds had single infection										Birds had mixed infection							
			Total		Ce		Cr		I.		Bl		Total		Ce + Cr		Ce + I		N + Bl + Cr	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
235	151	64.3	125	53.2	71	30.2	34	14.5	3	1.3	17	7.23	26	11.06	7	2.98	17	7.23	2	0.85

Ce = Cestodes .
Cr = Cryptosporidium .
I = Isospora .
Bl = Blood parasites .
N = Nematodes .

Table 2: Prevalence of different parasitic species recovered from the examined house sparrows (*Passer domesticus niloticus*).

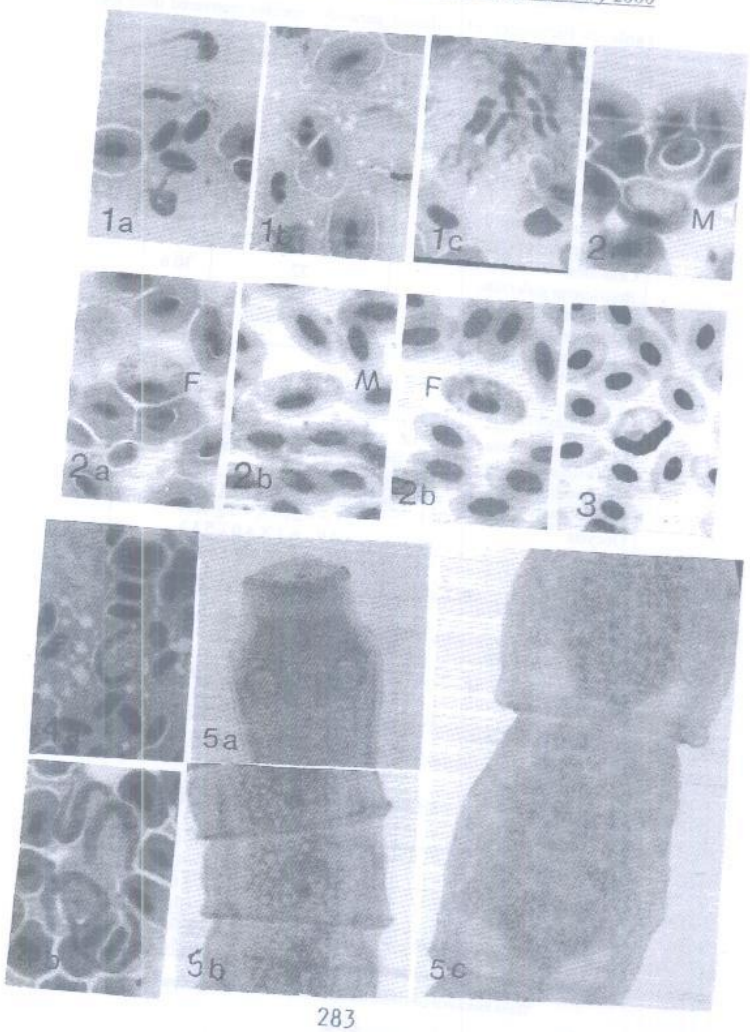
Parasitic species	No. of infected birds	%
Blood protozoa		
Trypanosoma avium.	2	0.85
Haemoproteus passeris.	18	7.7
Leucocytozoon fringillinarum.	4	1.7
Enteric protozoa		
Isospora aegyptia.	20	8.5
Cryptosporidium sp.	43	18.3
Cestodes		
Raillietena galeritae.	72	30.6
Raillietena echinobothrida.	23	9.8
Raillietena tetragona.	16	6.8
Choanotaenea infundibulum.	5	2.1
Nematodes		
Ascaridia galli .	1	0.43
Splendidofilaria .	1	0.43

Table 3: Measurement of the living endogenous stages of *Cryptosporidium sp.* isolated from sparrows in the mucosal scrapings obtained from experimentally infected pigeons.

Developmental stages	Measurement L X W (range) μ
Oocysts	5.7 ± 0.210 X 4.3 ± 0.07 (4.9 – 6.3 X 4.0 – 5.1)
Sporozoites	7.0 ± 0.04 X 1.0 ± 0.014 (6.4 – 7.5 X 1.0 – 1.2)
Type I meronts	4.6 ± 0.071 X 4.4 ± 0.062 (4.2 – 5.1 X 4.0 – 5.0)
Type I merozoites	6.1 ± 0.054 X 1.0 ± 0.012 (5.8 – 6.6 X 1.0 – 1.2)
Type II meronts	4.8 ± 0.32 X 4.4 ± 0.09 (4.2 – 5.2 X 3.9 – 4.8)
Type II merozoites	4.9 ± 0.099 X 1.1 ± 0.03 (4.2 – 5.3 X 1.2 – 1.4)
Type III meronts	5.0 ± 0.063 X 4.7 ± 0.18 (4.1 – 5.6 X 4.3 – 5.2)
Type III merozoites	3.5 ± 0.041 X 1.2 ± 0.04 (3.1 – 4.0 X 1.1 – 1.4)
Microgamonts	4.2 ± 0.112 X 4.1 ± 0.09 (3.9 – 4.7 X 3.5 – 4.5)
Macrogametes	5.2 ± 0.051 X 5.1 ± 0.07 (4.7 – 5.5 X 4.6 – 5.5)
Fertilized macrogametes	5.3 ± 0.06 X 5.3 ± 0.04 (4.8 – 5.5 X 4.6 – 5.6)

L = Length W = Width .

These measurements were the mean of 20 different organism .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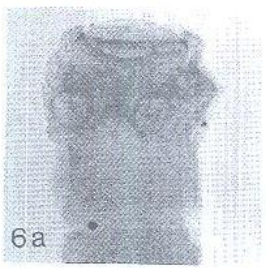
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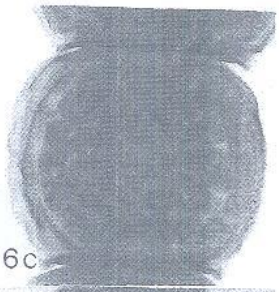
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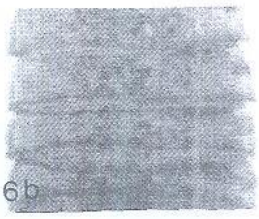
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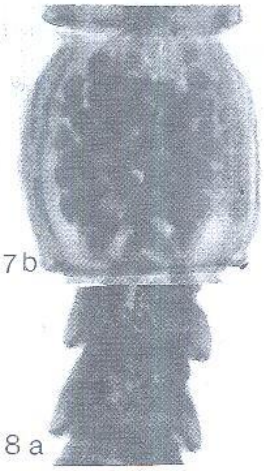
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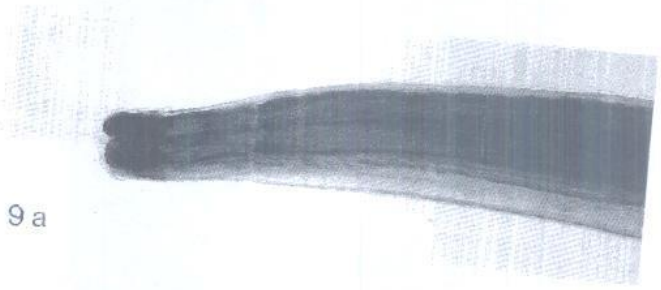

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