

---

## On the Morphology of the Oxyurid Nematode *Pharyngodon mamillatus* Linstow, 1899 (Ascaridida: Pharyngodonidae) from *Eumeces shneideri* in Egypt

**Mohammed Hassan Ibraheem**

Department of Zoology, Faculty of Science, Minia University, El-Minia 61519, Egypt.  
E-mail: mohamhas@mu.edu.eg.

**Bahaa Kenawy Abuel-Hussien Abdel-Salam**

Department of Zoology, Faculty of Science, Minia University, El-Minia 61519, Egypt and  
Department of Biology, Quwayha College of Science and Humanities, 11961, Shaqra  
University, Saudi Arabia. E-mail: bahaa.kenawy1@yahoo.com.

**Rasha Shehata Abd El Gwad**

Department of Zoology, Faculty of Science, Minia University, El-Minia 61519, Egypt.  
E-mail: biologist.rasha@gmail.com

---

Received: 09 April 2017/ Accepted: 11 May 2017/ Publication date: 20 July 2017

### ABSTRACT

The aim of the present study was to characterize the morphological features of *Pharyngodon mamillatus* using light and scanning electron microscopy. The morphometric measurements of adult *P. mamillatus* are given in this study. Scanning electron microscopy revealed that the cuticle has regular transverse annulations extending from the posterior margin of the lips to the level of the anus. The triangular mouth opening is surrounded by three large lips. The excretory pore is oval in shape and has a row of cirri on its posterior edge. The vulva is a slit-like opening that possesses double walled anterior and posterior cuticular lips. The anus is a slit-like ventral opening at the posterior end which terminates with a long spicule.

**Key words:** *Pharyngodon mamillatus*, Ascaridae, *Eumeces shneideri*, Pharyngodonidae Egypt, Nematoda, Oxyuridea

---

### Introduction

*Pharyngodon mamillatus* was originally described by Linstow (1897) from *Plestriodon aldrovandi* in Algeria. It was then redescribed by Chabaud and Golvan (1957) from *Eumeces algeroensis* in Morocco. *P. mamillatus* was reported by Baylis (1923) and Myers *et al.* (1962) from *E. shneideri* in Egypt. Ashour *et al.* (1992) studied the morphology of *P. mamillatus* from *Chalcides ocellatus* in Egypt. Al-Bassel and El-Damarany (2002) studied the morphology of *Pharyngodon mamillatus* from *Tarentola annularis* in Fayoum Governorate, Egypt. Amer and Bursey (2008) recovered more than 100 individuals of *P. mamillatus* from *Novoeumeces schneideri* in Cairo, Egypt. The purpose of this study was to throw some light on the morphology of this helminth parasite as seen by light and scanning electron microscopy. The prevalence of infection and mean abundance of the parasite in the alimentary tract of *E. shneideri* have been reported.

### Material and Methods

Twenty seven specimens of *Eumeces shneideri* were captured from Burg El Arab and El Hammam, North west of Egypt. They were brought to the laboratory alive and were killed by the exposure to high dosage of Chloroform vapour, then immediately dissected. Intestinal contents were investigated in 0.75% physiological saline solution under a stereomicroscope and the collected worms were washed several times in saline solution. Twenty female nematodes only of the genus

---

**Corresponding Author:** Mohammed Hassan Ibraheem, Department of Zoology, Faculty of Science, Minia University, El-Minia 61519, Egypt. E-mail: mohamhas@mu.edu.eg

*Pharyngodon* were obtained from the intestines of thirty-six adults of *E. shneideri*. The nematodes were fixed in 70% ethanol and cleared in lactophenol for morphological studies.

For SEM the worms were fixed in a solution of 2.5% glutaraldehyde made in 0.1 M sodium cacodylate buffer containing calcium acetate (pH 7.2) at 4°C for at least 2 hours. Subsequently, they were washed three times with the same buffer and post-fixed for 3 hours in 1% osmium tetroxide in buffer (pH 7.2) at 4°C. After washing several times in the buffer solution, the specimens were dehydrated through an ascending ethanol series and dried in a critical-point drying machine using liquid carbon dioxide as a transitional medium. Later on, the specimens were mounted on aluminium stubs and then coated with gold using a JEOL JFC-1100 E ion sputtering device with a setting of 10 – 15 mA, for 20 min. Afterwards, the specimens were examined with a stereoscan JEOL JSM-5400 LV operating at 15 kV. Morphometric measurements stated in the results section were taken from unstained whole mount preparations of slightly flattened adult specimens and are given in millimetres. All measurements are summarized in Table 1 and expressed as mean values ( $\bar{X}$ ), with their standard deviation (SD) and standard error (SE) values.

## Results

### Light Microscopy:

*Pharyngodon mamillatus* is a small, slender nematode, whitish in color and fusiform in shape. The body tapers gradually towards the posterior end and terminates with a long tail. The mouth opening is triangular in shape and followed by a cylindrical esophagus which is muscular and tubular in shape. It is composed of an anterior cylindrical corpus and a posterior valvated bulb. The excretory opening is oval in shape and is situated at a short distance below the level of the esophagus. It has a row of cirri on its posterior edge. The vulva is a slit-like opening; it is situated just posterior to the excretory opening and the esophageal intestinal junction. The esophagus leads to a yellowish tabular intestine that opens into a subterminal a slit-like anal opening. All morphometric measurements are given in Table (1).

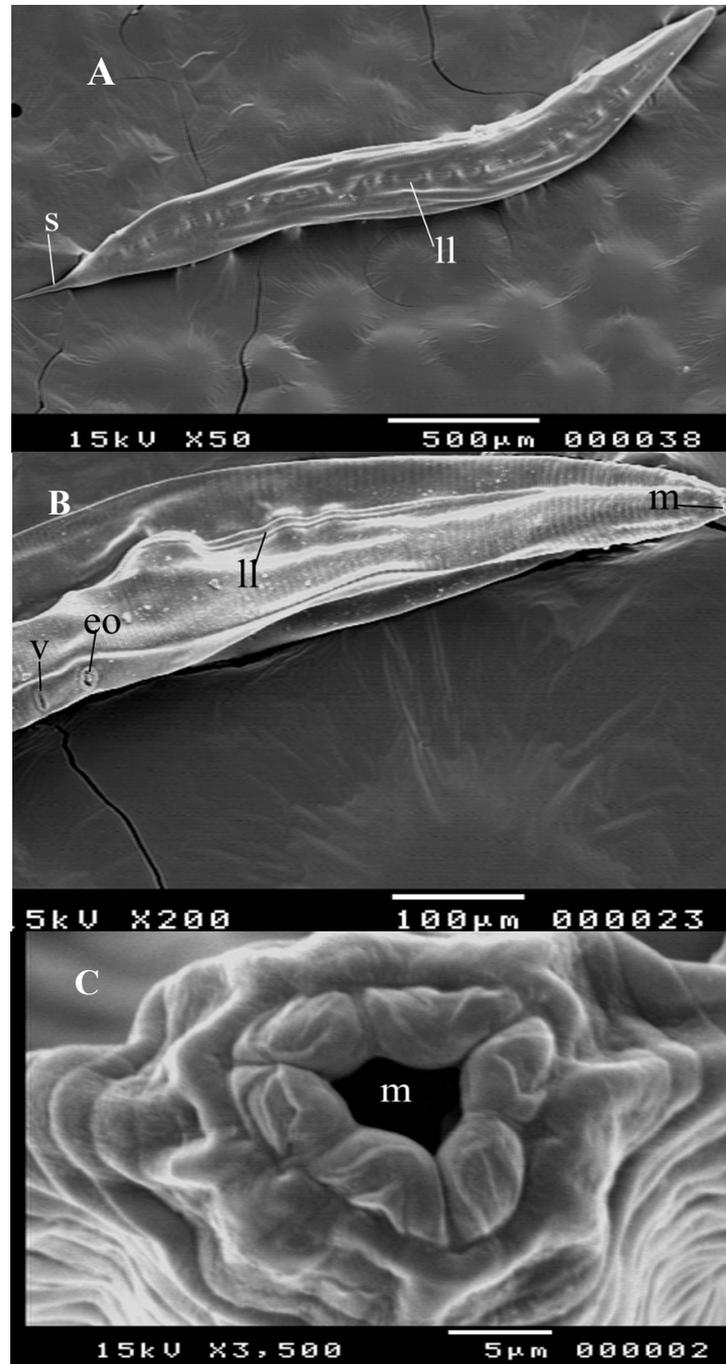
**Table 1:** Morphometric measurements of female *Pharyngodon mamillatus* collected from *Eumeces shneideri*. (All measurements are given in millimeters).

Morphological parameters	Female			
	Mean	SD	SE	n
Total body length	4.1	0.5	0.1	11
Maximum width	0.53	0.02	0.01	11
Total esophagus length	0.01	0.63	0.004	11
Esophageal bulb length	0.63	0.4	0.1	6
Esophageal bulb width	0.082	0.02	0.007	11
Intestine length	3.1	0.5	0.1	7
Distance of nerve ring from the anterior end	0.3	0.01	0.006	7
Distance of excretory pore from the anterior end	0.63	0.01	0.005	6
Distance of vulva from the anterior end	0.85	0.06	0.02	9
Distance of the anus from the posterior end	0.43	0.01	0.005	9
Egg length	0.1	0.01	0.005	15
Egg width	0.033	0.002	0.001	15
Spike length	0.21	0.05	0.01	9

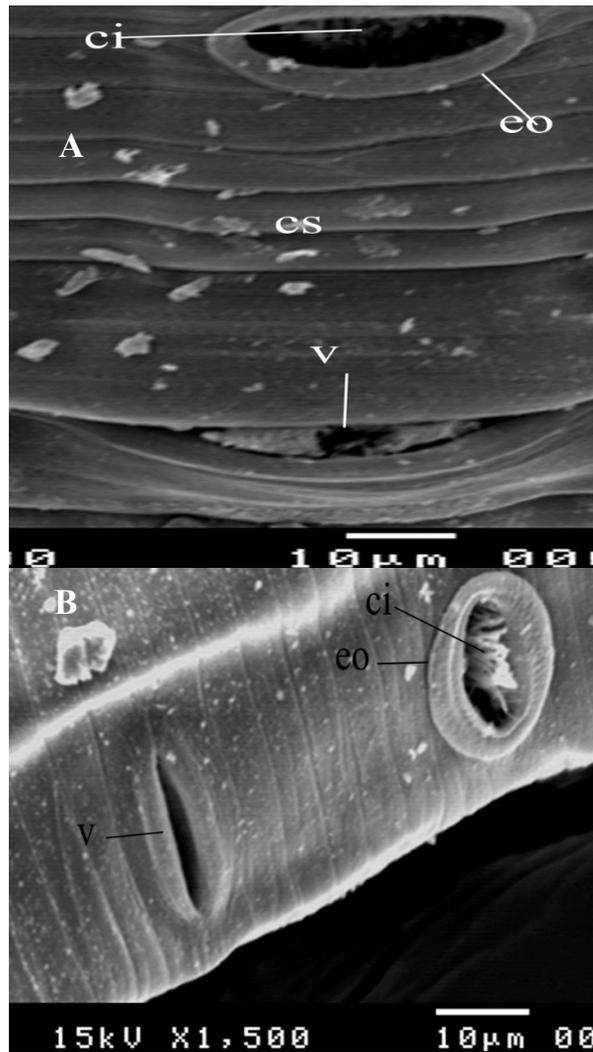
### Scanning Electron Microscopy:

Scanning electron microscopic observations on the female of *Pharyngodon mamillatus* from the large intestine and the rectum of *Eumeces schneideri* revealed that the anterior end of the worm is smooth. The body is robust in shape, tapering anteriorly and posteriorly (Fig. 1A). It has transverse striations which begin just behind the mouth opening (Fig. 1B). The latter is triangular in shape (Fig. 1C). It is surrounded by 3 large bilobed lips. The lateral lines run from a level behind the esophageal

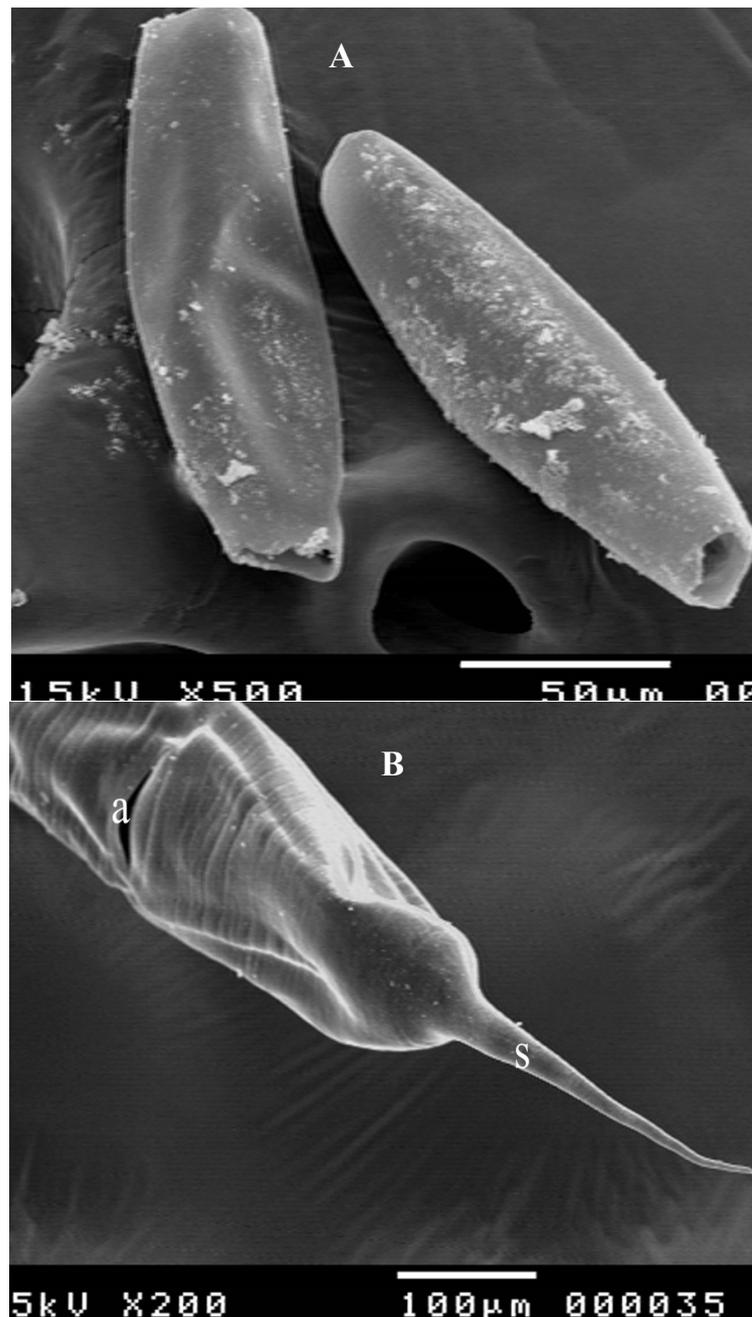
bulb to a little distance behind the anus, where they come together (Fig. 1A). The excretory pore is situated anterior to the vulval opening and is provided with cilia like structures on its inner border (Fig. 2A). The vulva is a slit-like opening and possesses double walled anterior and posterior cuticular lips (Fig. 2B). The ova are elongated and are provided on either pole with smooth opercula (Fig. 3A). The tail is conical in shape and ends with a smooth terminal spike. At the posterior end of the body the anus appears as a wide slit-like opening on a ventral, sub terminal position; it is surrounded by a smooth cuticle (Fig. 3A).



**Fig. 1:** Scanning electron micrographs (SEM) of female *Pharyngodon mamillatus*. Showing: A - the whole body, the spike (s), and the lateral line (ll); -B the mouth opening (m), the lateral lines (ll), the excretory opening (eo), and the vulva (v); - C triangular mouth opening.



**Fig. 2:** SEM of female *P. mamillatus* showing: A - the excretory opening (eo), which is provided at the inner border with cilia-like structures (ci), the slit-like vulval opening (v), which is surrounded by anterior and posterior cuticular lips and the cuticular striations (cs) (1000 $\times$ ); - B another female *P. mamillatus* showing the excretory opening (eo) provided with cilia like structure (ci) and the vulval opening (v).



**Fig. 3:** A- SEM showing 2 ova of *P. mamillatus* which are elongated and smooth; B - the posterior end with the body annulations, a long terminal spike (s), and the anus (a).

### Discussion

The present specimen belongs to the genus *pharyngodon* due to:

- (a) The presence of post esophageal excretory pore.
- (b) The presence of a sharply pointed single spicule.
- (c) The vulva is situated post esophageal at the anterior half of the body.

(d) The ova are elongated and contain unsegmented embryos. Thirty-four species of the genus *pharyngodon* except two have been described from reptiles other than the wall lizards Gecko. These two species are *pharyngodon apapillosus* koo, (1938) and *p. geckonis* Liu *et al.* (1941) from Geckonida in china. Fatima (1975).

The morphological characters of the present nematode coincide with those of the family Pharyngodonidae, Travasso, 1919 and the genus *Pharyngodon* Diesing, 1861. Malan (1939) has furnished a valuable key to the species *Pharyngodon*. Eleven species have been described since Malan's key has been prepared. Calvente (1948) proposed that the genus *Pharyngodon* is divided into two subgenera, *Pharyngodon* and *Neyrapharyngodon*.

*P. mamillatus* has been recorded by many researchers from many hosts in different localities all around the world. It has been originally described by Linstow (1897) from *Pledstridon aldrovandi* in Algeria. Chabaud and Golvan (1957) redescribed the same species from *Eumeces algerinsis* in Morocco depending on the presence or the absence of the spicules, the shape of the egg, the presence or absence of spine on the tail filament and the geographical distribution. It has also been reported from Madagascar, Spain, Soviet Union and central Asia (Skrjabin *et al.* 1960, Sharpilo 1976). Chabaud and Brygoo (1962) suggested that the geographical distribution is the most important factor in the speciation of reptilian oxyurids.

In Egypt *pharyngodon mamillatus* has been described by Baylis (1936) from *Eumeces* sp. and by Meyer *et al.* (1962) from *E. schneideri*. Ashour *et al.* (1992) redescribed the same species from *Ch. ocellatus* in Cairo, Egypt. Mazen *et al.* (1996) reported *P. mamillatus* from *Chalcides ocellatus*, *E. scheinder* and *Tarentola annularis* in Assuit governorate, Egypt. *P. mamillatus* is parasitic mainly in members of the family scincidae (Abd El Hameed 2008).

Scanning electron microscopic examinations of adult *P. mamillatus* in the present study revealed a transversely annulated cuticle with regular annuli. These annulations extend over the whole body, except for the tips of the head and tail. Annuli are not divided into sub annuli. Kozek and Marroquin, (2002) considered the main function of the cuticle in protection against environmental influences and maintain the shape of the worm. Smyth (1994) concluded that it protects against the inflammatory cells of the host, while Frantova (2002) considered that it supplies the nutrients.

The present results agree with the description given by Ashour *et al.* (1992) except that the adult worm in the present description are larger than those given by other authors whose description lacks details about the mouth and the vulval opening. This variation may be attributed to the host difference. The present description adds more details about the mouth opening, the excretory opening and the vulva.

## References

- Abd El Hameed, F., Z. AL, 2008. Studies on some parasites of some reptiles in Egypt. M.Sc. Thesis Faculty of Science. Assuit University., Egypt.
- Al-Bassel, D. and M. El-Damarany, 2002. On the morphology of *Pharyngodon mamillatus* (An Oxyurid nematode) from *Tarentola annularis* from Fayoum. Governorate, Egypt. Invertebrate Zoology and Parasitology, (37 D): 1-8.
- Amer, O.S.O. and C.R. Bursey, 2008. On the Oxyurid Nematode, *Pharyngodon mamillatus* in the skinks, *Novoeumeces schneideri* (Lacertilia: Scincidae) from Egypt. Comp. Parasitol, 75(2): 333-338.
- Ashour, A.A., E.A. Koura, N.M. El-Alfy and Z. Abdel-Aal, 1992. On the morphology of the oxyurid nematode *Pharyngodon mamillatus* (Linstow, 1897) from *Chalcides ocellatus* from Egypt. J. Egypt. Soc. Parasit.
- Baylis, H.A., 1923. Report on a collection of parasitic nematodes, mainly from Egypt. Parasitology, 15: 14- 23.
- Baylis, H.A., 1936. Fauna of British India. Nematoda. vol. 1. Taylor and Francis, London
- Calvente, I.G., 1948. Revision del Genero *pharyngodon* Descripcion de Especies Nuevas. Rev. Iberica Parasitol., (8): 367-410.
- Chabaud, A.G. and Y.J. Golvan, 1957. Miscellanea Helminthologica Maroccana XXIV. Nematodes parasites de lezards de la foret de Nefifik. Archives de l'Institut Pasteur.
- Chabaud, A.G. and E.R. Brygoo, 1962. Nematodes parasites de Cambleons malgaches. Deuxieme note. Annales de Parasitologie Humaine et Comparee, 37: 569-602.
- Diesing, K.M., 1861. Revision der Nematoden. Akademie der Sitzungsberichte Wissenschaften, 42: 595- 736.

- Fatima, M.B. and H.S. Mohammad, 1975. Three helminth parasites of the wall lizard *Gecko* sp. Pakistan J. Sci. Ind. Res., 18: 6.
- Frantová, D., 2002. On the morphology and surface ultrastructure of some parasitic nematodes (Nematoda) of birds (Aves). Acta Societatis Zoologicae – nicae, 66: 85-97.
- Kozek, J.W. and F.H. Marroquin, 2002. Electron microscopy of *Onchocerca volvulus* and its nodule. Proceeding of 10th International Congress of Parasitol., 4 – 9 August, Vancouver, Canada.
- Liu, C.K. and H.W. Wu, 1941. Notes on some parasitic nematodes. Sinensia, 12: 61-73.
- Linstow, O.V.O.N., 1897. Nematoden aus der Berliner Zoologischen Sammlung.
- Linstow, O. von, 1899. Nematoden aus der Berliner Zoologischen Sammlung. Hitt. a.d. Zool. Mus. Berlin, vol. i.
- Malan, J.R., 1939. Some helminths of South African Lizards. The Onderstepoort Journal, 12(5): 447-469.
- Mazen, N.A.M., F.G. Sayed, M. El-Nazer and M. El-Damarany, 1996. Studies on some parasitic nematodes of reptiles in Assiut Governorate. Bull. Fac. Sci., Assuit univ., 25(3-E): 1-10.
- Myer, B.J., R.E. Kuntz and W.H. Welles, 1962. Helminth parasites of reptiles, birds and Mammals in Egypt VII. Check list of nematodes collected from 1948 – 1955. Can. J. Zool., 40: 531-538.
- Sharpilo, V.P., 1976. parasitic worms of the reptile fauna of U. S. S. R. publ. House Naukova Dumka, Kiev, 287pp. (In Russian).
- Skryabin, K.I., N.P. Schikhobalova, E.A. Lagodovskaya, 1960. Oxyurata of animals and man. Part 1. Oxyuroidea. Izd. Akademii Nauk SSR. Translated 1974, Israel Program for Scientific Translations, Jerusalem.
- Smyth, J.A., 1994. Animal parasitology. 3rd edit. Cambridge Univ. New York.