

Preliminary Survey on Parasites Infecting Some Amphibian and Reptilian Species from United Arab Emirates and Qatar

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تقصي أولي لطفيليات بعض أنواع البرمائيات والزواحف المجمعة من دولتي الإمارات العربية المتحدة وقطر

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لقد تم فحص عدد من أنواع العلاجم *Bufo orientalis* وبعض الزواحف مثل الدفان *Scincus muscatensis* وسحلية الحدائق *Mabuya brevicolis* والنضب *Uromastix microlepis* والسحلية الدودية النادوس *Diplometopon zarudnyi* وقد جمعت العينات من خمس مناطق في دولتي الإمارات العربية المتحدة وقطر في شمال شرق الجزيرة العربية، وأسفر الفحص عن وجود طفيليات أولية مثل نوع من *Haemogregarina sp.* ونوع من *Trypanosoma sp.* كما أسفر أيضاً عن وجود ديدان طفيلية تشمل نوع واحد من ثنائيات العائل هو *Paradistomoides magnum* ونوعين من الشريطيات هما *Nematotaenia dispar* و *Oochoristica najdei* وثلاثة أنواع من الخيطيات هي *Rhabdias bufonis*, *Thelandros sp.* و *Parapharyngodon sp.* وقد قورنت هذه الطفيليات بما تم وصفه من قبل وتمثل هذه الدراسة تسجيلاً لأول مرة للجنسين *Parapharyngodon* و *Paradistomoides* في شبه الجزيرة العربية.

Key Words : Amphibian parasites, Reptilian parasites, Arabian Peninsula, Biodiversity, Helminths, Protozoa.

ABSTRACT

The common amphibian toad *Bufo orientalis* and four species of reptiles (*Scincus muscatensis*, *Mabuya brevicolis*, *Uromastix microlepis* and *Diplometopon zarudnyi*) were collected from five localities in the United Arab Emirates and Qatar (The north eastern of Arabian Peninsula) and examined for parasites. Two protozoans, *Haemogregarina sp.* and *Trypanosoma sp.*; one digenean species, *Paradistomoides magnum*, two cestode species, *Nematotaenia dispar* and *Oochoristica najdei*; and three nematode species, *Rhabdias bufonis*, *Thelandros sp.* and *Parapharyngodon sp.* All parasites were compared with the previous records in the Arabian Peninsula and revealed that the two genera *Paradistomoides* and *Parapharyngodon* are recorded here for the first time from the Arabian Peninsula.

Introduction

There have been very few studies on parasites of amphibians and reptiles from the Arabian Peninsula, none of which dealt with hosts collected from the eastern part close to Arabian Gulf coasts. Nasher [1] reported on some helminthic parasites infecting the toad *Bufo orientalis* and the tree frog *Hyla arborea* in Asir province in West-southern area of the Peninsula. He reported one monogenian, one cestode and 3 nematode species. Later, Adamson and Nasher, [2] described five new species of nematodes infecting *Agama yemenensis* lizards collected from the same area. From the central region of the peninsula, Magzoub et al. [3] assigned one cestode species and one nematode species from the Dhab *Uromastyx aegyptia*, the only edible lizard in the Peninsula. Kasim et al. [4] studied blood parasites infecting the frog *Rana ridibunda* and recorded 5 unidentified trypanosomes and one haemogregarine. In 1980, Ramadan et al. [5] described a new trematode species from *Rana ridibunda* collected from South of Riyadh city, Saudi Arabia. This species assigned as *Pseudosonsinotrema saudii* was the first digenean parasite recorded in the Peninsula from amphibians. This preliminary report is an extension to our knowledge about the parasites of the herpetological fauna of the Arabian Peninsula.

Materials and Methods

Between 1990-1993 and 1996-1998, 21 *Bufo orientalis*, 18 *Scincus muscatensis*, 12 *Mabuya brevicollis*, 5 *Diplometopon zarudnyi*, and 4 *Uromastyx microlepis* were collected during scientific trips and returned to the laboratory for parasite investigation. Specimens were collected from 5 areas: area (1) was Dhaid nearly 80 Km. east of Sharjah city, area (2) was desert region of Dubai city, area (3) was around Al Ain city, area (4) was Tareef about 120 km. West of Abu Dhabi city and area (5) was along Salwa Highway road west of Doha city (Fig. 1). Thin blood smears were made from cardiac blood, air dried, fixed in methanol for 3 minutes and stained with Giemsa solution. The gastro-intestinal tract of each specimen was excised in saline and the oesophagus, stomach, liver including gall bladder, small and large intestine were examined separately under a dissecting microscope for helminths. Lungs were also excised in saline and examined. Some specimens were examined post-mortem which were preserved in 10 formalin in the field. Trematodes and cestodes were fixed in neutral formal saline and stained with acetocarmine. Nematodes fixed in hot 70% alcohol were cleared in lactophenol for identification. Drawings were made with the aid of a microprojector. Measurements are given in microns unless otherwise stated.

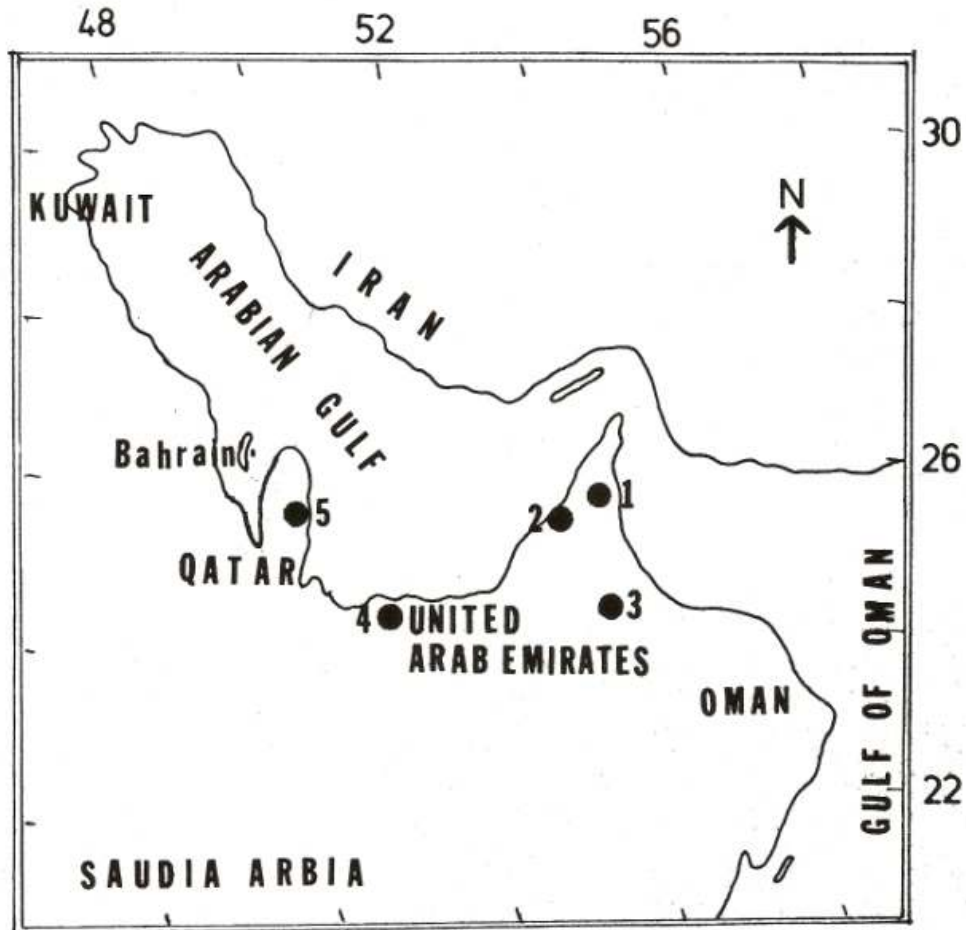


Fig. 1. Locations of the sampling areas in the Northeast of Arabian Peninsula. The numbers from 1 to 5 indicating respectively Dhaid region, Sharjah region, Al Ain region, Tareef region and Doha region.

Results

1- *Haemogregarina* sp. – (Figs 2, 3 and 4).

Host: *Bufo orientalis*

Locality and parasite habitat: Table (1).

Description

Blood forms were only observed. Gametocyte stages are abundant inside erythrocytes with medium parasitemia about (40/1000 erythrocytes). They have different developmental stages. Some are slime elongate with one curved end (Fig. 2) and others with thick bodies which curved around the host nucleus (Fig. 3). They reach 18 -21 in length and 3-5 in width. The slime forms have a central nucleus while thick have the nucleus near curved end. Nucleus length 6-9 and width 2-3 : Normal erythrocyte about 13-18 length while the infected cells clearly enlarged with length 23-25 . Cytoplasm is faintly stained, unvacuolated. In late stages of development the host nucleus is displaced at one end of the infected cells (Fig. 4).

Remarks

Haemogregarines have not been reported from the host *Bufo orientalis*. Kasim et al. [4] have mentioned an unidentified species which infecting the frog *Rana ridibunda* from Najd region, Saudia Arabia. A recent study from Egypt reported on the occurrence of haemogregarines in gecko blood [6].

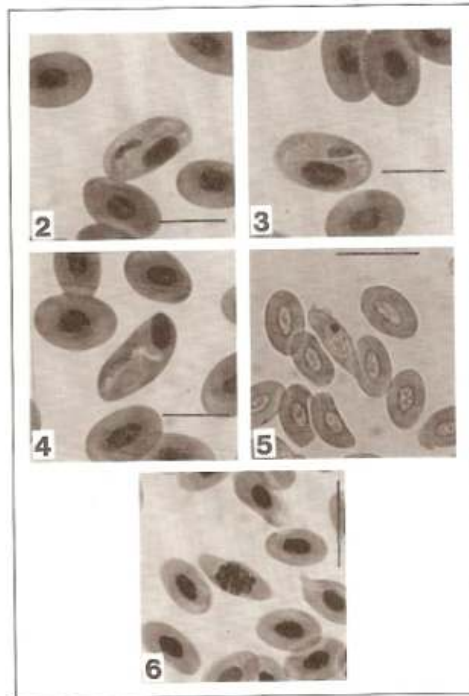
2- *Trypanosoma* sp. – (Figs 5 and 6).

Host: *Scincus muscatensis*

Locality and parasite habitat: Table (1).

Description

Examination of skinks revealed that one harbored two forms of undetermined trypanosome; promastigote and a typical epimastigote stages. Promastigote form has an ovoid shape with body length 12-16 and 6-8 width. Nucleus remarkably large filling nearly two third of body and kinetoplast located anteriorly (Fig. 6). Epimastigote form has a spindle body shape with 20-23 length and 5-7 width. Nucleus is large with length 7-9 and 5-7 width. Kinetosome deeply stained with the kinetoplast and both located closely in front of the nucleus with diameter 2.5 . A short extending flagellum lies along two folds undulating membrane which equal nearly 3 in length (Fig. 5).



Figs. 2-4. Photomicrographs of blood forms of *Haemogregarina* sp. from dry-fixed smears stained with Giemsa. Scale bar 0.01 mm. **Figs. 5-6.** Photomicrographs of *Trypanosoma* sp. epimastigote and promastigote stages. Sale bar 0.02 mm.

Remarks

It is controversial detecting pro- and epimastigote forms within a reptilian blood. The promastigotes which are motile, extracellular with prominent flagellum are found within the gut of the vector insect but it can be found also in saurian host [7]. Ashford et al. [8] stated that the epimastigote stages can be introduced by the vector into the reptilian blood stream either directly by inoculation through the vector's bite or indirectly through mucous membrane of the oral cavity or through the gut wall during ingestion of the vector itself by the reptile. Considering the Arabian Peninsula no literatures have been found dealing with saurian trypanosomes. The only reported trypanosomes were from the frog *Rana ridibunda* in the central region [4].

3- *Paradistomoides magnum* (Tubangui, 1928) Yamaguti, 1971 – (Fig. 7).

Host: *Mabuya brevicollis*

Locality and parasite habitat: Table (1)

Table 1
Protozoan and helminth parasites which infect *Bufo orientalis* and some reptiles from the Eastern of Arabian Peninsula

| Parasites | Host(s) (No. examined) | Habitat in host | Localities (Fig. 1) | Records from other areas of Arabian Peninsula |
|--|--|------------------------------------|---|--|
| Protozoa: 1- <i>Haemogregarina</i> sp. 2- <i>Trypansoma</i> sp. | <i>Bufo orientalis</i> (21) <i>Scincus muscatensis</i> (18) | Blood Blood | Areas (1), (3) and (5) Areas (3) and (5) | Unidentified Haemogregarines and Trypanosomes recorded from <i>Rana ridibundia</i> (Najd, central region). |
| Digenea: 1- <i>Paradistomoides magnum</i> | <i>Mabuja brevicollis</i> (12) | Gall bladder | Areas (1) and (3) | No records. |
| Cestodes: 1- <i>Nematotaenia dispar</i> 2- <i>Oochoristica najdei</i> | <i>Bufo orientalis</i> (21) <i>Mabuja brevicollis</i> (12) | Small intestine Small intestine | Areas (1), (3) and (5) Area (1) and (3) | Recorded from the same host at (Asir, South Western region) and <i>Hyla arborea</i> and <i>Bufo viridis</i> from (Iraq, Northern region). Recorded from <i>Uromastix aegyptia</i> (Najd, Central Saudi Arabia). |
| Nematodes: 1- <i>Rhabdias bufonis</i> 2- <i>Thelandrus</i> sp. 3- <i>Parapharyngodon</i> sp. | <i>Bufo orientalis</i> (21) <i>Uromastix microlepis</i> (4) <i>Diplometopon zarudnyi</i> (5) | Lungs Rectum Large intestine | Areas (1), (3) and (5) Areas (5) Area (2) | Recorded from <i>Hyla arborea</i> (Asir, South Saudi Arabia). Recorded from <i>Agama yemenensis</i> (Asir region). No records. |

Description

Based on 5 specimens collected from the gall bladder of one host. The body slightly oval without spines. Body length 2.2-3.2 mm and width 1.4-1.5 mm. Oral sucker sub-terminal with diameter 270-350. Prepharynx absent. Pharynx well developed with length 80-100. Oesophagus long nearly with the same length of pharynx. Caeca are highly dilated and terminating near posterior extremity. Ventral sucker nearly located at the first third of body, equal 280-300 in diameter. Testes symmetrical, ovoid with width greater than length. They located at the same level just posterior to acetabulum. Each measures 150-180 long by 260-300 wide. Vesicula seminalis originates posterior to acetabulum opens directly onto genital pore just posterior to pharynx. Ovary compact, slightly ovoid and located post-testicular. It measures 160-180 long by 200-220 wide. Uterus winding posteriorly filling most of postovarian region masking most parts of caeca but not exceeds the outer lining of them. Uterus ascending anteriorly giving metraterm which opens directly onto genital pore. Vitellaria follicular, extending from testicular filling nearly the mid third of the body. Excretory vesicle is V-shaped with terminal excretory pore.

Remarks

Genus *Paradistomoides* Travassos (1944) is closely related to genus *Paradistomum* Kossack (1910) but differs in smaller suckers in the first and more extensive vitellaria in the second which commence at testicular level. *Paradistomum magnum* was assigned by Tubangui in 1928 who collected it from gall bladder of *Hemidactylus frenatus* at Philippine. This species was transferred to genus *Paradistomoides* by Yamaguti [9] as a new combination according to the less extensive vitellaria and relative small suckers. The present species is so far the first record of a digenean from reptiles of the Arabian Peninsula. The mode of life of the garden lizard *Mabuva brevicollis* which occurs frequently in small ponds between vegetation makes them more susceptible to infection with Digenea.

4- *Nematotaenia dispar* Luhe (1899) – (Fig. 8).

Host: *Bufo orientalis*

Locality and parasite habitat: Table (1).

Description

Twelve frogs found harboring these worms from total 21 examined. Scolex simple, has 4 suckers and lacking rostellum. Neck present. Strobila nearly cylindrical. Genital pores irregularly alternating. Cirrus pouch intruding into medulla. Testes two in dorsal medulla. Ovary compact in ventral medulla. Vitellarian gland medullary and dorsal to ovary. Vagina ventral to cirrus pouch. Egg capsules scattered along the gravid segments, each with two eggs.

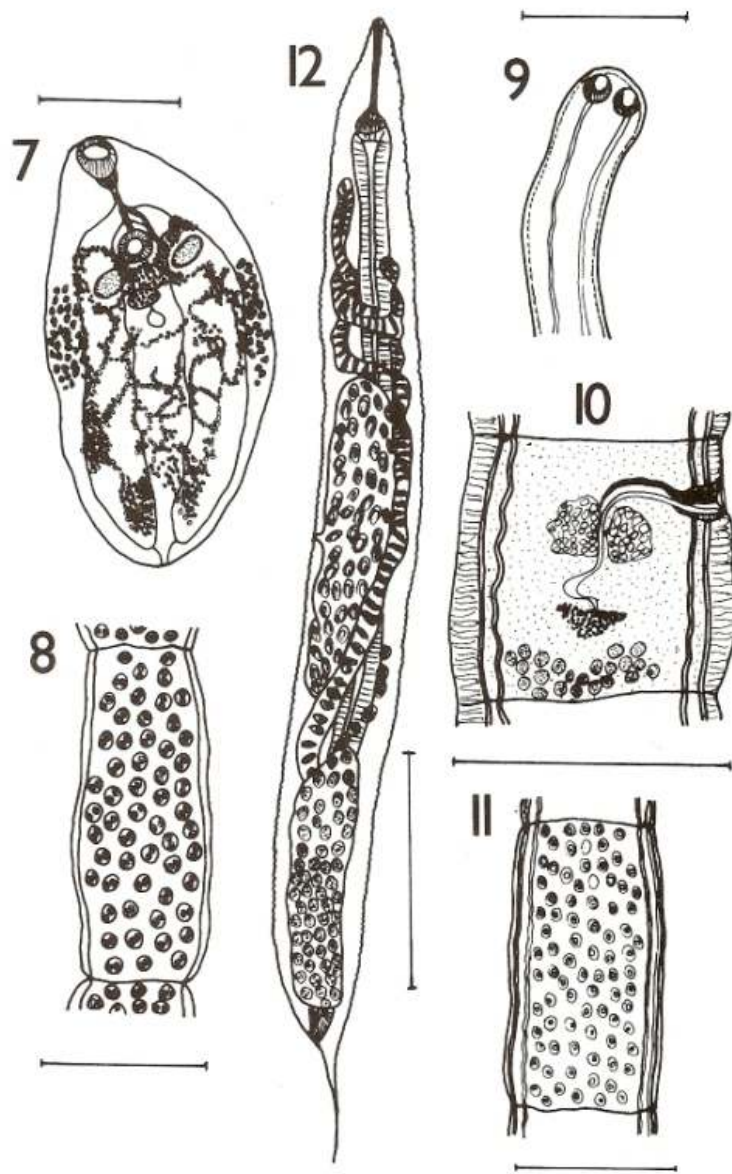


Fig. 7. Entire worm of *Paradistomoides magnum*, ventral view. Scale bar 1 mm.
 Fig. 8. Gravid proglottid of *Nematotaenia dispar*. Scale bar 1 mm. Figs. 9-11.
Oochoristica najdei. 9. Scolex. 10. Mature proglottid. 11. Gravid proglottid. Scale
 bar 1mm. Fig. 12. Entire female of *Thelandros* sp. Scale bar 1mm.

Remarks

N. dispar was described by Nasher [1] who reported this parasite from same host *Bufo orientalis* and also *Hyla arborea* from Southern Asir district of Peninsula. It seems that this species has a wide geographical distribution and highly specific to Bufonids [10]. These cestodes are very common among frogs in all Arab countries. It's distribution in the peninsula depends mainly on the distribution of frogs. In Tunisia, Maamouri and Chakroun [11] have described 3 species of the genus including *N. dispar* from *Bufo viridis* and assigning *N. viride* as a new species.

5- *Oochoristica najdei* Magzoub et al. (1980) – (Figs. 9, 10 and 11).

Host: *Mabuya brevicollis*

Locality and parasite habitat: Table (1).

Description

Description based on 4 specimens: Total length 55-72 mm. Immature proglottides wider than long. Mature proglottides nearly square but gravid are longer than wide. Greatest width of strobila 1.2-1.6 mm. Neck length 3.3-3.6 mm. Scolex with 4 suckers, it's diameter around 440-460. Suckers diameter 120-124. Excretory system of 4 longitudinal ducts visible through length of strobila. Genital pores irregular alternating, situated in anterior quarter of proglottid. Cirrus sac length 150-170 and width 40-60. Ovary situated in center of proglottid with 2 major lobes. Ovary width 120-140. Vitelline glands nearly triangular in shape situated on midline directly behind ovary. Vitellaria width 110-120. Testes lie posterior to ovary in approximately equal number on both sides of the vitellaria.

Testes number 16-20 and diameter 50-60 in each proglottid. In gravid proglottids, the uterine capsules fill the entire segment. Each capsule containing a single egg and has a diameter 50-60. Vagina, vas deferens and cirrus pouch visible in some gravid proglottids.

Remarks

Genus *Oochoristica* is a cosmopolitan which has been recorded from lizards, snakes and turtles [10 and 11]. Magzoub et al. [3] proposed *O. najdei* as a new species from *Uromastix aegyptia*, the only edible lizard in Arabian Peninsula. The lizard *Mabuya brevicollis* is established in this survey as a new host record for this cestode.

6- *Thelandros* sp. – (Fig. 12).

Host: *Uromastyx microlepis*

Host locality and parasite habitat: Table (1).

Description

These worms have oesophageal bulb without sclerotized apparatus. Tail obviously long in both sexes. Caudal alae absent. Cephalic extremity flattened. Lips absent. Oral opening subtriangular; one dorsal and two subventral cuticular flaps projecting into oral opening from sides of buccal cavity. Cuticle lining anterior end of oesophagus forming one dorsal and two subventral projections. Males and females body cuticle with distinct transverse striations. The only one male which obtained was unclear. Females with anterior striations but disappeared posteriorly. The buccal cavity with six inner papillae. Total length 4.2-4.6 mm. with width 0.45-0.48 mm. Oesophagus corpus 400-405 and bulb 100-104 long and 130-132 wide. Tail 360-362 long. The blind ends of ovaries in posterior ends are running anteriorly and flexing posteriorly and leading to oviducts just behind excretory pore. Oviducts leading to uteri which unite to form common uterus near level of vulva. Eggs deposited with fully developed larvae. Tail is rounded and supported by a short filiform appendage.

Remarks

Thelandros and *Parapharyngodon* are closely related genera which share mainly the great reduction of caudal appendage of males. Adamson [14] revised the two genera and distinguished between them according to some reliable criteria. He stated that in males of *Thelandros* the genital cone is prominent with V-shaped sclerotized accessory piece while in *Parapharyngodon* males have genital cone slightly developed or absent and lacks an accessory piece. The tail of female *Thelandros* varies from conical tapering to rounded with short filiform appendage (Fig. 12) while in *Parapharyngodon* females the tail is rounded and terminates with a short conical appendage (Fig. 16). Another criterion concerning the eggs which become larvated in utero in *Thelandros* but deposited in an early stage of cleavage in *Parapharyngodon*.

Magzoub et al. [3] represented, with very poor description, a new species of cestode and a new genus of nematode assigned it as *Parathelandros* (?) from *Uromastyx aegyptia* caught in the central region of the Peninsula. They misidentified their nematode specimens since genus *Parathelandros* was an old genus which was previously assigned by Baylis since 1930. Adamson and Nasher [2] reported on 5 new species of Pharyngodonid nematodes from *Agama yemenensis* collected from the southern district of Peninsula including 3 species belong to genus *Thelandros*: *T. agama*, *T. masaae* and *T. petterae* and discussed the special correlation between the genus and herbivorous reptiles.

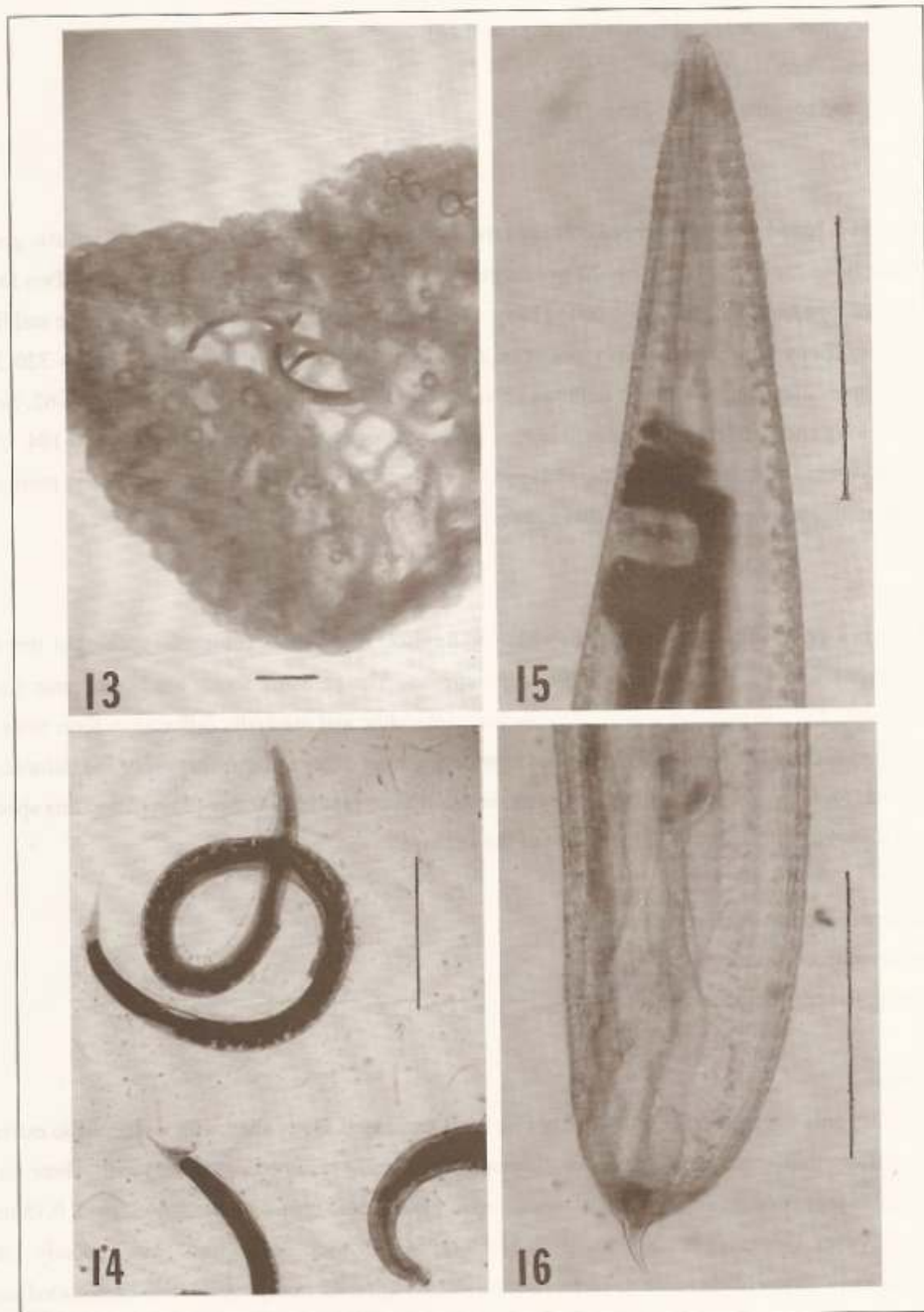


Fig 13. An infected lung of *Bufo orientalis* showing some worms of *Rhabdias bufonis* inside.
Scale bar 10 mm.

Fig. 14. Entire worm of *Rhabdias bufonis*. Scale bar 1 mm.

Figs. 15-16. *Parapharyngodon* sp. Anterior and posterior extremities. Scale bar 0.5 mm.

7- *Rhabdias bufonis* Schrank (1788) – (Figs. 13 and 14).

Host: *Bufo orientalis*

Host locality and parasite habitat: Table (1).

Description

Description is based on 13 specimens collected from the frog lungs. All worms were in parasitic generations. Some lungs harbored more than 22 worms inside and appeared enlarged and congested. Two forms were observed, one has small size, with coiled body and lives inside alveoli and the other is large and lives in lung cavity. Body stout with sharply posterior end. Total length 5.8 -8.4 mm., and width 320-326. Oesophagus muscular, simple without terminal valved bulb with length 420-450 and width 55-62. Some worms have long and slender oesophagus. Intestine with swelling proctodaeum with width 180-184. Uteri full of embryonated eggs in different developmental stages. Some hatched larvae are seen protruded through the midbody valva which have length 105-112.

Remarks

Rhabdias is a genus related to family Rhabdiasidae Railliet, 1916 which comprises species of free living saprophagus forms and others which are true parasites. The parasitic forms are heterogenic found mainly in amphibian and reptilian lungs. They are hermaphroditic and markedly different in form from the free living generation [12 and 13]. This species is widely spread related to distribution of the bufonids in the Peninsula. As far as it known, it has not been recorded from reptiles. Nasher [1] reported this species from *Hyla arborea* caught from Southern part of the Peninsula.

8- *Parapharyngodon* sp. – (Figs. 15 and 16).

Host: *Diplometopon zarudnyi*

Host locality and parasite habitat: Table (1).

Description

Two females only were collected from one of five hosts examined. Body stout with flat cephalic extremities and distinct transverse annulations. Oral opening bilaterally symmetrical, hexagonal. Three large cuticular plates presented on anterior end of oesophagus. Length 3.85 mm. and maximum width 0.75 mm. at region of vulva. Oesophagus 720 long. Bulb 160 long by 144 wide. Vulva located in midbody. Uteri with eggs in early stages of cleavage. Ovaries originating in region of oesophageal bulb then coiled anteriorly around oesophagus with nearly five coils (Fig. 15). Anus slit-like with slightly salient posterior lip. Tail conical curved dorsally with 90 long (Fig. 16).

Remarks

Genus *Parapharyngodon* is close related to genus *Thelandros* but it seems to be specific to Carnivorous reptiles. Like others, *Diplometopon zarudnyi* considered as a carnivorous reptile which mainly harboring this genus. The two females under investigation are close to *P. alvarengai* and *P. verrucosus* in that the ovary coiled around the oesophagus [14].

Unfortunately, the unavailability of a male made the identification inadequate. However, the worm lizard *Diplometopon zarudnyi* represents a new host record for the genus.

Discussion

This preliminary survey includes only 8 species of parasites comprising two species as new records in Arabian Peninsula: *Paradistomoides* sp. from *Mabuya brevicolis* and *Parapharyngodon* sp. from *Diplometopon zarudnyi*. It is a matter of fact that most hosts were collected in small numbers and unfortunately, this does not permit a conclusive statement of prevalence and complete identification. More work is needed to collect more reptiles to achieve a good knowledge and accurate identification to species level.

It is very interesting to mention that the presence of pharyngodonid genus in worm lizard *Diplometopon zarudnyi* seems to be an evidence of the specific relation of this host to lizards rather than snakes. This relation was documented by studies in the area that dealt with haematological and histochemical parameters [15 and 16]. More investigations are needed specially from omnivorous and carnivorous lizards and also snakes to give a good statement of evolutionary evidence of this group of parasites with their hosts.

Acknowledgements

I am deeply indebted to Professor K. Al Badry, Prof. of Environmental Physiology, Cairo university for his kind help in identification of reptiles. I am also grateful to the United Arab Emirates University as well as the University of Qatar for providing the facilities of this work. Special thanks are extended to all my students for collection of reptilian specimens.

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