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# Some internal parasites of reptiles in Alexandria province,Egypt

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**For the time being, a growing number of exotic reptiles are kept as pets. Pet reptiles are often infected with parasites, some of which are potentially dangerous to humans. A total of 115 samples from reptile species (Wedge-Snouted skink, African Chameleon, Egg eating snake and Egyptian tortoise) were collected for examination. The results indicated that (48.7%) out of 115 infected with internal parasites .A wide range of internal parasites were detected including nematodes, cestodes and protozoa. Wedge-snouted skink showed the highest infection rate where it reached 82.3%, followed by African Chameleon (51.5%), Egg eating snake (23%) and Egyptian tortoise (22.7%). Various parasites were detected including Strongylid eggs, Spirurid eggs, Heterakid eggs, Oxyurid eggs, eggs of mites, Nyctotherus cysts, Cryptosporidium oocysts, Thelandros spp., Parapharyngodon spp., Raillietascarisvarani, Physaloptera tupinambae, Meteterakis saotomensis and Oochoristica spp.These results revealed that a routine parasitological examination should be done in such animals.**

**Key words: Gastrointestinal parasites, Reptiles.**

## Introduction

Reptiles are bizarre pets, which used recently as home adornment. Habitually, most of them are possessed from wild or the progeny of wild trapped parents. Wildlife trafficking is rising. Recently illegitimate commerce in imperiled animals occupied the third degree close behind arms and drugs trafficking.

Reptiles are among the most viciously treated animals in the pet commerce, due to their special desires for habitats and diets. Moreover, animal concentration and existence of different species in a minor living space motivate parasites development and dissemination. Usually parasitic infection is chronic without clear clinical signs, even though presence of stress factors such as improper nutrition or animal concentration can decrease immunity causing parasitic disease with clinical symptoms. (Rataj et al., 2011).

Exotic reptiles originating from the wild, in particular, are often infected with a variety of different invasive parasites, harbouring a broad spectrum of endogenous parasites including diverse species of protozoa, nematodes, cestodes, pentastomids, acanthocephalans and trematodes (Zwart, 1975 and Juan-Salles et al., 2014). Pathogenicity of reptile parasites varies due to husbandry conditions, and poor husbandry hygiene can lead to clinically relevant massive parasitic burdens in a terrarium due to frequent reinfections (Pasmans et al., 2008). Additionally, captivity stress can exacerbate existing parasitic infection as well as negatively impact on the host innate immune system (Pasmans et al., 2008 and Grego et al., 2004).

Reptiles may carry diseases, which can be spread to other animal species and even to humans (Dovc et al., 2004). Reptiles can carry viruses, bacteria, parasites e.g. protozoa as Cryptosporidium spp. (Hassl et al., 2001), Pentastomes, for example Armillifer armillatus(De-Meneghi, 1999) and Porocephalus spp. (Tappe and Buttner, 2009), ticks like Amblyomma spp. and Hyalomma spp. (Pietzsch et al., 2006), mites as Ophionyssusnatricis(Schultz, 1975), which may not make the animal sick but can cause health problems in people.

A few data has been recorded on parasitic infection of reptiles in Egypt, hence we aimed in this study to identify the species of parasites that infected clinically healthy reptiles in Egypt.

## Material and methods

A total of 115 reptiles Table (1) were collected from different localities in Alexandria Governorate during the period extended from 2017-2018**.**

Reptiles were transferred in wire cages to Parasitology Department of Animal Health Research Institute; Alexandria. Reptiles were humanely killed by chloroform according to ethical standards for research. Abdominal cavity was opened, then gastrointestinal tract was opened and washed several times with physiological saline. Sediment was examined under dissecting microscope, detected parasites were mounted according to Carleton (1957), Kruse and Pitchard (1982). Fecal samples(75) and intestinal contents (40)of some reptiles (table 1)were used for examination. Macroscopical examination was done for the presence of tape worm proglottids and nematodes.Microscopical examination was done for detection of enteric protozoal oocysts or helminthes eggs using concentration sedimentation and flotation techniques described by Soulsby(1982). Smears were prepared and stained with Giemsa stain for detailed morphological description of some protozoa according to Levine (1985). Modified Ziehl-Neelsen staining technique was used for identification of Cryptosporidium species oocysts according to Henrikson and Pohlenz (1981).

The collected parasites were measured by using calibrated eye - piece micrometer, photographed and the obtained parasites were identified according toYamaguti (1959),Yamaguti (1961), Soulsby (1982), Soliman (2006), Anderson et al. (2009) and Gibbons (2010**).**

## Results:

Our results revealed that 56 out of tatal 115 reptiles were infected with different internal parasites representing (48.7%). Table(2)

### Lizard parasites (Wedge-snouted skink):

Different parasites species including nematodes, cestodes and protozoa were detected in 28 out of 34 lizards representing 82.3%.Coprological examination of fecal specimens showed that 17 out of 22, representing (77.2%) were infected ( Strongylid eggs (22.7%), Spirurid eggs (40.9%) and Nyctotherus cysts (13.6%). At necropsy, 11 lizards out of 12 (91.6%) were infected with Thelandros spp. (16.7%), Parapharyngodon sp. (25%), Raillietascarisvarani(16.7%), Physaloptera tupinambae (16.7%), Meteterakis saotomensis (8.3%) and Oochoristica spp.(8.3%). Tabel (3)

**Chameleon parasites:**

Out of 33 African chameleons 17(51.5%) were infected with different parasites. Coprological examination revealed presence of Oxyurid eggs (31.6%), Heterakid eggs (15.8%) and eggs of mites (10.5%). post mortem examination revealed presence of Parapharyngodon spp. (28.5%), and Oochoristica spp. (14.3%).Tabel (4)

**Turtle parasites** (Egyptian tortoise)

Twenty two turtles were examined for presence of any parasites or parasitic stages. Infection has been recorded in 5 turtles representing (22.7%). Examination of 16 fecal samples revealed the presence of Oxyurid eggs (18.7%), and Cryptosporidium oocysts(12.5%). While necropsy of 6 turtles showed absence of any parasites. Tabel (5)

**Snake parasites:**

Twenty six egg eating snakes were exposed to examination for parasitic infection. Out of 18 fecal samples six fecal samples were infected with parasitic infection with Cryptosporidium oocysts. While necropsy of 8 snakes showed absence of any parasites. Tabel (6)

**Morphology of the detected parasites:**

***Thelandros* spp Fig (1):**

Appeared as white small body tapering at both ends, esophagus is cylindrical ending by a well-developed bulb. The body was transversely striated. Male body length was 2.85-3.6 mm. Lateral alae was near the level of esophageal isthmus. Male has a single slender spicule and 3 pairs of anal papillae. Female length was 3.65-4.85 mm. The anterior ovary extended to the level of excretory pore and the posterior ovary extends posteriorly to the anal opening. The two uteri were contrasting and the eggs are oval in shape.

***Parapharyngodon* spp Fig (2):**

Worms had tapering at both ends, body cuticle transversally striated. Mouth opening is surrounded by six small lips. Male body length is 1.8-2.3 mm. Tail was reduced to a slim appendage inserted dorsally, directed obliquely to longitudinal axis of the body. There are nine caudal papilla. Female body is 1.9-2.5 mm long. Vulva opens in anterior extremely end. The egg is oval in shape.

***Raillietascaris varani* Fig (3):**

Small to medium-sized forms. Lips with denticles all around margins, oral groove is present and posterior angles of lips forming 'pillars' . Cervical alae present. Excretory pore is near the nerve ring. The excretory system with bilateral posterior filaments. Two uterine branches contain oval eggs.

***Physaloptera tupinambae* Fig (4):**

Appeared as strong nematodes. Mouth is surrounded by two large and lateral lips; each lip was armed with a variable number of teeth and carrying two external papillae. The mouth was provided with a large cephalic collaret. Oesophagus consisted of an anterior muscular and a posterior glandular part. Male length was 10.4-13.2 mm and posterior end has caudal alae, which is bonded ventrally, forming a well developed caudal bursa with 2 sub-equal, dissimilar spicules**.**

***Meteterakis saotomensis* Fig (5)**:

It had a slender body, tapering at both ends. Body cuticle with fine transverse striations. Anterior end contain three rounded lips which are not burst from the body. A muscular oesophagus, is divided into anterior short pharynx and posterior long cylindrical part which extended obviously forming valved bulb. Male body length is 4-4.5mm with a narrow caudal alae which enriched with 4 or 5 pairs of fleshy ventrolateral papillae on each side. Spicules are equal, robust, alate with finely tessellated ornamentation throughout their length and alae. Female length 5-6 mm, Anterior edge of vulva creating small flap covering vulvar opening. Reproductive system didelphic**.** Eggs are oval, with thick, smooth shells, unembryonated in uterus.

***Oochoristica* spp. Fig (6):**

It is an anoplocephalid cestode with a dorsoventrally flattened body, 14.6 mm length. Four large circular suckers, neck region was plain. Undifferentiated segments definitely wider than long. Mature segments contained testes were situated in posterior half of proglottid, ovary had two lobes and found in center of proglottid. Gravid proglottid contained several oncospheres .

***Strongylid* eggs Fig (7 .1):**

Eggs were ovoid, thin shelled, colourless and contain the embryo (of 4-32 cells when freshly laid).

***Heterakid* eggs Fig(7.2):**

It appeared as unsegmented ellipsoidal eggs with smooth and thick shell

***Oxyurid* eggs Fig (7.3):**

It had thin shell, oval format, symmetrical or asymmetrical, finely granulated three equidistant crests are present around the eggs.

***Spirurid* eggs Fig (7.4):**

Eggs with thick shell, embryonated on ovijector, measures 40-50um x 20um

***Nyctotherus* cysts Fig (7.5):**

It appeared as egg shaped with narrower rounded anterior end and posterior end broadly rounded. The parasites measures 97.5 X 66.5um.The peristomal groove starts from just near the anterior end of the body and goes along the ventral surface for some distance. Macronucleus is slightly oval, broader than long, with the anterior surface more compressed than the posterior. Micronucleus is small and covered on the macronucleus, near to its ventral surface.

wide. Rounded posterior end and lateral phasmidial openings obvious.

**Eggs of mite Fig (7.6):**

Mite eggs are similar to hookworm eggs but are usually larger (oval in shape). leg buds can be seen in the lower right area of the egg.

***Cryptosporidium* oocysts Fig (7.7):**

The oocysts are round, with obvious shiny wall and measuring 6.5 x 4.9 um. When stained with Modified Ziehl-Neelsen stain, it appeared as small red spherical bodies against green backgrounds.

**Table (1): Types of reptiles under investigation.**

| Types of reptiles | No of examined fecal samples (75) | No of examined intestinal content (40) |
|---|---|---|
| Wedge-snouted skink | 22 | 12 |
| African chameleon | 19 | 14 |
| Egg eating snake | 18 | 8 |
| Egyptian tortoise | 16 | 6 |
| **Total number** | 115 | |

**Table(2): Prevalence of detected parasites in reptile species in Alexandria Governorate.**

| Common name of reptiles | Scientific name of reptiles | number Examined | number Infected | % |
|---|---|---|---|---|
| Wedge-snouted skink | *Chalcides sepsoides* | 34 | 28 | 82.3% |
| African chameleon | *Chamaeleo africanu* | 33 | 17 | 51.5% |
| Egg eating snake | *Dasypeltis fasciata* | 26 | 6 | 23% |
| Egyptian tortoise | *Testudo klenmanni* | 22 | 5 | 22.7% |
| Total | | 115 | 56 | 48.7% |

**Table (3): Prevalence of endoparasites in lizardsAlexandria Governorate**.

| Type of samples | Examined | Infected | | Parasite species | Infected | |
|---|---|---|---|---|---|---|
| | | +ve | % | | +ve | % |
| **Fecal samples** | 22 | 17 | 77.2% | *Strongylid* eggs | 5 | 22.7% |
| | | | | *Spirurid* eggs | 9 | 40.9% |
| | | | | *Nyctotherus* cysts | 3 | 13.6% |
| **Intestinal contents** | 12 | 11 | 91.6% | *Thelandros* sp. | 2 | 16.7% |
| | | | | *Parapharyngodon*sp. | 3 | 25% |
| | | | | *Raillietascarisvarani* | 2 | 16.7% |
| | | | | *Physaloptera tupinambae* | 2 | 16.7% |
| | | | | *Meteterakis saotomensis* | 1 | 8.3% |
| | | | | *Oochoristica* sp. | 1 | 8.3% |

**Table (4): Prevalence of endoparasites in chamelons in Alexandria Governorate.**

| Type of samples | Examined | Infected | | Parasite species | Infected | |
|---|---|---|---|---|---|---|
| | | +ve | % | | +ve | % |
| Fecal samples | 19 | 11 | 57.9% | *Oxyurid* eggs | 6 | 31.6% |
| | | | | *Heterakid* eggs | 3 | 15.8% |
| | | | | Eggs of mite | 2 | 10.5% |
| Intestinal contents | 14 | 6 | 42.8% | *Parapharyngodon*sp. | 4 | 28.5% |
| | | | | *Oochoristica* sp. | 2 | 14.3% |

**Table (5): Prevalence of endoparasites in turtles in Alexandria Governorate.**

| Type of samples | Examined | Infected | | Parasite species | Infected | |
|---|---|---|---|---|---|---|
| | | +ve | % | | +ve | % |
| Fecal samples | 16 | 5 | 31.2% | *Oxyurid* eggs | 3 | 18.7% |
| | | | | *Cryptosporidium* oocysts | 2 | 12.5% |
| Intestinal contents | 6 | - | - | - | - | - |

**Table (6): Prevalence of endoparasites in snakes in Alexandria Governorate.**

| Type of samples | Examined | Infected | | Parasite species | Infected | |
|---|---|---|---|---|---|---|
| | | +ve | % | | +ve | % |
| Fecal samples | 18 | 6 | 33.3% | *Cryptosporidium* oocysts | 6 | 33.3% |
| Intestinal contents | 8 | - | - | - | - | - |

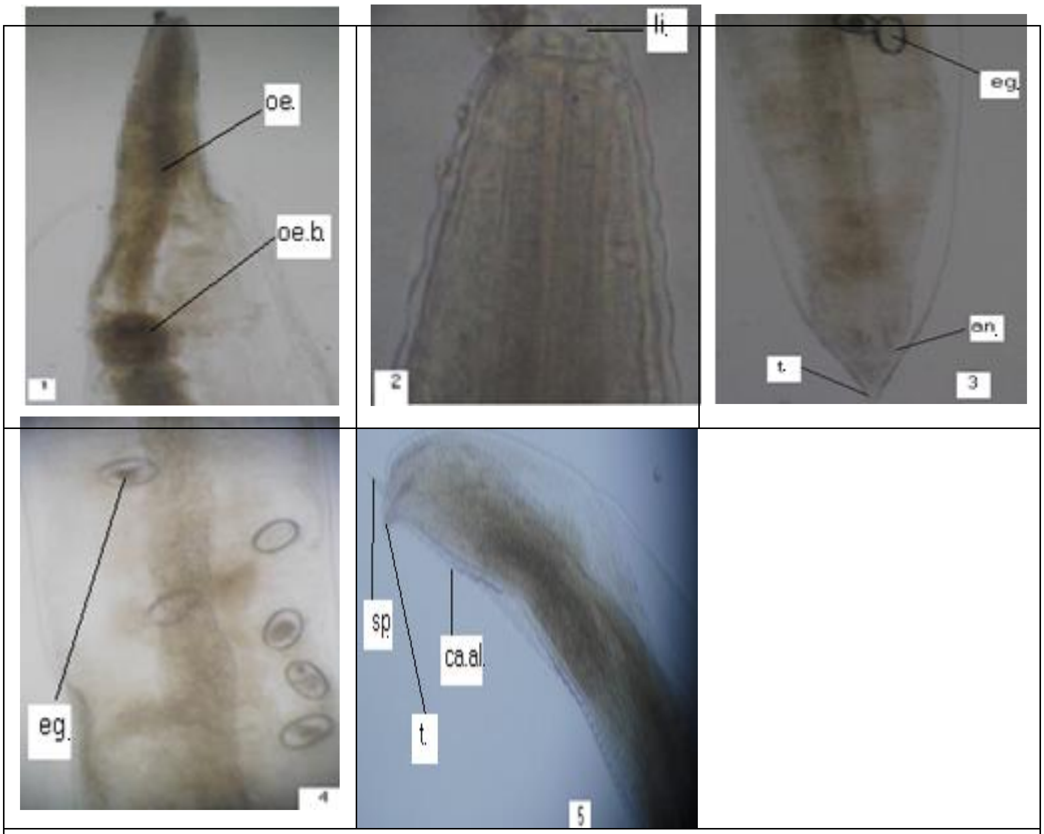



**Fig. (1):*Thelandros* species in large intestine of Wedge-snouted skink**
1) Anterior end (oe.= oesophagus, oe.b.= oesophageal bulb,x4).

2)Anterior end (li. = lips, x10).

3) Posterior end female (t.= tail, a.= anus, eg.= eggs, x4).

4) Posterior end female (eg.= eggs, x10).

5)Posterior end female (sp.= spicules, ca.al.= caudal alae, t.= tail,x4).

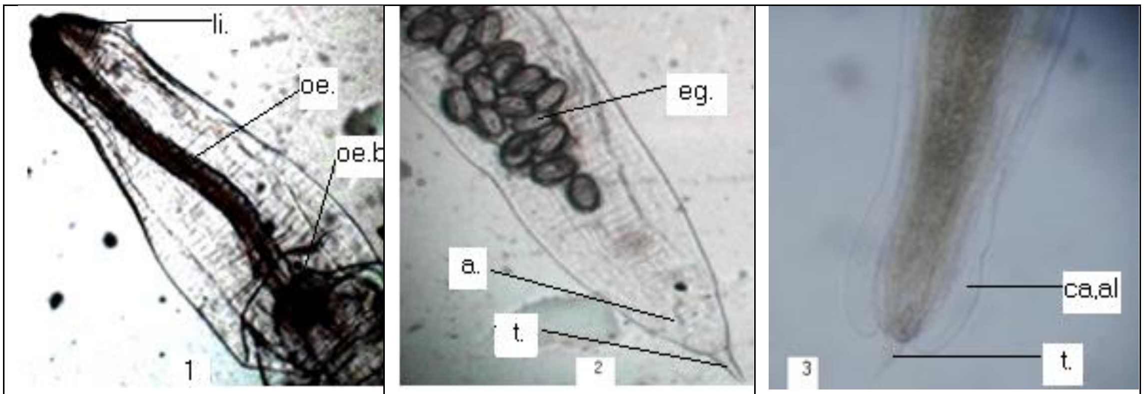



**Fig. (2):*Parapharyngodon* species**
**Host:**Wedge-snouted skink andAfrican chameleon **Site:**Large intestine

1) Anterior end (oe.= oesophagus, oe.b.= oesophageal bulb,li. = lips, x4)

2) Posterior end female (t.= tail, a.= anus, eg.= eggs, x4).

3) Posterior end male (t.= tail,, ca.al.= caudal alae, x4).

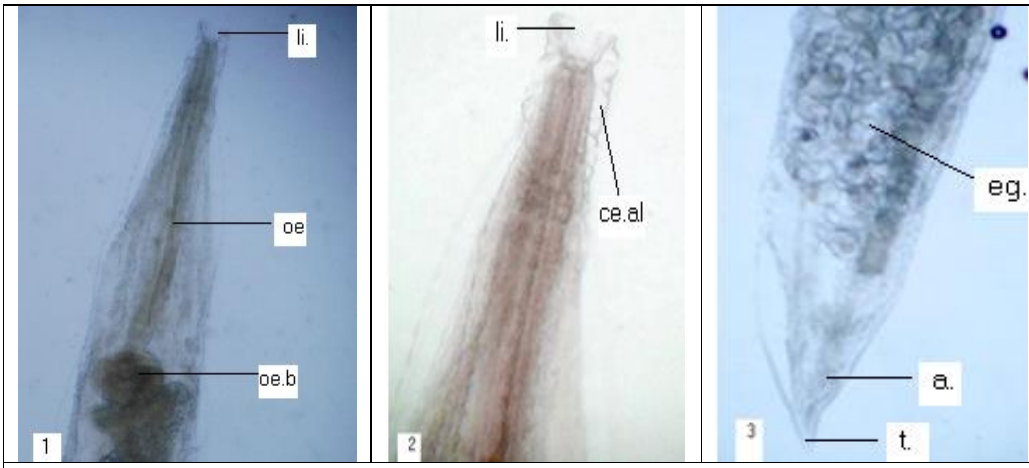


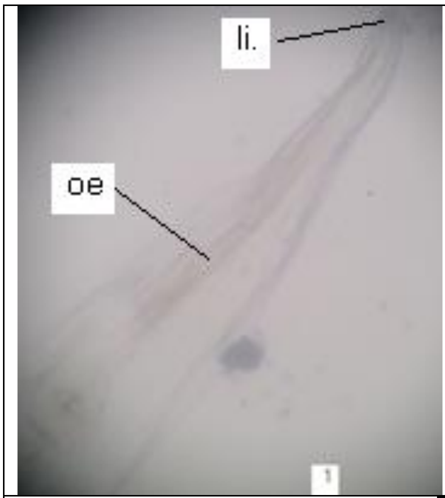

**Fig. (3):*Raillietascaris varani***

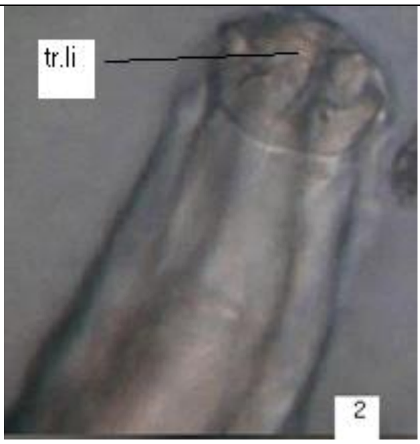
**Host:**Wedge-snouted skink**Site:**Small intestine

1) Anterior end (oe.= oesophagus, oe.b.= oesophageal bulb,li. = lips, x4)

2) Anterior end (li. = lips, ce.al.= cervical alae, x10).

3)Posterior end female (t.= tail, a.= anus, eg.= eggs, x4).



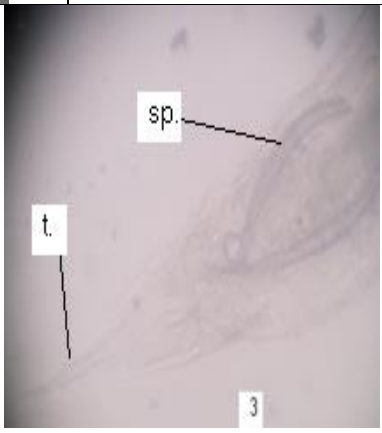




**Fig. (4): Physaloptera tupinambae**
**Host**:Wedge-snouted skinkSite:Stomach
1) Anterior end (oe.= oesophagus ,li. = lips, x4).
2 ) Anterior end (tr.li.= tri lips, x10).
3)Posterior end male (sp.= spicules, t.= tail x4)

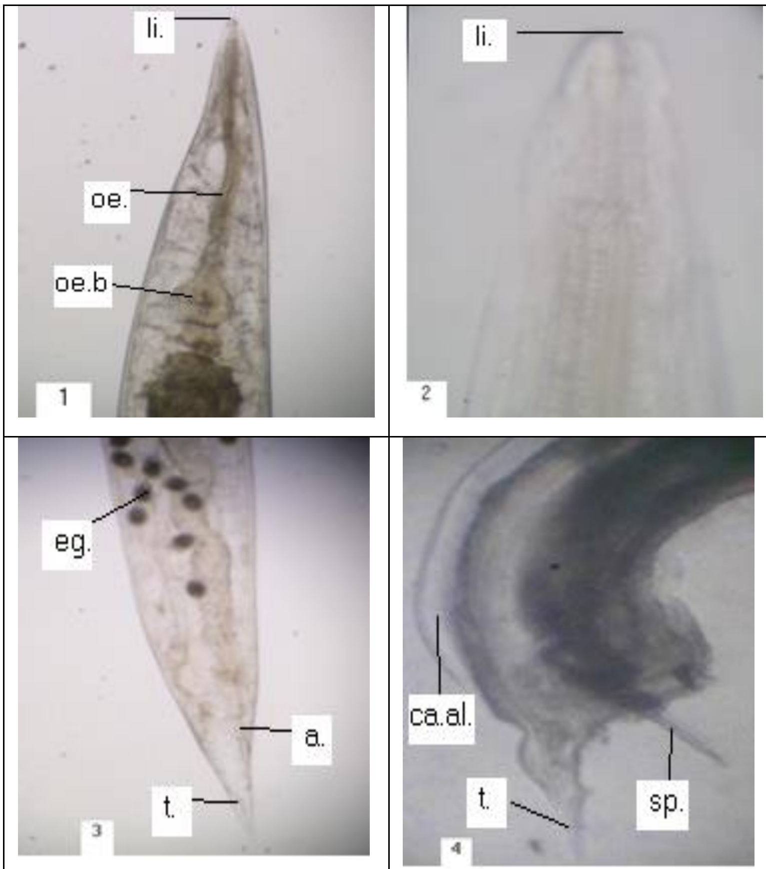



**Fig. (5):*Meteterakis saotomensis***
**Host:**Wedge-snouted skink**Site:**Small intestine

1) Anterior end (oe.= oesophagus, oe.b.= oesophageal bulb,li.= lips, x4).

2 ) Anterior end (li.= lips, x10).

3) Posterior end female (t.= tail, a.= anus, eg.= eggs, x4).

4)Posterior end male (sp.= spicules, ca.al.= caudal alae, t.= tail, x4).

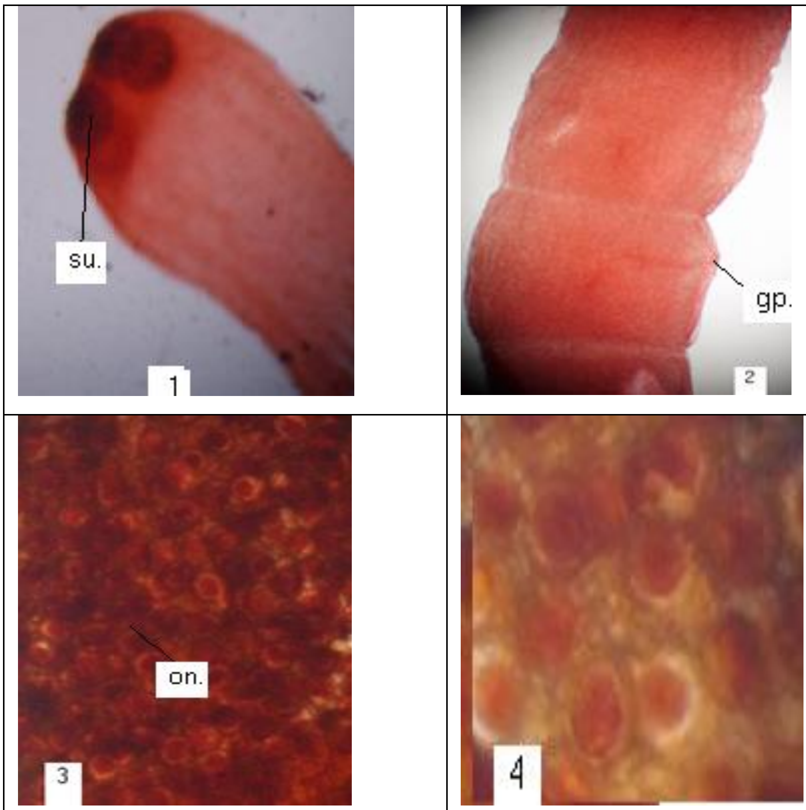



**Fig. (6):** ***Oochoristica*** **species**
**Host:**Wedge-snouted skink andAfrican chameleon
**Site:**small intestine

1) Scolex (su.= circular suckers, x4).
2) Mature segment ( gp.= genital pore, x4).
3) Gravid segment (on.= onchospheres, x4).
4) Onchospheres (x10).

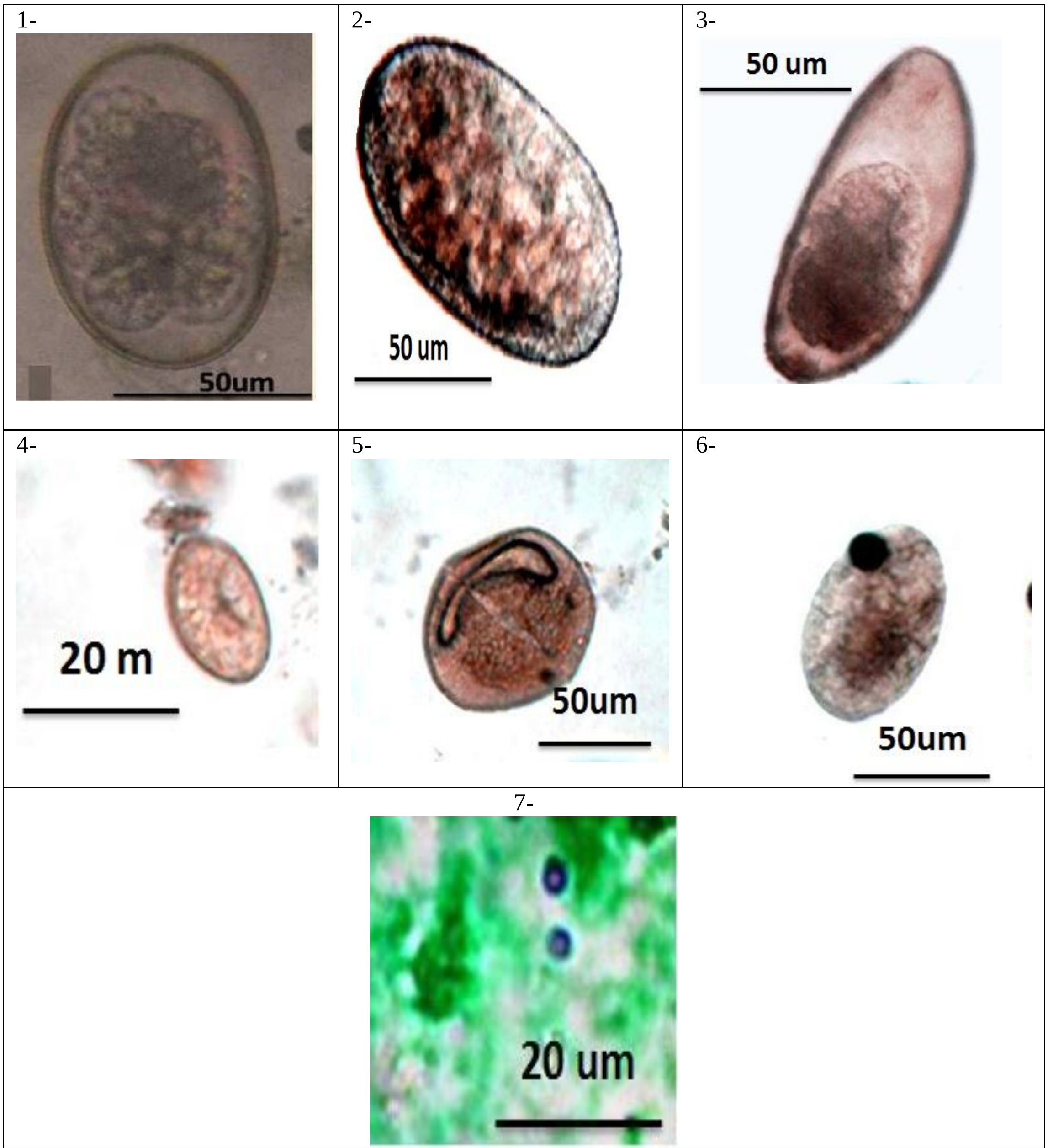



**Fig.(7): Eggs and cysts of different protozoa.**

**1)** *Strongylid* eggs (x40). **2)** *Heterakid* eggs (x40).
**3)** *Oxyurid* eggs (x40). **4)** *Spirurid* eggs (x40).
**5)** *Nyctotherus* cysts (x40). **6)** eggs of mite (x40).
**7)** *Cryptosporidium* oocysts(x100).

## Discussion

There is an enormously wide range of diverse reptile species from different parts of the world and a wide range of pathogens, some of which are known and regularly found while others are unusual and completely uninvestigated. The present work resulted in different parasites in different reptiles. Our study revealed that out of 115 examined reptile specimens, 56 were infected with internal parasites representing 48.7%. The findings of the current study were different from those of Ras-Norynska and Sokol (2015) in Poland (62.4%), on the other hand, higher prevalence was reported by Ratag et al. (2011) in Slovenia (81.7%) and Wolf et al. (2014) in Germany (93.2%).

**Lizard parasites:**

The present study indicated that 28 out of 34 (82.3%) were positive for endoparasites, nearly similar result was obtained by Ratag et al. (2011) in Slovenia (76.1%) and Jorge et al. (2013) in Spain (75%), but lower prevalence was recorded by Norval et al. (2014) in Taiwan (57.1%) and Okulewicz et al. (2015) in Poland (42.3%). Faecal examination in lizards showed the presence of Spirurid eggs, Strongylid eggs and

Nyctotherus cyst with infection rates 40.9%, 22.7 % and 13.6%. Ratag et al. (2011) in Slovenia reported Strongylid eggs (11.8%) and Nyctotherus cyst (10%). Examination of intestinal contents showed the presence of Parapharyngodon spp. with a prevalence of 25%. The result of the present investigation was lower than that reported by Sowemimoand Oluwafemi (2017) in Nigeria (89.5%) and higher than that recorded by Jorge et al. (2013) in Spain (13%) and Norval et al. (2014) in Taiwan (11.1%). The infection rate of Thelandros sp., Raillietascarisvaraniand Physalopteratupinambae was 16.7%,Jorge et al. (2013) in Spain reported Thelandros spp.(39%),Okulewicz et al. (2015) in Poland recorded Raillietascarisvarani (7.7%) and Ratag et al. (2011) in Slovenia recorded Physaloptera sp. (6.3%).

Dealing with Meteterakis saotomensis, the result of the present investigation was 8.3%. The result was nearly similar to that reported by Okulewicz et al. (2015) in Poland (5.4%) but higher prevalence was reported by Norval et al. (2014) in Taiwan (33.3%).

The prevalence of Oochoristicaspecies in this study was 8.3%, the result of the present investigation was lower than that reported by Sowemimoand Oluwafemi (2017) in Nigeria (56.4%) and higher than that reported byRatag et al. (2011) in Slovenia (3%) and Okulewicz et al. (2015) in Poland (1.2%).

Several causes might have affected observed variability in intestinal parasite infections including: geographical region (temperature and humidity), season, behaviors and habits of the local animal populations.

**Chameleon parasites:**

The present study indicated that17 out of 33 (51.5%) were positive for endoparasites.

Fecal examination of 19 fecal specimens in the present study revealed presence of Oxyurideggs in 6 spicemens (31.6%), higher prevalence reported by Ras-Norynska and Sokol (2015) in Poland (75%). Heterakid eggs were found in 3 specimens (15.8%). Furthermore, eggs of mites were recorded in 2 chameleons (10.5%), which may be returned to the

fact that free living organisms such as mites and their eggs can

contaminate water or food or even contaminate faeces after contact with soil Wolf et al. (2014).

Examination of intestinal contents of Chameleons resulted in finding of Parapharyngopodon sp. (28.5%) and

Oochoristica sp. (14.3%). Goldberg and Bursey (2008) found Oochoristica truncate and Parapharyngopodonkenyaensis in Chameleons.

**Snake parasites:**

Snakes were found to be infected with only one type of parasites belonging to protozoa. Cysts of Cryptosporidium oocysts were found in 6 fecal samples (33.3%), using Modified Ziehl-Neelsen staining, a nearly similar result was obtained by Ratag et al. (2011) in Slovenia (29%).

Cryptosporidium oocysts can cause a severe health delinquent in snakes including progressive wasting, regurgitation, hypertrophic gastritis, and may lead to death(Rundquist,. 1996). Moreover, recent researches confirmed the potential zoonotic risk of Cryptosporidium isolated from reptiles.

**Turtle parasites:**

The present study indicated that 5 out of 22 (22.7%) were positive for endoparasites. Higher prevalence was reported by Ratag et al. (2011) in Slovenia (88.5%).

Fecal examination in turtles showed the presence of eggs of Oxyurid nematodes in 3samples (18.7%), nearly similar result was obtained by Ras-Norynska and Sokol (2015) in Poland (13.3%) but higher prevalence was recorded by Ratag et al. (2011) in Slovenia (81.8%). The variation may be attributed to the differences in the number of the examined reptiles.

The prevalence of Cryptosporidium oocysts in the present study was 12.5%. Graczyk et al. (1998) said by histological examination of small intestine revealed heavy infection with Cryptosporidium sp. over 80% epithelial cells harbored the pathogen.

Morphological description of the detected parasites were agreed with those of Wedl (1861), Baylis and Daubney (1922), Karve (1938), Klingenberg (1993), Hering-Hagenbeck et al. (2002), Felipe et al. (2012), Conga et al (2015) and Junker et al. (2015).

**Conclusion:**

Many reptiles, before they even reach the pet store, die from rough handling during capture and shipping. The level of care, diet and habitat that reptiles need far out weigh that for other animals like dogs and cats, and the average person cannot adequately address these unique needs. Reptile species originating directly from

the wild can be carriers of many different parasites, some of which can infect humans. However, by practicing good sanitation and personal hygiene, and keeping snakes, lizards, chameleons and turtles out of the food preparation areas, it is possible to minimize the risk. In our investigation we can conclude that the presence of different endoparasites have an important role on the health status of reptiles and on the development of other diseases

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## المخلص العربى

# بعض الطفيليات الداخلية في الزواحف فى محافظة الاسكندرية , مصر

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تعد الزواحف التي تأتى من البيئة البرية حاملة للعديد من الأمراض التي من الممكن إن تصيب الإنسان. لقد تم فحص عدد ١١٥ من الزواحف المختلفة (سحلية النعامة و حرباء افريقية و ثعبان آكل البيض و سلحفاة مصرية) وكان معدل الانتشار الإجمالي للطفيليات الداخليه ٤٨.٧%. لقد سجلت سحلية النعامة اعلي معدل إصابة (٨٢.٣% ) يليها حرباء افريقية (٥١.٥%) ثم ثعبان آكل البيض (٢٣%) و سلحفاة مصرية (٢٢.٧%).وقد اظهرت النتائج أن هذه الزواحف بها العديد من الطفيليات مثل بويضات الاسترونجليد و بويضات الاسبيوريد و وبويضات الهيتراكيد و بويضات الاوكسيوريد وبويضات الجرب و حويصلات النيكتوثيريس و حويصلات الكريبتوسبوريديم وديدان ثيلاندروس و بارافارينجودون و ريليتاسكاريس فاراني و فيزالوبيترا توبينامبي و ميتاتريكس سوتومينسيس و اواوكريستيكا. وقدأشار وجود العديد من الطفيليات في الزواحف إلي ضرورة الفحص قبل إعطائها لصاحبها.