IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 11, Issue 5 Ver. II (Sep. - Oct.2016), PP 67-79
www.iosrjournals.org

Infection of Some Reptiles in Qena Governorate with Some Cestode Species.

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Abstract: *During the present study, about 30 of Chalcides sepsoides (the common name is Audouin's sand; Sehlia nana), 294 Mabuya quinquetaeniata (the common name is bean skin, sehlia garraiya), 60 Tarentola annularis (the common name is Egyptian gecko, white spotted gecko), 106 of Chalcides ocellatus (the common name is eyed shink, Sehlia doffana) and 24 Psammophis sibilans (the common name is Aboelsior Elghity) were collected from different localities of Qena Governorate which is considered as a new locality for harboring cestode spesies. Five cestode species were found and identified. The first species is Oochoristica crotaphyti which belongs to family Anoplocephalinae Cholodkovsky, 1902, was collected from the small intestine of Chalcides ocellatus (4 out of 106 hosts) and the rate of infection was 3.8%. The second species is Rhabdometra dogiete which belongs to family Paruterinidae Fuhrmann, 1907, was collected from the small intestine of Mabuya quinquetaeniata, (2 out of 294 hosts) and the rate of infection was 0.68% . The third species is Anophryocephalus anophrys which belongs to family Tetrabothriidae, was collected from the small intestine of Tarentola annularis, (2 out of 60 hosts) and the rate of infection was 3.3%. The fourth species is Oochoristica tuberculata Which belongs to family Anoplocephalinae Cholodkovsky, 1902, was collected from the small intestine of Chalcides sepsoides, (2 out of 30 hosts) and the rate of infection was 6.7%. The fifth species is Mesocestoides sp. which belongs to family Mesocestoididae, was collected from the small intestine of Psammophis sibilans, (10 out of 24 hosts) and the rate of infection was 41.7%.*

Keywords: *cestodes- reptiles – Qena – Governorate.*

I. Introduction

Several auther described many helminth parasites collected from some species of reptiles of them, Bursey and Goldberg (1992) described *Oochoristica islandensis* from the small intestine of the island night lizard *Xantusia riversiana* from U.S.A. Bursey et al.,(1994) described *Oochoristica ubelakeri* from the small intestine of *Agama atraknobeli* from Namibia. Bursey and Goldberg (1996a) described the cyclophyliid cestode *Oochoristica macallisteri* from the small intestine of *Uta stansburiana* . Bursey and Goldberg (1996d) described *Oochoristica maccoyi* from the small intestine of *Anolis gingivinus* . Bursey et al., (1997b) described *Oochoristica jonnesi* from the small intestine of house geckos , *Hemidactylus mabouia* Chambrier and Paulino (1997) described *Proteocephalus joanae* from the small intestine of the colubrid snake , *Xenodon neuwiedi* from Brazil. Biserkov and Kostadinova(1997) studied the development of plerocercoid stage of *Ophiotaenia europaea* in some reptiles . Arizmendi-Espinosa et al., (2005) described *Oochoristica leonregagnonae* from the small intestine of *Ctenosaura pectinata* . Bursey et al.,(2010) described *Mathevotaenia panamaensis* from green spiny lizard, *Sceloporus malachiticus*. MaAllister et al.,(2013) examined twenty-0ne adult rough green snakes *Opheodrys aestivus* (Ophidia: Colubridae) for helminth . A single *O.aestivus*(5%) harbourd a massive infection of *Mesocetoides* sp. Wich represent a new host record for *Mesocestiodes* sp. And 1 of the rare instances that *O.aestivus* has been reported to horbor any parasite. The aim of the present study is constructed to study the cestode parasites which infected some reptiles in Qena Governorate, determined the rate of infection and descried the morphology of these parasites.

II. Materials and methods

Collection of helminthes:

The collected hosts were dissected. The oral and body cavity were examined. The general viscera were removed and placed in physiological saline solution (0.7%). The parasites were removed and washed with saline to remove the adherent debris.

-Preparation of helminthes for light microscopic examination:

Fixation:-

The collected cestodes were refrigerated in saline solution for a few minutes or until totally relaxed to prevent the contraction during fixation. Small specimens were flattened by delicate pressure between a slide and cover glass. Large cestodes were cut into serial fragments, each fragment was flattened separately between two slides. Care was taken into account to keep the scolex during that procedure. Moreover, it was noticed that each fragment contained either immature, mature or gravid segments. The slides with the compressed parasites were put in a large petri-dish and fixed in 10% formal saline. The fixation time of parasites varied from few minutes to several hours depending on worm size. Fixed parasites were removed from the fixative and kept in vials containing 70 % ethyl alcohol, ready for staining. Prior to staining, the parasites were washed several times in tap water to remove excess fixative.

Staining:- Cestodes were stained in acetic acid alum carmine. The time of staining depends on the size of parasite. Small worms were stained in diluted stain for longer duration. Thick and big worms were stained in concentrated stain for a long host record for *Mesocestoides* sp., and 1 of the rare instances that *O. aestivus* has been reported to harbor any parasite. time (12-24 hours) to be certain of complete penetration of the stain into all parasite tissues.Dehydration:- After staining, the parasites were dehydrated in ascending grades of alcohol (30%, 50%, 70%, 90% and absolute alcohol) for 10 minutes in each grade. It was found that specimens must be left in 100% alcohol two times more than other grades for complete dehydration. Differentiation:- Over stained parasites were rinsed in acid alcohol until the perfect staining level was reached and the stained parasites become well differentiated.

Clearning:- After differentiation, the stained parasites were cleared in clove oil.

Mounting:- The parasites were mounted in Canada balsam, covered with cover glass and left to dry in oven at 37 ^{0}C.Drawing, Measurements and Photomicrograph of helminthes: Carl Zeiss drawing camera Lucida was used for drawing the specimens. Calibrated eye piece was used for measuring the specimens. For all micrographs Zeiss photo research microscope was used.

III. Results and discussion

1) *Oochoristica crotaphyti*

Order : Cyclophyllidea
Family : Anoplocephalinae Cholodkovsky,1902
Genus: *Oochoristica* Luhe, 1898
Species : *Crotaphyti*

Description of *Oochoristica crotaphyti*: This parasite was collected from the small intestine of *Chalcides ocellatus*. 4out of106 hosts were found harbouring the parasite and the prevalence of infection was 3.8%.

Light microscopical study (Fig. 1 & Plate 1):

The parasite is white in colour. The scolex is small and measures 0.28–0.39 mm. in wide, provided with four suckers, each about 0.11– 0.14 mm. in length and 0.092–0.11 mm. in width and is followed by very small or no evidence neck (Fig. 1a & Plate1A). The mature proglottid is wider than long, the width is 1.04–1.07 mm. and the length is 0.564–0.835 mm. The genitalia occupy the mid-region of the mature segment. The ovary is bilobed, each lobe is subdivided into 4–8 lobules and measures 0.12–0.16 mm. in length and 0.059–0.078 mm. in width. Genital pores are irregularly alternating situated in the anterior third of proglottid, the distance of genital atrium from the anterior end of segment is 0.021–0.026 mm. and from the posterior end of segment is 0.043–0.045 mm. (Fig. 1c & Plate 1C). Vagina is a thin-walled tube extending anteriorly and opens in the genital opening just below the cirrus pouch. The cirrus pouch measures 0.28–0.41 mm. in length. The globular testes are situated in two separating fields extending in the posterior half of the mature proglottid. The number of testes is 17–32 and each of them measures about 38.2–56.5 µ m long and 26.7-42.5 µm wide. The gravid proglottid is wider than long, the width is 0.99–1.12 mm. and the length is 0.67–0.91 mm. (Fig. 1d & Plate 1D). The posterior gravid proglottid is longer than wide, measures 0.82–1.2 mm. in length and 0.53–0.65 mm. in width (Plate 1E). The gravid is filled with uterine capsule about 25.7–43.8 x 39.9–52.1 µm, each of them contains oncosphere with four hooks (Fig.1d, e & Plate 1F).

Discussion

From the morphological characters of the present parasite, we can conclude that it belongs to the genus *Oochoristica* Luhe. 1898, family Linstowiidae Fuhrmann, 1932. The genus Oochoristica is a large unwieldy complex of species parasitizing more than 56 species of reptiles and more moles (Kennedy *et al.*, 1982). Forty-six species are known to occur in lizards throughout the world, of which 7 species have

been described from annielli, gekkonid, iguanid, scincid, and teiid lizards. Loewen (1940) reported an *Oochoristica* sp. from *Crotaphytin collaris* but the strobilae had only 6 distinct segments and the sexual primordium had not yet developed, since the specimens were not mature, their identity can not be determined. However the specimens were reported to have neck region similar to *O. bivitellobata*. Telford (1970) recovered *O. scelopori* from a western collared lizard *Crotaphytus collaris baileyi* in California. The *Oochoristica* spesies occurring in lizards can be divided into two groups according to the unsegmented region behind the scolex traditionally termed the " neck ". The first group contains three species without neck or with a very short neck region *O. anniellae* Stunkard and Lymnch, 1942, *O. crotaphytin* sp. and *O. vitellobata* Loewen, 1940. The second group has a long neck region and consists of approximately 43 species (McAllister *et al.*, 1985). Loewen (1940) described *O. bivitellotata* but distinctly different from the present species in having fewer proglottids and more larger testes. The present parasite was compaired by other species described by various authors as shown in table (1).

Table (1): Showing the measurement of the present species in comparison with other species of the genus *Oochoristica*, all measurements are in micrometer otherwise specified.

character	*O.crotaphyti* Present species	*O.eumecis* Larwood, 1932	*O.parvovaria* Steelmn, 1938	*O.anniellae* Stunkard and Lymnch, 1942	*O.scelopori* Voge and Fox,1957	*O.crotaphyti* Mcallister *et al.*, 1985
Number proglottids	50 (40 – 53)	-	5 - 7	28 - 30	112 – 171	47 (38 – 52)
Neck (mm)	Non	2.0	51 .6	Non	1.2 – 5.0	Non
Scolex width	280 - 390	500	350 (320 -380)	370 - 400	375(299– 431)	378(337– 409)
Suckers (L x W or diameter)	(110-140) x (92 – 110)	220 x 260	120 (110 -130)	(100 – 124) x (153 – 173)	117(100 – 130)	107 (92 -11) x 121 (114-138)
Number testes	17 – 32	40 – 55	69 (52 – 87)	60 - 70	32 (22 – 43)	30 (23 – 37)
Testes diameter	(38-56) x (26- 42)	-	27 (23 – 33)	20 - 34	46 (38 – 60)	25 (12 – 35)
Cirrus sac (L x W)	280 – 410 length	(180-260) x (60 – 70)	236 (220- 270) x120 (110–130)	(100-186) x (38 – 62)	148 (130-166) x 56 (50 – 66)	138 (120–163) x 56 (50-66)
Uterine capsule width	25 – 44	-	58 (49 – 71)	42 - 58	70 (64 – 80)	54 (49 – 60)
Oncosphere width	-	-	34 (26 – 46)	17 - 23	18 (15 – 20)	25 (23 – 27)

2) *Rhabdometra dogiete*

Class : Cestoidea
Order : Cyclophyllidea
Family : Paruterinidae Fuhrmann, 1907
Genus : *Rhabdometra* Cholodkowsky, 1906
Species : *dogiete* Gvosdev, 1954

Description of *Rhabdometra dogiete*:

This present species was collected from the small intestine of *Mabuya quinquetaeniata*, and the prevalence rate of infection was 0.68%.

Light microscopical study (Fig. 2 & Plate 2):

The parasite is white in colour. The scolex is small, circular in shape and measures 0.39-0.43 mm. in diameter. It is provided with four suckers. The suckers are oval in shape and each one measures about 0.09–0.11 mm. in length and 0.06-0.08 mm. in width. The scolex is followed by a long neck about 0.84–0.91 mm. in length (Fig. 2a & Plate 2A). The immature proglottid is wider than long, each one measures about is 0.90–0.95 mm. in width and about 0.10–0.19 mm (Fig. 2b & Plate2B). in length. The mature proglottid is wider than long, each one measures about0.97–1.00 mm in width and about 0.42–0.48 mm. in length. Ovary is bilobed and situated nearly in the center of proglottid; each lobe is subdivided into 3-5 lobules. The ovary is about 94-112 µm in width and about 131-164 µm in length. Vitelline gland is situated in

middle directly infront of ovary. Vagina extends from posterior side of genital atrium to the mid-region of ovary where it unites with oviduct. Testes are two clusters infront of ovary and vitelline gland. The number of testes is 36-42 and each one is about 0.020-0.024 x0.020-0.030 mm. The cirrus pouch measures 0.39-0.41 mm. in length and opens in the genital atrium which is situated nearly at the middle of lateral margin of the mature proglottid, the distance of genital atrium from the anterior end of the segment is 0.38-0.39 mm. and from the posterior end of segment is 0.31-0.32 mm. The genital atrium is irregularly alternating on the lateral sides of the parasite (Fig. 2c & Plate 2C). The gravid proglottid is wider than long, and the length is about 0.84-1.27 mm. and the width is about 1.61-1.64 mm. (Fig. 2d & Plate 2D). The gravid proglottid contains numerous uterine capsule containing oncospheres with six hooks, each one measures about 13.1-15.6 µm, the length of hook is 13.12-15.78 µm (Fig. 2e & Plate2D, E).

Discussion:

The family *Paruterinidae* was erected as a subfamily of Dilepididae by Fuhrmann (1907b) (Georgiev and Kornyushin, 1994). Opinions about its rank, even during the last few decades, are quite contradictory: some authorities regard it as a subfamily within the Dilepididae, others recognize it as a family or as a superfamily containing two or three different families. In its present composition, this family includes practically all of the cyclophyllidean cestodes with paruterine organs which can not be related to other families having a similar uterine apparatus. Moreover, it seems that the term "paruterine organ", defined as a fibrous or granular appendage to the uterus that usually receives the eggs and retains them in a common capsule with protective end (or) propagative functions after Schmit (1986), modified, is used for structures very different in their origin, formation and morphology (Jones, 1988; personal observations particularly on the paruterinids). These organs, consequently, are a result of convergence. In the traditional concept, the family Paruterinidae is evidently a heterogeneous and polyphyletic group. Several previous attempts to re-arrange its system are based on a study of the literature rather than of the relevant specimens. Recently, Kornyushin (1989) proposed the following classification (with some modifications at the generic level) of the genera traditionally considered as paruterinidae (or paruterinoidea): Superfamily: Davaineoidea: Family: Idiogenidae: Subfamily Rhabdometrinae: Rhabdometra, Metroliastbes, Lyruterina, Ascometra, Octopetalum. Diagnosis of Paruterinidae Fuhrmann, 1907:

- Medium and large cestodes. Scolex with armed rostellum, sometimes without rostellum or with rudimentary unarmed rostellum. Rostellum sucker-like discoid, without saccular sheath. Suckers unarmed. Proglottids usually craspeote. Genital system single per proglottid. Genital ducts ventral to or between osmoregulatory canals. Vas desferens does not form seminal vesicles exceptionally in Lyruterina and Triaenorbina internal vas deferens enlarges to some structure similar to seminal vesicle. Vitellarium and ovary present. Vitellarium usually compact or slightly lobed, median and postovarian, rarely poral to ovary. Ovary compact, oval or two-winged or fan-like. Uterus saccular, rarely reticular or consists of median stem with ventral branches. One paruterine organ of different structure per proglottid, usually anteriorly to uterus, sometimes anteroaporally. Eggs without pyriform apparatus. Oncosphere oval.

3) Anophryocephalus anophrys

Order : Tetrabothriidea
Family : Tetrabothriidae
Genus : *Anophryocephalus*
Species : *anophrys* Baylus, 1922

Description of *Anophryocephaus anophrys* :

The present species was collected from the small intestine of *Tarentola annularis*, the prevalence rate was 3.3%.

Light microscopical study (Fig. 3 & Plate 3):

This parasite is white in colour and consists of a large number of proglottids. The scolex is small and measures 0.31-0.35 mm. in width. It is provided with four ovoid-shaped suckers, each one measures about 0.09-0.17 (0.125) mm. in length and 0.085-0.141 (0.111) mm. in width. The scolex is followed by a short neck measuring about 0.95-1.10 mm. in length (Fig. 3a & Plate 3A). The immature proglottid is wider than long, each one measures about the 0.70-86 (0.81) mm. in width and about 0.11-0.21 (0.16) mm. in length (Fig. 3b & Plate 3B). The mature proglottid is wider than long, each one measures about is 0.26 -0.39 (0.346) mm. in length and about 0.97-1.13 (1.04) mm. in width. The ovary is bilobed, each one is branched into 3-5 lobes, it occupies nearly the mid-region of the proglottid. Each ovarian lobe measures about 0.168-0.237 (0.188) mm. in length and 0.074-0.114 (0.092) mm. in width. The vagina is a thin- walled tube extending anteriorly to open by a genital opening just below the cirrus pouch. The

globular testes are numerous, 34-44 in number and situated behind the ovary, each one measures about 0.041- 0.059 (0.050) mm. in length and 0.019- 0.031(0.046) mm. in width. The cirrus sac measures about 0.263-0.278 mm. (0.271) in length and 0.058- 0.067 mm. (0.062) in width. The cirrus pouch is situated nearly at the end of the second third of the segment and opens in the genital atrium. The distance of genital atrium from the anterior end of segment is 0.233-0.244 mm. and from the posterior end of segment is 0.099-0.109 mm (Fig. 3c & Plate 3C). The gravid proglottid is wider than long and each one measures about 0.874-2.179 (1.162) mm. in width and about 0.416- 0.982 (0.743) mm. in length (Fig. 3d & Plate 3D). The uterine capsule contains eggs with hooks (Fig. 3e & Plate 3 E-F).

Discussion:

Species of *Anophryocephaus* Baylis, 1922 are characteristic parasites of pinnipeds occurring at high latitudes in the northern hemisphere (Temirova and Skrjabin 1978). The type species, *Anophryocephalus anophrys* Baylis, 1922, was orginally described from *Phocacf hispida* collected in Spitsbergen (Baylis 1922). Although, the original diagnosis suggested great structural similarity to species of *Tetrabothrius* Rudolphi, 1819, *Anophryocephalus* sp. was established on the basis of a scolex lacking auricular appendages, absence of dorsal and ventral- transverse osmoregulatory canals, and a unique configuration of the cirrus sac and genital atrium. Lateral authorities have generally supported this contention (Meggit 1924; Baer 1932; Joyeux and Baer

1936; Wardle and Mcleod 1952; Deliamure 1955; Yamaguti 1959; Temirova and Skrjabin 1978; Schmidt1986; and others), although Baer (1954) re- examined the type specimens of *A. anophrys* and reported the presence of paired auricular appendages on the anterior margin of each bothridium. *Anophryocephalus* was reduced as a synonym of tetra-bothriid on the basis of a superficial similarity of the scolex in representatives of these genera. The former opinion has not been widely recognized or accepted (Murav,eva, 1970) and hasformed the basis for continued disagreement over a range of diagnostic characters for Anophryocephalus. The following erection of Anophryocephalus, Tetrabothrius albertinii Brighenti, 1931, was described from Phoca maculata in Spitsbergen. Subsequently, Deliamure reduced this species as a synonym of A. anophrys and described two additional species of cestodes from pinnipeds in the Sea of Okhotsk (both originally reported but not described by Krotov and Deliamure, 1952. Trigonocotyle skrjabini was named four specimens from P. hispida and was characterized by a scolex with three auricular appendages on each bothridium. Deliamure (1955) continued to recognize Anophryocephalus for tetra- bothriid cestodes lacking auricular appendages when T. skrjabini and A.

chotensis were defined. The former species were later transferred to Anophryocephalus by Murav,eva (1970). Murav,eva and Popov (1976), in examining new specimens of A. skrjabini from P. hispida, Phoca largha Pallas and Phoca fasciata Zimmerman in the Bering Sea and Sea of Okhotsk, reported the presence of only two appendages on each bothridium. Temirova and Skrjabin (1978), in partially redescribing A. anophrys from Cystophora cristata and P. hispida in the Greenland and White seas and A. skrjabini from P. largha in the Anadyr Gulf, noted the apparent differences in the structure of the scolex among species of Anophryocephalus, but did not emend the genus. The structure of the scolex has constituted a primary diagnosis character for genera of the Tetra bothriidae (Baer 1954; Temirova and Skrjabin 1978; Schmidt 1986). In contrast to other genera, Anophryocephalus apparently contained species with morphologically distinct scolex, e.g., A. anophrys and A. ochotensis without auricles and A. skrjabini with at least two appendages, based on the most recent redescriptions and figures (Temirova and Skrjabin 1978). The morphology of the scolex was found to be similar among known species of Anophryocephalus. Paired auricular appendages, structurally distinct but homologous with those typical of Tetrabothrius spp., were present on the anterior margin of each bothridium. Also apparent, however, were additional details of the scolex and the configuration of the genital atrium, cirrus sac, and osmoregulatory system, and other attributes, unique to each species, that had not been previously considered.

4) *Oochoristica tuberculata*

Order: Cyclophyllidea Family : Anoplocephalinae Cholodkovsky, 1902
Genus : *Oochoristica* Luhe, 1898
Species : *Tuberculata*

Description of *Oochoristica tuberculata*:

The present patasite was collected from the small intestine of *Chalcides sepsoides* and the prevalence rate was6.7%.

Light microscopical study (Fig. 4 & Plate 4):

This parasite is white in colour and consists of a large number of proglottids. The scolex measures 0.30-0.36 mm. in width. It is provided with four oval suckers, each measures about

0.12-0.16 mm. in length and 0.08-0.111 mm. in width and is followed by a short neck measuring about 0.95-1.10 mm. in length (Fig. 4a & Plate 4A). The mature proglottid is longer than wide, measures 0.90-0.12 mm. in length and 0.59–0.68 mm. in width. The ovary is bilobed, each one consists of 3-5 lobes. It occupies nearly the mid-region of the proglottid (Fig. 4b & Plate 4B). The vagina is a thin-walled tube extending anteriorly to open in the genital opening just below the cirrus pouch. The globular testes are situated in one field just infront of the ovary, each one measures 0.03–0.05 mm. in length and 0.025–0.035 mm. in width. The number of testes is 20– 30. The cirrus sac measures 0.12–0.16 mm. in length and 0.048–0.062 mm. in width. The cirrus pouch opens in the genital atrium which is located nearly at the end of the first half of the segment (Fig. 4b & Plate 4B). The distance of genital atrium from the anterior end of segment is 0.233- 0.244 mm. and from the posterior end of segment is 0.099–0.109 mm. The gravid proglottid is longer than wide and measures 0.65–0.76 mm. in width and 0.72–0.84 mm. in length (Fig. 4c & Plate 4C). It contains a large number of eggs.

Discussion:

From the morphological characters of the present parasite we can conclude that it belong to the genus *Oochoristica* Luhe, 1898, family Linstowiidae Fuhrmann, 1932. The genus Oochoristica is a large unwieldy complex of species parasitizing more than 56 species of reptiles (Kennedy *et al*.,1982). Forty-six species are known to occur in lizards throughout the worl, of which 7 species have been described from annielli, gekkonid, iguanid, scincid, and teiid lizards. Loewen (1940) reported an *Oochoristica* sp. from *Crotaphytin collaris* but the strobilae had only 6 distinct segments and the sexual primordium had not yet developed. Since the specimens were not mature, their identity can not be determined. However, the specimens were reported to have neck region similar to *O. bivitellobata*. Telford (1970) recovered *O. scelopori* from a western collared lizard *Crotaphytus collaris baileyi* in California. The *Oochoristica* spesies occurring in lizards can be divided into two groups according to the unsegmented region behind the scolex traditionally termed the "neck ". The first group contains three species with no neck or very short neck region *O. anniellae* Stunkard and Lymnch,1942, *O. crotaphytin* and *O. vitellobata* Loewen, 1940. The second group has a long neck region and consists of approximately 43 species (Mcallister *et al.*, 1985).

5) *Mesocestoides* sp.

Subclas: Eucestoda
Family : Mesocestoididae
Genus : Mesocestoides

Description of cysticercoid of *Mesocestoies* sp.

Mesocestoies sp.:

The parasite was collected from the small intestine of the reptilian host, *Psammophis sibilans*, 10 out of 24 were found harboring the parasite and the rate of infection was 41.7%.

Light microscopical study (Fig. 5 & Plate 5):

The adult worm is not found, only cysticercoids is found. The freshly collected parasite is white in colour. The body is fusiform oval in shape and measures 0.85-1.05 (av.= 0.95) mm in length and 0.220–0.320 (av.= 0.270) mm. in width. The scolex is provided with four rounded suckers, each sucker measures 0.12–0.16 mm. in diameter (Fig.5 & Plate5). The parasite has 22-36 hooks in three rows, every row has 11-18 hooks. The excretory pore is found at the posterior end of the parasite (Fig. 5 & Plate 5).

Discussion:

According to the morphological characters of the present parasite, it is similar to *Mesocestoides* sp. which belonges to family *Mesocestoididae*, subclass Eucestoda, genus *Mesocestoides*. Despite over 60 years of research on the life cycles of Mesocestoides tapeworms, it remains unclear how intermediate hosts such as mice, lizards, an domestic dogs acquire metacestode infection, Mesocestoides may require three hosts (Rausch, 1994). In particular, orbatid mites have been suggested as possible intermediate hosts of *Mesocestoides*, (Soldatowa, 1944). Mesocestoides was described in ants as first intermediate hosts on San Migulel Island, USA by Padgett and Boyce (2005). The arthropod (first intermediate host) is ingested by second intermediate host such as small rodent, bird, lizard, snake, or frog. Within the peritoneal cavity of the second intermediate host, the second larval stage develops into the third larval stage (tetra thyridium). The final adult form of *Mesocestoides* develops within the intestines of definitive host approximately 2-3 weeks after ingestion of the second intermediate host (Williams *et al.*, 1975 and Bowman 1999). In the present work found only cysticercoid of Mesocestoides sp.

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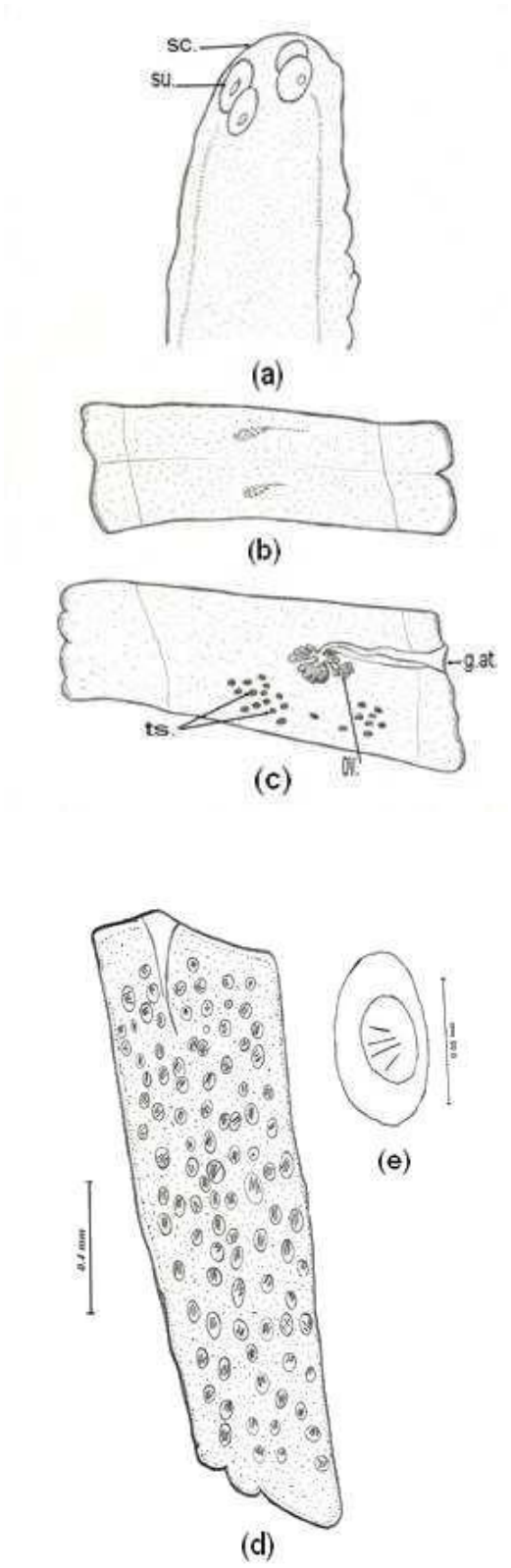


Fig. (1): Camera Lucida drawing of *Oochoristica crotaphyti* Showing:

a) Anterior portion of the worm (sc.= scolex, su.= sucker). b) Immature proglottid.
c) Mature proglottid (ov. = ovary, ts. = testes, g.at. = genital atrium).
d) Gravid proglottid.
e) Uerine capsule containing oncosphere.

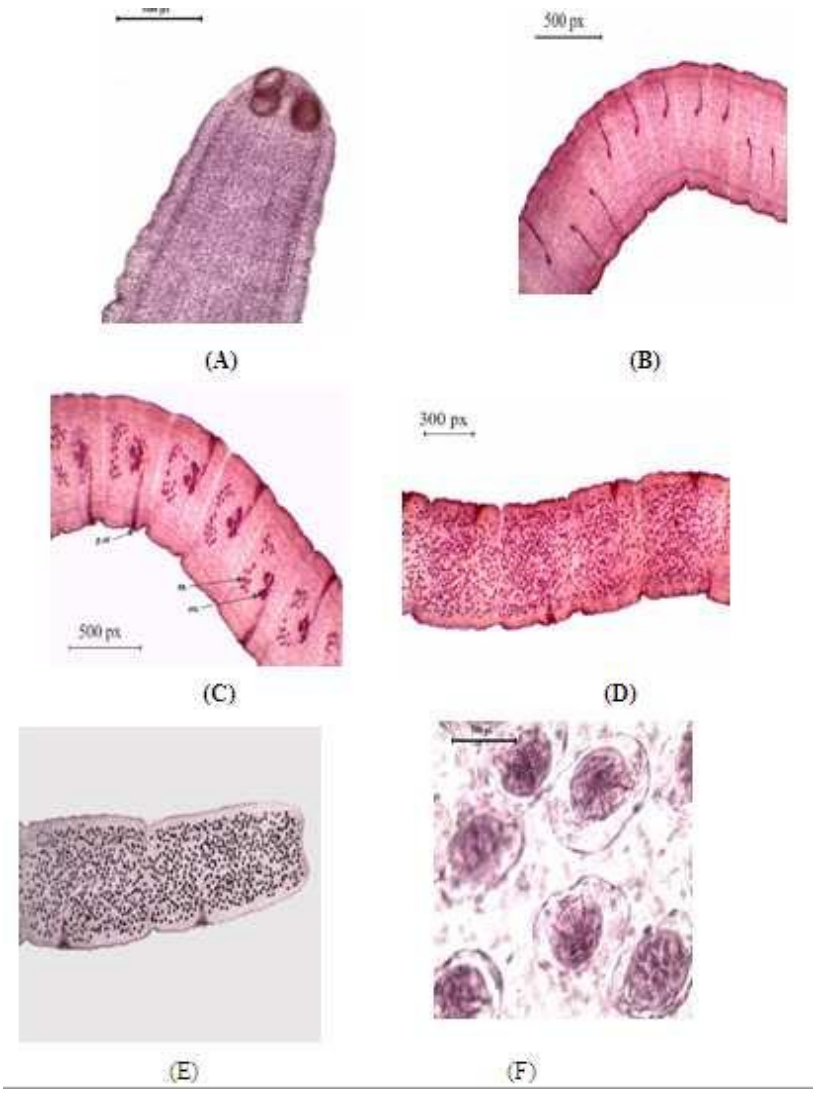
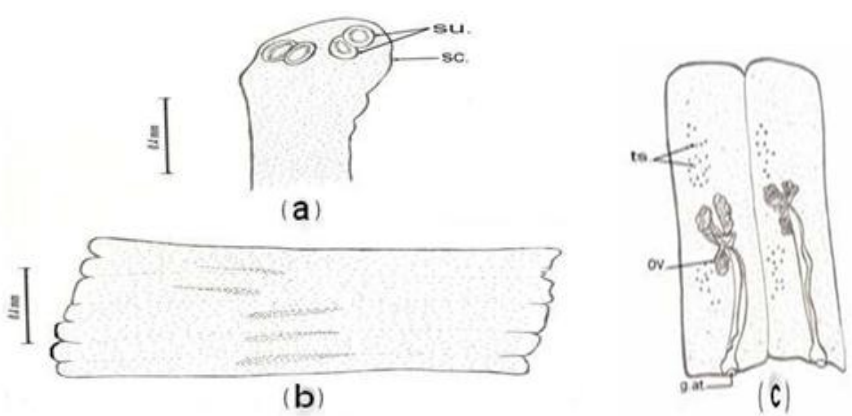


Plate (1): Photomicrographs of *Oochoristica crotaphyti* showing: A) The scolex and suckers.

B) Immature proglottid.
C) Mature proglottid showing (ov.= ovary, ts.= testes and g.at.= genital atrium)
D) Gravid proglottid.
E) Posterior gravid proglottid. F) The egg.



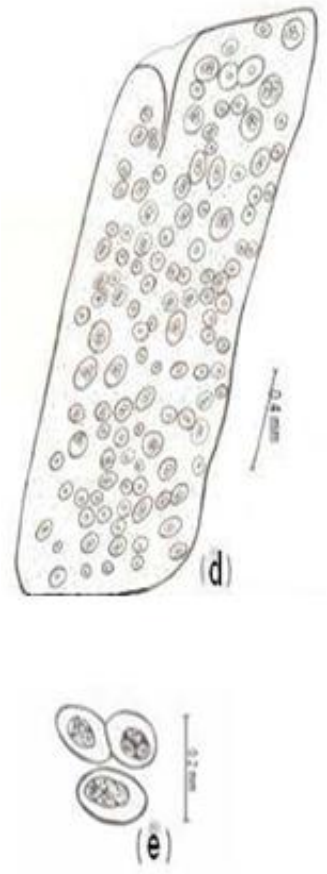


Fig. (2): Camera Lucida drawings of *Rhabdometra dogiete* showing:

a) Anterior portion of the worm showing: (su.= sucker, sc.= scolex). b) Immature proglottid.
c) Mature proglottid (ov. = ovary, tes. = testes and g.atr. = genital atrium). d) Gravid proglottid.
e) Uterine capsule containing oncosphere.

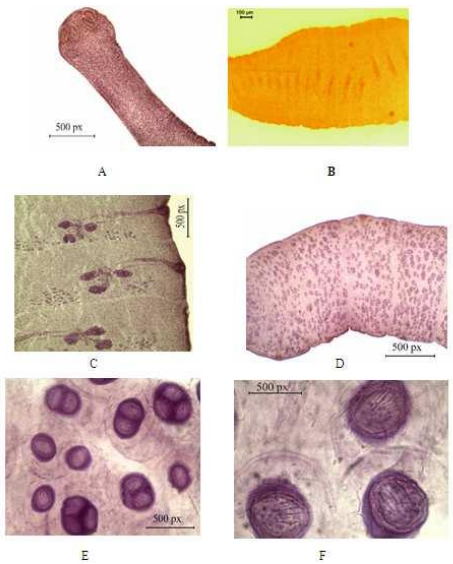


Plate (2): Photomicrographs of *Rhabdometra dogiete* showing: A) Anterior portion of the worm.

B) Immature proglottid. C) Mature proglottid.
D) Gravid proglottid.
E) Uerine capsule containing oncosphere.

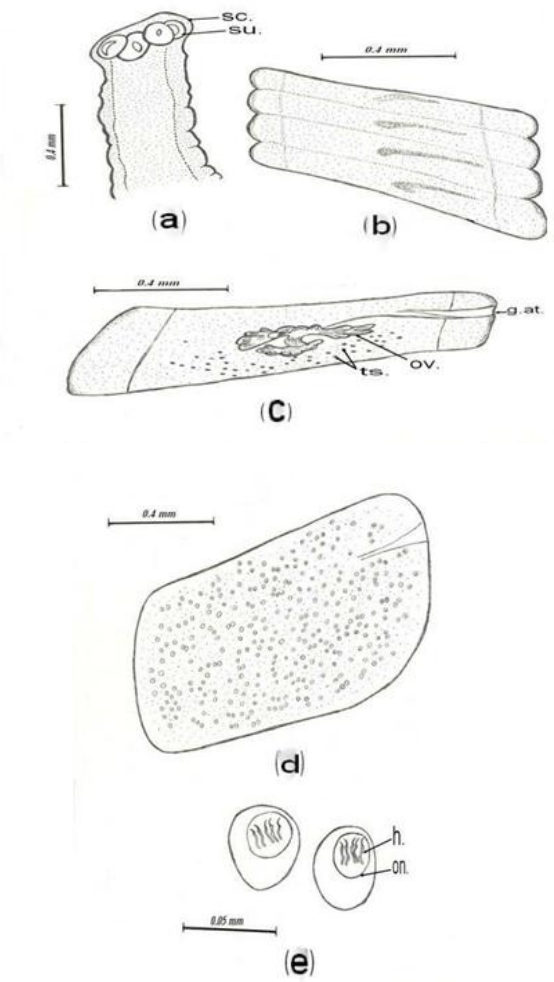
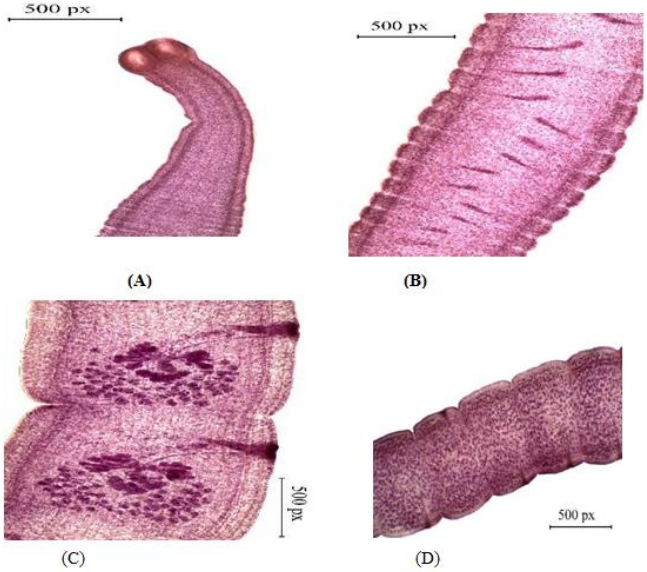
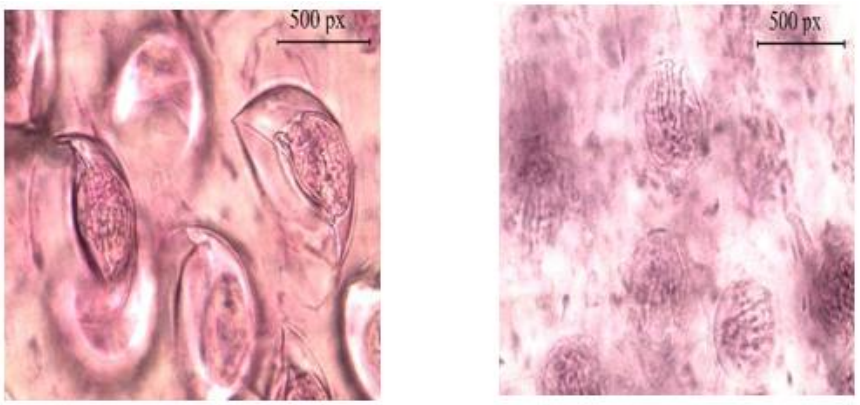


Fig. (3): Camera Lucida drawing of *Anophryocephalus anophry*s showing**:**

a) Scolex and sucker showing (su.= sucker, sc.= scolex). b) Immature proglottid.
c) Mature proglottid showing (ga. at.= genital atrium, ov.= ovary, ts.= testes).
d) Gravid proglottid.
e) The egg (h.= hook, on.= oncosphere).





(E) (F)

Plate (3): Photomicrographs of *Anophryocephalus anophrys* Showing**:**

A) Anterior portion of the worm. B) Immature proglottid.
C) Mature proglottid. D) Gravid proglottid. E) The egg**.**

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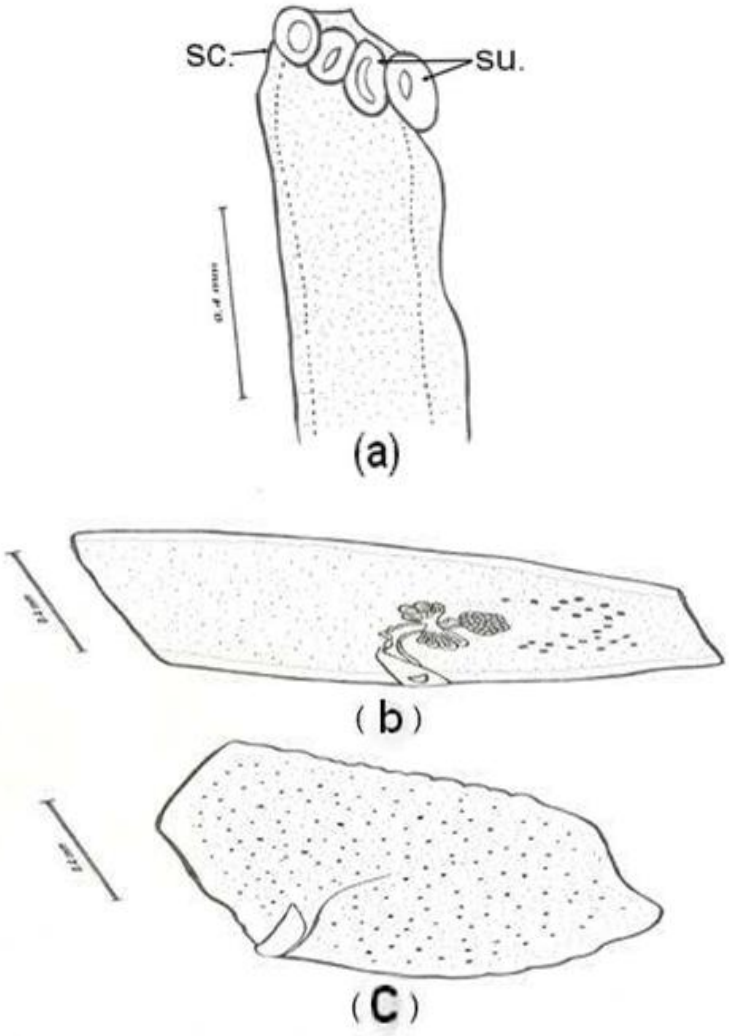

Fig. (4): Camera lucida drawing of *Oochoristica tuberculata* showing:

a) scolex and suckers (su.= sucker and sc.= scolex).
b) Mature proglottid.
c) Gravid proglottid

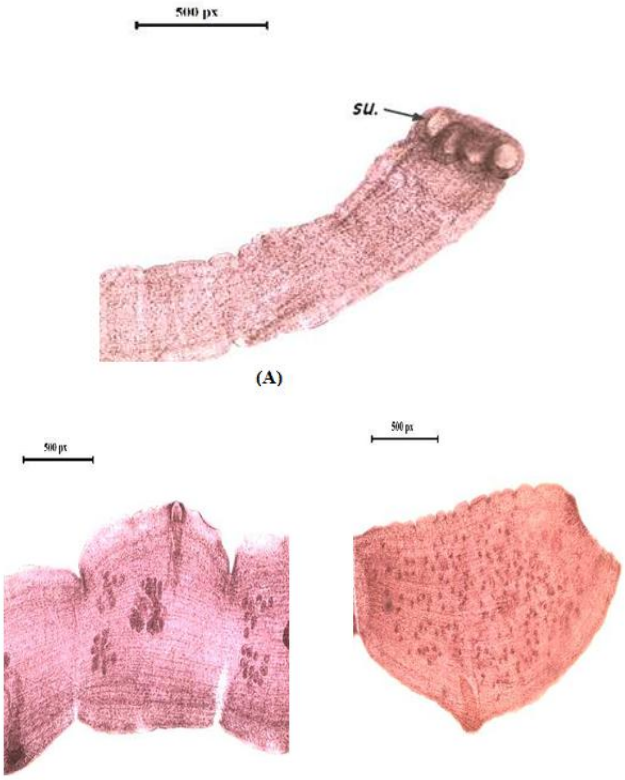

Plate (4): Photomicrographs of *Oochoristica tuberculata* showing: A) scolex and suckers.(su.= sucker) B) Mature proglottid. C) Gravid proglottid.

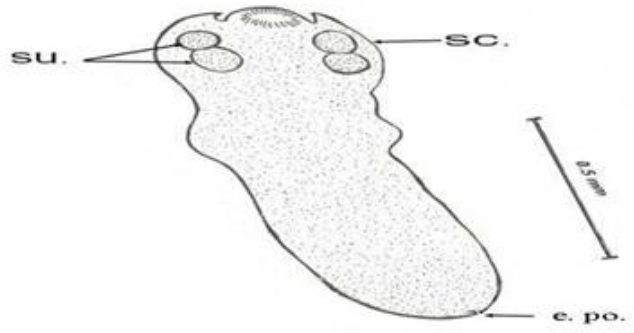

Fig. (5): Camera Lucia drawing of *Mesocestoides* sp**.**
Showing: (su.= sucker, sc.= scolex and e.po.= excretory pore)

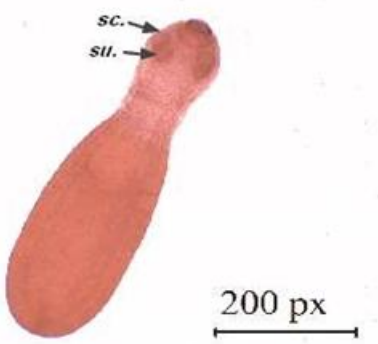

Plate (5): Photomicrographs of *Mesocestoides* sp. Showing: (su.= sucker and sc.= scolex)