

## SOME STUDIES ON DIGENETIC TREMATODES OF HERRING GULL (*LARUS ARGENTATUS*) AT PORT SAID GOVERNORATE

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### ABSTRACT

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During present study on the helminth parasites of herring gulls (*Larus argentatus*) in El Manzala Lake and Mediterranean Sea near Port Said city of Egypt, a total of 65 birds were infected with one or more species of intestinal digenetic trematodes, including 6 species, *Petasiger grandevesicularis*, *Petasiger jubilarum*, *Petasiger skrjabini*, *Stephanoprora spinosa*, *Dolichosacculus solecarius* and *Tylodelphys* sp. The morphometric features of each species were compared with earlier descriptions. The total prevalence of parasitic infestation in herring gulls was 61.54%. The prevalence of isolated trematodes were: *P. grandevesicularis* 25.00 %, *P. jubilarum* 9.23 %, *P. skrjabini* 7.69 %, *S. spinosa* 12.30 %, *D. solecarius* 7.69 % and *Tylodelphys* sp. 9.23 %. The public health hazards of the isolated parasites were discussed.

*Key words: Digenetic trematodes, Herring Gull, Prevalence, Egypt.*

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### INTRODUCTION

Port Said is a city located 31°15'N 32°17'E that lies in north east Egypt extending about 30 kilometers along the coast of the Mediterranean Sea with magnificent lake and wetlands have always been regarded as welcoming grounds for the millions of many local and migratory aquatic birds during the winter. Wild birds play an important role in spreading diseases and parasites to domesticated birds and even to man (Soulsby, 1986). On the other hand, wild aquatic birds may transmit diseases to the fishes as these birds act as final hosts for many trematodes whose larvae infect fishes and cause diseases in them (Williams and Jones, 1994). Seagulls are birds in the family Laridae. They are most closely related to the terns (Family: Sternidae). Most gulls, particularly *Larus* species, are ground-nesting carnivores, which will take live food. Live food often includes crabs and fish, Grant (1986), Olsen and Larsson (1995) and Howell and Jon (2007). Although there are many reports have been published on helminths of various species of the gulls from many parts of the world (Torres *et al.*, 1991; Uchida *et al.*, 1991; Kostadinova, 1995; Eyda *et al.*, 1996; Kreiter and Semenas, 1997; Roca *et al.*, 1999) the literature on the helminth parasites of aquatic birds in Egypt is not sufficient (Abdel-Aal *et al.*, 2001; Abdel-Aal and El-Sayed 2003; Ghattas, 2004). The world health organization (WHO), recorded the number of people currently infected with fish-borne trematodes exceed 18 million and the number of people at risk world

wide estimated at more than half a billion (Thu *et al.*, 2007).

The life cycle of trematodes differ from one species to another, but in general two intermediate hosts are required. The first intermediate host is snail, but second intermediate host may be another snail, a bivalve mollusk, a tadpole or a fish. The definitive host, including man in case of zoonotic trematodes, becomes infected by consuming raw foods (intermediate hosts) containing metacercariae (Pan American Health Organization, 2003).

Regarding this point of view the aims of this study were to determine the trematodes infecting gulls in Port Said City, to compare the species of trematodes infecting herring gulls with those studied earlier.

### MATERIALS and METHODS

A total of 65 herring gull (*Larus argentatus*) (Charadriiformes: Laridae) collected from different shores of El-Manzala Lake, Mediterranean Sea at El-Gameel district, Port Said City, Egypt were examined for digenetic trematodes during the period of January till May 2011. Trematodes were collected in 0.9% saline, fixed under slight cover glass pressure in alcohol formalin- acetic acid (AFA), stained with acetic acid alum carmine, dehydrated in a graded series of ethanol solutions (30-100%) and cleared in clove oil and xylol. Specimens were finally mounted in Canada balsam. All measurements are given in

millimeter (mm) and eggs in micrometer ( $\mu\text{m}$ ) as described by Fahmy and Selim (1959). Specimens were identified and compared with the literature available.

## RESULTS

Forty herring gull (*Larus argentatus*) out of 65 (61.5%) were infected with at least one intestinal trematode species (table 1). For each species a minimum of 10 specimens was examined and a description was developed.

**Order:** Digenea (Van Beneden, 1858)

**Suborder:** Prosostomata (Odhner, 1905)

**Family:** Echinostomatidae (Poche, 1926)

**Subfamily:** Echinostomatinae (Faust, 1929)

**Genus:** *Petasiger* (Dietz, 1909)

**Species:** *Petasiger skryabini* (Baschkirova, 1941)

*Petasiger jubilarum* (El'perin, 1937)

*Petasiger grandevascularis* (Ishii, 1935)

*Stephanoprora spinosa* (Odhner, 1911)

**1-*Petasiger skryabini*** (Baschkirova, 1941) Echinostomatidae was obtained from the small intestine of 5 birds. *P. skryabini* (Fig.1) have small body plump, broadly fusiform, with maximum breadth at middle; body 1.28- 1.78 mm long; 0.34-0.37 mm wide. Neck region more or less constricted. Head collar reniform, large, with double, dorsally uninterrupted row of spines. Oral sucker subterminal and subspherical. Ventral sucker pre-equatorial, large with average length 0.15 mm and average width 0.28 mm. (width 61-87% of maximum body width). Prepharynx short; pharynx elongate oval; oesophagus long; intestinal bifurcation at 24-47% of body length, anterior to the margin of cirrus-sac; caeca end blindly halfway between posterior testis and posterior extremity. Caeca reach close to posterior extremity. Testes tandem, opposite, near posterior extremity. Cirrus pouch small and entirely pre-acetabular. Acetabulum average length is 0.35mm and its average width is 0.31mm. Ovary round and submedian situated anterior to the left testes. Uterus short; eggs few, large 66-77  $\mu\text{m}$  long and the number up to seven. Vitellaria lateral reaching forward beyond acetabulum till behind the testes. It is intestinal parasites of birds (Faltynkova *et al.*, 2008).

**2- *Petasiger jubilarum*** (El'perin, 1937) (Fig. 2) Echinostomatidae was found in the small intestine of 6 birds (table 1). It has slender elongated body; 1.28 mm long and neck region less constricted. Head collar reniform, large and with double, dorsally uninterrupted row of spines. Cephalic collar spines were 27; 5 spines in ventral lobes, 3 corner spines 53-67  $\mu\text{m}$  long and other spines 38- 54  $\mu\text{m}$  long. Esophagus was 400  $\mu\text{m}$  long. The fore body is extended; body elongate, fusiform, small (body length <2,500  $\mu\text{m}$ ; body width <500  $\mu\text{m}$ ), acetabulum

postequatorial; ventral sucker pre-equatorial; testes oblique, tandem near posterior extremity; overlap and smaller than eggs. Cirrus pouch small and almost entirely pre-acetabular. Ovary round submedian and pretesticular. Uterus short; eggs few and large. Vitellaria extending in lateral fields of behind body postacetabular and reach to level of ventral sucker (Yamaguti, 1958 and McDonald, 1981).

**3- *Petasiger grandevascularis*** (Ishii, 1935) (Fig. 3), Echinostomatidae was found in the small intestine of 10 birds. Body was small 0.6- 1.75 mm  $\times$  0.27-0.45 mm, plump, broadly fusiform, with maximum breadth at middle and the neck region more or less constricted. Head collar was reniform, large, with 19 double spines, dorsally uninterrupted row of spines, angle spines 50-96  $\mu\text{m}$  long. And other collar spines 24-66  $\mu\text{m}$ . Esophagus was short. Acetabulum equatorial may be postequatorial when the forebody is extended. Testes were tandem near posterior extremity. Cirrus pouch small, entirely pre-acetabular. Ovary was round, submedian. Uterus was short; eggs few and large. Vitellaria were lateral and extend as far forward as intestinal bifurcation (Yamaguti, 1939 and 1958; McDonald, 1981 and Faltynkova *et al.*, 2008).

**4- *Stephanoprora spinosa*** (Odhner, 1911) (Fig. 4). Echinostomatidae, was found in the small intestine of 8 birds, body very much elongated, 2.9-3.6 mm long and 0.54-0.60 mm wide and spined anteriorly. Head collar reniform, with dorsally interrupted crown of spines. Pharynx longer than oral sucker which is 0.18- 0.2 mm long and 0.34- 0.39 mm wide. Acetabulum in anterior third of body 0.34- 0.39 mm long and 0.32-0.35 mm wide. Testes was median, directly tandem and in middle third of body. Cirrus pouch small and anterior to acetabulum. Ovary was median and a little in front of anterior testis. Eggs were few, four to seven, 60- 88  $\mu\text{m}$  long. Vitellaria occupying entire post-testicular region not extend forward to testicular zone. Uterus not very long (Yamaguti, 1958 and McDonald, 1981).

**Family:** Cathaemasiidae (Fuhrmann, 1927)

**Subfamily:** Cathaemasiinae (Dollfus, 1950)

**Genus:** *Dolichosacculus* (Johnston, 1942)

**Genotype:** *Dolichosacculus solecarius* (Johnston, 1917)

**5- *Dolichosacculus solecarius*** (Johnston, 1917) (Fig. 5). Cathaemasiidae, Five herring gulls were infected by this trematode, as its larval stages isolated from the small intestine. The parasite was small, cylindrical, with mean length 1.08 mm and mean width 0.22 mm; spinose body and oral sucker was subterminal and very large (0.145 and 0.160 mm mean length and width respectively). There were four lobed pharynx, esophagus partially absent and caeca

opened terminally in posterior end. Acetabulum smaller than oral sucker which is rounded with average diameter 0.045 mm, in anterior half of the body and the testes were entire, directly tandem in posterior third of body. Ovary between acetabulum and anterior testes. Uterus winding between postovarian shell gland and genital gland. Vitellaria confined fields of hindbody (Yamaguti, 1958).

**Family:** Diplostomatidae (Poirier, 1886)

**Subfamily:** Diplostomatinae (Monticelli, 1892)

**Genus:** *Tylodelphys* (Diesing, 1850)

**Genotype:** *Tylodelphys* sp. (Nordmann, 1832)

6- *Tylodelphys* sp. (Nordmann, 1832), (Fig. 6). Diplostomatidae, Six herring gulls were infected by this trematode. It has pseudosuckers. Body barely,

two segmented; with average length 1.69 mm and average width 0.62 mm. Anterior extremity indistinctly trilobate. Oral sucker length is 0.14- 0.16 mm and its width is 0.15- 0.17 mm. Tribocytic organ rounded, one-third to one-sixth as long as forebody, with its cavity opening by median slit. Hind body was conical and in direct continuation of forebody. Testes symmetrical, curved in form of horse-shoe, with ventral concavity and the anterior one was larger than posterior. Ovary was submedian and pretesticular. Vitellaria extending beyond acetabulum. The mean length and width of acetabulum are 0.125 mm and 0.135 mm respectively. Bursa with subterminal pore and genital cone is small, with opening of hermaphroditic canal at its tip (Yamaguti, 1958).

**Table 1:** Prevalence of Trematodes infestation in herring gulls (*larus argentatus*)

No. of examined birds	Isolated parasites	No. of infected birds	Prevalence (%)
65	1- <i>Petasiger skrjabini</i>	5	7.69
	2- <i>Petasiger jubilarum</i>	6	9.23
	3- <i>Petasiger grandevesicularis</i>	10	25.00
	4- <i>Stephanoprora spinosa</i>	8	12.30
	5- <i>Dolichosacculus solecarius</i>	5	7.69
	6- <i>Tylodelphys</i> sp.	6	9.23
65		40	61.54%

**Table (2):** Comparison between four Echinostomatidae species isolated from herring gull:

1- <i>Petasiger skrjabini</i>	1.28- 1.78	0.34- 0.37	Subterminal	long	0.15 mm long- 0.28 mm wide	Present	Submedian Anterior to left testis	near posterior end	lateral, beyond acetabulum till behind the testes
2- <i>Petasiger jubilarum</i>	1.28	-	Subterminal	400 µm long	pre-equatorial	post equatorial	submedian and pretesticular	near posterior end	lateral fields of behind body, postacetabula, to level of ventral sucker
3- <i>Petasiger grandevesicularis</i>	0.6- 1.75	0.27-0.45	Subterminal	Short	-	equatorial	submedian	near posterior end	lateral, extend as far forward as intestinal bifurcation
4- <i>Stephanoprora spinosa</i>	2.9-3.6	0.54-0.60	Subterminal	very much elongated	-	in anterior third of body	median, in front of anterior testis	in middle third of body	entire post-testicular region

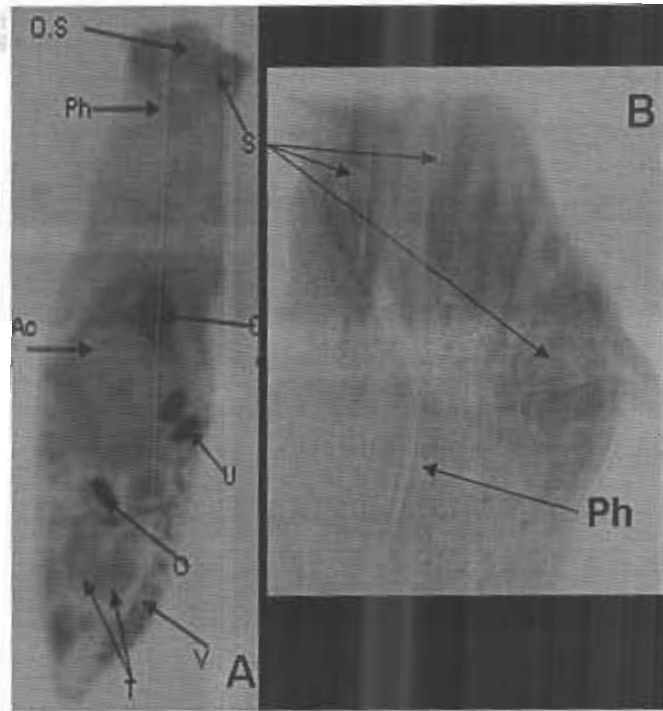


Fig. (1): *Petasiger skrjabini*. A) The whole worm, B) Anterior end. O.S= Oral sucker, S= Spine, Ph= pharynx, C= Cirrus pouch, Ac= Acetabulum, U= Uterus with eggs, O= Ovary with eggs, V= Vitellaria, T= Two testes.

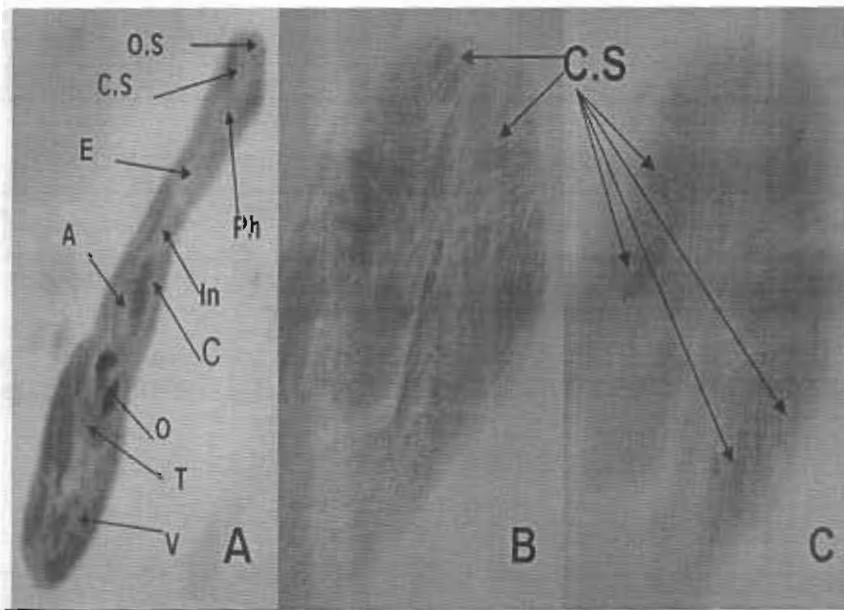


Fig. (2): *Petasiger jubilarum*. A) The whole worm. B & C) Anterior End. O.S = Oral sucker, C.S= Corner spines, Ph= Pharynx, E= Esophagus, In= Intestinal bifurcation, C= Cirrus pouch, O= ovary with eggs, T= Two testes, V= Vitellaria.

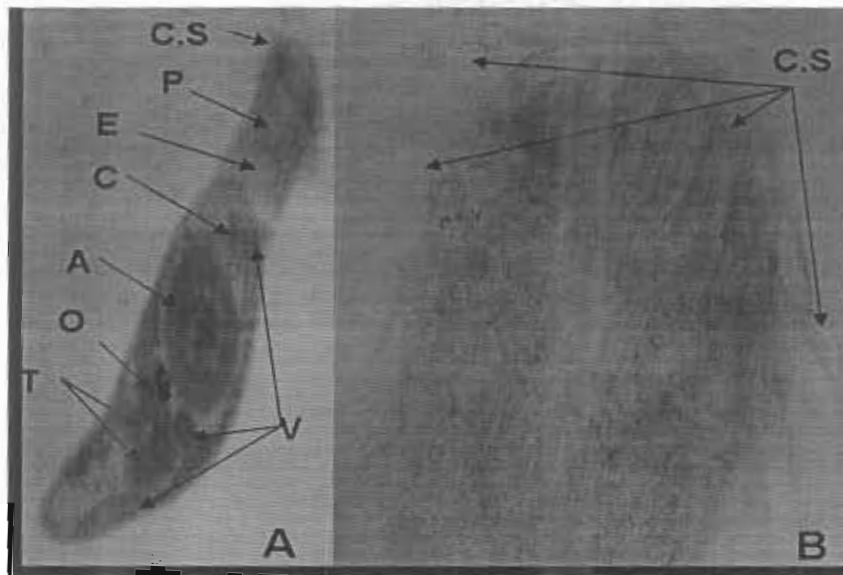


Fig. (3): *Petasiger grandevesicularis*. C.S= Crown of spines, P= Pharynx, E= Esophagus, C= Cirrus pouch, A= Acetabulum, O= Ovary, T= Two testes, V= Vitellaria.

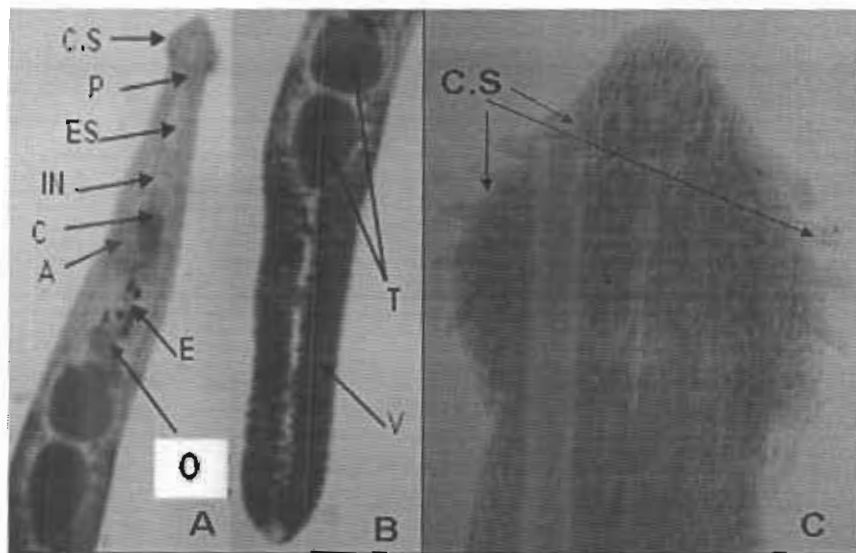


Fig. (4): *Stephanoprora spinosa*. A) Anterior end. B) Posterior end. C) Oral sucker with crown of spines. C.S= Crown of spines, P= Pharynx, ES= Esophagus, IN= Intestinal bifurcation, C= Cirrus pouch, A= Acetabulum, E= Eggs, O= Ovary, T= Two testes, V= Vitellaria.

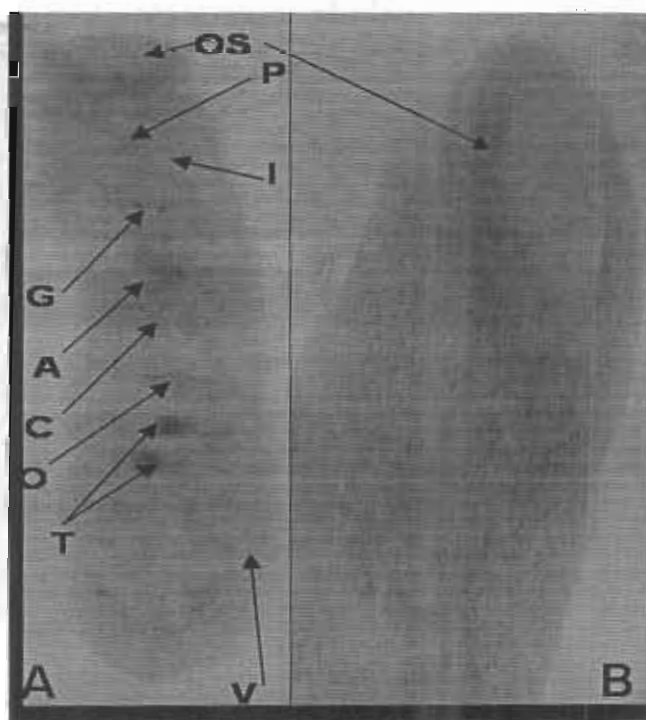


Fig. (5): Larval stage of *Dolichosacculus solecarius*. A) The whole worm. B) Anterior end. Os = Oral sucker, P = Pharynx, I = Intestinal ceca, G = Genetal pore, A = Acetabulum, C = Cirrus pouch, O = Ovary, T = Two testes, V = Vitellaria.

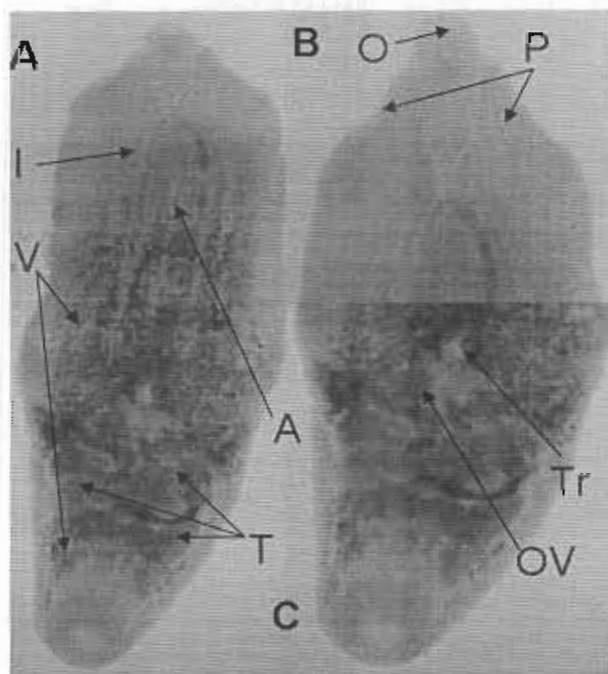


Fig. (6): *Tylodelphys* sp., A) The Whole worm. B) Anterior part. C) Posterior part. I: Intestinal bifurcation, V: Vitellaria, A: Acetabulum, T: Testes, O: Oral sucker, P: Pseudosuckers, Tr: Tribocytic organ, OV: ovary.

## DISCUSSION

*Petasiger skrjabini* was first recorded from *Falco tinnunculus* by Skrjabin *et al.* (1947) and distributed in Asia and America. The detailed morphological and metrical data obtained for *P. skrjabini* in the present study (Fig. 1) agree well with the description of *P. neocomense*. This species was distinguished solely on the basis of the holotype having symmetrical testes (Bashkurova, 1941). The measurements of body length, body width, oral sucker, pharynx, ventral sucker, ovary, anterior tests, and posterior tests for *P. skrjabini* are comparable to previously measurements by Faltynkova *et al.* (2008). It also agrees well with their description from *Podiceps cristatus* who consequently considers *P. skrjabini* to be a synonym of *P. neocomense*. They were found to possess oblique, rather than parallel testes. Kostadinova and Skirnisson (2007) reported *P. nitidus* from *Podiceps auritus* and *P. cristatus* in China. A comparison of the description of these authors with our data on the type-material of *Petasiger nitidus* revealed that, although the Chinese material resembles *P. nitidus* in body dimensions, it exhibits much lower limits for the size of the testes and ovary. The cirrus sac in *P. nitidus* is also substantially larger both in absolute dimensions and in relation to the body width and the size of the ventral sucker. Kostadinova and Skirnisson (2007) recognized this material as conspecific with *P. longicirratus* that described from Chinese material (Ku, 1938).

Finding of *Petasiger jubilarum* in this study (Fig. 2) matched the previous seen descriptions of Skrjabin *et al.* (1947) from *Falco tinnunculus*, Yamaguti (1958), McDonald (1981). Nasincova *et al.* (1994) suggested a possible synonymy of this form with *P. variospinosus*. Faltynkova *et al.* (2008) described this species from a single juvenile of *Falco tinnunculus* and probably macerated specimen (lacking tegumental spines).

The newly collected material of *Petasiger grandivesicularis* from herring gull (Fig. 3) exhibits a higher variation in the metrical features. Thus the size of body and most of the other metrical features (correlated with body size) were found to vary above the upper ranges given in the original description of *P. grandivesicularis* (Ishii, 1935). The material of Yamaguti (1939) exhibited somewhat greater upper limits for the size of the body, collar, ventral sucker, cirrus and anterior testis, thus extending the known range for this species. *P. grandivesicularis* is the only species in the genus with its vitelline fields confluent in the forebody (Faltynkova *et al.*, 2008). Other characteristic features include: small body, large cirrus-sac, bulb-like cirrus and eggs large in relation to body size. However *P. grandivesicularis* resembles *P. australis* which described by (Faltynkova *et al.*,

2008) in Australia from *Tachybaptus ruficollis* in the structure of the vitellarium (i.e. it is composed of large follicles) and its extent in the forebody, but differs in most metrical characters and in the fact that the vitelline fields, although approaching the mid-line anterior to the cirrus-sac, are not confluent. Also we can be distinguished it from *P. australis* and *P. neocomense* by the larger dimensions of the body and angle spines (Faltynkova *et al.*, 2008). Odening (1965) described *P. neocomense* from *Podiceps cristatus* in the vicinity of Berlin, which was later, redscribed and identified as *Petasiger grandivesicularis* (Kostadinova, 1999). Cankovic *et al.* (1983) and Kostadinova and Matskasi, (1994) listed two hosts, *Tachybaptus ruficollis* and *Podiceps cristatus* and this indicates that they have more than likely presented a composite description of *Petasiger grandivesicularis* and *P. neocomense*.

*Stephanoprora spinosa* trematode species of reptiles and fish was found in herring gulls during this study (Fig. 4). This species was identified according to the description of Yamaguti (1958) and McDonald (1981). Presence of this species in gulls may be due to feeding on reptiles or gulls may be considered as a new host for this trematode.

*Dolichosacculus solecarius* larvae in the present study (Fig. 5) are matched with the finding of Yamaguti (1958). The likely source of trematode infection in this study was fish and reptiles which considered the favorite food for herring gull at all. This explained the impact of sea birds on fish as a source of protein for human consumption. Also, this study was the first record for five species of trematode helminth parasites in aquatic birds in El-Manzala Lake in Port-Said Province.

The morphology and measurements of the *Tylodelphys* sp. are corresponding well to that of *Tylodelphys* sp. as described by Moravec (2001) from the Czech of Republic. The metacercaria of the *Tylodelphys* sp. recorded from the eye of fishes of genus *Cobitis taenia* in Poland by Marcin and Kotusz (2003). Yamaguti (1958, 1971) and Skrjabin (1960) clearly distinguished between the genera *Diplostomum*, and *Tylodelphys*. The features of the adult parasite, namely body form, size of the tribocytic organ, size and form of the hindbody, position of ovary, size of the anterior testis and vitelline field distribution, clearly indicate this species to fall in the genus *Tylodelphys*. Fishes are the source of infection for the gulls as it affect on the production of the fishes which act as the main source of protein to human consumption.

Regarding the total prevalence of trematode infestation in herring gull, it was 61.54% as shown in Table 1, which was lower than that recorded by

Kalantal *et al.* (2000) (98%) in slender-billed gull collected from Al-rames coast of Al-Qateef in eastern province of Saudi Arabia. Moreover, the prevalence of each trematode species recorded in this study is differed from their findings. This might be due to the diversity of the helminthes as well as the aquatic gull.

From the point of zoonotic view, the trematodes belong to the family Echinostomatidae are considered a great public health hazards parasites causing Echinostomiasis (Synonym: Echinostomatidosis) which live in the intestine of mammals, birds and occasionally humans. The definitive host, including man, becomes infected by consuming raw foods (intermediate hosts) containing metacercariae (Pan American Health Organization, 2003). The aquatic birds herring gull may play an important role in transmitting parasites to fish which in turn transmitting them to humans. Although the isolated Echinostomatid species, in this study, are not recorded as zoonotic ones but evidence suggests some fish parasites that are currently not considered as human pathogens may become a human health concern in the future (USFDA, 2001).

### CONCLUSION

As a result of present study, 6 species of digenetic trematodes belonging to 3 families were recorded from *Larus argentatus* from El Manzala Lake and Mediterranean Sea near Port Said city of Egypt. This study supports the view of Kennedy and Baker (1989) that in gulls as a group, helminth communities show common features of high species richness, low abundance, few or no core species and a number of species that occur rarely. Moreover, this relative species richness and diversity of the helminths are comparable to those of other gulls reported from other parts of the world and probably reflect the specialized non- selective diet of *Larus argentatus*.

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### بعض الدراسات على المثقبات ثنائية العائل في طائر النورس بمحافظة بورسعيد- مصر

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أجريت هذه الدراسة على الطفيليات التي تصيب طائر النورس في بحيرة المنزلة والبحر المتوسط بالقرب من مدينة بورسعيد. وجد أن 65 طائراً مصاباً بنوع أو أكثر من الطفيليات الثنائية العائل المعوية والتي تشتمل على ستة أنواع: بيتاسيجر إسكجابيني وبيتاسيجر جابيلارام وبيتاسيجر جرانديفازيكيولاريز وإستيغانوبورا إسبانيوزا وديكوساكيولاس سوليكارياس ونوع تايلوديلفيس. تم وصف الميزات المظهرية لكل نوع من هذه الطفيليات المعزولة ومقارنتها بما وصف في السابق. وجد أن نسبة الإصابة الكلية بالطفيليات في طيور النورس 61.04%. كما أن نسبة إصابة طائر النورس بكل نوع قد سجلت كالآتي: بيتاسيجر جرانديفازيكيولاريز 25.00% وبيتاسيجر جابيلارام 9.23% وبيتاسيجر إسكجابيني 7.69% وإستيغانوبورا إسبانيوزا 12.30% وديكوساكيولاس سوليكارياس 7.69% ونوع تايلوديلفيس 9.23%. كما تم مناقشة المخاطر الصحية لهذه الديدان المعزولة على الإنسان.