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Apharyngogyliauchen callyodontis Yamaguti, 1942 (Digenea) from a New Host, the Common Parrotfish, *Scarus psittacus* (Scaridae) with Special Reference to its Morphological Intra-Specific Variations

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Abstract

As part of an on-going study of the helminth parasites collected from the Red Sea fishes, Apharyngogyliauchen callyodontis Yamaguti, 1942 is reported for the first time parasitizing the middle and lower parts of the intestinal tract of Scarus psittacus (Common parrotfish) (Forsskål), collected from the northern Red Sea of Egypt. The encountered helminth was re-described morphologically and morphometrically based on the light microscope study. The current study demonstrated that some taxonomically important, previously unreported morphological and morphometric features, including the variation in; intestinal ceca length, and their posterior extension, testes position relative to ventral sucker, cirrus-sac shape, pars prostatica shape and its extension inside cirrus, genital pore positions from median to nearly submedian, vitelline follicles distribution and its posterior extension, seminal receptacle shape, ovary shape and posterior extension of the uterus. The diagnostic morphological features were elucidated and discussed to provide correct identification of Apharyngogyliauchen species with very careful consideration to avoid overlapping with the closely related species.

Keywords: Apharyngogyliauchen callyodontis; Common parrotfish; Egypt; Red Sea; Scarus psittacu.

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Introduction

Apharyngogyliauchen Yamaguti, 1942 was erected for *Apharyngogyliauchen callyodontis* Yamaguti, 1942 from the intestine of an unidentified parrotfish ("*Callyodon* sp.") from off Naha, Okinawa, Japan, characterizing by absence of the oesophageal bulb (= "pharynx" of Yamaguti [1942]) and the intermediate position of its reproductive organs between closely related genera *Gyliauchen* Nicoll, 1915 and *Paragyliauchen* Yamaguti, 1934. (Yamaguti, 1942). Later, on the basis of those two distinctive features, Yamaguti (1958) proposed a new subfamily Apharyngogyliaucheninae Yamaguti, 1958. In 1962, Manter and Pritchard erected another gyliauchenine, the *Leptobulbus* Manter & Pritchard, 1962, differentiating from *Apharyngogyliauchen* only by the presence of a uniquely, weakly developed oesophageal bulb (= "pharynx" of Manter and Pritchard [1962]) which represented an intermediate state between *Apharyngogyliauchen* and other gyliauchenide genera that have well-developed oesophageal bulbs. Therefore, Manter and Pritchard (1962) felt unsatisfactory to recognize Apharyngogyliaucheninae as a distinct subfamily and reassigned again *Apharyngogyliauchen* into Gyliaucheninae. Hall & Cribb (2005) investigations followed Manter and Pritchard (1962) reassignment and clarified that *Apharyngogyliauchen* has the same diagnostic features of the Gyliaucheninae Fukui, 1929 and indicated no value in the recognition of a monotypic subfamily for *Apharyngogyliauchen*. Cu & Shen (1983) added another two species from the Xisha islands in the South China Sea; *Apharyngogyliauchen opisthovarius* Gu & Shen, 1983 from the intestine of an unidentified Wrasses fish ("*Cirrhilabrus* sp.") and *Apharyngogyliauchen scarustis* Gu & Shen, 1983 from the intestine of Daisy parrotfish, *Scarus sordidus*. Wang (1977) recognized *Gyliauchen thalassamae* from the Sixbar wrasse, *Thalassoma Hardwicke*], off China Sea and characterized it from the other *Gyliauchen* spp. by its long ceca and absence of the oesophageal bulb (= "pharynx" of Wang [1977]) and on the basis of the later feature, Hall & Cribb (2005) investigations reassigned *G. thalassamae* Wang, 1977 inside *Apharyngogyliauchen* as *Apharyngogyliauchen thalassamae* (Wang, 1977) Hall & Cribb, 2005.

As part of an on-going study of the Digenea parasitizing the Red Sea fishes (see Khalifa et al., 2015; Dronen et al. 2016; Blend et al. 2017; Khalifa et al., 2018), *A. callyodontis* Yamaguti, 1942 was redescribed and its comparative metric account by several authors is also given and discussed.

Materials and Methods

Sampling

A total of 8 alive Common parrotfish, *Scarus psittacus* caught by small trawl at Sharm El-Naga, Makadi Bay, Southern Hurghada, Egypt (27°15'26.57"N, 33°48'46.48"E), during a period from17 May 2012 to 2 September 2012 were screened for the presence of trematodes immediately after capture at the zoology laboratory, Faculty of Science, South Valley University.

Parasitological investigation

The captured fish were dissected, and the intestines were removed and examined under American Optical Forty Model 41–48 stereomicroscope for the presence of endohelminths. Some specimens were observed alive. Adult worms were flattened under very slight coverslip pressure in hot 5% buffered formal saline solution (Garcia and Ash, 1979), and preserved in 70% alcohol. Whole-mounts were stained with acetocarmine, cleared in Xylene, mounted in DPX and studied under a light microscope. Additionally, drawings were made with the aid of a Zeiss Universal compound microscope using micro-projector or camera Lucida (PZO 01852 10x). All measurements are given in micrometers (μm). The recovered parasites were morphologically identified according to available literature; Hall and Cribb (2005). Furthermore, the prevalence was calculated according to Bush et al. (1997) and abundance and mean intensity according to Margolis et al. (1982). Additionally, the host fish was identified according to criteria established by Randall (1982), Lieske and Myers (1994, 1996) and Lieske et al. (2004). Fish identification authorities through the FishBase (Froese and Pauly 2019).

Results

Family Gyliauchenidae Fukui, 1929

Syns. Dissotrematidae Goto & Matsudaira, 1918; Robphildollfusiidae Paggi & Orecchia, 1963

Subfamily Gyliaucheninae Fukui, 1929

Syns. Apharyngogyliaucheninae Yamaguti, 1942; Ichthyotreminae Caballero & Bravo-Hollis, 1953

Genus *Apharyngogyliauchen* Yamaguti, 1942

Apharyngogyliauchen callyodontis Yamaguti, 1942.

Host: Common parrotfish, *Scarus psittacus* (Forsskål) (Perciformes: Scaridae).

Locality: Northern Red Sea, off Sharm El-Naga, Makadi Bay, Southern Hurghada, Egypt (26°55’N, 33°56’E–26°54’N, 33°59’E; depth = 0.5–2.5 m; 17/May/2012 to 02/September/2012).

Site of infection: Middle and lower section of the intestinal tract.
Deposited material: Zoology Department, Faculty of Science, South Valley University (SVU), Qena, Egypt.
Prevalence*:* 6 of 8 (75% infected).
Intensity: 1−27, 103 worms.
Mean intensity: 59.67 (358/6).
Relative density/abundance*:* 44.75 (258/8).

Re-Description (Fig. 1, a-c)

[Based on 12 mature specimens.] Body fleshy, robust, yellowish orange in life, Horn-like in lateral view to pyriform in ventral view, dorsoventrally curved, with almost smooth and straight margins, maximum width at the level of mid-ventral sucker or slightly anterior to it. The anterior end was tapering; the posterior end was less truncated to almost round. Tegument was smooth. The most morphological feature is the absence of Oral sucker and it was replaced by the well-developed pharynx. The pharynx is elliptical to oval, subterminal or slightly terminal with conspicuous, oval aperture directed anteroventrally. Ventral sucker sessile, unspecialized, spherical to subspherical, subterminal, at ovary level or slightly anterior, distinctly larger than pharynx and situated at the anterior half of the last body third. The hind body is very short. Oesophagus fairly long, wide, less than 1/4 of body length straight, extends from the base of the pharynx to end of the anterior third level of the body and surrounded by numerous glandular esophageal cells along its length. The oesophageal bulb was absent. The intestinal bifurcation was found at the anterior third level of the body, distinctly very distant from the ventral sucker. Ceca 2, simple, equal in length with the same width along its length and terminating blindly; bifurcates nearly at the end of the first third of the body.

Testes two rounded to elliptical, entire, smooth, subequal, side-by-side or slightly oblique, at the level of the ventral sucker to slightly posterior, situated at the anterior half of the last body third, well-separated from the posterior end. Seminal

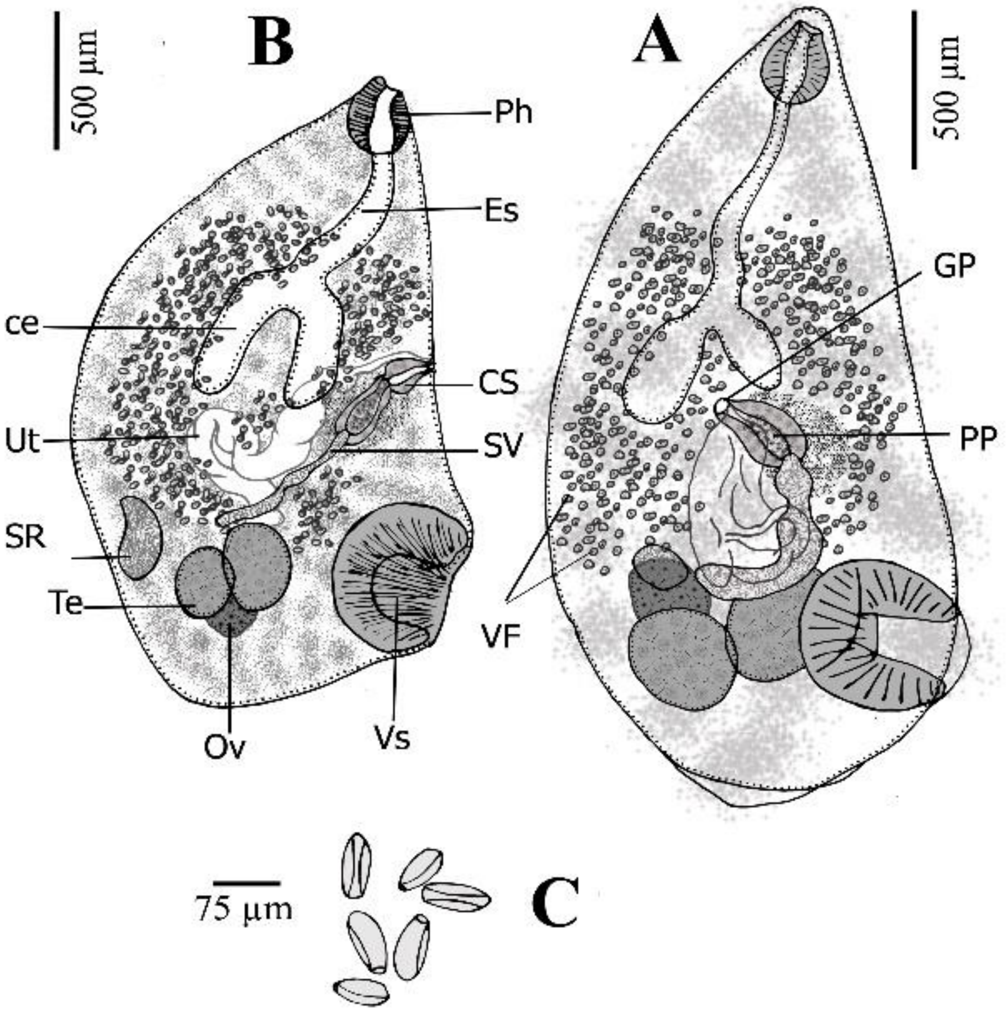

Fig. 1. *Apharyngogyliauchen callyodontis* Yamaguti, 1942. **A,** voucher from *Scarus psittacus*, northern Red Sea off Egypt, ventro-lateral view; **B,** voucher from *Scarus psittacus*, northern Red Sea off Egypt, lateral view. **C,** elongate-oval operculated eggs. *Abbreviations*. Ph, pharynx; Es, esophagus; Ce, cecum; VS, ventral sucker; Te, testis; SV, seminal vesicle; CS, cirrus sac; GP, genital pore; PP, pars prostatica; Ov, ovary; SR, seminal receptacle; Ut, uterus.

vesicle tubular, often concealed by the uterus, bipartite, dumb-bell-shaped. Both two parts separated by a narrow constriction; distal portion occasionally perpendicular to the proximal portion. Most of the seminal vesicle external to the cirrus-sac and the distal extremity of the second part of the seminal vesicle is partly internal to cirrus-sac and enters it posteriorly. Cirrus-sac moderate in size, well-developed, claviform, extends in an obliquely vertical direction, extends from the beginning of the last third of intestinal caeca and terminates at the posterior level of caecal ends by a short distance. Pars prostatica dark-stained, well-devolved, oval, occupy about posterior half of the cirrus-sac. Dense numbers of prostate cells surround almost of the cirrus-sac and anterior third of the distal portion of the seminal vesicle. Ejaculatory duct relatively short, tubular and straight. Genital atrium present. Genital pore equatorial, submedian (sinistral), anterior to mid-ceca level directly, (at the midpoint of body length).

Ovary entire, rounded, smooth, sinistro-submedian, immediately at the testicular level or slightly separated by a short distance. Seminal receptacle conspicuous, claviform, overlaps sinistral testis, immediately posterodorsal and sinistral to the ovary, larger than the ovary. Uterus extends anteriorly from mid-testicular and mid-ventral sucker level to mid-body, primarily intercecal, winding but not expansive, slightly coiled, restricted to the area among ovary, seminal receptacle, seminal vesicle, anterior margins of testes and genital pore. Uterus extends anteriorly as short, narrow metraterm parallel to the sinistral side of cirrus-sac and opens dorsolateral to it in the genital atrium. Vitellarium were follicular; field extends along lateral margins of body, a short distance post-pharynx to the level of the ovary or slightly posterior to anterior margins of testes. confluent in the anterior portion of vitellaria especially anterior region of ceca and, overlaps intestinal caeca, the outer lateral margins of uterus and cirrus-sac and anterior margins of the ovary and seminal receptacle. Follicles were numerous, moderately dense, relatively small, spherical to subspherical in shape. Eggs were relatively few, moderately dense, oval in shape, moderate in size, operculated, thin-shelled, without filaments.

The excretory vesicle was saccular, claviform, extends anteriorly to reach the posterior margin of testes. The excretory pore was terminal. No excretory papilla was present.

Remarks

The present material is placed within *Apharyngogyliauchen* on the basis of presences of amphistomatous body-plan, a pre-testicular ovary, pyriform body, and absence of both oesophageal bulb and excretory papilla (Hall and Cribb, 2005). Comparison among newly collected specimens and the previously mentioned species indicated that present specimens matched *A. callyodontis* in overall appearance, egg size range, possessing submedian and post-bifurcate genital pore, alike in vitellarium distribution and parasitizing in the same host group. In addition, a large number of allometric measurements very similar and clearly with converge ranges included body width, pharynx length, ovary length, and pre-testicular distance as a percentage of body length as well as mean testes width/Ovary width ratios very identical.

A. callyodontis specimens in the current study are characterized from all previously described forms by having a smaller body size of both body and the internal organs; a ventral sucker is further anterior relative to the testes, a dumb-bell-shaped seminal vesicle, and a dark-stained Pars prostatica. Furthermore, few allometric variations included slightly higher values in oesophagus length, post-testicular distance and pre-vitelline distance as a percentage of body length, and mean testes length/Ovary length ratio. In addition, slightly lower values observed in testes length as a percentage of body length.

Discussion

Several morphological variations have been observed among all described sets of *A.s callyodontis* which in need to be considered carefully to avoid miss identifications when an *Apharyngogyliauchen* material recognized due to the overlap of some these features with the corresponding features in other *Apharyngogyliauchen* spp. Those variations included: [i] The difference in intestinal ceca length changed from longer, about 2/3 length of the body (Yamaguti, 1942) to shorter, did not exceed 50% of body length (Nagaty, 1956; Ramadan, 1986; Rabie and Ahmed, 2000; present study). [ii] The extension of cecal ends varied from just reaching or slightly overlapping the anterior border of testes (Yamaguti, 1942; Nagaty, 1956; Ramadan, 1986), to extend to the mid-ovarian level (Rabie and Ahmed, 2000) or being distant from the anterior border of testes as in present specimens. [iii] Testes position relative to ventral sucker differentiated into three positions, side-by-side and anterolateral to ventral sucker (Yamaguti, 1942; Ramadan, 1986), opposite or slightly diagonal and dorsal to ventral sucker (Nagaty,1956) and testes side-by-side at level of ventral sucker or slightly posterior (Rabie and Ahmed,2000; present study). [iv] Cirrus-sac shape distinguished among truncated elliptical (Yamaguti, 1942), a pyriform (Nagaty,1956; Ramadan, 1986; Rabie and Ahmed,2000) and a claviform in the present study.[v] In addition, Pars prostatica exhibited several variations in both shape and its extension range inside cirrus-sac from being ovoid to elliptical and partly to entirely outside cirrus-sac (Yamaguti, 1942; Ramadan, 1986; Rabie and Ahmed,2000), to be fan-shaped and inside cirrus-sac (Nagaty,1956), or a dark-stained ovoid or elliptical and completely inside cirrus-sac as in the present study. [vi] Genital pore positioned into two very close positions, a sinistro-submedian position (Yamaguti, 1942; Rabie and Ahmed,2000; present study) and median position (Nagaty,1956; Ramadan, 1986). [vii] Seminal receptacle shape showed up a wide range of variability included a retort-shaped (Yamaguti, 1942), an oval shape (Nagaty,1956), equally bipartite (Ramadan, 1986) and a claviform as in the present study. [viii] The posterior extension of the vitelline field exhibited slight variations included extending of vitellaria to the ends of the ceca/ovary level (Yamaguti, 1942, Fig. 25; Rabie and Ahmed,2000, Fig. 4a; Present study) or vitellaria reaching further posterior to the level of the testes (Nagaty,1956, Fig. 4; Ramadan, 1986, Fig. 2). [ix] Ovary in all described forms of *A. callyodontis was* an oval to rounded except in Rabie and Ahmed (2000), it was irregular, maybe subtriangular anteriorly. [x] Uterus extension revealed either a pre-acetabular position (Yamaguti, 1942; Nagaty, 1956; Rabie and Ahmed, 2000) or the uterine loops extend to the mid-ventral sucker level (Ramadan, 1986; present study).

As known that differences in morphometric features (e.g. body length and width, ventral sucker width, etc.) can be symptomatic of host-induced variability. Measurements, morphometric percentages and morphometric ratios of *A. callyodontis*

Table 1. Measurements, morphometric percentages and morphometric ratios of *Apharyngogyliauchen callyodontis* Yamaguti, 1942 from present study compared to previously described forms.

Reference	Yamaguti (1942)	Nagaty (1956)	Ramadan (1986)	Rabie and Ahmed (2000)	Present study
Host(s)	*Callyodon* sp.	*Hipposcarus harid*	*Hipposcarus harid* & *Anampses caeruleopunctatus*	*Hipposcarus harid, Scarus ghobban* & *Cheilinus abudjubbe*	*Scarus psittacus*
Locality	Off Naha, Okinawa Prefecture, Japan	Off Al-Ghardaga, Egypt in the Red Sea			Off Sharm El-Naga, Egypt, in the Red Sea
Site of infection	Intestine	Intestine	Intestine	Intestine	Mid and lower intestine
Body Length [L]	4,600–5,140 5016[a]	2,150–3,890 2,724–2,729[a]	3,070–3,710	2,410–2,740	2,220–2,480; 2332
Body Width [W]	2,100–2,400	1,080–2,170	1,580–2,050	1,120–1,360	1,100–1,220; 1,184
Body W %*	46%–47%[b]	50%–56%[b]	51%–55%[b]	46%-50%[a]	47%–54%; 52%
Pharynx [Ph.] L × W	470–550 × 420–580	260–440 ×260–440	320–380 × 290–350	240–280 × 290–300	208–240; 224 × 168–224 ;194
Pharynx L%*	10%–11%[b]	11%–12%[b]	10%[b]	9%–10%[a]	9%–10%;10%
Oesophagus L	800	387–501[a]	350–550	620	480–520; 491
Oesophagus L %*	16%–17%[b]	14%–18%[a]	11%–15%[b]	23%–26%[a]	20%–22%; 21%
Ventral sucker L × W	870–980 × 870–980	570–930 × 570–930	660–820 × 650–900	550–630 × 680–730	384–504; 451 × 416–504; 440
Ventral sucker [VS] L%*	18%–19%[b]	24%–27%[b]	21%–22%[b]	22%–23%[a]	17%–20%; 19%
Ph. length: VS. length	1:1.78–1.85[b]	1:2.11–2.19[b]	1:2.06–2.16[b]	1: 2.25–2.29[a]	1:1.85–2.10; 1:2.01
Ph. Width : VS Width	1:1.69–2.07[b]	1:2.11–2.19[b]	1:2.08–2.17[b]	1:2.34–2.43[a]	1:2.08–2.62;1:2.28

Table 1. (Continued)

Proximal portion of seminal vesicle L × W	504 × 267^{a}	180–207 × 66–175^{a}	100–140 × 540–650	513 × 180^{b}	216–244; 230 × 108–144 ; 126
Distal portion of seminal vesicle L × W	397 × 328^{a}	259–352 × 57–125^{a}	310–400 × 170–180	158 × 128^{b}	144–240; 191 × 88–144 ;113
Cirrus sac L × W	220–250 × 265^{a}	207–319 × 147–214^{a}	440–570 × 170–190	278 × 163^{b}	204–264; 242 × 88–136 ; 105
Cirrus sac L%*	4%–5%^{b} 8^{a}	11%^{a}	14%–15%^{b}	11%^{b}	8%–12%; 10%
Pars prostatica L × W	260 × 175	127 × 147^{a}	240–350 × 100–110	---	107–135; 123 × 76–100; 87
Ovary L × W	280–350 × 450–470	180–320 ×180–320	350–420 × 330–350	140–150 × 170–240	168–392; 250 × 128–240; 185
Ovary L%*	6%–7%^{b}	8%^{b}	11%^{b}	5%-6%^{a}	8%–16%; 11%
Seminal receptacle L × W	552 × 435^{a}	169–232 × 145–295^{a}	410–620 × 230–250	---	308–324;315 × 116–;134
Testes L × W	1,000–1,400 × 650–750	380–1,030 × 310–650	780–1,130 × 540–830	350–740 × 170–310 450–570 × 170–340	320–496; 399 × 240–432;342
Testes L%*	22%–27%^{b}	18%–29%^{b}	2%5–30%^{b}	15%–27%^{a} 12%–19%^{a}	14%–20%; 17%
Intestinal caeca L × W	2,250 × 400	863–1,025 × 248–329^{a}	1,180–1,780 × 240–410	694 × 196^{b}	700–1,240; 945 × 104–160; 140
Intestinal caeca L%*	44%–49%^{b}	32%–38%^{a}	38%–48%^{b}	26%^{b}	32%–50%; 41%
Mean testes L: Ovary L	1:0.25–0.28^{b}	1:0.31–0.47^{b}	1:0.37–0.45^{b}	1:0.23–0.35^{a}	1:0.53–0.79; 1:0.63
Mean testes W: Ovary W	1:63–0.69^{b}	1:0.49–0.58^{b}	1:0.58–1.38^{b}	1:0.75–1.00^{a}	1:0.40–0.79; 1:0.54
Vitelline field L	2,529^{a}	1,650^{a}	963^{b}	901^{b}	1,060–1,240; 1,172
Vitelline field L%*	50%^{a}	61%^{a}	49%^{a}	35%^{b}	48%–50%; 50%

Table 1. (Continued)

Pre-genital pore distance%*	45%[a]	46%–47%[a]	39%[a]	50%[b]	45%–50%; 48%
Previtelline distance%*	17%[a]	15%[a]	16%[a]	31%[b]	19%–25%; 22%
Post-vitelline distance%*	33%[a]	27%[a]	35%[a]	33%[b]	26%–29%; 28%
Preovarian distance%*	64%[a]	62%–64%[a]	51%[a]	64%[b]	50%–66%; 59%
Pre-testicular distance%*	69%[a]	67%–69%[a]	68%[a]	77%[b]	69%–73%; 70%
posttesticular distance%*	7%[a]	7%[a]	1%[a]	8%[b]	10%–14%; 12%
Egg L × W	72–84 × 39–45	70–90 × 40–60	76–78 × 41–46	70–80 × 30–40	72–80; 75 × 36–44; 40

All dimensions, measurements, and percentages are calculated to [0] decimal places; all ratios are calculated to 2 decimal places.
Range values are given first followed by the mean value. %* percentage of body length.
--- = Neither given in the original description nor available from published illustrations.
[a] Calculated from measurements given in the original description.
[b] Calculated from illustration in the original description (see Yamaguti, 1942, Fig. 25; Nagaty, 1956, Fig. 4; Ramadan, 1986, Fig. 2; Rabie and Ahmed, 2000, Fig. 4a).

in Table 1 were listed from six different hosts, 4 scarids (*Callyodon* sp., *H. harid, S. ghobban, S. psittacus*) and two labrids (*A. caeruleopunctatus*, *C. abudjubbe*) so the slight variability among these measurements across these host species is due to host-induced variability. Furthermore, the data included in Table 1 reported from considerably two distant localities; one record from Japanese water (Yamaguti, 1942) and four records from the Red Sea off Egypt (Nagaty, 1956; Ramadan, 1986; Rabie and Ahmed, 2000; present study) which may have a contributed role in the intraspecific variability.

Hall and Cribb (2008) investigations on Gyliauchenidae specimen preparation referred that the flattening process of specimens often causes a distortion of the internal morphology, particularly of the reproductive system and can obscure gross morphological features. Furthermore, "the preparation of dorsoventral wholemounts is often impossible to achieve without fracture of the posterior half of the body". Therefore, with the presence different procedures used during *A. callyodontis* specimens preparation in some publications and absence detailed information on how *A. callyodontis* specimens killed or on the methods used for *A. callyodontis* specimen preparation in other publications, we may consider that the observed differences in the intestinal ceca length, posterior extension ceca, testes position relative to both ventral sucker and ovary, cirrus-sac shape, pars prostatica shape and its extension inside cirrus, genital pore positions, vitelline follicles distribution and its posterior extension, seminal receptacle shape, ovary shape and posterior extension of the uterus, were caused by differential treatment of the specimens. Regarding the specimens' age, we think it has another small effect on the observed variations in *A. callyodontis* particularly the size body, uterus extension, and seminal receptacle, vitelline follicle, and the growing degree of embryonated eggs, oesophageal glands, and pars prostatica cells.

Species of *Apharyngogyliauchen* parasitize the intestine of herbivorous marine teleosts within the families Scaridae and Labridae distributed in the Indo-West Pacific region (Hall and Cribb, 2005). Previously *A. callyodontis* described forms found parasitizing the intestine of 3 Scarid fish; an unidentified parrotfish, "*Callyodon* sp." (Yamaguti, 1942), Hipposcarus *harid* (Nagaty, 1956; Ramadan, 1986; Rabie and Ahmed, 2000) and *Scarus ghobban* (Rabie and Ahmed, 2000). In addition, 2 labrid fish harbored *A. callyodontis*; *Anampses caeruleopunctatus* (Ramadan, 1986) and *Cheilinus abudjubbe* (Rabie and Ahmed, 2000). The present study reports *A. callyodontis* from another a scarid fish, *Scarus psittacus* from the same geographic locality (Northern Red Sea off Egypt) [See table.1]. To our knowledge, only two digenean parasites are known to infect *Scarus psittacus*; both *Plesioschistorchis callyodontis* (Yamaguti, 1942) and *Plesioschistorchis haridis* (Nagaty, 1957) were reported by Blend et al (2017) from off Northern Red Sea, off Sharm El-Naga, Makadi Bay and El-Halaka Fish Market, southern Hurghada, Egypt (respectively).

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References

Blend CK, Karar YFM, and Dronen NO (2017). Revision of the Megaperidae Manter, 1934 n. comb. (Syn. Apocreadiidae Skrjabin, 1942) including a reorganization of the Schistorchiinae Yamaguti, 1942. Zootaxa, 4358(1): 001–044.

Bray RA (2005). Superfamily Lepocreadioidea Odhner, 1905. In Keys to the Trematoda. Vol. 2, Jones, A., R.A. Bray and D.I. Gibson, (Eds.). Wallingford: CABI Publishing and the Natural History Museum. pp: 540–543.

Bush AO, Lafferty KD, Lotz JM and Shostak AW (1997). Parasitology meets ecology on its own terms: Margolis et al. revisited. Journal of Parasitology, 83: 575–583.

Dronen NO, Blend CK, KhalifaRMA, Mohamadain HS, & Karar, YFM (2016). *Pelopscreadium aegyptense* n. gen., n. sp. and *Pelopscreadium spongiosum* (Bray & Cribb, 1998) n. comb., (Digenea: Lepocreadiidae), each from disjunct populations of the yellow boxfish, *Ostracion cubicus* Linnaeus (Ostraciidae). Zootaxa, 4127(3): 567–578.

Froese R and Pauly D (Eds.) (2019). FishBase. Version 06/2018. http://www.fishbase.org. Accessed 30 March 2019.

Garcia LS and Ash LR (1979). Diagnostic parasitology: clinical laboratory manual. 2nd Ed. London: The C.V. Mosby Company.

Hall KA and Cribb TH (2005). Family Gyliauchenidae Ozaki, 1933. In Keys to the Trematoda. Vol. 2, Jones, A., R.A. Bray and D.I. Gibson, (Eds.). Wallingford: CABI Publishing and the Natural History Museum. pp: 665–678.

Hall KA and Cribb TH (2008). Revision of *Flagellotrema* Ozaki, 1936 (Digenea, Gyliauchenidae Fukui, 1929), including the description of two species from acanthuroid fishes from the Great Barrier Reef, Queensland,Australia. Zootaxa, 1718 (1), 1-35.

Khalifa RMA, Hassan HA, Mohamadain HS and Karar, YFM (2018). Molecular Phylogenetic Taxonomy and Descriptive Analysis on *Hexangium sigani* Goto & Ozaki, 1929 (Digenea: Microscaphidiidae) from Three Different *Siganus* spp. Fishes from Red Sea, Egypt. Applied Microbiology: Open Access, 4(147): 2.

Khalifa RMA, Mohamadain HS and Karar, YFM (2015). Redescription of *Pseudolepidapedon balistis* Manter, 1940 and a biological variant (Trematoda: Acanthocolpidae) from the Red Sea fishs; *Balistoides viridescens* and *Rinecanthus assasi*. Journal of the Egyptian Society of Parasitology, 240(1794): 1-10.

Lieske E, and Myers RF (1994). *Collins pocket guide*. Coral reef fishes: Caribbean, Indian Ocean, and Pacific Ocean including the Red Sea. London: Harper Collins

Lieske E, and Myers RF (1996). Coral reef fishes: Caribbean, Indian Ocean and Pacific Ocean including the Red Sea (Vol. 41). Princeton: Princeton University Press.

Lieske E, Fiedler KE and Myers RF (2004). Coral reef guide: Red Sea to Gulf of Aden, South Oman; [the definitive guide to over 1200 species of underwater life]. London: Collins.

Manter HW and Pritchard MH (1962). Studies on digenetic trematodoes of Hawaiian fishes: Families Fellodistomatidae, Opistholebetidae and Gyliauchenidae. Transactions of the American Microscopical Society, 81(2): 113–123.

Margolis L, Esch GW, Holmes JC, Kuris AM and Schad G (1982). The use of ecological terms in parasitology (report of an ad hoc committee of the American Society of Parasitologists). The Journal of Parasitology, 68(1), 131-133.

Nagaty HF (1956). Trematodes of fishes from the Red Sea. Part 7. On two gyliauchenids and three allocreadoids, including four new species. The Journal of parasitology, 42(5): 523-527.

Rabie SA and Ahmed TA (2000). Redescription of five species of trematodes (Digenea) infecting some fishes in the Red-Sea. Journal-Egyptian German Society of Zoology, 33(D): 191–218.

Ramadan MM (1986) Trematodes of the genera Helicometra Odhner, 1902 (Opecoelidae) and Apharyngogyliauchen Yamaguti, 1942 (Gyliauchenidae) from the Red Sea fishes. *Japanese Journal of Parasitology*, 35(6): 483–490.

Randall JE (1982). The diver's guide to Red Sea reef fishes. Biblios Pub Distribution Service.

Yamaguti S (1942). Studies on the helminth fauna of Japan. Part 39. Trematodes of fishes mainly from Naha. Transactions of the Biogeographical Society of Japan, 3(4): 329–398.

Yamaguti S (1958). Systema helminthum. Vol. 1. The digenetic trematodes of vertebrates. Part 1. New York: Interscience Publishers Inc.

Wang X (1977). Study on the life history of two species of trematode, two new species, and the Chinese species. Natural Science Edition, 2: 62–77 (in Chinese).

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