Digenean Parasites of *Sarpa salpa* (Linnaeus, 1758) from the Eastern Mediterranean Coasts of Turkey

Türkiye'nin Akdeniz Kıyılarından Yakalanan *Sarpa salpa* (Linnaeus, 1758) Larin Digenea Parazitleri

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ABSTRACT

Objective: The purpose of the study is to determine the digenean parasite fauna of *Sarpa salpa* (Sparidae) from the Mediterranean Sea.
Methods: The fish samples from the coasts of Mersin-Anamur were brought to the Parasitology Research Laboratory of the Biology Department of Science Faculty of Atatürk University, dissected and investigated parasitologically. The parasites that were found in the visceral organs were fixed with A F A (Alcohol-Formalin-Acetic Acid). The dying process of the parasites was carried out with Mayer's Carmalum and mounted with Canada Balsam.
Results: *Mesometra orbicularis* (Rudolphi 1819) Lühe, 1901, *Mesometra brachycoelia* Lühe, 1901, *Centroderma sp*. (Stossich 1883) (Mesometridae) and *Robphildollfusium fractum* (Rudolphi 1819) Paggi et Orecchia, 1963 (Gyliauchenidae) were determined. Although these parasites were detected in *Sarpa salpa* (Linnaeus 1758) from different localities of the Mediterranean Sea, they have not been found in the fish of the coasts of Turkey so far.
Conclusion: The mentioned 5 species of parasites are the first records for the parasite fauna of Turkey. *(Turkiye Parazitol Derg 2013; 37: 208-11)*

Key Words: Digenea, parasite, *Sarpa salpa*, Mesometridae, Gyliauchenidae, Mediterranean Sea, Turkey

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ÖZET

Amaç: Bu çalışmanın amacı Akdeniz kıyılarında yaşayan *Sarpa salpa* (Sparidae)'ların digenean parazit faunasını tespit etmektir.
Yöntemler: Mersin-Anamur kıyılarından yakalanan balıklar Atatürk Üniversitesi, Fen Fakültesi, Biyoloji Bölümü Parazitoloji Araştırma Laboratuvarına getirilerek, diseksiyonları yapılmış ve parazitleri incelenmiştir. İç organlarda tespit edilen parazitler Alkol, Formalin, Asetik asit (AFA) ile tespit edilmiştir. Parazitlerin boyanmasında Mayer's Carmalum kullanılmış, kalıcı prepatarlar Kanada Balsamıyla yapılmıştır.
Bulgular: Mesometridae familyasından *Mesometra orbicularis, Mesometra brachycoelia, Centroderma sp*. ve Gyliauchenidae (Robphildollfusiinae) familyasından *Robphildollfusium fractum* türleri tespit edilmiştir. Söz konusu parazitler daha önce Akdeniz'in muhtelif kesimlerinden *Sarpa salpa*'da tespit edilmiş olmasına rağmen ülkemiz sularında bugüne kadar rastlanmamıştır.
Sonuç: Söz konusu 5 tür de Ülkemiz parazit faunası için yeni kayıt niteliğindedir. *(Turkiye Parazitol Derg 2013; 37: 208-11)*

Anahtar Sözcükler: Digenea, parazit, *Sarpa salpa*, Mesometridae, Gyliauchenidae, Akdeniz, Turkey

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INTRODUCTION

In the Mediterranean Sea, the Digenean fauna of sparid fish has aroused the interest of numerous parasitologists (1). In the family Sparidae, the monospecific genus *Sarpa* is vegetarian and has a wide geographical distribution (2). Digenean parasite fauna of *S. salpa* (L) consists of the Mesometridae, Gyliauchenidae, Opecoelidae and Lepocreadiidae families (2, 3).

Adult stages of some Mesometrid species (*Elstia stossichianum, Wardula capitellata, Centroderma spinosissima*) parasitize the herbivorous sparid teleost *Sarpa salpa* and *Diplodus sargus* (4).

Some parasitological investigations on *Sarpa salpa* were carried out in the seas surrounding the country. The acanthocephalan and cestod parasites were not found in salema from the coasts of Gökçeada (5), across some monogenean and crustacean parasites in the coasts of Salih Island had come across (Bodrum) (6). Also, some crustacean (*Gnathia* sp.) parasites were found in the Aegean Sea (7). Some of *S. salpa* from the Aegean coasts of Greece was infected with *Centroderma spinosissimum, Mesometra brachycoelia, Mesometra orbicularis* and *Podocotyle fractum* (Digenea) (3) and it was found that the infection rates of parasites of Sparid fish in the Aegean Sea were higher in the spring and summer seasons than the autumn and winter (8). Even though several studies were carried out on the *Sarpa salpa* in Turkey, no infection has been investigated so far.

METHODS

The fish samples which were collected from the sea were brought to the Parasitology Research Laboratory of the Biology Department of Science Faculty of Ataturk University, dissected and investigated parasitologically. The parasites that were found in the visceral organs were fixed with Alcohol-Formalin-Acetic Acid (AFA). The dying process of the parasites with Mayer's Carmalum and preparation methods were established according to Pritchard and Kruse (9). Description of the parasites was done according to Jones et al. (10) and Dawes (11, 12). For identification of the fish Can and Bilecenoğlu (13) and Ekingen (14) were used. The examinations and measurements of the parasites were established under an Olympus BH-2 stereomicroscope. The morphometric measures are presented in Table 1 and Table 2. The drawings of the parasites are presented in Figure 1. The parasites and fish materials have been stored in the Biology Department, Faculty of Science at Atatürk University.

RESULTS

Mesometridae Poche 1926

***Mesometra orbicularis* (Rudolphi 1819) Lühe 1901**

The body is flat, disc-like and non-spinous. The average length of the body is 1238 µm and the width is 995 µm. The average oral sucker size is 186-194 µm. The ventral sucker is absent. The caeca is 735 µm length, large, horseshoe shaped and enclosing

Table 1. The morphometric measures of Mesometrid parasites of *Sarpa salpa*

	Mesometra orbicularis			*Mesometra brachycoelia*			*Centroderma sp.*	
	Present study	**Dawes 1947**	**Bartoli 1987**	**Present study**	**Dawes 1947**	**Bartoli 1987**	**Present study**	**Bartoli 1987**
L	1238	2250-3000	2048 (1849-4038)	1774±369 (1198-2213)	1350-1750	2216 (1806-2805)	881±94 (743-954)	1683 (1487-1976)
W	995	1650-2700	1825 (1488-3613)	1464±287 (995-1847)	1100-1200	1781 (1232-2104)	425±28 (396-453)	678 (637-744)
OSL	186	145	219 (176-362)	204±25 (170-242)		226 (192-277)	84±7 (76-92)	167 (160-181)
OSW	194	250	253 (213-373)	217±17 (186-242)		244 (192-304)	96±14 (84-108)	179 (165-187)
TL	242		458 (293-773)	339±81 (218-485)		439 (346-506)	154±42 (129-202)	373 (293-437)
TW	162		328 (240-480)	230±37 (178-283)		368 (266-533)	119±5 (113-121)	189 (160-219)
OL	89		163 (107-267)	110±25 (73-154)		166 (117-187)	53±6 (48-57)	165 (107-203)
OW	178		316 (213-533)	212±43 (137-267)		277 (224-373)	53±5 (48-57)	80 (69-107)
EL	68	62-83	72 (65-80)	79±5 (72-88)	78-80	77 (78-87)	83±4 (80-88)	86 (78-93)
EW	36	25-42	31 (26-35)	40±4 (32-44)	35-40	34 (30-39)	45±5 (40-52)	31 (28-35)
CL:	735			659±130 (404-808)			356±9 (347-364)	

(L: Length; W:width; OSL: Oral sucker length; OSW: Oral sucker width; TL: Testis length; TW: Testis width; OL: Ovary length; OW: Ovary width; EL: Egg length; EW: Egg width; CL: Caeca length)

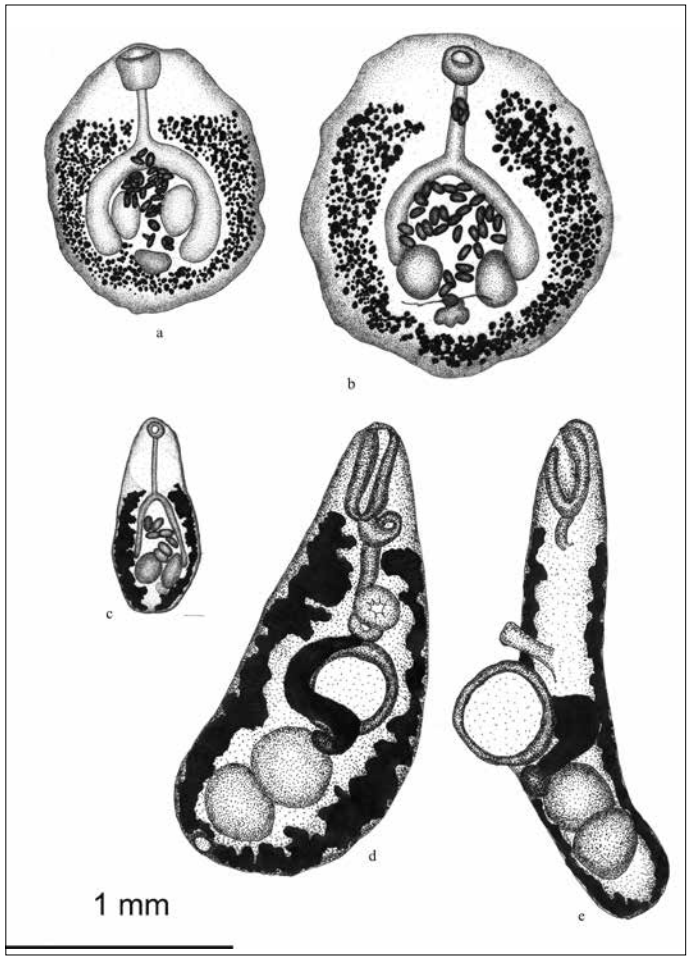

Figure 1. a: *Mesometra orbicularis*, b: *Mesometra brachycoelia*; c: *Centroderma sp.*, d: ventral and e: lateral view of *Robphildollfusium fractum*

the testicles which are ellipsoidal shaped (242 µ-162 µ), located symmetrically and separated by the uterus, which is preovarian. The ovary is lobed and posttesticular. The size of the ovary is 89 µ-178 µ. The eggs are oval shaped, without filaments, 68 µm length and 36 µm width. The vitellaria contain numerous follicles that spread between the bifurcation level of caeca and posterior end of the body (Figure 1a) (Table 1).

***Mesometra brachycoelia* Lühe 1901**

The body is flat, broad and non-spinous. It is 1774 µ long and 1464 µ wide. The ventral acetabulum is absent. The oral sucker length is 204 µ and the width is 217 µ. The caeca is 659 µ long, ending in the region of the testes. The testes are 339 µ long, 230 µ length and symmetrical. The ovary is posttesticular and oval (110-212 µm). The uterus is preovarian. The eggs are without filaments and oval. The size of the egg is 79-40 µm. Vitelline follicles are profuse and spreading from the bifurcation level of the caeca to the posterior end of the body (Figure 1b) (Table 1).

***Centrodema* sp. (Stossich 1883)**

The body, which is ellipsoidal and non-spinous, is 881 µ long, 425 µ wide. The ventral sucker is absent. The size of the oral sucker is 84x96 µm. The testicles are located symmetrically in the posterior half of the body and ellipsoid (154-119 µm). The ovary is posttesticular and circular (53-53 µm). The eggs are non-filamentous and oval (83-45 µm). The uterus is preovarian. The vitelline follicles spread from the fork of the caeca to the posterior end of the body (Figure 1c) (Table 1).

Table 2. The morphometric measures of *Robphildollfusium fractum* of *Sarpa salpa*

	Robphildollfusium fractum	
	Present study	**Bartoli 1987**
L	2851±440 (1908-3288)	3870 (3421-4208)
W	709±141 (548-1015)	884 (722-1190)
OSL	470±69 (345-609)	526 (490-560)
OSW	241±51 (182-345)	294 (272-330)
VSL	431±45 (365-507)	490 (426-533)
VSW	492±48 (406-568)	474 (416-533)
ATL	327±31 (284-385)	260 (213-341)
ATW	332±56 (243-406)	327 (224-437)
PTL	342±55 (263-446)	334 (266-373)
PTW	332±45 (263-406)	308 (203-432)
OL	132±37 (97-185)	219 (160-266)
OW	108±32 (65-153)	191 (144-240)
EL	67±6 (60-80)	70 (67-74)
EW	42±4 (32-48)	30 (26-35)

(L: Length; W: width; OSL: Oral sucker length; OSW: Oral sucker width; VSL: Ventral sucker length; VSW: Ventral sucker width; ATL: Anterior testis length; ATW: Anterior testis width; PTL: Posterior testis length; PTW: Posterior testis width; OL: Ovary length; OW: Ovary width; EL: Egg Length; EW: Egg width)

Gyliauchenidae Fukui 1929

***Robphildollfusium fractum* (Rudolphi 1819) Paggi et Orecchia 1963**

The body is elongated (2851-709 µm). The oral sucker is 470 µ long and 241 µ wide. The ventral sucker is slightly oval, located in the middle of the body, 431 µ long and 492 µ wide. The oesophagus has a single loop. The caeca extend close to the posterior end of the body. The testes are tandem. The size of the anterior testis is 327 µ-332 µ and the posterior testis is 342 µ-332 µ. The ovary is 3-4 lobed and pre-testicular. The vitelline follicles are extended between the oesophageal loop and the posterior and of the body. The non-filamentous eggs are 67 µ long and 42 µ wide (Figure 1d) (Table 2).

DISCUSSION

Mesometrid parasites live in the intestine of Sparid fish (*Sarpa salpa*) in the Mediterranean Sea (10). *Mesometra orbicularis* was found previously on the coasts of Corsica (2), Tunisia (1, 15), Marseille (16) and on the Aegean Sea coasts of Greece (3).

Mesometra brachicoelia was reported previously on the coasts of the Mediterranean Sea of Corsica (2), Marseille (16), in Tunisia (1, 15) and on the coasts of the Aegean Sea of Greece (3).

Centroderma sp. was recorded previously in Corsica (2), in Tunisia (1, 15), in Marseille (16) and in Greece (3).

As the measurements of the *Centroderma* sp. compare with the values given by (2) Bartoli (2), it can be calculated that the average size of our samples is half of Bartoli's. It is different from *C. spinosissima* with these characteristics; larger eggs, circular ovary and non-spinous tegument. The following characteristics; non-filamentous eggs, situation of the caeca, symmetrical located testicles, preovarian and intertesticular uterus are suitable for the features of *Centroderma spinosissima* mentioned by Bartoli (2). It is assumed that it is a new species.

Robphildollfusium fractum is found in the intestine of teleost fish (only Sparidae) of the eastern coasts of the Atlantic Ocean (the Canary Islands, the Mediterranean Sea) (10). This species was recorded previously in *Sarpa salpa* from Corsica (2) and Tunisia (1, 15).

CONCLUSION

The parasite fauna of the Eastern Mediterranean coasts of Turkey has been studied but *Mesometra orbicularis* (Rudolphi 1819) Lühe, 1901, *Mesometra brachycoelia* Lühe, 1901, *Centroderma* sp. (Stossich 1883) (Mesometridae) and *Robphildollfusium fractum* (Rudolphi 1819) Paggi et Orecchia, 1963 (Gyliauchenidae) have not previously been determined in the teleost fish of the coasts of Turkey.

Conflict of Interest
No conflict of interest was declared by the authors.

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Author Contributions
Concept - Y.T.; Design - Y.T., M.C.O.; Supervision - Y.T.; Funding - Y.T.; Materials - Y.T.; Data Collection and/or Processing - Y.T.; Analysis and/or Interpretation - Y.T., M.C.O.; Literature Review - Y.T., M.C.O.; Writer - Y.T.; Critical Review - M.C.O.; Other - M.C.O.

Çıkar Çatışması
Yazarlar herhangi bir çıkar çatışması bildirmemişlerdir.

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