**SOLEARHYNCHUS KOSTYLEWI (MEYER, 1932) COMB. NOV.
(ACANTHOCEPHALA: ECHINORHYNCHIDAE),
A RARE PARASITE OF SOLEA SOLEA (PISCES: SOLEIDAE)
IN THE GEMLIK BAY, SEA OF MARMARA**

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Summary:

Paracanthocephaloides kostylewi (Meyer, 1932), a rare parasite of the common sole *Solea solea*, previously placed in the Arhythmacanthidae, is transferred to the genus *Solearhynchus* de Buron & Maillard, 1985 of the family Echinorhynchidae as *Solearhynchus kostylewi* (Meyer, 1932) new comb., because its proboscis is armed by a single type of hooks, the posterior hook in each row is pinlike and with feebly developed root. The species is redescribed on the basis of newly collected material from the Gemlik Bay, Sea of Marmara. A key to the species of *Solearhynchus* is provided.

KEY WORDS : *Acanthocephaloides*, Arhythmacanthidae, Echinorhynchidae, Sea of Marmara, *Solearhynchus*.

Résumé : *SOLEARHYNCHUS KOSTYLEWI* (MEYER, 1932) COMB. NOV. (ACANTHOCEPHALA : ECHINORHYNCHIDAE), RARE PARASITE DE *SOLEA SOLEA* (PISCES : SOLEIDAE) DE LA BAIE DE GEMLIK, MER DE MARMARA

Paracanthocephaloides kostylewi (Meyer, 1932), un rare parasite de la sole commune *Solea solea*, précédemment placé dans la famille des Arhythmacanthidae, est transféré dans le genre *Solearhynchus* de Buron et Maillard, 1985 de la famille des Echinorhynchidae comme *Solearhynchus kostylewi* (Meyer, 1932) comb. nov., car sa trompe est armée par un seul type de crochets, le crochet postérieur de chaque rangée étant en forme d'épingle avec une racine faiblement développée. L'espèce est redécrite sur la base du matériel nouvellement collecté dans la Baie de Gemlik, Mer de Marmara. Une clé de l'espèce de *Solearhynchus* est proposée.

MOTS CLÉS : *Acanthocephaloides*, Arhythmacanthidae, Echinorhynchidae, Mer de Marmara, *Solearhynchus*.

INTRODUCTION

Five acanthocephalan species, *Solearhynchus soleae* (Porta, 1905) de Buron & Maillard, 1985 (Echinorhynchidae), *Acanthocephaloides propinquus* (Dujardin, 1845) Meyer, 1932, *Paracanthocephaloides kostylewi* (Meyer, 1932) Pichelin & Cribb, 1999 (all Arhythmacanthidae), *Longicollum pagrosomi* Yamaguti, 1935 (Pomphorhynchidae), and *Telosentis exiguus* (von Linstow, 1901) Kostylew, 1926 (Illiosentidae), have been reported from fishes of the Sea of Marmara (Oğuz, 1991; Oğuz & Kvach, 2006).

Paracanthocephaloides kostylewi is a rare parasite that infects the sole *Solea solea* (Linnaeus). All previous cases of the occurrence of this acanthocephalan are rather old and data on its morphology are rather scarce and incomplete (Kostylew, 1926; Chulkova, 1939;

Osmanov, 1940; Chernyshenko, 1947; Rădulescu, 1948; Butskaya, 1952; Rădulescu & Angelescu, 1973; Solonchenko, 1982; Florescu & Ienîştea, 1984).

During a study of the helminth parasites of marine fish of the Sea of Marmara, Turkey, new material of *P. kostylewi* was found, which made it possible to redescribe this poorly known and fairly rare taxon and to discuss its taxonomic status.

MATERIALS AND METHODS

Three specimens (one male, two females) were sampled by MCO from the common sole *S. solea* in the coastal waters of the Gemlik Bay, Sea of Marmara (40° 22' N, 28° 52' E). The parasites were fixed in acetic acid/formaldehyde/alcohol solution (AFA). Then the worms were stained with Mayer's carmalum and mounted in Canada balsam. Measurements of body are given in millimetres (mm), but all other measurements are given in micrometres (µm). Figures were prepared with the aid of a camera lucida.

The type specimens of *P. kostylewi* are not available. For the comparative study the type specimens of *Solearhynchus soleae* deposited in the Muséum National d'Histoire Naturelle, Paris, were studied (Cat. Nos. 475 HF H1 105-106, samples in alcohol).

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RESULTS

FAMILY ECHINORHYNCHIDAE COBBOLD, 1876

SOLEARHYNCHUS KOSTYLEWI (MEYER, 1932) COMB. NOV.

Syns.: *Echinorhynchus propinquus* Dujardin, 1845 sensu Kostylew (1926); *Acanthocephaloides kostylewi* Meyer, 1932; *Paracanthocephaloides kostylewi* (Meyer, 1932) Pichelin & Cribb, 1999.

Description: body smooth, 7.3 (6.5-7.9) long and 0.9 (0.7-1.0) wide; anterior part wider than posterior one (Fig. 1). Lemnisci 642 (504-824) long. Two sensory papillae on neck (Fig. 2). Brain ganglion on base of proboscis receptacle. Proboscis receptacle 642.7 (616-672) long. Proboscis cylindrical, 333 (240-400) long, armed with 16 longitudinal rows, 5-6 hooks in each row (Fig. 2). All hooks of similar type. Largest hooks in middle part of proboscis, 59 (40-80) long. Posterior hook in each row smallest, 27 (20-30) long, pinlike, with feebly developed root (Fig. 2). Hook roots with anteriorly direc-

ted processes. Basal part of hook blades covered by tegument.

Male (n = 1): 6.6 mm long and 0.9 mm wide (Fig. 1). Lemnisci 560 and 624 long. Proboscis 360 long, proboscis receptacle 672 long. Genital system occupies 60 % of posterior part of trunk. Testes (anterior 240 × 320; posterior 240 × 312) located in middle part of body, at distance from cement glands. Cement glands six, in tandem, pyriform. Saeftigen's pouch well developed. Genital pore terminal.

Female (n = 2): 7.5-7.9 mm long and 0.7-1.0 mm wide (Fig. 1). Lemnisci 504-824 long. Proboscis 240-400 long, proboscis receptacle 616-640 long. Uterine bell with well-developed selector cells. Eggs (n = 15) 57 (50-65) × 14.2 (12.5-17.5) (Fig. 3) with polar prolongations. Genital pore subterminal.

Type host: the snouted sole *Pegusa lascaris* (Risso, 1810) (Pleuronectiformes).

Other hosts: common sole *Solea solea* (Pleuronectiformes), horse mackerel *Trachurus trachurus* (Linnaeus, 1758) (Perciformes); grass goby *Zosterisessor*

Fig. 1. – *Solearhynchus kostylewi* (Meyer, 1933) comb. nov. From *Solea solea*, Turkey. A. Female *in toto*; B. Male *in toto*; C. Vagina. For A, B, scale-bar: 1,000 µm; for C, scale bar: 100 µm.

Fig. 2. – Proboscis (A) of male *Solearhynchus kostylewi* and a hooks row (B). Scale-bar: 100 μ m.

Fig. 3. – Egg. Scale-bar: 10 μ m.

ophiocephalus (Pallas, 1814) (Perciformes); stargazer *Uranoscopus scaber* Linnaeus, 1758 (Scorpeniformes); flounder *Platichthys flesus* (Linnaeus, 1758) (Pleuronectiformes).

Site: intestine.

Distribution: Sevastopol Bay (Kostylew, 1926; Osmanov, 1940; type locality). Other localities: Gulf of Odessa (Chernyshenko, 1947), North-Western Black Sea (Rădulescu, 1948; Butskaya, 1952; Rădulescu & Angelescu,

Fig. 4. – *Solearhynchus soleae* (Porta, 1905) de Buron & Maillard, 1985. From *Pegusa impar*, France. Type specimens (samples in alcohol), Muséum National d'Histoire Naturelle, Paris, Cat. Nos. 475 HF H1 105-106. A. Female *in toto*; B. Male *in toto*; C. Proboscis and a hook row; D. Vagina; E. Egg. For A, B, scale-bar: 1,000 μ m; for C, D, scale-bar: 100 μ m; for E, scale bar: 10 μ m.

1973; Florescu & Ieniştea, 1984), Caucasus near-shore (Chulkova, 1939), Kerch Strait (Solonchenko, 1982), Gemlik Bay, Sea of Marmara (this study, new locality). Deposition of voucher specimens: Parasitological Collection of Atatürk University, Erzurum, Turkey (Cat. no. MP9016A1-3).

DISCUSSION

This species was first reported off the Crimean coast in the snouted sole *Pegusa nasuta* by Kostylew (1926) under the name *Echinorhynchus propinquus* Dujardin, 1845. It was then described as a new species, *Acanthocephaloides kostylewi*, by Meyer (1932) based on a drawing from Kostylew (1926) and its validity was accepted by Petrochenko (1956), Yamaguti (1963) and Golvan (1968). However, Amin (1985) synonymized this species with *Acanthocephaloides propinquus* (Dujardin, 1845). At the beginning this species was put in Echinorhynchidae (Meyer, 1932; Petrochenko, 1956; Yamaguti 1963), but then moved to Arhythmacanthidae (Golvan, 1968). Bray *et al.* (1988) supposed that this species possibly may belong to *Paracanthocephaloides* Golvan, 1969 because of the lack of tegumental spines. Later Pichelin & Cribb (1999) note *Paracanthocephaloides kostylewi* (Meyer, 1932) Bray, Spencer Jones & Lewis, 1988 when reviewing the subfamily Paracanthocephaloidinae in Arhythmacanthidae. However, the characteristic of the family Arhythmacanthidae is different types of hooks on the proboscis (see Golvan, 1969).

Our observations indicate that the proboscis hooks are of one type (see Fig. 2), as typical for the Echinorhynchidae (Petrochenko, 1956; Golvan, 1968). According to Oğuz & Kvach (2006), the posterior hooks are unrooted, but the present study shows that *S. kostylewi* has had developed root, as is presented in Echinorhynchidae too. A study of the type specimens of *Solearhynchus soleae* has revealed that the posterior-most hooks of each longitudinal row is pin-like and has a feebly developed root (Fig. 4). The hooks of *S. soleae* have roots with the anteriorly-directed appendices (see Fig. 4 in this study, Fig. 2 in de Buron & Maillard, 1985). Also the six linearly arranged cement glands, location of the genital pore, two sensor papillae on the neck, and the brain ganglion in the base of the proboscis receptacle are typical characters of the genus *Solearhynchus* as defined by de Buron & Maillard (1985). In contrast to *S. soleae*, which has a proboscis armed with 12 rows of 5-6 hooks in each (Porta, 1905; Petrochenko, 1956; Golvan, 1969; de Buron & Maillard, 1985), *S. kostylewi* has a proboscis armed with 16 rows of 5-6 hooks (Fig. 2). Another difference between these two species is in the morphology of the eggs, which have four lateral-longitudinal swellings without polar

prolongations in *S. soleae*, whereas those of *S. kostylewi* possess polar prolongations (Figs 3, 4).

S. kostylewi was found in the snouted sole *P. nasuta* by Florescu & Ieniştea (1984) and Rădulescu (1948) in the Black Sea and Solonchenko (1982) in the Kerch Strait. Chernyshenko (1947) reported this species as *Acanthocephaloides propinquus* from the snouted sole from the Gulf of Odessa. Also Chulkova (1939) and Osmanov (1940) noted the acanthocephalans from soles as *A. propinquus* de Buron *et al.* (1986) noted that *S. kostylewi* is a "small species", which "reproductive male structures occupy only the posterior third of the body". However, we found that the testes occupy the central part of the body. This characteristic was also illustrated by Kostylew (1926). The size of the body is relatively large, agreeing with the data of Chernyshenko (1947) who reports 4,500-10,000 µm length. To facilitate identification of species of *Solearhynchus*, parasites of Soleidae, a simple key based on morphological characteristics is provided.

Key to species of *Solearhynchus*:

- 1(2). Proboscis armed with 12 rows of hooks of 5-6 each; eggs with four lateral-longitudinal swellings.....
.....*S. soleae* (Porta, 1905) de Buron & Maillard, 1985
- 2(1). Proboscis armed with 16 rows of hooks of 5-6 each; eggs with polar prolongation.....*S. kostylewi* (Meyer, 1932) comb. nov.

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