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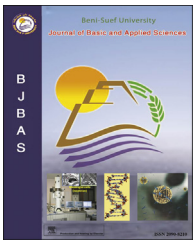

Full Length Article

Description of *Acleotrema maculatus* sp. nov. (Monogenea: Diplectanidae) infecting the spotted coral grouper *Plectropomus maculatus* (F:Serranidea) from the Red Sea and its histopathological impact

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ABSTRACT

Acleotrema maculatus sp. nov. (Monogenea: Diplectanidae) was described from the gills of The spotted coral grouper *Plectropomus maculatus* (F:Serranidea, Forsskal, 1775). Fish were collected from boot landing sites and fishermen at different water locations along the Red Sea at Hurghada City, Egypt. The morphology and morphometric characterization of the recovered worms were described by means of light microscopy. Eight (53.3%) out 15 specimens of *P. maculatus* were infected. Most of the infected fish had very pale gills. Morphologically, the adult worm of *A. maculatus* sp. nov., possessed a body which was elongated, fusiform with a total length 0.86–0.90 (0.88 ± 0.02) mm, and a maximum width 0.09–0.13 (0.11 ± 0.02) mm at the level of ovary. Haptor, broad, differentiated from the rest of the body, measured 0.04–0.08 (0.06 ± 0.02) mm and provided with continuous rows of squamodiscs. Two pairs of lateral hamuli, three bars and 14 marginal hooklets were also observed. Lateral (dorsal) bars two, stout, dumbbell-shaped, measured 0.052–0.056 (0.054 ± 0.002) mm in length. Ventral bar slender, with transverse groove, measured 0.09 –0.11 (0.10 ± 0.01) mm in length. Ventral hamuli measured 0.02–0.06 (0.04 ± 0.02) mm in total length with an outer root that was very long measured 0.016–0.02 (0.018 ± 0.002), stout, slightly notched at broad proximal end; inner root was conical and measured 0.013 –0.017 (0.015 ± 0.002) mm, with shaft measured 0.025–0.029 (0.027 ± 0.002) mm and point length 0.007–0.009 (0.008 ± 0.002) mm. Dorsal hamuli measured 0.034–0.038 (0.036 ± 0.002) in total length; base large, stout, with only lateral rudiment of roots; blade and point were long and curved with shaft length measured 0.024–0.028 (0.026 ± 0.002) mm and 0.02–0.06 (0.04 ± 0.02) mm point length. The worm is hermaphrodite, male copulatory organ measured 0.058–0.062 (0.060 ± 0.002) mm in length with a sclerotized part composed of a well-defined, sclerotized anterior sheath. The new species was compared with those

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described previously from the same genus, it was shown that there were significant morphological and morphometric, which was a strong criteria for the placement these monogenean parasites as new species with new host and locality records in Egypt.
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1. Introduction

Fish are important members of aquatic ecosystems and an important source of human food. Increased interest in fish culture has also increased awareness of and experience with parasites that affect fish health, growth and survival. The gills of fish represent one of the biotope mostly exploited by different fish ectoparasites (Rhode, 1982). Among these ectoparasites, monogenetic trematodes that cause severe destructions of the gills as well as severe losses too (Morsy et al., 2012). Gills of infested fish were congested or pale haemorrhagic with hypersecretion of mucus. These signs may be due to severe irritation caused by movement, feeding activity, fixation and attachment of monogenean worms. Also, the presence of thick mucus secretion leads to respiratory failure and osmotic stress ending in the fish death. Like all ectoparasites, monogeneans have well developed attachment structures, the anterior attachment organ and the posterior haptor which is associated with hard (sclerotized) structures in the form of hooks, anchors, clamps. The disease caused by monogenean parasites, causes serious problems in aquaculture (Okamoto, 1963; Ogawa and Inouye, 1997; Yoshinaga et al., 2000, 2001, 2009; Mushiake et al., 2001; Nakayasu et al., 2002) with an obvious pathogenicity. Immature worms of these parasites attach to the gill filaments of their hosts and migrate to the buccal cavity wall for maturation, as the worms ingest the blood from the gills of host fish, heavily infected wild and cultured fish become anaemic (Nakayasu et al., 2002; Anshary et al., 2001).

The genus *Diplectanum* (Diesing, 1858) represents one of the genera of the family Diplectanidae Monticelli, 1903 which are gill parasites of marine perciformes (Oliver, 1982, 1993). Family Diplectanidae includes about 22 genera and more than 218 valid species. The first species which detected as a member of Diplectanidae was proposed by Wagener (1857) named as *Dactylogyrus aequans*. Later, Diesing (1858) proposed the genus *Diplectanum* as a new genus when he transferred *Dactylogyrus aequans* to *Diplectanum aequans* and considered it as a type species of this new genus. Recently, Diesing (1858) mentioned that the genus *Diplectanum* is restricted to species that have male copulatory organ with nested tubes, accessory copulatory organ, prostatic reservoir separated into three zones, ventral and dorsal squamodiscs.

Diplectanids often show strict host-specificity (Oliver, 1992); thus, it is a safe prediction that many other species of Diplectanids are still undescribed.

During a survey of gill monogenean parasites of marine fish, The spotted coral grouper *Plectropomus maculatus* (F:Serranidea) from the Red Sea, Egypt was found infested by one species of Diplectanids. Herein, descriptions of this new species were carried out using light microscopy. Also, the histopathological impact of this parasite on fish gills was studied.

2. Materials and methods

A total of fifteen specimens of *P. maculatus* (F:Serranidea Forsskal (1775)) (size range: 14–28 cm, mean 18.5 ± 7.15 cm; body weight 100–250 g, mean 205 ± 20 g) were caught from the coasts of Hurghada City of the Red Sea in Egypt. Samples were obtained at irregular intervals in 2013. Captured fish were kept alive in aquaria filled with the same water source and examined within few hours. Skin surface, fins and gills were firstly examined by naked eyes and with the help of a dissecting microscope for any attached parasites, lesions or external changes. After removing opercula and exposing gill arches, each gill was removed carefully from the fish, immersed in normal saline to remove any excess gill mucus. Monogenean parasites were recovered with a Pasteur pipette using a dissecting binocular microscope. Worms were fixed in 4% formalin and then washed with distilled water to remove excess fixative. Worm identification was confirmed by mounting specimens on slides in drops of ammonium picrate glycerine under cover slips, and examining hard parts using light microscopy. For each monogenean parasite, the sclerotized parts of the haptor were measured using an ocular micrometer calibrated against a stage micrometer slide (Gussev, 1985). Ten specimens were measured for the range and the mean ± standard deviation (SD). Prevalence, mean abundance and measurements followed the guidelines of Bush et al. (1997).

2.1. *Histopathological studies*

Small portions of gills from naturally infected fish were fixed in 10% formalin, dehydrated in series of alcohols, cleared in xylol, embedded in paraffin wax and sectioned by a microtome at 6 μm thick. The tissue sections were stained with Haematoxylin and Eosin, the stained sections were examined and photographed by a Zeiss research photomicroscope (Carleton, 1967).

3. Results

Eight (53.3%) out of 15 specimens of *P. maculatus* were infected with an *Acleotrema* sp., most of the infected fish had very pale gills and showed symptoms of anaemia.

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