Morphometric characteristics of *Monascus filiformis* (Rudolphi, 1819) (Digenea: Fellodistomidae) of *Nemipterus furcosus* from the South China Sea

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Abstract

This study is based on three specimens of *Monascus filiformis* (Rudolphi, 1819) Looss, 1907 collected by R. M. Elshawesh of marine fish from the South China Sea. All these specimens were from 369 *Nemipterus furcosus* (Nemipteridae). The parasite was described originally by Rudolphi (1819) as *Distoma filiformis* from the intestine marine teleosts. A detailed description of *M. filiformis* is being presented in this paper in order to amplify the exceedingly brief diagnosis, with one figure, by Rudolphi. The worms of this study were fixed in 70% ethyl alcohol, stained in alum-carmine, and mounted in balsam. Dollfus (1947) has presented a brief historical account of the genus *Monascus* Looss, 1907. The parasite (*M. filiformis*) is reported here for the first time from the Malaysian coastal waters of the South China Sea.

Keywords: Marine fish Parasites, Digenetic trematodes, Fellodistomidae, South China Sea, Malaysia - Terengganu coast.

Introduction

The digeneans are different from other groups of parasitic worms, because the first larval stages are developed in intermediate hosts from the same phylum [1]. Some digenetic trematodes will develop fully as adults in the fish gastrointestinal tract and will not move on to other host [2]. They are mostly found in the gastrointestinal canal of vertebrates and many of the related organs, such as the liver, bile duct, gall bladder, lungs, the swim bladder of fish, the eye, coelom, and ureter, with other sites such as the blood system and urinogenital system [1]. There are about 1700 species of digenetic trematodes in fish, they are found in the blood vessels, intestine or surrounded by a capsule in fish tissues. Fish parasitology has rapidly developed more than other aquatic sciences, and the reason is the increasing importance of marine aquaculture, concerns on pollution consequences on fish life and a generally growing interest in environmental issues [3]. There are about 600 digenean species were described from Indian marine fishes [21]. In addition, two digenetic trematodes were found infecting African catfish (*Clarias gariepinus*) [22].

The single caecum in *Monascus* Looss, 1907 has been used to validate subfamily and even family rank for this genus. The discovery of the single caecum in Coomera some researchers [4] and the previous studies of indicate that this morphological feature does not serve to distinguish these forms at the family or subfamily level [5]. In *Monascus* a short reduced left caecum is sometimes described, but not as yet in Coomera. Other study pointed out, that Cercaria praecox Walker, 1971 has some characters similar to Coomera and has a reduced left caecum [4]. *Haplocladus* Odhner, 1911 has been generally recognized as a synonym of *Monascus*, at least since Dollfus pointed it out [6] (see [7] for discussion). Re-examination of the holotype of *Karachitrema trilobata* Bilqees, 1973 (BMNH1982.5.13.13) has confirmed my earlier opinion [7] and that of Hafeezullah that *Karachitrema* is also a synonym of *Monascus* [8]. Odhner described a uroproct in *Monascus* and Dollfus repeated Odhner's statement but did not see the uroproct personally [6, 9]. Authors who have studied juvenile specimens of *M. filiformis* [e.g. 10, 11, 12, 13] have stated more or less unequivocally that it does not occur, but my observations of a set of serial sections suggest that it may occur, in the adult at least. Careful observation of live worms and further sections are needed to be certain, as the single caecum often overlies the excretory vesicle in whole-mounts, giving the superficial appearance of a uroproct [14].

In fact, there are few studies on digenetic trematodes of South China Sea fishes and their distribution and most of these studies were done by Chinese scientists. *M. filiformis* (Rudophi, 1819) Looss, 1907 was described of the marine fishes (*Ariomma indica* and *Liza affinis*) from the South China Sea [15, 16, 17, 18, 19]. This study is the first to provide data on the digenean parasites and their infection indices in *Nemipterus furcosus* from the Terengganu coastal water (in Malaysia) which facing the South China Sea. The specific objective

of the study are to study the fish parasites from the Terengganu coastal water with emphasize on digenean trematodes using morphological description.

Materials and methods

Marine fish were collected throughout a year from local fishermen in the period from March to May. A total of 369 fish specimens near Terengganu were transferred to parasitology laboratory in the Institute of Tropical Aquaculture (AKUATROP) located at the University Malaysia Terengganu. All fish were subsequently examined for digenean parasites by using conventional methods under a dissecting microscope. The examination included gills, pharynx, body cavity and visceral organs (stomach, intestine, liver, swim bladder and gonads). The isolated parasites were fixed with 70% ethyl alcohol. Digenean species was identified and counted using a phase contrast Leica microscope (DM750) equipped with a camera Lucida. The identification of the parasites was conducted according to the keys provided by some researchers [14, 20]. The measurements of the good specimens were made by advanced Nikon microscope (Eclipse 80i) equipped with a digital camera (in micrometers). Metrical data, when incorporated in the descriptions, are given as ranges followed by the mean in parentheses.

Results

Description of *Monascus filiformis* (Rudolphi, 1819) Looss, 1907 : Measurements based on three wholemounted of mature specimens from one host. Body much elongate, narrow, tapered anteriorly, rounded to tapering posteriorly, tegument unarmed, nearly of uniform width, longer than wide 4158 – 4413 (4286) µm in length, 134 – 201 (168) µm in width at level of ovary; forebody 671 – 863 (767) µm in length; oral sucker subterminal, longer than broad, with longitudinally elongate opening, with preoral lobe, larger than acetabulum 121 – 142 (132) µm in length, 84 – 117 (101) µm in width; prepharhynx absent; pharynx large 68 – 93 (81) µm in length, 79 – 106 (93) µm in width; oesophagus short, with tegumental lining 31 – 33 (32) µm in length, 79 – 106 (93) µm in

Family: Fellodistomidae Nicoll, 1909

Genus: *Anahemiurus* Manter, 1947

Monascus filiformis (Rudolphi, 1819) Looss, 1907 (Fig. 1, 2).

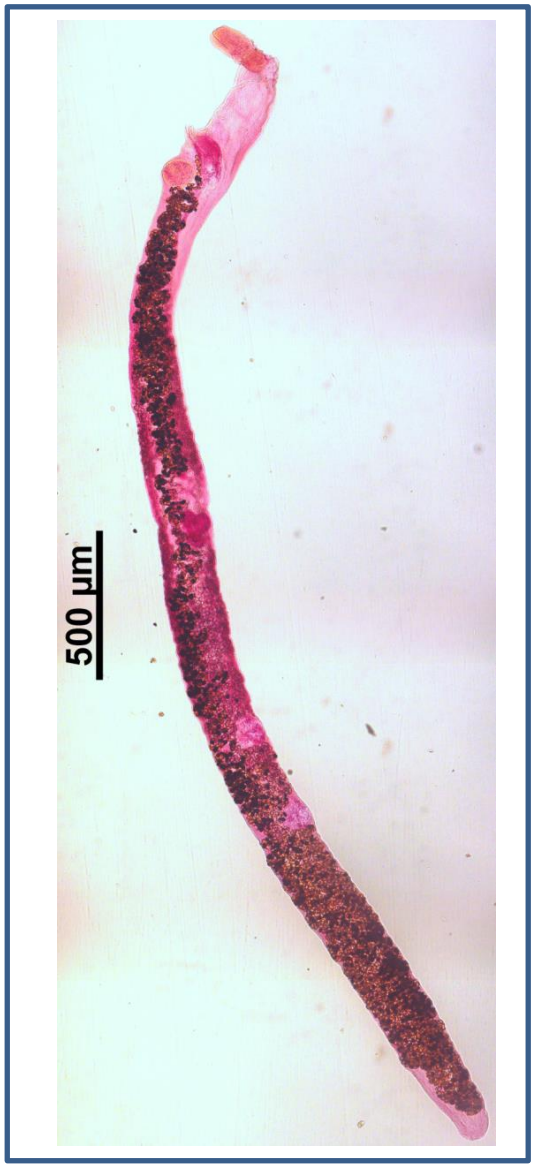

Figure 1: *Monascus filiformis* (Rudolphi, 1819) Looss, 1907 ex *Nemipterus furcosus*. Specimen stained with alum-carmine and photographed by advanced microscope. All scale bars are in micrometres.

width; cecum single, long, on right side of body, posterior opening into excretory vesicle at extreme posterior end of body, mouth subterminal; ventral sucker relatively small, smaller than oral sucker, in anterior third of body 106 – 111 (109) µm in length, 104 – 106 (105) µm in width; gonads separated, tandem;

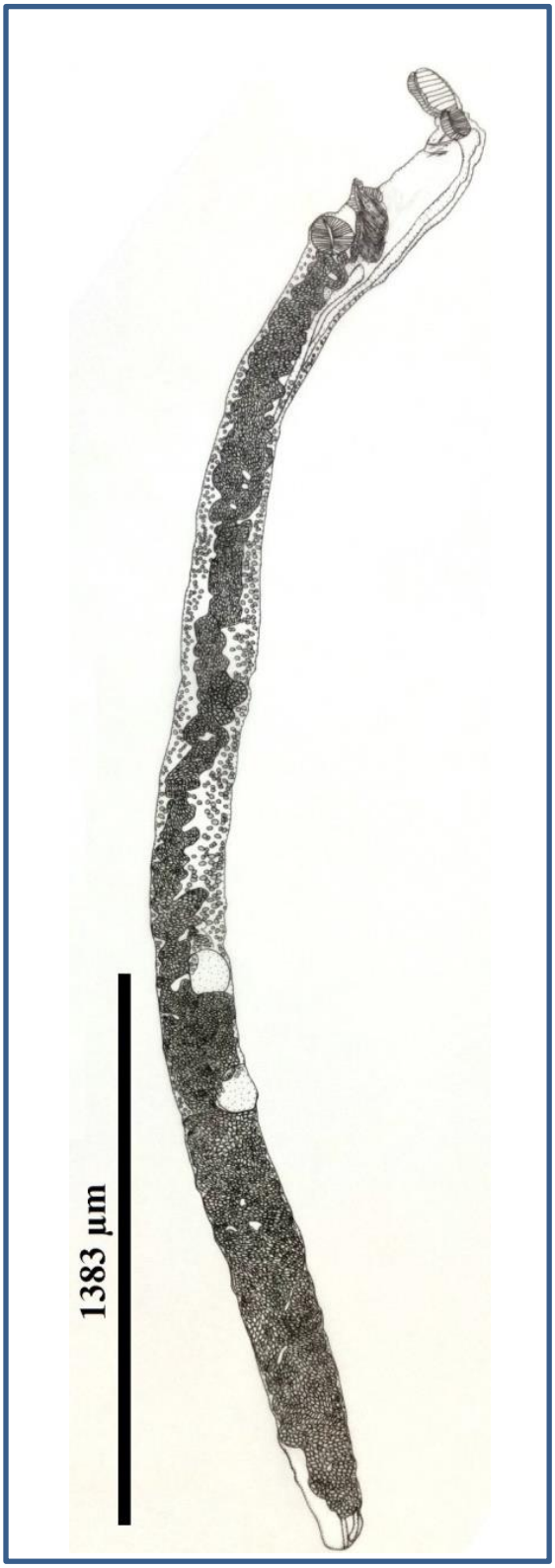

Figure 2: *Monascus filiformis* (Rudolphi, 1819) Looss, 1907 ex *Nemipterus furcosus*. Whole-mount ventral view drawn by camera lucida. All scale bars are in micrometres.

testes double, round to oval, smooth, dorso-sinistral in situated next to dorsal and lateral body walls, dorsal to uterus, in tandem but widely separated, post-ovarian, in posterior half of body, anterior testis 110 – 112 (111) µm in length, 98 – 100 (99) µm in width; posterior testis 76 – 116 (96) µm in length, 69 – 101 (85) µm in width; post-testicular region 1098 – 1198 (1148) µm in length; ovary trilobed, pretesticular, in between acetabulum and anterior testis, separated from anterior testis by uterine slings sinistral in about middle of body 142 – 145 (144) µm in length, 107 – 110 (109) µm in width; uterus filled much of hindbody, extending between acetabulum to nearly of posterior extremity; post-uterine region 79 – 138 (109) µm in length; cirrus-sac oval, large, dorsosinistral to acetabulum 193 – 215 (204) µm in length, 100 – 110 (105) µm in width; seminal vesicle bipartite, content in cirrus-sac, overlapping anterior one-half to three-fourths of acetabulum dorsum, extending preacetabular more than length of acetabulum 173 – 199 (186) µm in length, 85 – 98 (92) µm in width; pars prostatica well developed, tubular, wide, curved, musular and content in cirrus-sac; ejaculatory duct sometimes seen; genital atrium large; genital por sinistrally, submedian, pre-acetabular in posterior half of forebody; anterior extremity to genital pore 429 – 599 (514) µm in length; excretory vesicle Y-shaped, arms extending to acetabulum; vitellaria extendin in two symmetrical, lateral fields along each side of body between level of acetabulum to anterior or posterior testis, not entering in forebody 9 – 10 (10) µm in diameter; anterior extremity to vitellarium 1085 – 1088 (1087) µm in length; posterior extremity to vitellarium 1608 – 1610 (1609) µm in length; eggs oval to pyriform, widest at or near one end, tapering almost to a point at the other end, numerous, pale yellow to black, dark pigmented, small in size 19 – 24 (22) µm in length, 8 – 17 (13) µm in width (Fig. 1, 2).

Host: *Nemipterus furcosus*.
Site: intestine.
Locality: Terengganu city.

Discussion

The genus was erected to include those species of *Anahemiurus* which are possess a small body, ecsoma, conspicuous scales and two large masses of vitellarium [16]. The genital opening was located ventrally in relation to the oral sucker, near the mouth. Since that time the genus has generally been recognised and many additional species have been added to it, mostly by transfer from (*Anahemiurus*). According to previous study *Daniella* Sahai & Srivastava, 1977 and *Bapatina* Srivastava & Sahai, 1977 at face value appear to be synonyms of *Anahemiurus* Manter, 1947 [19]. However, another study considered the former to be a synonym of *Parahemiurus* Vaz & Pereira, 1930 [20], although one more study claimed that the body is scaled [21]. *Dentiacetabulum* Sihai & Srivastava, 1977 is here listed under *Parahemiurus*, as no crenulate plications ("scales") were mentioned. As the presence of crenulate plications is, in isolation, a feature of questionable generic value, and in view of the fact that it is readily misinterpreted in poorly preserved material, *Anabemiurus* is here considered a symonym of *Parabemiurus* [19].

Anahemiurus microcercus Manter, 1947 was described from *Calamus bajonado*, Florida-USA. This species was not actually described as having an crenulate plicatnions [16]. Clearly *A. microcercus* (in this study, fig. 1) is closely related to *A. microcercus* (Manter, 1947), and is possibly the senior synonym, and should, at least, be included in the same genus as *A. microcercus* [16]. We can see no reason to distinguish our digenean from *A. microcercus* Manter, 1947 and, therefore, consider them same species. At this stage we can find no good morphological distinction between our specimens from the South China Sea and the worms described by Manter [16]. My specimens are bigger (1859 – 1975 × 666 646 – vs 375 – 926 × 150 – 331) with oval eggs (40 – 47 vs 20 – 28) and a few ratios may differ slightly, e.g. the ventral sucker to ovary distance is relatively slightly longer according to the illustration in this study (fig. 1) (25.2 vs 15 of body-length), but most ratios fall within the same ranges.

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الخصائص الشكلية والقياسية لطفيلي *Monascus filiformis* (Rudolphi, 1819) من سمكة الكريسي *Nemipterus furcosus* من بحر الصين الجنوبي

الملخص العربي

استندت هذه الدراسة على ثلاث عينات من ديدان *Monascus filiformis* (Rudolphi, 1819) Looss, 1907 التي تم جمعها من الأسماك البحرية من بحر الصين الجنوبي. كل هذه العينات الطفيلية تم الحصول عليها من فحص 369 سمكة من نوع *Nemipterus furcosus* من عائلة Nemipteridae. وصف رودولف (1819) الطفيل في الأصل على أنه *Distoma filiformis* من أمعاء الاسماك العظمية البحرية. تم تقديم وصف مفصل لطفيلي *M. filiformis* في هذه الورقة من أجل التشخيص الدقيق ومقارنته مع الوصف الاول الذي تم بواسطة رودولف. تم تثبيت الديدان في 70٪ كحول إيثيلي ، وصبغت بصبغة الكارمين، وحملت على شرائح بواسطة كندا بلسم. بين دولفوس (1947) وصفًا دقيقا ومفصلا لجنس *Monascus* Looss, 1907. تم الإبلاغ عن الطفيلي (*M. filiformis*) هنا لأول مرة من المياه الساحلية الماليزية لبحر الصين الجنوبي.

الكلمات المفاتيح: الأسماك البحرية، المثقبات، عائلة Fellodistomidae، بحر الصين الجنوبي، ماليزيا- شاطئ تيرينجانو.