

MORPHOMETRIC AND SCANNING ELECTRON MICROSCOPE-BASED IDENTIFICATION OF *Taenia hydatigena* PARASITES IN STRAY DOGS

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ABSTRACT

Taenia hydatigena, an intestinal parasite of domestic and wild canids which can cause medical problems and economic losses in animals. Thirty *T. hydatigena* recovered from the intestine of stray dogs after *T. hydatigena* based on morphological characters and morphometric observations involving Scanning Electron Microscopy (SEM) and the scoleces were stained by Semichon's acid carmine and viewed on a light microscope. High-quality SEM photographs were shown the blade dimensions of both large and small hooks (83.89 μm and 48.16 μm) respectively, which was close to measurements by a digital camera. The number of hooks around the rostellum were 30 hooks, and both were equal in number (15 hooks), while the average length of the large hooks was $220.11 \pm 28.07 \mu\text{m}$, and was 88.58 ± 7.92 , and the average length of small hooks was $142.37 \pm 12.52 \mu\text{m}$ and was $65.73 \pm 6.94 \mu\text{m}$. body surface of *Taenia hydatigena* presence of characteristic transverse cuticular striations.

Key words: tape worm, canine, morphology, Iraq, heads, hooks

السوداني والعامري

مجلة العلوم الزراعية العراقية- 695-691:(2)55:2024

القياس الشكلي لطفي الشريطية المُعدّرة *Taenia hydatigena* التي تصيب الكلاب السائبة بالمجهر الإلكتروني الماسحي

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باحث

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المستخلص

الشريطية المُعدّرة *Taenia hydatigena* طفيلي معوي يصيب الفصيلة الكلبية الداجنة والبرية، يمكن أن يسبب مشاكل طبية وخسائر اقتصادية في الحيوانات. تم عزل الطفيلي البالغة الحاصل عليها من أمعاء كلاب السائبة بعد التشريح بناءً على الشكل المظهري والقياسات الشكلية والتي تتضمن المجهر الإلكتروني (SEM) وروؤيسات الطفيلي بواسطة صبغة حمض سميكون القرمزي ومشاهدته بالمجهر ضوئي. كانت صور عالية الجودة لشفرة كل من الخطافات الكبيرة والصغيرة بأبعاد 83.89 ميكرومتر و 48.16 ميكرومتر على التوالي، والتي كانت مشابهة للقياس بواسطة الكاميرا الرقمية أن عدد الخطافات حول المنصة كان 30 خطافاً، والخطافات الكبيرة والصغيرة متساوية في العدد (15 خطافاً)، وإن متوسط طول الخطافات الكبيرة 220.11 ± 28.07 ميكرومتر، ومتوسط طول شفرة 88.58 ± 7.92 ميكرومتر ومتوسط طول الخطافات الصغيرة 142.37 ± 12.52 ميكرومتر، ومتوسط خطافات الشفرات الصغيرة كان 65.73 ± 6.94 ميكرومتر. ظهر سطح جسم الطفيلي وجود خطوط جلدية عرضية مميزة.

الكلمات المفتاحية: الديدان الشريطية، الفصيلة الكلبية، الشكل الظاهري، العراق

INTRODUCTION

Taenia hydatigena is a cosmopolitan intestinal parasite of domestic and wild canids (dog, wolf, fox, and coyote) that can infect many livestock, such as sheep, buffalo, yak, cattle, and goats with its larval stage (*Cysticercus tenuicollis*) (4, 11, 15). One of the most important animal species is stray dogs that act as a host and reservoir for public health importance of parasites infection that dogs were discharged eggs included *Taenia hydatigena* parasite (7, 15). The disease has a wide distribution with prevalence in the range of 0.1 and 32% varying between various countries and hosts (3, 5, 12). The morphological identification by light microscope of *Taenia hydatigena* was helped for the confirmation of adult parasites Further, Scanning Electron Microscopy (SEM) is beneficial to study the ultrastructure as it provides detailed three-dimensional and topographical imaging and the versatile information garnered from parasites (8,). Aim of the present study deal with morphometric observations coupled with SEM for the identification of *T. hydatigena*.

MATERIALS AND METHODS

Stray dogs were examined according to OIE (13), samples were collected from different areas of Baghdad, necropsied dogs were dissected directly to collect the small intestine and cecum; a longitudinal incision was performed on the small intestine and cecum and the contents initially analyzed to direct visualization of adult parasites (10). The worms will be collected in a petri dish rinsed several times with physiological normal saline and kept in 70% ethyl alcohol. The morphological features of the adult worms were described according to Zajac and Conboy (16). For morphometric analysis, parasites were identified by using SEM (Inspect™ Scanning Electron Microscope) model Inspect S50, at Scanning Electron Microscopy Laboratory, Applied Sciences, University of Technology. Further, SEM studies were conducted for exploring minute morphological features of *T. hydatigena*. The scolexes were viewed on a microscope (Light microscopy, Olympus Optical Co., Ltd., Tokyo, Japan) using an x100 objective lens. Number, length, and arrangement of rostellar hooks were done

using a digital microscope camera (5,0 MPx VisiCam and VisiCam analyzer software) and Semichon's acid carmine staining procedures according to (1,9) was applied to *T. hydatigena* parasites. The morphological investigation was led on 30 samples from adult parasites. The scolexes were mounted and adequate pressure was applied to the coverslip to cause the snares to lie level. For measurable examination, five factors were thought of: the number of hooks per rostellum, the total length of large and total small and hooks blade length of large and blade length of small hooks.

RESULTS AND DISCUSSION

Adult *Taenia hydatigena* parasites recovered from the intestine of the dog at the time of necropsy were identified as taenia based on morphological characters. The adult parasite is very like the cord. Its usual length is about 75-115 cm. The body of the parasite consists of the head called a scolex, a narrow neck, and many segments called strobila. The scolex possesses four suckers and a rostellum with 30 hooks, situated in two rows of hooks. The results showed that morphological analysis of the hooks surrounding the rostellum was determined that the hooks were arranged with two rows of altering large and small hooks as noted (Figures 3, 4). The number of hooks was calculated (30 hooks) in all examined samples were analyzed (30 samples) as shown in table (1). The results showed that the range of large length hooks between 172.85 and 246.12 μm , and the average 220.11 ± 28.07 while hooks between 105.70 and 167.09 μm and the average was 142.37 ± 12.52 . The range length Blade of large hooks was between 70.3 and 107.22 μm with average 88.58 ± 7.92 and the blade range length of small length hooks was 90.68 and 40.01 μm with average 65.73 ± 6.94 μm . These results were close agreed with many references like Al-Hamzawi and Al-Mayali in Iraq (2), Loos-Frank in Germany (9), Radfar *et al.*, in Iran (14), Singh *et al.*, in India (16), Mokhtaria *et al.*, in Algeria (10), OIE, (13) and Filip *et al.*, in Poland (6). High-quality SEM photographs showed large and small hooks (Figure 4) and the measurements of the blade of the large hook was 87.03 – 83.89 μm and of the small hook was 48.61 μm in (Figures 4, 5) and that size was similar to measurement the blade of large and small

hooks in this study by using a digital microscope camera, furthermore, the outer surface of proglottid was shown the presence

of characteristic transverse cuticular striations on the body surface (Figure 6)

Table. number and measurement of hooks in rostellum of *T. hydatigena*

Host of hooks	Dogs
Number of samples analyzed	30
Number of hooks	30
Number of large hooks	15
Number of small hooks	15
Total large length hooks	172.85 - 246.12 μ m
Blade of large length hooks	70.3 – 107.22 μ m
Average of large length hooks	220.11 \pm 28.07 μ m
Average Blade of large length hooks	88.58 \pm 7.92 μ m
Total Small length hooks	105.70 – 167.09 μ m
Blade of Small length hooks	90.68 – 40.01 μ m
Average of Small length hooks	142.37 \pm 12.52 μ m
Average of Blade Small length hooks	65.73 \pm 6.94 μ m

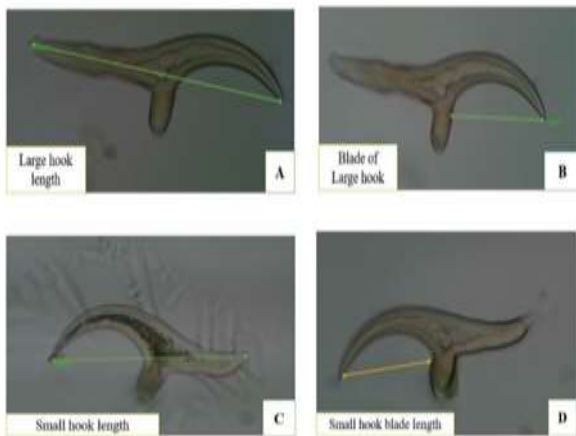


Figure 1. Show hooks set free (x100) power (A) Large hook length, (B) Blade of large hook, (C) Small hook length, (D) Small hook blade length.

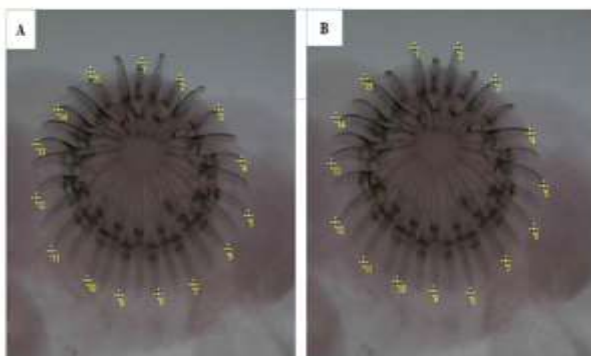


Figure 2. A. shows the number of small hooks, B. shows the number of large hooks (x100)

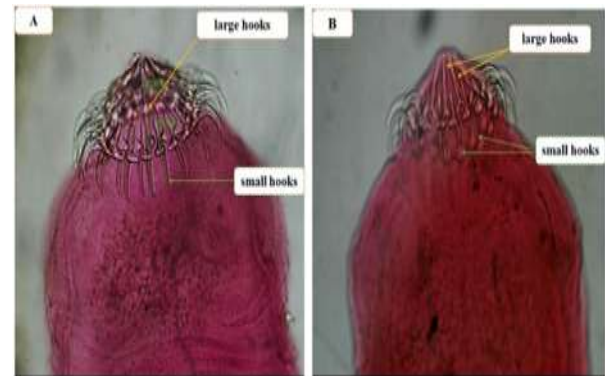


Figure 3. A. B. *Taenia hydatigena* stained with Semichon's acid carmine stain show the small hooks, and large hooks x100 power

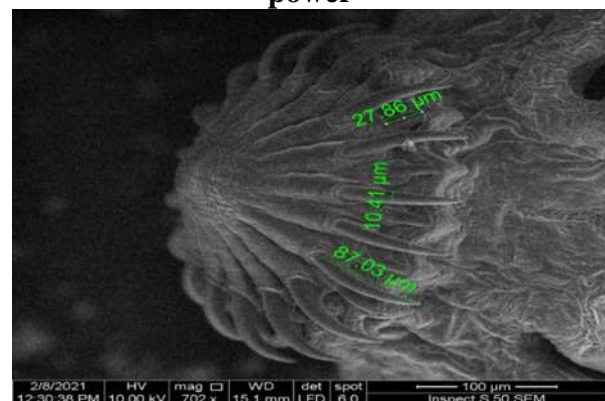


Figure 4. Scanning electron microphotograph of *Taenia hydatigena* showing dimensions blade of large and small hooks

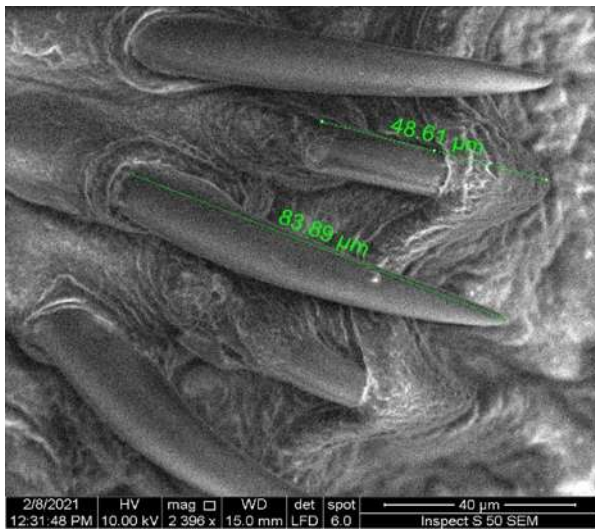


Figure 5. Scanning electron microphotograph of *Taenia hydatigena* showing measurements of the blade of both large and small hooks

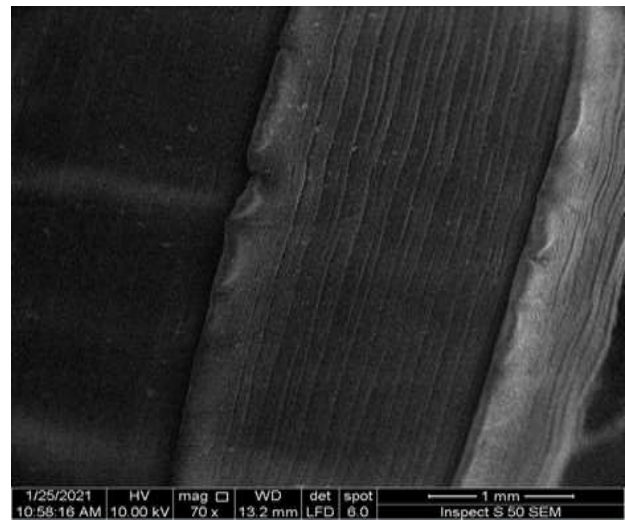


Figure 6. Scanning electron microphotograph of *Taenia hydatigena* showing transverse cuticular striations on the body surface

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