

ARTÍCULO ORIGINAL

***Scanning electron microscopy of Neoechinorhynchus sp. (Acanthocephala: Neoechinorhynchidae), a possible new species of intestinal parasite of the Tallfin croaker Micropogonias altipinnis (Günther, 1864)***

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ABSTRACT

We describe an unidentified species of the genus *Neoechinorhynchus* occurring in the intestine of the marine fish *Micropogonias altipinnis* using scanning electron microscopy (SEM). The genus *Neoechinorhynchus* occurs mostly in freshwater fishes; this may be the first report of its occurrence in the marine fish genus *Micropogonias* and the New World Sciaenidae. The specimens collected have characteristics typical of the genus. The mean length of the trunk is 9.5 mm. The proboscis is short and subcylindrical measuring 70  $\mu\text{m}$  in length and 50  $\mu\text{m}$  in diameter near the base. The proboscis has three rings of curved spines each with six spines. The anterior spines are long measuring a mean of 55  $\mu\text{m}$  in length, 9  $\mu\text{m}$  in width, and 7  $\mu\text{m}$  in depth, and are supported by simple unmodified roots. The spines of the middle ring are smaller and equivalent to 70% of the roots of the anterior spines. The spines of the posterior ring are much smaller than those of the anterior ring. The body surface lacks spines and consists of a series of folds. The estuarine habits of *M. altipinnis* and its ability to tolerate fresh waters may have facilitated its infection with a species of the primarily freshwater genus *Neoechinorhynchus*, as well as the possibility that this parasite can infect human beings from the consumption of this kind of croaker.

**Key words:** *Acanthocephala*, *Neoechinorhynchus*, *Micropogonias altipinnis*, SEM.

INTRODUCTION

The phylum Acanthocephala includes approximately 1,150 species of relatively small vermiform endoparasites, the adults of which feed on the intestinal walls of vertebrates,

especially in freshwater and marine fishes<sup>1</sup>. There are relatively few studies of the acanthocephalans of the marine fishes of Latin America<sup>2-9</sup>. The acanthocephalans of the marine fishes of Ecuador are particularly poorly known. We have found little published in this regard beyond Van

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Cleave's<sup>10</sup> description of species from marine fishes of the Galapagos Islands.

The acanthocephalan genus *Neoechinorhynchus* is a relatively large genus with approximately 70 - 75 species<sup>11,12</sup>. It occurs throughout the world including Latin America and is typically found in freshwater fishes<sup>13-16</sup>, although it occurs in other taxa as well. In this paper, we carried out a description and scanning electron microscopy study of the fine structure of an unidentified species of *Neoechinorhynchus* found in the intestine of the Tallfin croaker, *Micropogonias altipinnis* (Teleostei: Sciaenidae). This fish is locally named as "corvinon" or "torno" in Ecuadorian fish markets. The biodiversity on acanthocephalan species is poorly known in Ecuador. This study contributes to the knowledge of the genus *Neoechinorhynchus* in marine fishes, as well as to the knowledge of the acanthocephalans of the marine fishes of Ecuador.

#### MATERIALS AND METHODS

The parasites were collected from the intestine of specimens of *M. altipinnis* purchased from a fish market in Guayaquil, Ecuador. This species is a demersal fish common in coastal waters. Two sampling efforts were carried out, the first consisted of a sample of four fish and the second consisted of three fish. Fish were dissected in the laboratory and a total of 19 acanthocephalans were collected. Specimens were identified to genus using the Meyer-Van Cleave System for identification of classes, orders, families and subfamilies of acanthocephalans<sup>17</sup>, and the key to species of the genus *Neoechinorhynchus* for freshwater fishes of North America<sup>12</sup>. Two voucher specimens (codes: 001 and 002) were deposited in the collection of the Parasitology Department of the National Institute of Hygiene and Tropical Medicine "Leopoldo Izquieta Pérez", Guayaquil, Ecuador. Specimens from the first sampling effort were placed in saline solution prior to being processed whereas specimens from the second sampling effort were placed in cold distilled water to allow relaxation. A few specimens were dissected with an Olympus stereoscope for general description of the parasites. The proboscis of two specimens were isolated, cleared with glycerin, and mounted on a slide using Canadian's balsam. Eggs, male

reproductive systems, and lemnisci were also mounted for future studies. The slides were observed under a light microscope (Olympus CX31). For the scanning electron microscopy study, two specimens were fixed with 3% glutaraldehyde, washed in phosphate buffer (pH 7.4), treated with 1% osmium tetroxide (OsO<sub>4</sub>) and then with distilled water, and dehydrated through consecutive washes of alcohol of increasing concentrations (50-100% washes). They were then treated with isoamilacetate and 100% alcohol in ratios of 3:1, 2:2, and 1:3, and pure isoamilacetate. Afterwards, samples were dried to critical point and covered in gold-platinum. Finally, the samples were observed and photographed with a Hitachi S-430 Scanning Electron Microscope (SEM), with an acceleration voltage of 15 KV.

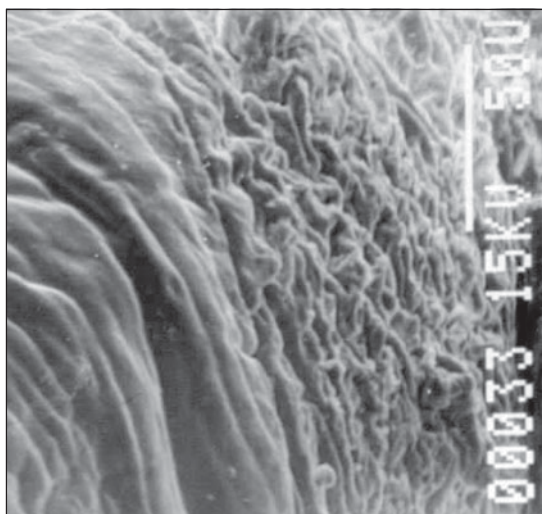
#### RESULTS

**SEM-description:** This species of *Neoechinorhynchus* is small to moderate in size; the mean length of the specimens collected was 9.5 mm. The trunk varies in shape but is typically cylindrical to oblong or fusiform (Figure 1). The body surface consists of a series of folds and lacks spines (Figure 2). The proboscis is short and subcylindrical, almost globular, measuring approximately 70 µm in length and 50 µm in diameter at the base (Figures 3-4). It possesses three rings of curved hooks each with six hooks (Figure 5). The anterior ring has long hooks all of similar size, with a mean length of 55 µm (maximum 62 µm) by 9 µm in width and 7 µm in depth (Figure 4), that are supported by simple unmodified roots (Figure 5). The hooks of the middle ring are smaller than those of the anterior ring, measuring approximately 70% of the length the roots of the anterior spines (Figure 5). The posterior ring of hooks is the smallest. The hooks of the middle and posterior rings lack roots (Figure 5). The eggs are ovoid (Figure 6).

**Taxonomic comparison:** We compared the unidentified species described in this paper with published accounts of several species of the genus known from South America<sup>13,15</sup>. The trunk is longer than that of *N. paraguayensis*, *N. prochilodorum*, and *N. pterodoridis* (the trunk of these species measures 1.6-2.0 mm, 4.5-8.0 mm, and 1.74-3.30 mm in length respectively, whereas the mean trunk length of our species is



**Figure 1.** SEM photograph of the body morphology of *Neoechinorhynchus* sp.



**Figure 2.** SEM photograph of the ultrastructural folded appearance of the acanthocephalan external surface. Note the absence of spines.



**Figure 3.** Globular proboscis with hook rings and anterior part of *Neoechinorhynchus* sp.



**Figure 4.** Ultrastructural appearance of the largest hooks located in the anterior ring of hooks. This is a key taxonomic feature for identification of *Neoechinorhynchus* genera.

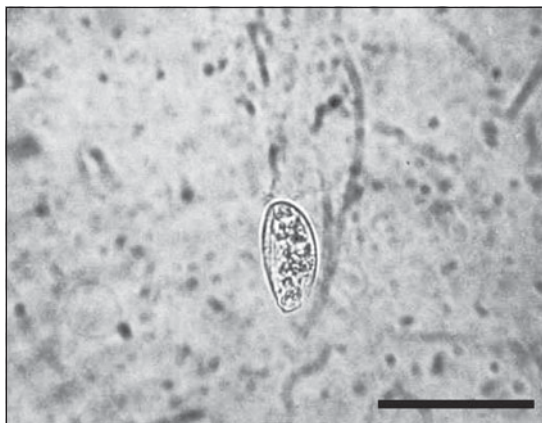
9.5 mm). The proboscis is typically shorter and narrower than that of *N. prochilodorum* and *N. pterodoridis* (the proboscis length and width in *N. prochilodorum* is 83  $\mu\text{m}$  and 93  $\mu\text{m}$  respectively and in *N. pterodoridis* it is approximately 127  $\mu\text{m}$  and 119  $\mu\text{m}$  respectively,

whereas in our species it is 70  $\mu\text{m}$  and 50  $\mu\text{m}$ ). The anterior hooks of the proboscis are smaller than those of *N. australis*, *N. paraguayensis*, and *N. pterodoridis* (they are 75  $\mu\text{m}$ , 87  $\mu\text{m}$  and approximately 141  $\mu\text{m}$  long respectively in these species, whereas they are 55  $\mu\text{m}$  long in our





**Figure 5.** Light microscope photograph of proboscis with all the hook rings (40x; bar = 60  $\mu$ m); note the tremendous difference in size among hooks.



**Figure 6.** Light microscope photograph of an egg with an early stage found in one parasite specimen (light microscope, 40x; bar = 60  $\mu$ m).

species). In addition, *N. australis*, *N. paraguayensis*, *N. prochilodorum*, and *N. pterodoridis* are all known from freshwater fishes.

The unidentified species described in this paper also differs from the published description of the Asian species *N. argentatus* collected from the sciaenid *Pennahia argentata*<sup>18</sup>. This is the only published account of a species of *Neoechinorhynchus* collected from a sciaenid we could find. Our species differs in having a smaller trunk (19.2 mm in length in *N. argentatus*), a shorter, narrower proboscis (123  $\mu$ m in length and 99  $\mu$ m in width in *N. argentatus*), and shorter anterior spines on the proboscis (96  $\mu$ m in length in *N. argentatus*).

## DISCUSSION

This study documents the occurrence of the genus *Neoechinorhynchus* in marine waters of Ecuador, specifically as an intestinal parasite of the marine sciaenid *M. altipinnis*. The characteristics described of the specimens studied, such as the shape and size of the proboscis, the low number and position of the spines on the proboscis, and the form of the body, clearly place this species within the genus *Neoechinorhynchus*. As far as we can tell, this is the first report of the genus *Neoechinorhynchus* from marine fishes of Ecuador and from the genus *Micropogonias*. In addition, we have not found published accounts of the genus *Neoechinorhynchus* occurring in other New

World sciaenids. Other acanthocephalan genera have been reported from the genus *Micropogonias* and other New World sciaenids<sup>4,6,9,19-21</sup>, and there is at least one report of the genus *Neoechinorhynchus* from an Asian sciaenid<sup>18</sup>. The specimens studied differ morphologically in several respects from species infecting freshwater fishes of South America as discussed above. However, we have not been able to compare our specimens with species of *Neoechinorhynchus* infecting other South American marine fishes because of the scarcity of information available on the latter. The estuarine habits of *M. altipinnis* and its ability to tolerate fresh waters may have facilitated its infection with a species of the primarily freshwater genus *Neoechinorhynchus*.

Presently, there is little known about the life history of this species of *Neoechinorhynchus*. In this study, the number of acanthocephalans per fish seemed to increase as the size of the fish increased. This finding has been reported previously; for example, Amin<sup>22</sup> noted the progressive increase in the number of acanthocephalans of the genus *Echinorhynchus* in older brown trout and whitefish of North America. Acanthocephalans of the class Eoacanthocephala, to which the genus *Neoechinorhynchus* belongs, typically use crustaceans as intermediate hosts<sup>1</sup>. Therefore, we suggest that the intermediate host for this species is also an estuarine-marine crustacean. We found remains of amphipods of the suborder

Gammaridea and caridean shrimp of the family Ogyrididae in the digestive tract of one of the fishes dissected; either of these could be the intermediate host for the infective cystacanth stage.

Given that *M. altipinnis* is common in coastal waters and occasionally consumed as a traditional semi-raw seafood called "cebiche" in Ecuador, there is the possibility that human beings may become infected with this species of *Neoechinorhynchus*. Acanthocephalans have been known to infect or potentially infect human beings in other areas<sup>23,24</sup>, and the genus *Neoechinorhynchus* has been reported to infect mammals occasionally<sup>25</sup>.

In the future, larger collections for studies of this species should be made to elucidate if this is a new specie, and to document its abundance and spatio-temporal dynamics in *Micropogonias*. In addition, surveys of other estuarine sciaenids are warranted as these may also serve as hosts for the same or closely related species of *Neoechinorhynchus*.

#### RESUMEN

Se describe una especie de acantocéfalo no identificada del género *Neoechinorhynchus* presente en el intestino del pez marino *Micropogonias altipinnis*, conocido localmente como "corvinón" o "torno", usando microscopia electrónica de escaneo. Este género ocurre mayormente en peces de agua dulce y probablemente este es el primer informe de su presencia en el pez marino del género *Micropogonias* y peces de la familia Sciaenidae del Nuevo Mundo. La longitud media del tronco es 9,5 mm. La proboscis es corta y subcilíndrica, la cual mide 70 µm en longitud y 50 µm en diámetro, cerca de su base. La proboscis tiene tres anillos de espinas recurvadas, con cada anillo teniendo seis espinas. Las espinas anteriores son largas y tienen una longitud media de 55 µm, un ancho de 9 µm y una profundidad de 7 µm, mantenidas por raíces no modificadas en sus bases. Las espinas del anillo medio son pequeñas y equivalen al 70% de las raíces de las espinas anteriores. La superficie del cuerpo presenta escasas espinas y consiste de una serie de pliegues. El comportamiento estuarino de *M. altipinnis* y su habilidad para tolerar agua dulce puede haber facilitado la infección parasitaria con esta especie de acantocéfalo del género

*Neoechinorhynchus*, el cual es primariamente dulceacuícola, así como la posibilidad de que este parásito infecte al hombre a partir del consumo de este tipo de corvina.

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## ANUNCIO

### PARASITOLOGIA LATINOAMERICANA EN INTERNET

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