ANGIOSTRONGYLUS SANDARSAE ALICATA, 1968 (NEMATODA: METASTRONGYLOIDEA) FROM PRAOMYS NATALENSIS IN KENYA

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In July 1979, Angiostrongylus sandarsae Alicata, 1968 was detected in the pulmonary artery of Praomys natalensis collected in Kitale, western Kenya. This is the first record of the genus Angiostrongylus (subgenus Parastrongylus) in Kenya.

Key words: Angiostrongylus sandarsae, Kenya, Praomys natalensis

Public health importance of angiostrongylid nematodes has been recently reviewed by Cross (1987). A parasitological survey of rodents on the outskirts of Kitale, Kenya, in 1979, revealed the presence of angiostrongylid nematodes in rats. In the African continent, only three species of the genus Angiostrongylus, that is, A. tateronae, A. cantonensis and A. sandarsae have been found in rodents. The specimens from Kenya were compared with 7 species of the genus Angiostrongylus (Parastrongylus), also collected from rodents.

MATERIALS AND METHODS

In July, 1979, rodents were trapped in a forest on the outskirts of Kitale, west of the Republic of Kenya and were examined for helminth parasites. Two male and 2 female angiostrongylid nematodes were recovered from the pulmonary arteries of 3 multimammate rats, Praomys natalensis. The worms were collected using a dissection microscope. Only one complete male worm was obtained. The worms were fixed in 10% formalin, cleared in lacto-phenol, and then observed and measured under a light microscope. The specimens were deposited in the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University.

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Results

Angiostrongylus sandarsae Alicata, 1968

Host: Praomys natalensis

Habitat: Pulmonary arteries

Host locality: Kitale, Republic of Kenya (1° North, 35° East)

Date of collection: July, 1979

Description: Major measurements of the worms are shown in Table 1. Filiform nematode with smooth body surface. No lips, no sclerotized wall of buccal cavity (Fig. 1).

Male (based on an intact specimen and the posterior end of an incomplete specimen): Body length 18.3 mm. Esophagus clave shape, 0.24 mm in length. The distance from anterior end to nerve ring and excretory pore, 163 and 189 μ, respectively. Tail end ventrally curved. Caudal bursa reduced and asymmetric (Figs. 2 & 3). Rays short, with ventral and lateral rays widely divergent. Ventro- and posteroventral rays originating from the same trunk. Ventroventral ray short and branched off at a point proximal 1/3 the length of the posteroventral ray. Tip of posteroventral ray reaches the margin of the lateral lobe but not that of the ventroventral ray. Lateral rays possess common trunk. Antero-lateral ray more stout but shorter than the other 2 lateral rays. Medio- and posterolateral rays have same length and a common trunk which bifurcates distally. Externodorsal rays slender and longer than dorsal ray. Externodorsal ray arising separately from lateral and dorsal rays. Dorsal ray thick at basal portion and bifurcates distally. Cloaca with thick wall. Spicules almost equal in length and comparatively short, 500 and 556 μ, respectively. Each spicule made up of one axis and with 2 finely striated alae extending through the whole length. Sclerotized gubernaculum present.

Female (based on 2 incomplete specimens): Esophagus length 288 and 301 μ. The distance from anterior end to nerve ring and excretory pore 172 and 181 μ in one worm and 241 and 258 μ in another, respectively (Fig. 1). Distance from posterior end vulva and of anus 40 μ for both and 150 and 190 μ, respectively (Fig. 4). Tail end conical. Size of eggs in uterus 51–61 by 36–39 μ.

Discussion

The genus Angiostrongylus has been classified under the superfamily Metastrongyloidea. Taxonomy of this superfamily differed among the various investigators. According to the proposal by Anderson (1978), this superfamily can be divided into 7 families. However, according to Drożdż (1970), 2 subgenera, namely, Angiostrongylus (Angiostrongylus) which contains parasites of carnivores and Angiostrongylus (Parastrongylus) which contains parasites of rodents, have been proposed. In the present study, we suggest the use of only the genus Angiostrongylus.

To date, the following 7 species are known to be parasites of rodents:
Angiostrongylus sandarsae from Kenya

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A. tateronae (BAYLIS, 1928)
A. cantonensis (CHEN, 1935)
A. sandarsae ALICATA, 1968
A. mackerrasae BHAIBULAYA, 1968
A. malaysiensis BHAIBULAYA & CROSS, 1971
A. costaricensis MORERA & CESPEDES, 1971
A. siamensis OHBAYASHI, KAMIYA & BHAIBULAYA, 1979

The features of the above 7 species were compared with that of the present specimens in Table 2. Of these species only three, A. tateronae, A. cantonensis and A. sandarsae, have been reported in the African continent. The present specimen has distinctively shorter spicules than those of A. cantonensis or A. malaysiensis and resembles the descriptions of A. sandarsae and A. tateronae. Although both A. tateronae and A. sandarsae have rudimentary ventroventral rays, those of the former are longer than those of the latter. In addition, A. tateronae has thicker ventrolateral ray than the other two lateral rays, and also longer spicules than those of A. sandarsae.

The present specimen is similar to A. sandarsae in having a gubernaculum and distinctively short ventrolateral ray. Moreover, the bifurcation of the dorsal ray, which was not described for A. tateronae but stated in the description of A. sandarsae also indicates the similarity of the present specimen to the latter.

Nevertheless, the present specimen is also similar to A. tateronae in having comparatively longer spicules (over 500 μ) and thicker ventrolateral ray as compared to the other two lateral rays.

Thus, from the above discussion, there is not much differences between A. tateronae and A. sandarsae. On the basis of the presence of gubernaculum and reports from rodent hosts which were located geographically near to Kenya, the present specimen is thought to be that of A. sandarsae.

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We thank Drs. H. SUZUKI, K. HAYASHI and K. TORIYAMA of the Institute of Tropical Medicine, Nagasaki University, and Prof. M. OHBAYASHI of Hokkaido University for making this study possible. Assistance in collecting and identifying the rodents in Kenya by Mr. I. R. AGGUNDEY and Mr. K. K. JOSEPH, National Museum of Kenya, is gratefully acknowledged. We also wish to express our thanks to Mr. M. MICALLEF for reading the manuscript, and to Drs. J. H. CROSS, L. ROSEN and H. K. Ooi for their encouragements given during the work.

REFERENCES

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896–899


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**Table 1**: Major measurements of worms

<table>
<thead>
<tr>
<th>Sex of worm</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of worm</td>
<td>No. 1</td>
<td>No. 2</td>
</tr>
<tr>
<td>Body length (mm)</td>
<td>18.3</td>
<td>—</td>
</tr>
<tr>
<td>Esophagus</td>
<td>240</td>
<td>—</td>
</tr>
<tr>
<td>Distance from head end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nerve ring</td>
<td>163</td>
<td>—</td>
</tr>
<tr>
<td>Excretory pore</td>
<td>189</td>
<td>—</td>
</tr>
<tr>
<td>Spicules</td>
<td>503</td>
<td>556</td>
</tr>
<tr>
<td>Gubernaculum</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Distance from tail end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vulva</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs in uterus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Measurements in μm unless otherwise indicated and based on one intact male and one incomplete male, and two incomplete females.
<table>
<thead>
<tr>
<th>Species</th>
<th>Host</th>
<th>Habitat</th>
<th>Locality</th>
<th>Authors</th>
<th>Male Body length</th>
<th>Esophagus</th>
<th>Cervical papillae</th>
<th>Excretory pore</th>
<th>Spicule</th>
<th>Gubernaculum</th>
<th>Female Body length</th>
<th>Esophagus</th>
<th>Excretory pore</th>
<th>Vulva</th>
<th>Anus</th>
<th></th>
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<tbody>
<tr>
<td>cantonensis</td>
<td><em>Ratus</em> spp.</td>
<td>Pulm. A.</td>
<td>Cosmopolitan (Asia)</td>
<td>BHAIBULAYA (1968)</td>
<td>12.07-27.69</td>
<td>0.22-0.33</td>
<td>+</td>
<td>0.28-0.53</td>
<td>1.0-1.46</td>
<td>+</td>
<td>14.9-34.1</td>
<td>0.22-0.42</td>
<td>0.34-0.55</td>
<td>0.15-0.31</td>
<td>0.02-0.08</td>
<td>0.02-0.08</td>
</tr>
<tr>
<td>malayensiis</td>
<td><em>R. jalorensis</em></td>
<td>Pulm. A.</td>
<td>Malaysia</td>
<td>BHAIBULAYA &amp; CROSS (1971)</td>
<td>16-20</td>
<td>0.11-0.28</td>
<td>-</td>
<td>0.17-0.28</td>
<td>0.80-1.20</td>
<td>+</td>
<td>23-27</td>
<td>0.25-0.30</td>
<td>0.34-0.55</td>
<td>0.1-0.24</td>
<td>0.03-0.06</td>
<td>0.03-0.06</td>
</tr>
<tr>
<td>costaricensis</td>
<td><em>R. norvegicus</em></td>
<td>Mes. A.</td>
<td>Costa Rica (Caribbean sea)</td>
<td>MORERA &amp; CESPEDES (1979)</td>
<td>15-17.9</td>
<td>0.16-0.18</td>
<td>-</td>
<td>0.32</td>
<td>0.267-0.297</td>
<td>+</td>
<td>26.9</td>
<td>0.168</td>
<td>0.34-0.49</td>
<td>0.1-0.24</td>
<td>0.03-0.06</td>
<td>0.03-0.06</td>
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<tr>
<td>siamensis</td>
<td><em>Sigmodon hispidis</em></td>
<td>Mes. A.</td>
<td>Thailand</td>
<td>OHAYASHI et al. (1979)</td>
<td>0.23</td>
<td>0.21-0.38</td>
<td>-</td>
<td>0.3-0.41</td>
<td>0.339</td>
<td>+</td>
<td>11-13</td>
<td>0.23-0.27</td>
<td>0.34-0.49</td>
<td>0.3-0.38</td>
<td>0.07-0.1</td>
<td>0.07-0.1</td>
</tr>
<tr>
<td>mackerrasae</td>
<td><em>Macaca sp.</em></td>
<td>Pulm. A.</td>
<td>Australia</td>
<td>BHAIBULAYA (1968)</td>
<td>12.78-21.3</td>
<td>0.25</td>
<td>-</td>
<td>ND</td>
<td>+</td>
<td>+</td>
<td>21.3-30.5</td>
<td>0.24-0.62</td>
<td>ND</td>
<td>0.3-0.38</td>
<td>0.03-0.06</td>
<td>0.03-0.06</td>
</tr>
<tr>
<td>tateronae</td>
<td><em>Tateronaka Kempi</em> (= <em>Tatera sp.?</em>)</td>
<td>Pulm. A.</td>
<td>Australia</td>
<td>CSPEDES (1971)</td>
<td>14-14.7</td>
<td>0.25</td>
<td>+</td>
<td>ND</td>
<td>+</td>
<td>+</td>
<td>21-36</td>
<td>0.28</td>
<td>ND</td>
<td>0.3-0.38</td>
<td>0.03-0.06</td>
<td>0.03-0.06</td>
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<tr>
<td>sandarsae</td>
<td><em>Mastomys natalensis</em></td>
<td>Pulm. A.</td>
<td>Mozambique</td>
<td>AISCATA (1968)</td>
<td>18-22</td>
<td>0.23-0.241</td>
<td>-</td>
<td>ND</td>
<td>+</td>
<td>+</td>
<td>14.5-21</td>
<td>0.235-0.264</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>sandarsae</td>
<td><em>Gerbil tetra</em> (= <em>Tatera sp.?</em>)</td>
<td>Pulm. A.</td>
<td>Kenya</td>
<td>Present authors (1988)</td>
<td>18.3</td>
<td>0.24</td>
<td>-</td>
<td>ND</td>
<td>+</td>
<td>+</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

| Mes. A. | Mesenteric Artery | Pulm. A. | Pulmonary artery | ND: not examined | * in mm |

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Angiostrongylus sandarsae from Kenya
Figs. 1–4 *Angiostrongylus sandarsae*

Fig. 1 Anterior end of female

Fig. 2 Bursa (♯1), ventral view

Fig. 3 Bursa (♯2), ventral view

Fig. 4 Posterior end of female