New species of genus Subulura molin, 1960 (Nematoda: subuluridae) from poultry bird Gallus domesticus of district Khairpur, Sindh, Pakistan

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Abstract

During the current investigation on helminths parasites of Domestic Fowl (Gallus domesticus Linneus), fifty hosts were randomly collected from different localities of district Khairpur, Sindh, Pakistan. Alimentary canal, liver, gallbladder, lungs, kidneys and body cavity were examined under a stereo dissecting microscope for the presence of nematode parasites. Amongst these hosts examined, 300 specimens (70\% and 230\%) of nematodes belonging to genus Subulura Molin, 1960 were recovered from intestine and gizzard of 60 hosts. Present specimens come closer to all the known species of genus subulura but differ in the arrangement of precloacal papillae, post cloacal papillae and caudal papillae, the shape of gubernaculum; the position of the vulval opening; and varying size of diagnostic characters other uniqueness. Hence the specimens identified as new species S. aligulabi sp. The name S. aligulabi refers the name of the father of the first author. Though, this genus is being accounted for the first time from Pakistan.

Keywords: subulura, gallus domesticus, Khairpur, Sindh, Pakistan

Introduction

Poultry gives imperative part in farming and has a huge commitment to sustenance generation by playing an essential capacity in the national economy by contributing towards nourishment security of the nation lessening interest for meat and sheep and gaining of remote trade [1]. Poultry products egg and meat are fundamental source of protein for man. A sum of 30\% poultry protein-dependent at worldwide level [2]. The domestic fowl hunting around housing during the daytime, as a result they directly expose to the environment and obtain what on earth to nosh, they may be able to find in an environment often offal, seeds, fruits and insects. Which may infective stage of parasite and include many species of gastrointestinal parasite. Including Platyhelminthes, nematodes [3].

Nematodes represent a significant group of endoparasite which causes damage the health of domestic chicken, main genera comprise Ascaridia, Ascaridia Schrank, 1788, Heterakis Dujardin 1845 and Subulur Molin [4].

These genera of nematode have also fatal effect on fitness of bird these genera involve in holdup growth, drooping wings, loss of appetite, messy feathers also reduce the egg production [5].

Based on these points the bird desi fowl (Gallus domesticus) has been preferred as an experimental host for nematode parasite.

Materials and methods

Introduction
50 domestic fowl (10 males and 40 females) were collected from the different region of district Khairpur of Sindh, Pakistan. These were brought to parasitological laboratory of Department of Zoology, Shah Abdul Latif University, Khairpur, Sindh, Pakistan and examined for the presence of nematode parasites. For this purpose the internal organs of the hosts like alimentary canal, liver, gallbladder, lungs, kidneys and body cavity were checked carefully using a stereo dissecting microscope or the presence of found worms. Among the hosts, examined 33 birds were found infected with nematode parasites. Live specimens were isolated with the help of forceps and killed in hot 70% ethanol, cleared in lactophenol and glycerol and preserved in alcohol-glycerol solution. Diagrams were made with the help of Camera Lucida. Photographs were taken with Camera DP12, measurements given micrometre (μm). The identification of specimens was made accordance to keys given by Yamaguti [18, 19] and relevant literature. Specimens deposited in the Department of Zoology, Shah Abdul Latif University Khairpur.

Results

Family Subuluridae Yorke & Maplestone 1926.
Subulura aligulabi n. sp.
Site of infection: Intestine and Gizzard
Number of worms: 300 (70 (23.3%) ♂ and 230 (76.6% ♀)
Material examined: 50
Number of effected birds. 33 (66%)

Description

General
Anterior body cylindrical and bent posteriorly wider at the middle region; vestibule large, hexagonal lacking lips; pharynx with three piercing teeth; nerve ring absent; esophagus long club-shaped followed by almost spherical smooth bulb without denticles; excretory opening at the posterior end of the body; spicules unequal with pointed tip; cloacal sucker round muscular. Females larger than males; vulva near the posterior tip of the body, vulval lips rounded; eggs almost round containing larvae; 10 caudal papillae present arranged as three pairs precloacal, three pairs are cloacal and four last pairs are postcloacal in position.

Measurement

Male
The body of worm measuring 7090-13200X290-320. Buccal capsule hexagonal, measuring 10-60X10-16 in size. Esophagus long, measuring 589-871X41-87. Oesophageal bulb round measuring 153-200X69-98. Gubernaculumir regular measuring 82 in size; spicules unequal in size, right spicule measuring 1120-1641 in length and left spicules 1025-1179 in length, both the spicules overlapped at the middle. Precloacal sucker around with radial muscles, measuring 194-205 in diameter; 10 pairs of caudal papillae present; out of the three pairs are cloacal, three pairs are precloacal and four last pairs are postcloacal in position; tail measuring 378-380 in length.

Female
The body of nematode is 11540-20000X309-545 long. Buccal capsule measuring 26-178X17-20. The oesophagus is 866-1172X25-68. Oesophageal bulb is 140-267X131-310. Valvular opening at distance 8363-10900 from the anterior body, 4181-6727 from posterior of the body; tail measuring 327-448; eggs round measuring 59-69X59-90.

Fig 1: A. Cephalic end; B. Anterior end of female; C. anterior end of male; D. posterior end of male viewing spicules, caudal papillae and gubernaculum

Scale bars: A. 50µm; B & C. 200µm; D. 50µm

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having larger body; buccal capsule bigger; esophagus bigger; nerve ring present; blub larger; gubernaculum bigger; varying in the composition of caudal papillae, precloacal three, cloacal two and six-post cloacal; varying in position of valvular opening in female body.

*S. acutissima* Freitas et al., [23] collected from the intestine of the *Glaucidium brasilianum* from Brasil male specimens varying in larger body; spicules larger; tail smaller 0.26-0.31; caudal papillae 10 in number; female smaller in body size; valvular opening at the anterior; eggs smaller in size. *S. longispica* Wang, [24] collected from the intestine of *Ninox scutulata* from China male specimens differs in larger; specula by 2.88-3.36; tell smaller; female smaller body size; valvular aperture at the middle of the body; eggs smaller.

*S. glaucidii* López-Neyra, [25] collected from the intestine of *Glaucidium passerinum* varying in the smaller body; spicules smaller; varying in the arrangement of caudal papillae; tail smaller 0.150-0.220; the female has as smaller body, eggs; valvular aperture at the middle. *S. lutzi* Barreto [26], collected from the intestine of *S. brumpati* from Brasil varying in male larger; spicules smaller; varying in caudal papillae arrangement; tail smaller 0.169; female larger; valvular opening at anterior of the body, eggs slightly smaller. *S. reclinata* from *Crotophaga ani* Linnaeus from Brasil differs in male specimens smaller, spicules smaller; tail smaller 73 μm in length; female larger; vulva at anterior; eggs smaller.

**Discussion**

Genus *Subulura* was established by Molin in 1860 with type species *S. brumpati* in domestic fowl. Other species of genus added reported from various avian hosts from the different region of the world. Including *S. analata* Molin, 1860 (Travassos in 1913) *Anthenoc nutia* from Europe; Molin during 1860 reported *S. acutissima* in *Strix, Cuculus* sp and *S. papillosa* from common house crow; Gendere, 1909 reported *S. similis* recovered from *Ptilopsis lecoticus* Linstow reported *S. recurvata* from gray francolin; *S. rima* from *Otis haubara*; *S. bolivari* (Lopez-Neyra, 1922); *S. different* Sonsino, 1890 from dasi fowl; *S. albai* Agerwal, 1965 from barn owl of India; *S. Alfenensis* Pinto, 1968 from *Anthenecunicularia* of Brazil; *S. galloperdicis* Baylis and Daubney, 1922 from Red super fowl *Galloperrdix spadicea*; *S. forcipata* Vicente et al., 1995 in Cuckoo in South America and Kinsella et al., 2001 from *Athenecunicularia*; *S. mackoi* Barus et al., 2013 from Eurasian owl there is no record from Pakistan.

*S. skrabini* Semenov, 1926 syn. *S. coturnix* Yamaguti [20] collected from intestine of the *S. coturnix* varying in smaller body; vestibule smaller; esophagus larger by 860-960; gubernaculum triangular in contrast irregular compact shaped; arrangement of caudal papillae 2 pairs paracloacal, 3 pairs precloacal and 6 post cloacal; female larger body size; valvular opening at anterior; eggs smaller in diameter. *S. samulis* Gender [21], collected from the intestine of the *Ptilopsis lecoticus* differs from present species in having larger body size; 11 pairs of caudal papillae; spicules equal in size; female having smaller body size; varying in valvular aperture position. *S. acutissima* Molin [22], collected from the *P. falcinellus* from Asia varying from present specimens in

**Table 1:** Morphometric comparisons (mm) of new species with various reported male species of genus *Subulura* Molin, 1960.

<table>
<thead>
<tr>
<th>Present species</th>
<th>Male size</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Subulura brumpati</em> (Lopez-Neyra, 1922; Cram, 1926)</td>
<td>7090-13200 X 290-320</td>
<td>7.174-9.758</td>
</tr>
<tr>
<td><em>S. mackoi</em> (Barus et al., 2011)</td>
<td>10-60 X 10-16</td>
<td>0.032-0.043 X 0.029-0.036</td>
</tr>
<tr>
<td><em>Subulura scutoria</em> (Molin, 1860)</td>
<td>589-871 X 41-87.</td>
<td>0.700-1.022</td>
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| &nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&n
Table 2: Morphometric comparisons (mm) of new species with various reported female species of genus Subulura Molin, 1960.

<table>
<thead>
<tr>
<th>Present species</th>
<th>Subulura burmpti (Lopez-Neyra, 1922) Cram, 1926</th>
<th>Subulura mackoi (Barus et al., 2011)</th>
<th>Subulura suctoria Molin, 1860</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Measurement</td>
<td>Female</td>
<td>Measurement</td>
</tr>
<tr>
<td>Body size</td>
<td>11540-20000 X 309-545</td>
<td>7.140-13.872</td>
<td>16.90 X 0.46</td>
</tr>
<tr>
<td>Buccal capsule</td>
<td>26-178 X 17-20</td>
<td>10.043-0.058 X 0.036-0.040</td>
<td>31 X 51</td>
</tr>
<tr>
<td>Esophagus</td>
<td>866-1172 X 25-68</td>
<td>0.952-1.078</td>
<td>1234-1787</td>
</tr>
<tr>
<td>Esophageal bulbs</td>
<td>140-267 X 131-310</td>
<td>0.120-0.210 X 0.168-0.238</td>
<td>178-202</td>
</tr>
<tr>
<td>Nerve ring</td>
<td>Un seen</td>
<td>0.191-0.0288</td>
<td>191-288</td>
</tr>
<tr>
<td>Valvular region</td>
<td>8363-10900 from anterior end of body.</td>
<td>3.264-3.774 from anterior end of body</td>
<td>643</td>
</tr>
<tr>
<td>Eggs</td>
<td>59-69 X 59-90.</td>
<td>0.057-0.092 X 0.0468-0.0576</td>
<td>46-52 X 39-48</td>
</tr>
<tr>
<td>Tail</td>
<td>327-448</td>
<td>832</td>
<td>327-448</td>
</tr>
<tr>
<td>Host</td>
<td>Gallus domesticus</td>
<td>Phasianis colchicus</td>
<td>Otus scap</td>
</tr>
<tr>
<td>Location</td>
<td>Khairpur, Sindh, Pakistan</td>
<td>Brazil</td>
<td>Chez Republic</td>
</tr>
</tbody>
</table>

Conclusion

Above discussion indicates present specimens have varying characters like arrangement of precloacal papillae, post cloacal papillae and caudal papillae, shape of gubernaculum; pointed spicules; shape of and thickness of cloacal sucker, absence of nerve ring, absence of denticles in esophagus, position of valvel pening; and varying size of diagnostic features and other uniqueness. Hence the specimens identified as new species S. aligulabi n. sp. The name of new species S. aligulabi refers the late father’s name of the first author. Ali Gulab Lund. However, this genus is being reported for the first time from Pakistan.

References

20. Yamaguti S. Systema Helminthum III. The Nematodes of...


