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SPHAERIROSTRIS WINDERI N. SP. (ACANTHOCEPHALA: CENTRORHYNCHIDAE) FROM THE HOUSE CROW (*CORVUS SPLENDENS*: VIEILLOT) (AVES: CORVIDAE) OF BALOCHISTAN, PAKISTAN

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ABSTRACT

Sphaerirostris winderi n. sp. was obtained from the intestine of the house crow, *Corvus splendens* Vieillot from Balochistan, Pakistan. The acanthocephalan was present in 1 of 6 examined hosts with 18 worms in the intestine of the infected bird. This new species of Acanthocephala is characterized by a spinous, slender body with a reticular lacunar system. The proboscis is cylindrical, somewhat swollen mid body with 10 to 12 longitudinal rows of 16 hooks each. There are 6 to 8 rows of spines, each row with 14 to 15 spines on the body. Proboscis receptacle is double walled; lemnisci slightly unequal, testes in the anterior trunk; four tubular cement glands; Saefftigen's pouch and cement glands elongated; bursa is well developed and muscular. Eggs oval without polar prolongations and numerous. Specific differences between *S. winderi* and other species of the genus include hook and spine number and rows shape and size of the worm and surface pattern of the eggs. Key characteristics and species comparisons are included.

Key words: *Sphaerirostris winderi* n. sp., crow, *Corrus splendens*, intestine, Balochistan

INTRODUCTION

Acanthocephala or the spiny-headed worms represent a group of helminths commonly found in the intestine of piscine and avian parasitic hosts (Yamaguti, 1963). A key characteristic for the group is the armed evertible proboscis with numerous hooks (Crompton and Nikol, 1985). Commonly found in fish and birds, with more being described each year (Amin, 2013, Amin *et al.*, 2013).

Sphaerirostris Golvan, 1956 has been in a state of confusion due to its subgenus status to *Centrorhynchus* Luhe, 1911. Golvan (1984) listed 26 species of *Sphaerirostris*, the number is questionable with more being described. Many of these were based on hook number and pattern found on the proboscis. This genus needs additional research and revision including nuceic acid (DNA) studies.

Some key characteristics of *Sphaerirostris* include the hook armature on the proboscis, a polydentritic lacunar system, 3 or 4 tubular cement glands and an enlarged midway proboscis.

The host, the house crow (*Corvus splendens*), also known as Colombo crow, is a common bird of the crow family (Corridae: Passeriformes) that is of Asian origin but now found in many countries of the world. It is associated with human populations in all of its range from small villages to large cities. Numbers have increased due to human population explosion in the areas it inhabits (India, Pakistan, Singapore, Nepal, Bangladesh, Sri Lanka, and Coastal Southern Iran). This species has also proportionately multiplied in relation to other species of Aves (Brook *et al.*, 2003). Being a carnivorous scavenger has enabled it to survive in many adverse circumstances (Ryall, 2002). It feeds on small reptiles and other animals such as insects, other small invertebrates, grain, fruit, nestlings and eggs. It is a highly opportunistic bird and given its omnivorous diet, it can survive on nearly anything that is edible. Being a scavenger, this crow is highly susceptible to parasites.

A number of Acanthocephala has been reported from the House Crow from Pakistan (Khan and Bilqees, 1998, Khan *et al.*, 2002, Khan *et al.*, 2010, Rahman, 2011). In the present study specimens belonging to a new species of *Sphaerirostris* (Golvan, 1956) collected from the House Crow are described herein. The genus *Sphaerirostris* is being reported for the first time from Pakistan (Amin, 2013, Yamaguti, 1963, Petrotschenko, 1958).

MATERIALS AND METHODS

Eighteen acanthocephalan specimens were recovered from the intestine of a single crow from Winder, Balochistan. Six crows were examined in the area. Worms were placed in water for a few hours for proboscis relaxation and extension. Sixteen worms were fixed in F.A.A. solution (a mixture of ethyl alcohol 92 ml + formalin 5 ml + acetic acid 3 ml) for 25 hours, stained with Mayer's carmalum, dehydrated in graded series of alcohols, cleared in clove oil and xylene and mounted permanently on glass slides in Canada balsam by the

usual procedure. Diagrams were made with camera Lucida attached to a light microscope and measurements are given length by width in millimeters unless otherwise stated. For scanning electron microscopy studies (SEM) specimens previously fixed in 70% ethanol were placed in critical-point drying baskets and dehydrated using an ethanol series of 95% and 100% for at least 10 minutes per soak followed by critical point drying using a Tousimis Autosandri (Lee, 1992). Samples were then mounted on SEM sample mounts, gold/palladium coated, with 18 to 20 mm thickness (Quorum Q 150 TES, coater/sputterer) and observed with a scanning electron microscope (XL33 ESEMFEG; FEI, Hillsboro, Oregon). Digital images of the structures were obtained using digital imaging software attached to a computer and stored on a USB.

RESULTS

The following observations and measurements are given for the acanthocephalan observed in the intestine of the house crow. All measurements arein mm unless otherwise specified. Of the eighteen worms observed, 15 were males and 3 females.

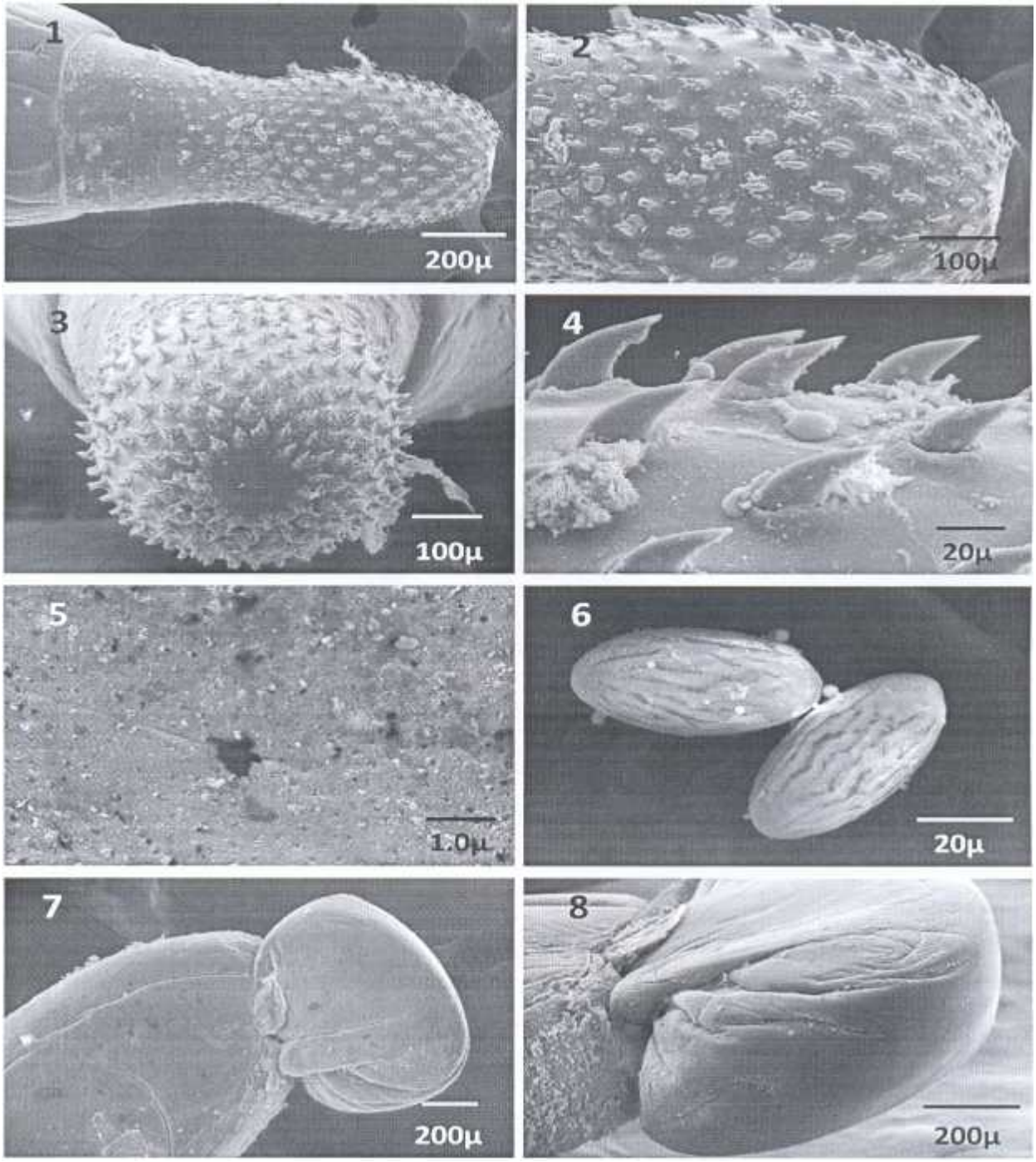
Description-Male: Trunk slender, aspinose gradually tapering towards both ends, measuring 8.80-15.16 by 1.16-2.04 (Figure 10). Body with reticular lacunar system with prominent nuclei. Tegment with many microspores (Figure 5). Proboscis cylindrical, somewhat swollen, measuring 0.62-0.80 by 0.32-0.42; divided by insertion into two regions, well armed with 10-12 longitudinal rows of hooks each row has 16 hooks (Figs. 1, 3, 4), while the spine rows are 6-8 having 14-16 spines (Fig. 2). The hooks measure 0.038-0.045 by 0.011-0.015, while the spines in the last 6-8 rows are smaller, measuring 0.026-0.032 by 0.0068-0.0072. Neck short, cylindrical 0.26-0.31 by 0.28-0.32. Proboscis receptacle, double walled, elongate measuring 0.75-1.12 by 0.31-0.52 inserted at about middle of proboscis with ganglion in its mid-region. Lemnisci longer than the proboscis receptacle, the left measuring 1.35-2.44 by 0.16-0.22 and the right measuring 1.36-2.76 by 0.16-0.24. Testes in the anterior portion of trunk, the anterior measuring 0.52-1.0 by -.031-0.68 the posterior measuring 0.57-0.92 by 0.37-0.72. The distance between two testes varies from 0.015-0.021. Cement glands four tubular measuring 1.2-4.4 by 0.40-0.52. Cement reservoir 0.60-0.73 by 0.14-0.22. Saefftigen's pouch elongated, 0.70-0.92 by 0.23-0.24. Bursa well developed, muscular (Figs. 7, 8) measuring 1.2-1.6 by 0.45-0.64.

Female: Body length 5.76-6.24 by 1.33-1.40. Proboscis cylindrical, somewhat swollen 0.45-0.49 by 0.28-0.31. Neck measures 0.26-0.28 by 0.28-0.30. The rows of hooksand number of hooks and its size are similar to male specimens. Lemnisci longer than proboscis receptacle, the left measuring 1.00-1.05 by 0.13-0.14; and the right measuring 1.08 by 0.14. Uterus long, tubular. Genital pore subterminal. Eggs small, oval, numerous without polar prolongations with wavy appearance on surface (Fig. 6) measuring 0.045-0.048 by 0.024-0.026.

From the measurements and morphological characteristics it was determined to be a new species; *Sphaerirostris winderi* n. sp. Summary of the new species is as follows:

Sphaerirostris Golvan, 1956
Sphaerirostris winderi n. sp.
(Figs. 1-15)

Type host:	House Crow (*Corvus splendens* Vieillot)
Site of infection:	Intestine
Type locality:	Winder, District Lasbela, Balochistan
No. of specimens:	15 males and 3 females from a single host
No. of host examined:	6
Slide No.:	Holotype CDAC 2133, 2134
Paratype CDAC 2144-2157	
Name:	Due to host location: Winder, Balochistan, Pakistan



Figures 1 through 8 represent the results of the scanning pictures for the Acanthocephalan, *Sphaerirostris winderi* n.sp. found in a crow. Figures 1 represents the proboscis of an adult male armed with numerous hooks. The hooks are arranged in longitudinal rows. The posterior part of the proboscis has spines. Figure 2 and 3 is a higher magnification of the proboscis again showing the longitudinal arranged rows of hooks. The flat apical, uncovered end of the proboscis is depicted for figure 2. Few pointed hooks without surface modifications arranged in a longitudinal rows, have been magnified for figure 4. The anterior integument with numerous microspores (arrows) is shown with figure 5. The oval shaped eggs are well depicted with SEM (Figure 6) which have a wavy appearance on the surface. Figures 7 and 8 represent the male bursa (B). The gonopore of the female was not visible for the samples we examined.

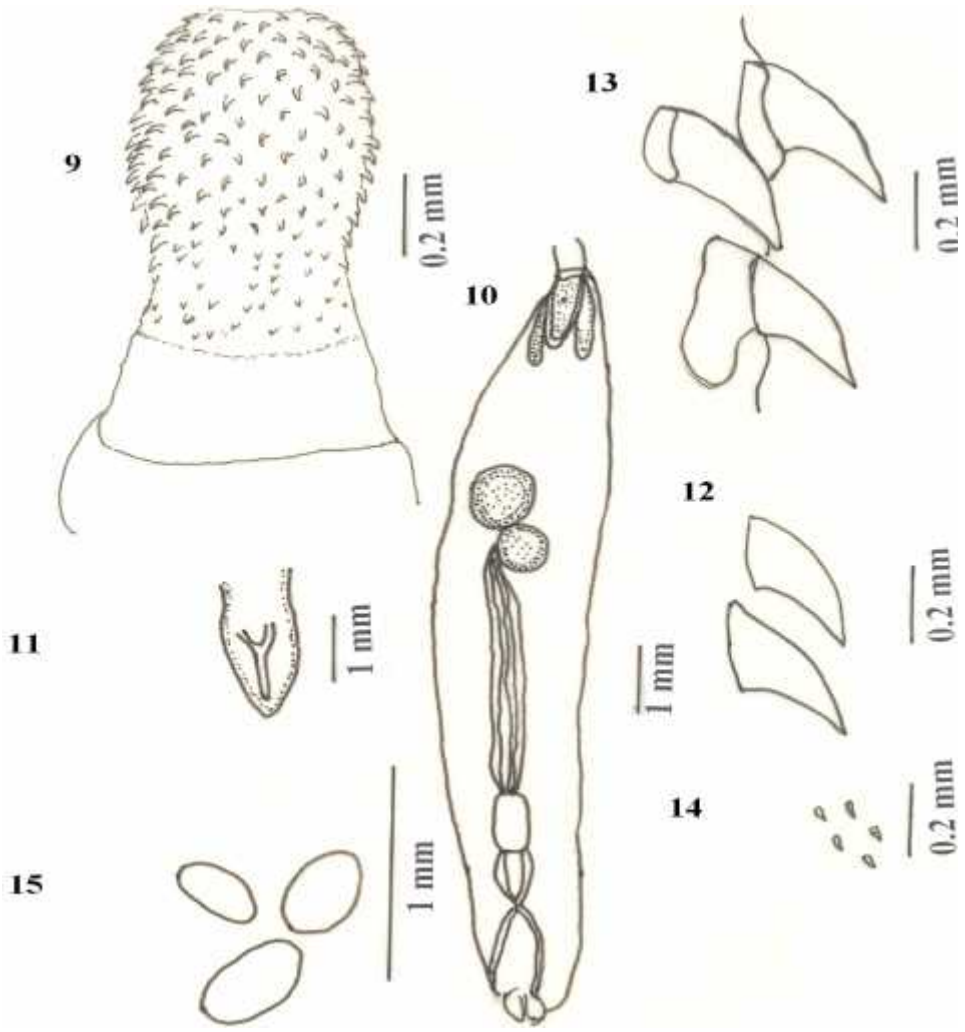


Figure 9–15 represent camera Lucida drawings: 9. Proboscis; 10. General view male (holotype); 11. Female posterior end; 12. Hooks; 13. Rows of hooks; 14. Spines; 15. Eggs enlarged.

DISCUSSION

More new species of Acanthocephala are being described by researchers each year as well as previous descriptions being reviewed (Amin *et al.*, 2013a, Amin and Heckmann, 2012). This includes research on the genus *Sphaerirostris* (Radwan *et al.*, 2012). A recent tool for descriptions of worms has been the electron microscope both SEM and TEM (Heckmann, 2013, Amin *et al.*, 2013c). The taxonomy of the genus *Sphaerirostris* has centred mainly on hooks of the proboscis especially on the number and orientation of the armature rows (Petrotschenko, 1958, Hoklova, 1971, 1986, Yamaguti, 1963). Amin (2013) has published lists of all the known species of Acanthocephala including the *Sphaerirostris*. As mentioned previously, the taxonomy of *Sphaerirostris* Golvan, 1956 has been questioned since Golvan (1956) established the subgenus.

Genus *Sphaerirostris* was erected by Golvan, 1956 as a subgenus of *Centrorhynchus* Luhe, 1911 and included 21 species with polydendritic lacunar system and having 3 or 4 tubular cement glands. Later, Golvan (1960) listed 26 species by reversing the synonymies that he noted earlier Golvan (1956) without any explanation. Amin *et al.* (2010) listed 20 species valid of the genus *Sphaerirostris*. The present is comparatively similar to *S. picae* (Rudolphi, 1819) Golvan, 1956 but differs in proboscis armature which in the present specimens are 10-12 rows of hooks with 16 hooks and 6-8 spines having 14-16 spines. As compared to *S. picae* (Rudolphi, 1819) Golvan, 1956 described by Amin (2010)in *Pica pica* and *Corvus* spp. from northern Iran the hooks rows are 32-38 each having 8-10 hooks, while the spines rows are 27-36 with 2-5 spines. The posterior end of females is somewhat pointed in the present specimens as compared to *S. picae*. The eggs surface in *S. picae* are smooth but have a wavy surface in the present species as obvious by scanning electron microscopy (Fig. 6). Keeping in view

the specific differences, the present forms are proposed to be new and designated as *Sphaerirostris winderi*. The species name refers to the locality of the host.

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