STEPHANOPRORA LARKANENSIS SP.N. (TREMATODA: ECHINOSTOMATIDAE) FROM THE INTESTINE OF *VANELLUS INDICUS* (REDWATTLED LAPWING) IN LARKANA, SINDH, PAKISTAN

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ABSTRACT

A new species of the genus *Stephanoprora larkanensis* sp.n. parasitizing *Vanellus indicus*, Redwattled lapwing reported form Larkana, Sindh, Pakistan. The new species is characterized by having: different body size, large oblong shaped acetabulum, prepharynx absent, esophagous start below the pharynx and bifurcates in the middle of acetabulum, ovary median, rounded and pretesticular, both testes are small, rounded, tandem and situated in the middle of body, behind the ovary, vitelline follicles commence below the acetabulum and extend to the posterior part of the body.

Key words: *Stephanoprora larkanensis* sp.n., *Vanellus indicus*, Larkana, Sindh, Pakistan.

INTRODUCATION

The Present specimens belong to the family Echinostomatidae (Looss, 1902) Poche, 1926, sub-family Echinochasminae Odhner, 1910 and the genus *Stephanoprora* Odhner, 1902. Cited literature reveal several species of the genus *Stephanoprora*, reported from all over the world (Yamaguti, 1971). Species of the genus are reported from reptiles, birds and mammals. Twenty-five species are reported from avian hosts including four species from India, other species are from Brazil, Belgium, Congo, Florida, Panama, Russia, Kazakhstan, Eastern Canada, Japan, Turkestan, North America, Germany and Africa (Yamaguti, 1971). The Present specimens were recovered from *Vanellus indicus*, Redwattled lapwing from Larkana, Sindh, Pakistan. This is a first and new record of the genus and species from Pakistan and new host *Vanellus indicus*, (Redwattled lapwing) from new locality i.e Larkana, Sindh, Pakistan.

Vanellus indicus belongs to family Charadriidae. It is also called *did-he-do-it* bird because of his alarm calls which can be hear during day and night. This bird is mostly found in Asia and in huge quantity in the south Asia. *Vanellus indicus* feeds on snails, insects, invertebrates, ants, beetles, grains etc during day and night time. People commonly says that this bird does not sit on trees.

MATERIALS AND METHODS

Three birds *Vanellus indicus* were caught alive from District Larkana, Sindh, Pakistan and brought to the Parasitology laboratory, Department of Zoology, University of Sindh, Jamshoro, Pakistan. The morphometric of birds were recorded and then anthesized, dissected and examined for collection of internal Helminth parasites. During examination of the gut contents and visceral organs six mature specimens were collected from the small intestine of birds. Later these specimens were fixed in hot steaming 70% ethanol, where trematodes expand and instantly die. Later the specimens were gently placed over a clean glass slide, pressed lightly with another, tied with thread and fixed in F.A.A. solution for twenty-four hours, stained with Mayer's carmalum, dehydrated in graded series of ethanol, cleared in clove oil and rinsed with xylene. Finally, the specimens were permanently mounted in Canada balsam for detailed further study. Line Drawings were made with the aid of a Camera lucida. Measurements are length by width in millimeters (mm). Photomicrographs were prepared with the courtesy of Department of Zoology, University of Karachi. Specimens are deposited in the Parasitological laboratory, Department of Zoology, University of Sindh, Jamshoro.

***Stephanoprora larkanensis* sp.n.**
(Figs. A-E)

Host: *Vanellus indicus* (Redwattled Lapwing)
Location: Small Intestine
Locality: District Larkana, Sindh
Number of hosts examined/infected: 03/03
Number of specimens recovered: 06

Description is based upon six, permanently mounted, mature egg bearing specimens:

Body elongate, anterior and posterior ends are narrower while middle of the body is broader, measure 3.90-4.35 (4.08) by 0.84-0.86 (0.85), maximum width is attained at the acetabular level.

Head collar small, reniform, measure 0.16-0.18(0.16) by 0.36.-0.38(0.37) and have 26 spines.

Oral sucker terminal, well developed, oval to rounded in shape and measure 0.7-0.9 (0.7) by 0.1-0.1 (0.1). Pharynx muscular, oval, elongate and measures 0.24-0.26 (0.25) by 0.13-0.15(0.14).

Esophagus moderately long, bifurcates near mid of the ventral sucker into two intestinal caeca 0.54-0.56 (0.55) long. Acetabulum much larger than the oral sucker, rounded, highly muscular situated in the anterior part of the body 0.73-0.75 (0.74) by 0.64-0.66(0.65) in size. Distance between oral and ventral sucker is 0.64.

Ovary median, pre-testicular, without lobes, oval to rounded, little in front of the anterior testis measure 0.22-0.25(0.23) by 0.23-0.26(0.24).

Testes post-ovarian, median, tandem situated in the middle of the body, anterior testis is 0.10-0.12 (0.11) by 0.1-0.2 (0.1) and posterior testis is 0.17- 0.19(0.17) by 0.17-0.18(0.17). Cirrus pouch plump shaped, anterior to the acetabulum, 1.85 by 0.65 in size.

Vitellaria extend in the lateral fields starting from below the acetabulm up to the posterior part of the body. Uterus short, with loops, between the ovary and acetabulum. Eggs oval, thin walled measure 0.75-0.80 by 0.34-0.38 (Table 1).

Table 1. Comparative features of species of the genus *Stephanoprora* Odhner, 1902 reported from avian hosts.

Species Name	**HOST**	**LOCATION**	**BODY SIZE**	**EGG SIZE**	**No. Of Spines**
S. anomala	*Phalacrocorax olivaceus*	Brazil	5.2 by 0.78	Not mention	Not mention
S. conciliata	*Rhynchops nigra, sterna, butorides, striarus,*	Brazil	1.45-2.12, by 0.52-0.65	64.8-67.2 by 43.2-45.6	22
S. dendiculata	*Sterna hirundo, S.caspica, Botaurus, Stellaris, Rhynchops, flavirostris,*	Europe, Siberia, Africa	1.7-2.13 by 0.27-0.28	74 by 50	22
S. dendticulata var. Nilotica	*Larus cirrocephalus*	Belgian, Congo	3.0-4.0 by 0.34-0.38	78-82 by 45-46	22
S. fusca	*Totanus fuscus, Dicrurus macrocercus, Upupa aeropes*	India	4.77 by 0.45	50 by 25	22
S. gigantic	*Xenorhynchus asiaticus*	India	22.5-26.76 by 1.39-1.68	94.5-100.2 by 53.5-62.8	22
S.gracilis	*Anas platyrhyncha*	Europe	1.35 by 0.19	80-86 by 50-56	22

S.Graciosa	*Pandion haliaetus*	Russia	9.12 by 0.86	82 by 56	No
S. iliensis	*Ixobrychus minutus*	S. Kazakhstan	Not mention	Not mention	24
S. kaschic	*Hydrochelidon nigra*	Russia	6.92 by 0.31	84-86 by 43-51	24
S.magnioval	*corvus corone corone*	Japan	5.8 by 0.7-0.88	87-108 by 60-62	22
S. mergi	*Mergus merganser americanus*	E. Canada	1.16 by 0.277	87-90 by 40-50	22
S. merulae	*Merula eumonus*	Japan	3.1 by 0.47	87-93 by 51-54	22
S. microtestius	*Sterna anglica*	Turkestan	4.56 by 0.30	77-86 by 43-48	22
S.nigerica	*Phalacrocorax niger*	India	2.68-4.01 by 0.45-0.55	67.9-76.5 by 50.1-54.9	22
S.ozakii	*Bubulcus ibis cormorandus*	Japan	6.45-7.5 by 0.72-0.81	98-105 by 68-72	Not mention
S. pendula	*Recurvirostra avocet, Himantopus candidus, Tringa minuta, Totanus guttifer, Sterna contiaca, S. Scandvicensis, Tringa erythrropus*	Africa, Japan	3.4 by 0.37	100 by 59	22
S.pennant	*Indian darter*	India	7.5 by 0.92	75.6-80 by 48	22
S.polycestus	*Alca torda, Urinatorarcticus, Corvus, Larus, aechmophorus occidentalis*	Greifswald, Russia, Nava	3.0-5.0 by o.54-0.64	81.6-84 by 55-58	22
S.pseudodentriculata	*Trauerente*	Germany	4.24 by 0.36	75.5-80 by 67.2-76.3	22
S.pseudoechinata	*Larus marinus, L.argentalus,L. ridibunddus, Larus, Colymbus, Hydroprogne, Sterna hirundo,*	Europe, Gavia, N.America, Czechslovakia, Poland, Russia	4.4-5.92 by 0.31-0.473	75.8-80 by 76.2-76.3	22

	podiceps, Rissa, Mergus, Nyroca, Aythya, Gelochelidon, Chlidonias, Pelacanus				
S.revnoldi	*Corvus insolens Larus canus*	Burma, Russia	2.44-3.48 by 0.36-0.574	73-81 by 47-60	22
S.singularis	*Nycticorax violaceus, Phalacrocorax v.vigua*	Brazil, Panama	6.0 by 1.0	Not mention	22
S. spinose	*Anhinga rufa, Ciconia ciconia, Rositten, Podiceps, cristatus, Crestedgreb, gull, Glaucionetta elangula Americana, Gavia immer, Larus Philadelphia*	Africa, England, U.S.A.	2.0-2.25 by 0.4-0.5;	74-80 by 40	No
S. podicipei	*Podiceps major*	Argentina	1.10-1.40 by 0.24-0.32	0.08-0.09 by 0.04-0.05	Not mention
S. uruguayense	*Larus dominicanus*	Uruguay	2.36-2.82 by 0.29-0.41	0.08-0.10 by 0.04-0.06	22
S.dogieli	*Larus dominicanus*	Uruguay	1.98-3.25 by 0.22-0.38.	0.08-0.10 by 0.04-0.06	Not mention
S. larkanensis	*Vanellus indicus*	Pakistan	3.90-4.35 by 0.84-0.86	0.75-0.80 by 0.34-0.38	26

DISCUSSION

Number of species of the genus *Stephanoprora* reported from all over the globe including; Asia, Africa, Europe and U.S.A which include India, Russia, Siberia, England, Brazil, Poland, Japan, Panama etc but previously none from Pakistan. Species of the genus have been recovered from reptilian, avian and mammalian hosts (Cannon, 1938; Gupta, 1962; Verma, 1936; Yamaguti, 1933; 1937; 1939; 1971).

Present specimens are reported for the first time from Larkana, Sindh, Pakistan from an avian host *Vanellus indicus* (Red wattled lapwing).

Species reported from reptiles are *S. ornata* Odhner, 1902 (26 spines); *S. jacaretinga* Freitas and Lent, 1938 (22 spines); *S. odhneri*, Odhner, 1910 (spines not mentioned); in crocodiles, *Caiman sclerops* in Sudan, Egypt, Congo, Brazil (Yamaguti, 1937).

Species reported from mammals are; *S. advena* Shehupakov, 1936 n.comb (22 spines); *S. denticulate* Rudolphi, 1802 (spines not mentioned); *S. denticulatoides* (Issaitchikow, 1925) Beaver, 1937; in *Phoca caspica*, dog, Crimea, cat in (22 pines) in Caspian, Denmark and Egypt.

Yamaguti, (1971) reported 25 species of genus *Stephanoprora* from avian hosts out of which four reported from India are; *S. fusca* Lal, 1939 in *Totanus fuscus, Dicrurus macroce*; *S. gigantica* Gupta, 1962 in Black-necked stork, *Xenorhynchus asiaticus*; *S. nigerica* Gupta, 1963 in *Phacacrocorax niger*; *S. pennant* (Verma, 1936) Yamashita, 1937 in Indian darter.

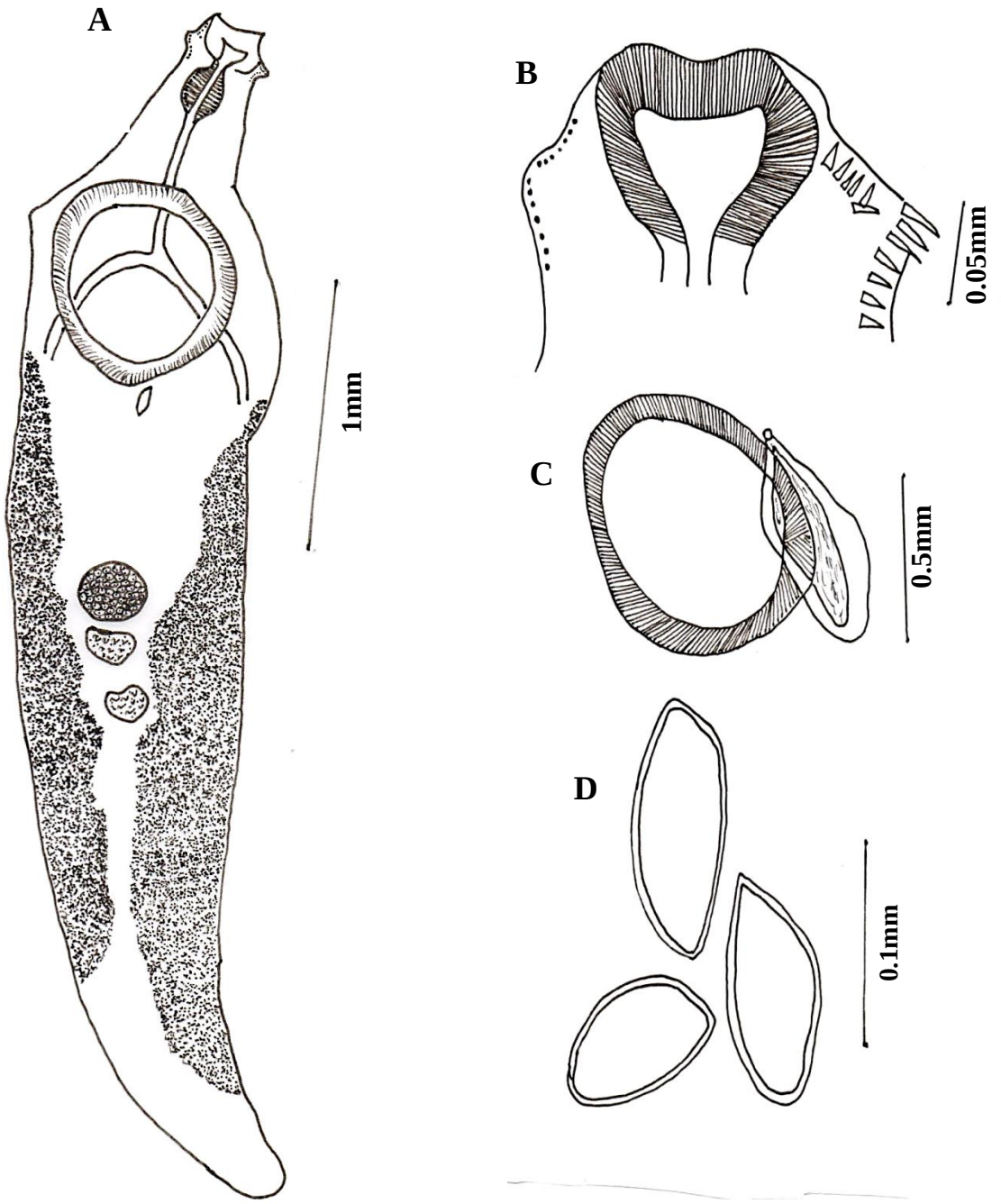

Fig. A. *Stephanoproralarkanensis*sp.n. entireworm, holotype
B. Head collar spines enlarged with oral sucker
C. Cirrus sac and preacetabulum genital opening
D. Eggs enlarged

E. *Stephanoproralarkanensis*sp.n. entire worm, holotype. Photomicrograph (5x10).

Body size in the present specimens is 3.90-4.35 (4.08) by 0.84-0.86 (0.85), nearly similar with *S. fusca* 4.775 by 0.45; *S. microtestius* (Kurova, 1927) 4.56 by 0.30; *S. polycestus* (Dietz, 1909) 3.0-5.0 by 0.54-0.64; *S. pseudodenticulata* (Mendheim, 1940) 4.24 by 0.36; *S. pseudoechinata* (Olsson, 1876) Yamaguti, 1958, 4.4-5.92 by 0.31-0.47 but from different host and locality; smaller than *S. anomala* (Travassos, 1922) 5.2 by 0.78; *S. gigantica* (Gupta, 1962) 22.5-26.76 by 1.39-1.68; *S. graciosa* (Subarikov, 1950) 9.12 by 0.86; *S. kaschic* Yamaguti, 1958, 6.92 by 0.31; *S. magnioval* (Yamaguti, 1939) 5.8 by 0.7-0.88; *S. ozakii* Beaver, 1937, 6.45-7.5 by 0.72-0.81; *S. pennanti* (Verma, 1936) Yamashita, 1937 7.5 by 0.92; *S. singularis* (Beaver, 1937), 6.0 by 1.0.

The present specimens are larger than; *S. conciliata* (Dietz, 1909) Odhner, 1910, 1.45-2.12, by 0.52-0.65; *S. dendiculata* (Rudolphi, 1802) Odhner, 1910, 1.7-2.13 by 0.27-0.28; *S. dendticulata var. nilotica* (Baer, 1959) 3.0-4.0 by 0.34-0.38; *S. gracilis* (Mandheim, 1940) 1.35 by 0.194; *S. mergi* (Cannon, 1938) 1.16 by 0.27; *S. merulae* (Yamaguti, 1933) 3.1 by 0.47; *S. nigerica* (Gupta, 1963) 2.68-4.01 by 0.45-0.55; *S. pendula* (Looss, 1899) Odhner, 1910, 3.4 by 0.37; *S. reynoldi* (Bhalerao, 1926) 2.44-3.48 by 0.36-0.57; *S. spinosa* (Odhner, 1910) 2.0-2.25 by 0.4-0.5; in *S. podicipei* (Etchegoin & Martorelli, 1997) 1.10-1.40 by 0.24-0.32; *S. uruguayense* (Holcman-Spector & Olague, 1989) 2.36-2.82 by 0.29-0.41; *S. dogieli* (Holcman-Spector & Olague, 1989) 1.98-3.25 by 0.22-0.38; and body size of *S. iliensis* (Gvozder, 1962) (Not given).

In present specimens the head collar is reniform and measure 0.16-0.18(0.16) by 0.36.-0.38(0.37) and possess 26 spines in forehead region of the body it differ from *S. uruguayense*, it is reinform and measure 0.25-0.34; *S. podicipei*, measure 0.21-0.23; *S. spinosa* is reniform in shape; *S. conciliata*; *S. dendiculata*; *S. dendticulata var. nilotia*; *S. fusca; S. gigantica; S.gracilis; S. magnioval; S. mergi; S. merulae; S. microtestius; S.nigerica; S. pendula; S.pennanti; S. polycestus; S. pseudodenticulata S. pseudoechinata; S. reynoldi; S. singularis* all possesses 22 spines and *S. iliensis*; *S. kaschic*, have 24 spines, While in *S. anomala, S. Graciosa, S. ozakii, S. dogieli,* head collar spines not mentioned in the literature.

In present specimens pharynx is oval, elongate and located below the oral sucker measure 0.24-0.26 (0.25) by 0.13-0.15 (0.14) differs from *S. uruguayense*, it is oval, elongate measures 0.10-0.13 by 64; *S. gracioa; S. spinnosa* it is oval in shape; *S. dogieli* measures 0.08-0.10 by 0.04-0.08; *S. podicipei* 0.09-0.13 by 0.07-0.09 and in all above species pharynx is present below the pre-pharynx.

In the present specimens esophagous is 0.54-0.56 (0.55) long, start from pharynx and bifurcate near the mid of ventral sucker, differs from *S. uruguayense* measure 0.20-0.26, *S. graciosa; S. spinnosa* in which esophagous start below the pharynx and bifurcate above the ventral sucker; while in *S. dogieli* 0.26-0.42 and in *S. podicipei* 0.08-0.14 (size and position not mention).

In the present specimens acetabulum is oblong, larger than oral sucker, situated in the anterior part of the body measure 0.73-0.75(0.74) by 0.64-0.66 (0.65) differ from *S. uruguayense* it is roughly rounded, situated in the anterior part of the body 0.22-0.35 by 0.22 0.29; *S. dogieli* measure 0.20-0.24 by 0.20-0.33 (shape not mention); *S. podicipei* measure 0.17-0.23 by 0.16-0.22 (shape not given); *S. graciosa*, it is rounded (measurements not mention); in *S. spinosa* it is bowl shaped (measurements not mentioned).

In the present specimens ovary is, median, oval to rounded, small, littlte infront of anterior testis and situated in the middle of the body and measure 0.22-0.25(0.23) by 0.23-0.26(0.24) differ from *S. uruguayense* ovary is oblong, in front of anterior testis and situated in the second quarter of the body 0.10-0.11 by 0.12-0.14; *S. dogieli* it measure 0.09-0.11 by 0.10-0.12; *S. podicipei* 0.03-0.06 by 0.05-0.08; *S. graciosa* ovary is horizontal oval, median and situated in the second quarter of the body, in *S. spinosa* ovary is oval and situated in the middle of the body

In the present specimens testes are small, post-ovarian, median, oval to rounded, tandem and situated in the middle of the body anterior testis is 0.10-0.12 (0.11) by 0.1-0.2 (0.1) and posterior testis is 0.17- 0.19(0.17) by 0.17-0.18(0.17) in size differ from; *S. uruguayense* testes are large, anterior testis is roughly square measure 0.19-0.26 by 0.13-0.24 and posterior testis is roughly oval in shape, measure 0.27-0.31 by 0.14-0.19 and situated below the middle region of the body; *S. dogieli* anterior testis measure 0.24-0.36 by 0.18-0.28 and posterior testis (not mention); *S. podicipei* anterior testis measure 0.07-0.09 by 0.10-0.15 and posterior testis (0.12-0.15 by 0.10-0.14); *S. graciosa;* testis are large in size, median, tandem and situated in the second quarter of the body; in *S. spinosa* testes are large, median, tandem , anterior testis is oval and posterior testis is heart shaped and situated in the middle of the body.

In the present specimens vitellaria starts at a short distance from below the acetabulum extends in lateral fields to the posterior part of the body differ from *S. graciosa* in which viltellaria start from the middle of anterior testes extends in lateral fields to the posterior most part of the body; in *S. spinosa* vitellaria start from the start of posterior testis extends in lateral fields and in the middle of the body to the most posterior part of the body; in *S. uruguayense* vitellaria start from anterior testis and externds posteriorly throughout the body to the posterior part of the body; *S. dogieli* (not given); *S. podicipei* vitellaria extend to the middle of anterior testis.

In presents pecimen's uterus is short and filled with enormous eggs, while in *S. graciosa*, *S. spinosa* and *S. uruguayense* uterus is short with less number of eggs. *S. dogieli, S. podicipe* (not mention)

Size of eggs in present specimens are 0.75-0.80 by 0.34-0.38 in size differ from *S. anomala* (not mention); *S. conciliata* 64.8-67.2 by 43.2-45.6*; S. dendiculata*, 74 by 50; *S.dendticulata var. nilotica*, 78-82 by 45-46*; S. fusca* 50 by 25 ; *S.gigantica*, 94.5-100.2 by 53.5-62.8 ; *S.gracilis*,80-86 by 50-56; *S.graciosa*, 82 by 56; *S. iliensis*, (not mention*); S. kaschic*, 84-86 by 43-51; *S. magnioval* 87-108 by 60-62; *S. mergi*, 87-90 by 40-50 ; *S. merulae* 87-93 by 51-54; *S. microtestius* 77-86 by 43-48; *S. nigerica* 67.9-76.5 by 50.1-54.9 ; *S. ozakii* 98-105 by 68-72; *S. pendula* 100 by 59; *S. pennanti*, 75.6-80 by 48; *S. polycestus*, 81.6-84 by 55-58; *S. pseudodenticulaata*, 75.5-80 by 67.2-76.3; *S. pseudoechinata*, 75.8-80 by 76.2-76.3; *S. reynoldi*, 73-81 by 47-60; *S. singularis* (not mention); *S. spinosa*, 74-80 by 40; *S. uruguayense* 0.08-0.10 by 0.04-0.06; *S. dogieli*, 0.08-0.10 by 0.04-0.06; *S. podicipei* (0.08-0.09 by 0.04-0.05).

CONCLUSION

Keeping in view the unmatched specific characters such as larger, oblong shape of acetabulum, absence of pre-pharynx, moderately long esophagus, number and arrangement of spines, commencement of vitelline follicles, smaller size of testes, oval to elongated eggs, and new host and locality serve to propose a new species *Stephanoprora larkanensis* sp.n. The species name refers to the host locality.

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