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HELMINTH PARASITES OF SOME BIRDS IN SIND (PAKISTAN)

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Abstract. The present investigations report on some endoparasites of birds of Sind, collected from Karachi and Hyderabad. It includes descriptions of two species of cestodes and six-species of nematodes from seven different species of birds.

The genus *Tubangiella* Yamaguti, 1933 is rediagnosed based on a new species *T. ardeola* from *Ardeola bacchus* and *Raillietina (Raillietina) flaccida* (Meggit, 1926) is described from the sparrow *Passer domesticus*.

T. ardeola is the second species of the genus and first from Pakistan.

The six nematode species are *Pseudaspidodera sindia* n.sp., *Physaloptera tadorna* n.sp., *Diplo- triaena streptopelia* n. sp., *Leipoanema* sp., *Amplicaeum* sp., *Dispharynx* sp. from the birds *Amaurnis phoenicurus chinensis*, (Chinese bird), *Tadorna tadorna* (Duck), *Streptopelia senegalensis* (Fakhta), *Coturnix coturnix* (common quail), and *Phalacrocorax carbo sinensis* (Jal kawa).

Other three species of nematodes reported here are identified only up to the genus belong to the genus *Leipoanema*, *Amplicaeum* and *Dispharynx*.

Present work includes the descriptions of the helminth parasites of the Sheld-Duck *Tadorna tadorna*, common Quail *Coturnix coturnix*, Jal kawa *Phalacrocorax carbo sinensis*, Bagla *Ardeola bacchus*; Fakhta *Streptopelia senegalensis*, Sparrow *Passer domesticus* and the Chinese bird *Amaurnis phoenicurus chinensis* which is also commonly known as Jal murghi. These birds were collected from different regions of Sind including Karachi.

The previous reports on the parasites of birds in Pakistan are only those of Khan and Habibullah¹⁴, Akram,¹ Bilqees⁸ Bilqees and Jehan,⁹ Bilqees *et al.*¹⁰ In spite of the fact that the avian fauna of Pakistan including Sind presents a large variety of migratory and residential birds, attention was not paid to study the parasites of these birds. Sind is a province of lakes which serve as reservoirs and breeding places for a big variety of waterfowls or Jal murghi. Similarly the muddy places and shallow waters around these areas are the favorite site for many species of ducks and related birds. Species of *Phalacrocorax*, *Ardeola* and *Amaurnis* are the common inhabitants in different seasons at the lakes of Sind. *Streptopelia senegalensis* and *Passer domesticus* are found more or less throughout the year in Karachi and Sind. *Coturnix coturnix* is usually seen soon after the rainy season. The present is the part of the survey of parasites of birds carried out in this labora-

tory which provides the description of eight species of helminths including two cestodes: *Raillietina (R) flaccida* Meggit, 1927 in *Passer domesticus*; *Tubangiella ardeola* n.sp., in *Ardeola bacchus*; and six nematodes *Pseudaspidodera sindia* n.sp. in *Amaurnis phoenicurus chinensis*; *Physaloptera tadorna* n.sp. and *Dispharynx* sp. from *Tadorna tadorna*; *Diplo- triaena streptopelia* n.sp. in *Streptopelia senegalensis*; *Leipoanema* sp. in *Coturnix coturnix*; and *Amplicaeum* sp. in *Phalacrocorax carbo sinensis*.

Material and Method

The Birds were either shot down from the Thatta, Gharo districts and from the area near Kalri lake of Sind, or the dead bodies of the birds were purchased from the Empress Market of Sadar. The cestodes were recovered from stomach and intestine of the birds. Specimens were relaxed in cold water, then pressed between two glass slides and fixed in F.A.A. solution (formalin acetic acid and 50% alcohol in the proportions of 6: 2.5: 100) for 24 hr. Subsequently, they were transferred to 70% alcohol for another 24 hr to remove the fixative. Selected specimens were stained with Meyers carm-alum for 24-48 hr, dehydrated in graded alcohols, cleared in clove oil, washed with xylol and mounted permanently in Canada balsam.

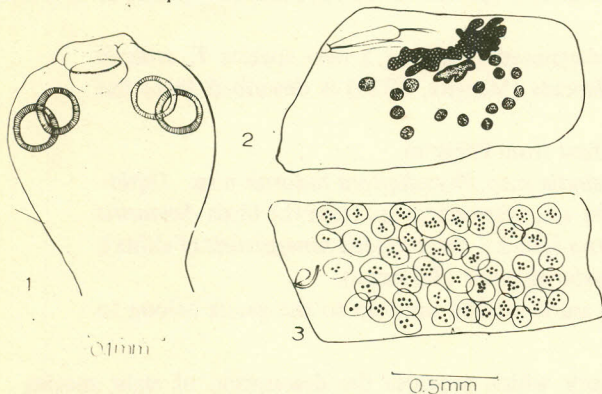
Specimens of nematodes were fixed and cleared in

a mixture of glycerine and 70% alcohol (50:50). Drawings were made with the help of a camera lucida. Type material is deposited in the School of Parasitology, Department of Zoology, University of Karachi.

Raillietina (Raillietina) flaccida Meggitt, 1926.

(Figs. 1-3)

Cyclophyllidea Ben. in Braun, 1900; Davaineidae Fuhrmann, 1907; Davaineinae Braun, 1900 *Raillietina* Fuhrmann, 1920. Host. *Passer domesticus*; Date. 12 - 2 - 73; Incidence. 25 %, Intensity . 2 - 5; Habitat. Intestine. Catalogue No: SPUK1197-1202. Description is based on 10 specimens.



Figs. 1-3. Fig. 1 *Raillietina (Raillietina) flaccida* Meggitt, 1926. Scolex Fig. 2. Mature segment. Fig. 3. Gravid segment.

Several specimens of this species were collected from the intestine of the host, the common house sparrow. Scolex was not so deeply embedded in the intestinal mucosa and thus could easily be removed. The globular scolex measures 0.27 - 0.29 mm and is provided with four unarmed suckers and an apical circular rostellum. The rostellum measures 0.06 - 0.07 mm in diameter and is provided with a double circle of innumerable hooks. The diameter of each sucker is 0.06 mm. The characteristic shape of the scolex in these specimens is fairly constant.

The scolex is followed by a short neck, which in turn is followed by a series of immature segments showing slight external segmentation, but indistinct internal organs. Such segments measure from 0.22 to 0.199 mm in length and 0.14 to 0.51 mm in width and their number varies in each specimen.

Fully mature segments measure 0.22 - 0.43 mm in length and 0.62 - 0.87 mm in width and their number also varies from specimen to specimen. The ovary lies in the mid line near the anterior margin of the proglottis, and is bilobed. Each transversely elongated lobe is slightly indented, this being more pronounced in fully mature segments. Behind the ovary lies a compact vitelline gland which measures 0.19 - 0.21 mm. A seminal receptacle is absent.

There are 14 - 17 testes lying in two groups at the sides of the ovary, but not extending laterally beyond the longitudinal excretory vessels. The diameter of each testes is 0.03 - 0.04 mm. The genital openings are unilateral throughout the strobila situated near the anterior end of the segments. The atrium is deep and muscular. The mature proglottids are followed by the gravid ones. In the first few gravid proglottids the genital organs are just poorly visible, but further on these structures disappear and their place is taken up by egg capsules, each usually containing 2-9, or some times more, eggs. The egg capsules do not extend beyond the longitudinal excretory vessels. Gravid proglottis measure 1.23 - 1.48 mm in width and 0.57 - 0.87 mm in length.

With the exception of those in the immature region, all the proglottids of the strobila are broader than long. Each proglottis overlaps the anterior end of the segment following it. The excretory system comprises two pairs of longitudinal excretory canals.

Remarks. The species described above is identified as *R. (Raillietina) flaccida* for the following reasons.

The present specimens resemble *Raillietina (Raillietina) flaccida* in the number and position of testes, structure and position of the ovary, number of eggs in a capsule, position of unilateral genital pores near the anterior end of the proglottis. It is therefore, identified the same. Differences from Meggitt's account are noticed in the size of cirrus sac, shape of vitelline gland and number of testes at the poral and aporal side. Previously *R. (Raillietina) flaccida*, Meggitt (1926) has been reported from the sand grouse (*Pterocles orientalis*) from Rangoon, *Passer domesticus* is a new host record.

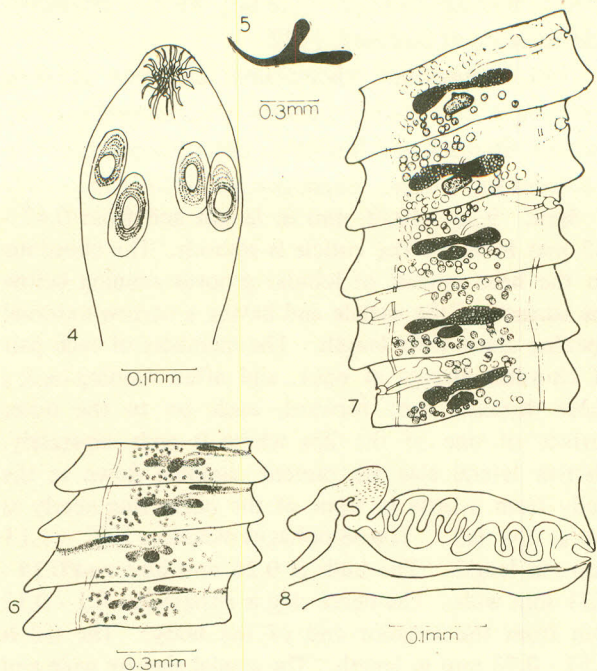
Recently *Raillietina (Raillietina) galeritae* (Skrjabin, 1914) has been described from *Passer domesticus* in Lahore by Khan and Habibullah.¹⁴ As far as authors are aware this is the only species of the genus *Raillietina* reported from the house sparrow in Pakistan. The present specimens are from the same host in Sind, but are different from the species described by Khan and Habibullah.¹⁴ The differences are encountered in the number of testes, position of genital pore, position of ovary, scolex diameter, over all size of the strobila including the immature, mature and gravid proglottids.

Tubanguiella ardeola n.sp.

(Figs. 4 - 8)

Cyclophyllidea Ben. in Braun, 1900; Dilepididae Railliet et Henry, 1909; Dilepidinae Fuhrm, 1907; *Tubanguiella* Yamaguti, 1961. Host. *Ardeola bacchus*. Date. 14-2-73., Incidence. 1%, Intensity. 1, Habitat. Intestine; Description is based on one complete specimen. Catalogue No: SPUK 203.

Only one specimen of this species was collected from



Figs.4-8. *Tubangiella ardeola* n.sp., Fig. 4. Scolex, Fig. 5. Hook at higher magnification, Fig. 6. Immature segments, Fig. 7. Mature segments, Fig. 8. Reproductive organs at higher magnification.

Ardeola bacchus. The scolex of this species was attached to the internal wall of the intestine of the host.

The scolex measures 0.3 mm in diameter and is armed with a single crown of 20 hooks on the rostellum, the latter attaining about 0.14 mm in diameter. The rostellar hooks measure 0.08 - 0.1 mm in length. The suckers measure 0.08 - 0.09 mm in diameter. The scolex is followed by unsegmented neck 0.1 mm long.

The neck is followed by immature segments in which the external segmentation is poor and the internal organs are not distinguishable. These proglottids measure 0.62 - 0.85 mm in width and 0.15 - 0.21 mm in length. All the immature segments are broader than long. Posterior to this region are partly and fully mature proglottids in which the external segmentation becomes prominent. These segments are protoandrous and the 33-45 testes lie in anterior and posterior groups, the posterior group has testes more than the anterior, each testes measuring about 0.03 - 0.04 mm in diameter. The bilobed ovary lies in the median part of the proglottis and is transversely elongated. The total width of the ovary attains 0.44 - 0.39 mm, each lobe measuring 0.03 - 0.06 mm in length and 0.14 - 0.24 mm in width. The poral and aporal parts of the ovary are variable in size. The compact vitelline gland lies posterior to the ovary, and measures 0.11 - 0.12 mm in diameter. The genital openings are marginal and lie in the anterior quarter to one third of the proglottis. The genital openings alternate irregularly in the proglottis through-

out the strobila. The elongated cirrus sac extends almost one third of the way across the segment and measures 0.22 - 0.25 mm in length and 0.05 - 0.06 mm in breadth. At the base of the cirrus sac a prominent seminal vesicle is present which continues into narrow convoluted vas-deferens. Posterior and parallel to the cirrus sac lies the vagina which continues inwards towards the ovary. The mature proglottids measure 0.25 - 0.28 in length and 0.95 - 1.1 mm in width. The strobila does not contain any gravid segments.

Remarks. Only one species of the genus *Tubangiella* has been described by Tubangui et Masilungan, 1937, from *Butaster indicus* namely *Tubangiella buzzardia*. The new species *T. ardeola* from *Ardeola bacchus* represents a second species of the genus. The host is also new for the genus. The present species differs from the only known species *T. buzzardia* in possessing a prominent seminal vesicle, 33-45 testes, smaller ovary, rostellar hooks, 20 in number and 0.08 - 0.1 mm in length with relatively smaller blade.

The seminal vesicle is said to be absent in *Tubangiella* but the present specimens have this structure. The presence or absence of seminal vesicle is a generic character, but the present specimens are included in *Tubangiella* because other morphological features are similar to this genus. As the original (type) specimens of *T. buzzardia* were not examined the absence of seminal vesicle in the genus was not confirmed.

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Emended Diagnosis of the Genus Tubangiella Yamaguti.

Rostellum with a single crown of rostellar hooks. Mature proglottis craspedote, wider than long throughout strobila. Testes numerous, divided into two groups; one anterior and the other *posterior, to female gland; posterior testis more* in number than the anterior. Cirrus pouch well developed, overreaching excretory stems medially. Genital ducts passing between dorsal and ventral excretory stems. Genital pores alternating irregularly. Ovary large, bilobed, occupying whole breadth of intravascular medulla, vitelline gland immediately postovarian. Uterus a transversely elongated sac, lobed confined to intervascular field. Vagina posterior to cirrus pouch; seminal receptacle absent. Seminal vesicle present†, or absent when present it is a prominent structure at the base of the cirrus sac. Parasites of birds.

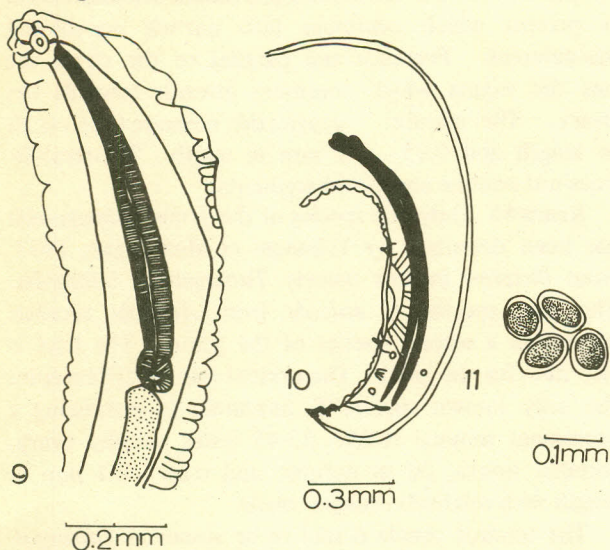
Leipoanema sp. (Figs. 9 - 11)

Oxyuroidea Weinland, 1858; Subuluridae York et Maplestone, 1926; Subulurinae Travassos, 1914; *Leipoanema* Johnston et Mawson, 1942.

*Not necessarily twice in number,

†Obvious in the present specimens.

Host. *Coturnix coturnix*; Date. 14 - 2-73; Incidence. 5%; Intensity. 4-22; Habitat. Stomach and Intestine. Description is based on 4 males and 18 females. Catalogue No. SPUK. 1088



Figs.9-11. *Leipoanema* sp. (Johaston et Mawson, 1942). Fig. 9 Anterior portion of male. Fig. 10 Posterior portion of male, Fig. 11. Eggs magnified.

Male. 8.99-10.88 mm in length and 4.0-4.4 mm in breadth. The esophagus is 0.7 - 0.83 mm long and with the bulb it reaches 0.9 mm in length with a width 0.16 - 1.28 mm. The tail measures 0.08 - 1.92 mm in length. The preanal pseudosucker is situated 0.43 - 1.83 mm from the posterior end of the body. There are 7-9 pairs of caudal papillae of which 5 pairs are preanal and 2-4 pairs postanal. A gubernaculum is present. The spicules measure about 1.0 mm in length.

Female. Larger than males, and of uniform thickness throughout the length of the body except the anterior and posterior extremity which tapers gradually. The length of the body is 13.72 - 25.52 mm and the width reaches 0.35 - 0.38 mm. The tail of the female is 5.44 - 5.76 mm long. The vulva is situated at 6.43 - 7.15 mm from the posterior end of the body. The vagina runs forward for about 9.66 - 9.92 mm before giving off two opposed uterine branches. The eggs measure about 0.065 - 0.07 x 0.05 - 0.051 mm.

Remarks. The specimens belong to the genus *Leipoanema* from the following characters: 1) esophagus with posterior bulb or enlargement; (2) intestine without diverticula; (3) caudal extremity of female prolonged into pointed tail.

The specimens are identified only up to genus because of the lack of literature.

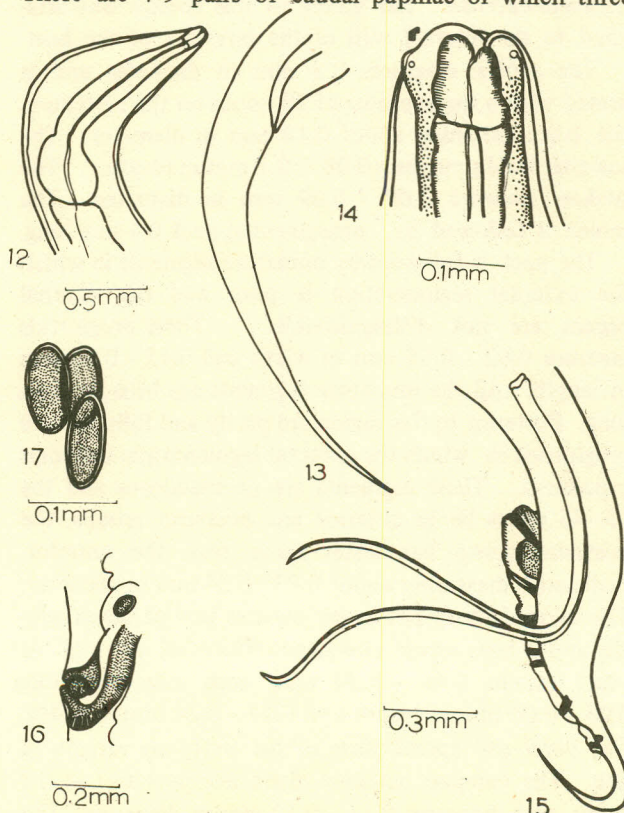
Pseudaspidodera sindia n.sp. (Figs 12 - 17)

Oxyuroidea Cobbold, 1864, Aspidoderidae Freitas,

1956, Spinaspododerinae Freitas, 1956, *Pseudaspidodera* Baylis et Daubney, 1922.

Host. *Amaurornis phoenicurus chinensis* (Chinese bird); Date. 20 - 2 - 73; Incidence. 5%; Intensity. 3 - 6; Habitat. Stomach and Intestine., Description is based on 3 females and 3 males., Catalogue No. SPUK 1082 - 1083

Male. 9.52 - 10.06 mm in length and from 0.47 - 0.5 mm in width. The cuticle is smooth. The chordons on the head consist of lobular grooves running below the surface of the cuticle and having a narrow external opening along their length. The members of each pair of chordon diverge at once, and after running back a short distance turn forward, each on to the outer surface of one of the lips where it ends separately. Narrow lateral alae are present, running down to the body from a little in front of the nerve ring nearly as far as the tail. The oesophagus measures 1.62 - 1.13 mm in length. The bulb is 0.26 mm long and 0.24 - 0.31 mm wide. The nerve ring is situated at 0.1 - 0.12 mm from the anterior end of the body. The tail is 0.57 - 0.73 mm in length. The caudal alae are wide and extend posteriorly to near the middle of the tail. The distal portion of the tail is slender and pointed. The preanal sucker has a diameter of about 0.12 mm and is situated at 0.12 - 0.17 mm from the anal opening. There are 7-9 pairs of caudal papillae of which three



Figs.12-17 *Pseudaspidodera sindia* n.sp., Fig. 12. Anterior portion of female, Fig. 13. posterior portion of female, Fig. 14. Anterior portion of male (enlarged), Fig. 15. Posterior portion of male, Fig. 16. Vulva, Fig. 17. Eggs.

pairs are postanal. The spicules are unequal and dissimilar. The right spicule is slender and simple, measuring about 1.75 - 1.85 mm in length and the left one is about 1.89 - 1.97 mm long.

Female. 10.83 - 13.49 mm in length and 0.38 mm in maximum breadth. The tail tapers and measures about 1.5 mm in length. The vulva is situated behind the middle of the body, at a distance of 4.57 - 6.77 mm from the posterior end. The vagina runs forward at first for a short distance from the vulva, then taking a characteristic turn to the right and dorsally doubles back and runs quite straight posteriorly to a point. It then doubles forwards again, and behind the vulva gives off the two opposed uterine branches. The two oviducts doubling upon themselves in the anterior and posterior halves of the body respectively, return and cross each other, so that the coils of the ovary belonging to the anterior uterus are disposed in the posterior half of the body and those of the other ovary in the anterior half. The eggs are oval measure 0.09 - 0.11 x 0.04 - 0.05 mm

with a shining shell.

Remarks. The genus Pseudaspidodera was erected by Baylis and Daubney, 1922 and four species of this genus are known from the avian hosts Burmese peafowl and *Argus pheasant* and *Pavo cristatus*. The present specimens are larger than the three species *P. pavonis* Baylis, 1922; *P. voluptusa* Chandler, 1926; and *P. spinosa* Maplestone, 1932. The length of esophagus and diameter of preanal sucker of the present specimens is close to *P. pavonis*. The length of the right spicule is similar with the spicule length of *P. voluptusa*. But other diagnostic feature of the present specimens are different from the described species. For instance, the position of nerve ring, length of tail, position of preanal sucker and number of papillae. In the present specimens the number of papillae varies from 7-9 pairs and the length of right spicule varies from 1.75 - 1.85 mm while in other species the spicule length varies from 0.27 - 1.7 mm in length and the number of papillae are 12 pairs.

TABLE 1. COMPARATIVE MORPHOLOGY AND MEASUREMENTS (IN MILLIMETERS) OF DIFFERENT SPECIES OF PSEUDASPIDODERA BAYLIS ET DAUBNEY? 1922.

Species	<i>P.sindia</i> n.sp.	<i>P.pavonis</i> Baylis, 1922	<i>P.vouluptusa</i> Chandler, 1926	<i>P.spinesa</i> Maplestone 1932
<i>Male</i>				
Body length	9.52-10.06	6.0	6.25-9.25	7.9-8.5
Breadth	0.47- 0.55	0.25	0.32-0.38	0.45-0.49
Esoph. length	1.13- 1.62	1.4-1.48	1.3	0.65-0.71
Nerve ring from ant. end.	0.1 - 0.12	0.4-0.46	-----	-----
Tail length	0.57- 0.73	0.38-0.43	0.36-0.39	0.39-0.45
Diameter of pre- anal sucker	0.14-	0.12-0.13	0.1	0.24-0.25
Dist. between Post. tip & preanal sucker	0.17- 0.22	0.15-0.17	0.125-0.16	0.14-0.18
No. of papillae	7-9 pairs	12 pairs	12 pairs	12 pairs.
Rt. spicule	1.75- 1.885	0.78	1.44-1.7	0.27-0.31
left spicule	1.89-1.997	0.45	2.7- 3.4	0.61-0.67
<i>Female</i>				
Body length	10.83-13.49	7	9.35-10.15	9.3- 9.5
Breadth	0.38	0.3	0.46	-----
Vulva	4.67-6.77	3	2.33	3.74-4.05
Tail length	1.55	1	1.05-1.25	1.09
Egg size	0.09-0.11x0.04-0.05 0.04-0.05	0.07-0.04	0.06x0.035	0.06x0.036
.Host	Chineses bird	Burmese peafowl	Argus pheasant	Argus pheasant.

The female of the present species differs from that of the other species in the length of body and position of vulva. In the present specimens the vulva is situated at a distance of 4.67 - 6.77 mm from the posterior end of the body while in the other species it is situated at a distance of 2.33 - 3.00 mm and and 3.47 - 4.05 mm from the posterior end.

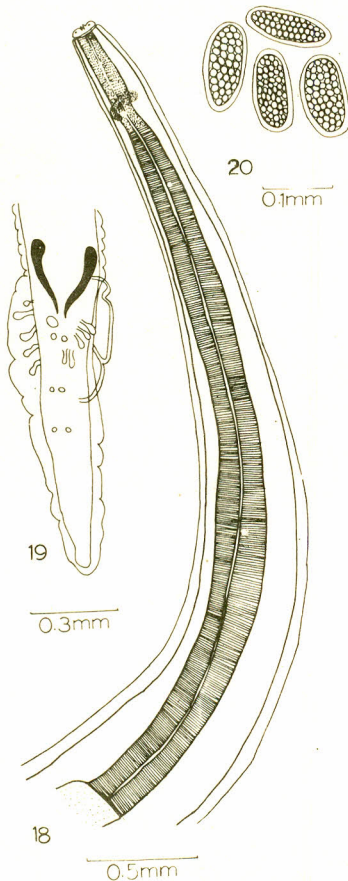
The difference in the body length, size of the spicule, number of papillae, position of vulva and a different host *Amaurornis phoenicurus chinensis* justifies the proposal of a new species. (Table 1).

Physaloptera tadorna n.sp. (Figs. 18 - 20)

Spiruridea, Diesing, 1861; Physalopteridae Leiper, 1908; Physalopterinae Stossich, 1898; *Physaloptera* Rud. 1819.

Host. *Tadorna tadorna* (Sheld - Duck); Date. 12-12-72; Incidence. 15%; Intensity. 6-18; Habitat. Intestine. Description is based on 4 males and 6 females. Catalogue No: SPUK 1084 - 1085

Male. 17.03-19.62 mm in length and 0.54 - 0.66 mm in width. The esophagus has a total length of about 3.58 mm and its anterior muscular portion measuring about 0.41 mm in length. The nerve ring is situated



Figs. 18-20. *Physaloptera tadorna* n.sp, Fig. 18 Anterior portion of male, Fig. 19. Posterior portion of male, Fig. 20 Eggs.

at about 0.32 - 0.36 mm from the anterior end of the body. The tail is 0.79 - 0.81 mm long. At the lateral margin of the tail and on the caudal alae continuous longitudinal ridges are present. Five pairs of pedunculated lateral papillae and the latter three pairs of sessile papillae are present, of the later, one pair is adanal and two pairs are postanal. The couplatory spicules are equal and measure about 0.28 - 0.29 mm in length. In most of the specimens caudal alae are well developed. The tail is slightly pointed and curved.

Female. 21.16-26.09 mm in length and 0.61 - 0.73 mm in breadth. The cuticle is smooth. Total length of esophagus is about 4.15 mm. The nerve ring is situated 0.29 - 0.31 mm from the anterior end of the body. The tail is conical with a blunt tip and measures 0.25 - 0.31 mm in length. The vulva which is not prominent in all the specimens is situated nearly in the anterior half of the body at a distance of 7.56 - 8.13 mm from the head end. There is a thick walled vagina, 0.8 - 0.18 mm in length leading to a large, some what pyriform egg chamber. The oval eggs measure 0.12 - 0.13 x 0.05 - 0.06 mm.

Remarks. The genus *Physaloptera* was erected by Rudolphi in 1819, Approximately 24 species have been described from different localities²⁵. Recently *Physaloptera badiata*¹ was described from *Accipitar badius* of Manchur Lake (Sind), which represents the only report of this genus from bird of Pakistan. A few species are known from India, one which is common is *P. alata* Rud., 1819. Present specimen resemble to some extent to both *P. alata* and *P. badiata*, description of the later is based on male specimens only. Male of *P. tadornae*; is larger than *P. badiata* and has a different position of nerve ring, different spicule sizes, and different number of caudal papillae. The spicules of the present specimens are 0.28 - 0.29 mm in length, the nerve ring is situated at a distance of 0.36 - 0.98 mm from the anterior end and caudal papillae are 5 pairs pedunculate and 3 pairs sessile; where as in *P. badiata* the nerve ring is situated at a distance of 0.32 mm from the anterior end, spicules are 0.50 and 0.56 mm in length and the caudal papillae are 5 pairs sessile. As far as length of spicule is concerned the present species resembles *P. alata* (i.e. 0.28 - 0.29 mm, while in *P. alata* these are 0.265 - 0.28 mm in length). The number of papillae are different, these being 5 pairs sessile and 5 pedunculate pair, in *P. alata*. The position of vulva is in anterior 1/3 of the body in *P. tadornae*, but in *P. alata* it is in the anterior fifth varying from 0.45 - 7.0 mm from the anterior end (Baylis, 1939)(Table 2).

The difference in the body size, sizes of the spicules, and 3 pairs of sessile papillae instead of 5, more posteriorly situated and a different host serves to separate specimens from *P. badiata* and *P. alata* and they are

TABLE 2. COMPARATIVE MORPHOLOGY AND MEASUREMENTS (IN MILLIMETERS) OF THE NEW SPECIES *P. tadorna* WITH CLOSELY RELATED SPECIES.

	<i>P. tadorna</i> n.sp.	<i>P. badiata</i> ¹
<i>Maie</i>		
Body length	17.03-19.62	15.64
Breadth	0.54- 0.66	0.62
Esop. length	3.58	3.69
Position of nerve ring fromantend of body	0.32- 0.36	0.32
Tail length	0.79- 0.81	1.08
Spicule (a)	0.28	0.50
Spicule (b)	0.29	0.56
No. of papi	5 pairs pedunculate & 3 pairs sessile	5 pairs pedunculate 5 pairs sessile
<i>Female</i>		
Body length	21.6- -26.09	
Breadth	0.61-0.73	
Esop. length	4.15	
Nerve ring from ant. end of body	0.29- 0.31	
Tail length	0.25- 0.31	
Vulva from ant end of body	7.56- 8.13	
Vagina	0.18- 0.8	
Egg size	0.12- 0.13 x 0.05-0.06	
Location	Intestine	Intestine
Host	<i>Tadorna tadorna</i> (Duck)	<i>Accipitar badius</i>

regarded a new species *Physaloptera tadorna*. The species name *tadorna* refers to the host.

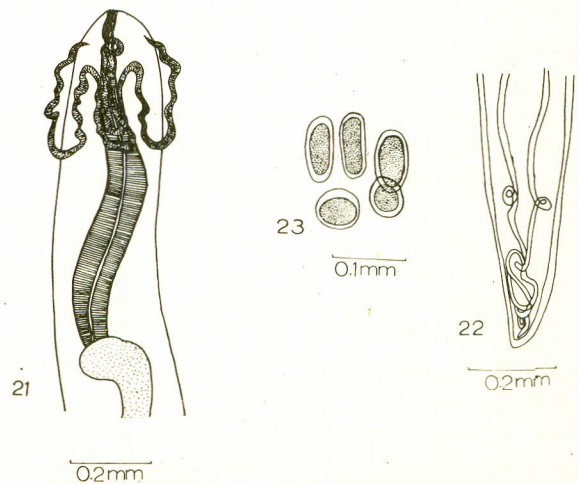
Dispharynx sp. (Figs. 21 - 23)

Spiruroidea Diesing, 1861 Acuariidae Seurat, 1913; *Dispharynx* Railliet, Henry et Sisoff, 1912.

Host: Sheld-Duck, *Tadorna tadorna*; Location. Stomach & Intestine. Description is based on one female specimen only. Catalogue No. SPUK 1086 .

Description . These are smaller worms. The body is relatively stout and curled ventrally, especially towards the posterior end and measures 9.63 mm in lenth and 0,29 mm in breadth. The lips are small and conical. The four cuticular chordons are wavy and extends for a distance of about 0.28 mm from the anterior extremity. The head is not marked off from the rest of body. The esophagus is divided into two portion. The anterior muscular portion measures 0.28 mm and the posterior glandular portion 0.62 mm. The total length of the esophagus is thus about 0.9 mm, The nerve ring is

situated about 0.1 mm from the anterior end of the body. The tail is conical, about 0.25 mm in length. Eggs 0.05 - 0.07 by 0.039 - 0.049. Vulva in the posterior region of the body.



Figs. 21-23. *Dispharynx* sp., Fig. 21 Anterior portion of female, Fig. 22. Posterior portion of female. Fig. 23. Eggs.

Remarks. In Pakistan previously nematode of the genus, *D. alata* is reported from Lahore in *Toccus birostris*². The present is the second report of the genus from Pakistan and from a new host and locality. *Dispharynx spiralis* Molin, 1858 has been described from Galliformes³⁻⁴ and *D. ketupae*²¹ in *Ketya zeylonensis* of India. More than 17 species have been described from other countries including Japan, Australia, N African, N. America and Java²⁵. Species of the genus are also reported from Cuba⁶⁻⁷ and Russia (Kobishev, 1969).

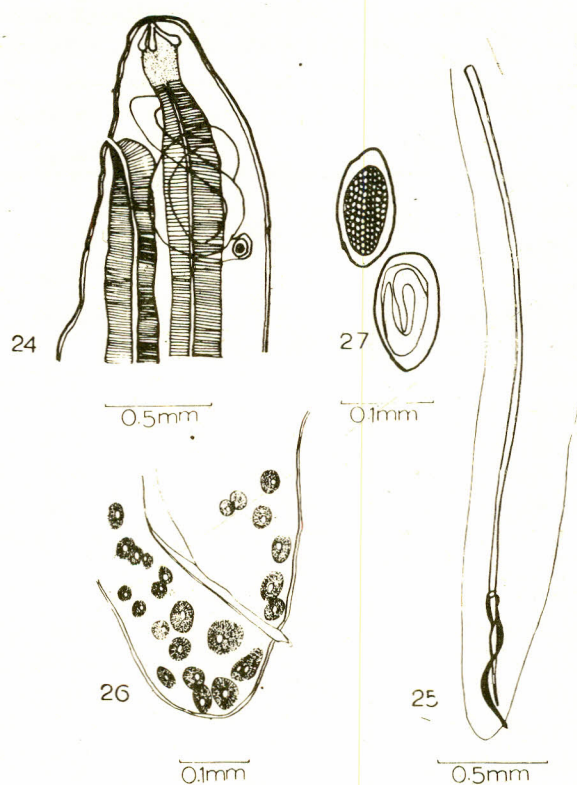
A detailed study shows that the present nematode from sheld-duck collected in Karachi belongs to the genus *Dispharynx* Railliet Henry et Sisoff, 1929. This is a new host record for the genus. Three species of this genus are described from Fowl, guinea pig, pigeon and galliformes, *Pavocristatus* (Pea fowl), and the Hornbill *Toccus birostris*. The present female is large with large eggs than all three species namely *Acuaria* (D.) *spiralis* Molin, 1858., Railliet, Henry and Sisoff, 1912; *D. pavonis* Sanwal,²¹ *D. alata* Akhtar². The present specimen also differs from all other species in the length of esophagus, position of nerve ring, length of tail, and posterior extension of cordons. The vulva is inconspicuous. The description is not complete as it is based on only one female specimen. Therefore species identification is not possible.

Diplotriaena streptopelia n.sp. (Figs. 24-27)

Filaroidea Weinland, 1858; *Filariidae* Claus, 1885; Diplotrianeninae Skrjabin, 1916; *Diplotriaena* Railliet & Henry, 1909,

Host. Dove, *Streptopelia senegalensis*; Location. Stomach & Intestine; Catalogue No. SPUK 1087. Description is based on 2 males and 4 females.,

Male. 29.9 – 30.79mm in length and 0.50-0.55 mm in breadth. The tridents are 0.11 - 0.12mm in length and 0.02 - 0.021mm in diameter. The esophagus has a total length of about 6.71mm, the anterior portion measuring about 0.15 mm and posterior portion 6.56 mm in length. Head is bluntly rounded. The anterior most portion of the fixed specimens becomes slightly narrower from its usual uniformity, while the posterior end in the fixed specimens becomes slightly curved. The tail end is rounded. Caudal alae are lacking. Caudal papillae are sessile, numerous, beginning in front of the cloacal aperture to near the tail. The copulatory spicules are dissimilar. The left spicule is straight longer and measures about 2.86 mm in length. The other spicule is smaller, but thicker. It measures about 0.64 mm in length. The spicules have a broad base and a tapering extremity which does not protrude from the genital opening. There are 6 to 8 pairs of large caudal



Figs. 24-27 *Diplotriaena streptopelia* n.sp., Fig. 24. Anterior portion of female, vulva in esophageal region is visible, Fig. 25. Posterior portion of male., Fig. 26. Posterior extremity. caudal papillae, Fig. 27. Eggs.

papillae and numerous small papillae in the posterior region of the body. All these papillae are sessile. Unlike the female, the male genital orifice is posteriorly situated.

Female. 76.0 – 77.67 mm in length and 0.7 mm in width. The vulva is situated at a distance of 0.27-0.29 mm from the anterior end. The vagina is muscular and measures about 1.14 mm. It passes backward without branching and then gives rise to parallel uterine branches occupying the space through out the body length except at the anterior and posterior regions of the body. The major portion of the body is occupied by two uterine tubes, filled with eggs in various stages of development. The worms are oviparous. The eggs are thick shelled & embryonated, smooth shelled, measuring about 0.04 – 0.06 x 0.029 – 0.030 mm in size.

Remarks. According to Lopez – Neyra¹⁵ the genus *Diplotriaena* can be distinguished into two groups namely *Euranisospiculum* with female 80 – 100 mm long and their males with widely unequal spicules and *Stenoanisospiculum* with their females less than 100 mm in length and their males with spicules not widely unequal. The present specimens can be included into the first grouping useful for the purpose of identification of the large number of species in the genus. But they

suggested slight modification in the range of female body length in the two groups.

The genus *Diplotriaena* was erected by Railliet et Henry, 1909 and based on the description of *D. ozouzi* from *Fuadias madagascariensis*. Later on more than 77 species were added to this genus from workers of different parts of the world. Ogdon¹⁷ Pinto and Moronta,¹⁹ and Olson and Bayer¹⁸ added some more species from Australia, Brazil and N. America. Out of these 16 species are reported from India, one from Pakistan.

D. tricuspis (Fedschenko, 1874) Seurar, 1915; *D. bhamoensis* (Parona, 1889); *D. graculi* (Maplestone, 1931); *D. dubia* (Maplestone, 1931); *D. nagpurensis* (Karve, 1934); *D. kennedi* (Grewal, 1965); *D. indica* (Singh, 1962); *D. kumaunensis* Singh, 1962; *D. mukteswarensis* (Singh, 1962); *D. tristisi* (Mojumdar & Chakravarty, 1963); *D. malpastis* (Mojumdar & Chakravarty, 1963); *D. sturnopastori* (Mojumdar & Chakravarty, 1963); *D. buckleyi* (Fotedar & Kaw, 1968).

The species listed from Pakistan is *D. nocti* (Hoepli et Hsu, 1929); but this is not sufficiently known and is reported from the birds *Pastor roseus* and *Acridotheres ginginianus*²⁶.

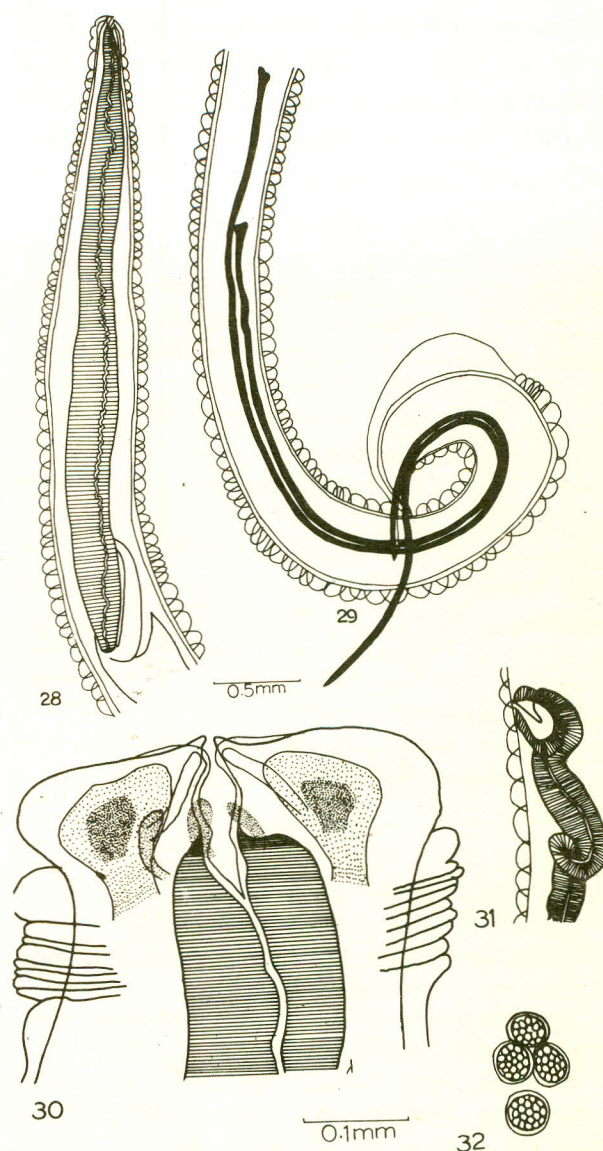
Most out of more than 77 species listed in the literature are insufficiently described, therefore the present specimens are compared only with the fully known species and with the species described from India. The present species differs from the Indian species in the sizes of body of the males and females, length of the spicules and sizes of the eggs. As far as other species are concerned *D. ozouzi* is somewhat close to the present species in length of small spicule and number of papillae. But differences are found in body sizes and distance of vulva from anterior end which is more in *D. ozouzi*. The present species therefore, is regarded new and the name *D. streptopelia* is given referring to the genus of the host. The bird *Streptopelia senegalensis* is a new host recorded for the genus. Species of the genus described recently are also distinct from the present species¹⁹ and are from different hosts.

Amplicaecum sp. (Figs. 28 - 32)

Ascarididea Chitwood et Chitwood, 1937., Heterocheilidae Railliet et Henry, 1915; *Amplicaecum* Baylis, 1920.

Host *Phalacrocorax carbo sinensis*; Location. Stomach & Intestine; Catalogue No: SPUK. 1089. Description is based on 6 males and 4 females.

Male. The worms are thick and large. Cuticle is finely striated. They are uniform in thickness throughout the body length, except the anterior and posterior extremities which gradually taper. Posterior portion of the body is slightly coiled. The body is 27.30 -



Figs. 28-32. *Amplicaecum* sp. (Baylis, 1920)., Fig. 28. Anterior portion of male, Fig. 29. posterior portion of male, Fig. 30. Anterior portion of female, Fig. 31. Vulva magnified.

28.1mm in length. The greatest thickness is 0.85 - 0.87 mm. The diameter of the head is 0.23 - 0.24 mm. The lips are nearly square in outline. They have a deep indentation on the inner surface at the anterior margin. The interlabia are very small and almost hidden by the lips. There are well marked interlabial grooves, which nearly meet on the outer surface of the base of each lip. The grooves have prominent membranous cuticular borders posteriorly. The esophagus measures 2.32 mm in length. Developed, but rather narrow, intestinal caecum is present. Cervical papillae are very small and indistinct. The tail is conical and measures 0.19 mm in length. Spicules are large. Caudal alae highly developed. There are two pairs of postanal and 11 pairs of preanal papillae of which the first and third from the top of the tail are ventral, the rest lateral in position,

those nearest to the cloaca being very small, the more anterior much larger. There is also a small, median papilla on the anterior lip of the cloaca. The spicules are equal, simple, cylindrical and remarkably large measuring 4.87 - 4.89 mm in length.

Female. 24.90 - 39.89 mm. The tail is conical 0.26 - 0.43 mm in length. One pair of caudal papilla is present. The vulva is situated at a distance of 13.45 - 14.71 mm from anterior end. There is a long coiled and muscular vagina which follows a very irregular course in a posterior direction. The two uterine branches are wide and thin walled, run backward with a rather sinuous course. The tail of the ovaries occupy the posterior region of the body. The eggs are oval and have rather thin shells.

Remarks. The present specimens are included in the genus *Amplicaeum* due to the presence of following characters: (1) Presence of lips. (2) Oesophagus without bulb. (3) Ventriculus and ventricular appendix absent. (4) Intestinal caecum present. (5) Spicules equal and gubernaculum absent. (6) Vulva in anterior part of body. As the literature was not available these specimens are identified only upto generic level.

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