

SOME TREMATODES FROM AVIAN HOSTS OF INDIA

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ABSTRACT

Six species of Digenea are reported. New species of *Platynotrema* (Family Dicrocoelidae) from the gall bladder of *Coturnix coturnix* (Linnaeus), and from *Zonorchis* from the gall bladder of *Pastor roseus* are described. *Z. delectans* (Braun, 1901) Travassos, 1914 from the gall bladder of *Coturnix coromandelica* (Gmelin) is reported. From the Family Notocotylidae, three new species, one from the genus *Catatropis*, from the intestine of *Anas poecilorhyncha* (Forster), and two from the genus *Notocotylus*, one from the intestine of the same host and one from the intestine of *Casarca ferruginea* (Vroeg).

Key words: Digenea, parasites, worms, new species. India.

RESUMEN

Se incluyen seis especies de Digenea. Se describen nuevas especies de *Platynotrema* de la vesícula biliar de *Coturnix coturnix* (Linnaeus) y de *Zonorchis* (Familia Dicrocoelidae) de la vesícula biliar de *Pastor roseus*. *Z. delectans* (Braun, 1901) Travassos, 1914 de la vesícula biliar de *Coturnix coromandelica* (Gmelin) se registra. Se describen tres nuevas especies de la Familia Notocotylidae, una del género *Catatropis* del intestino de *Anas poecilorhyncha* (Forster) y dos del género *Notocotylus*, uno del intestino del huésped anterior y uno del intestino de *Casarca ferruginea* (Vroeg).

Palabras Clave: Digéncos, Parásitos, Gusanos, Nuevas especies. India.

During the survey of trematode parasites of vertebrates, numerous specimens were collected from a variety of avian hosts from Lucknow. The trematodes were fixed in FAA, stained in either Ehrlich's Haematoxylin or Acetic alum carmine and mounted in Canada balsam. All measurements are in microns unless otherwise indicated. The type and paratype specimens would be deposited in Prof. G. S. Thapar Helminthological Collection.

Family — Dicrocoelidae Odhner, 1911
Platynotrema caballeroi sp. nov.
(Pl. I. Figs. 1-3)

Six specimens of this from were collected from the gall bladder of a Common or Gray Quail, *Coturnix coturnix* (Linnaeus) from Lucknow.

Description: Body elliptical, rounded at extremities, aspinose, 4.27 to 6.95 mm long, 2.65 to 5.3 mm wide. Oral sucker terminal or subterminal, subs-

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spherical, 0.57 to 0.95 mm long, 0.65 to 1.15 mm wide. Prepharynx absent. Pharynx oval or globular, 0.24 to 0.25 mm long 0.25 to 0.32 mm wide. Oesophagus tubular, 0.12 to 0.32 mm long, dividing into two simple, intestinal caeca extending up to a little anterior to hind end of body. Ventral sucker spherical, larger than oral sucker, preequatorial, 0.75 to 1.30 mm long, 0.75 to 1.30 mm wide, at 2.4 to 2.78 mm from anterior end of body.

Genital pore median, just behind intestinal bifurcation at 1.0 to 1.35 mm from anterior end of body.

Excretory bladder tubular. Excretory pore subterminal at posterior end of body.

Testes entire, spherical or oval, equal or subequal, symmetrical, immediately preacetabular or slightly overlapping it, at 2.18 to 2.60 mm from anterior end of body. Right testis 0.3 to 0.6 mm long, 0.25 to 0.55 mm wide. Left testis 0.25 to 0.50 mm long, 0.25 to 0.55 mm wide. Cirrus sac claviform, 0.3 to 0.6 mm long, 0.1 to 0.11 mm wide just posterior to intestinal bifurcation. Vesicula seminalis convoluted; pars prostatica small and cirrus short.

Ovary entire, oval, median or submedian, 0.22 to 0.55 mm long, 0.20 to 0.7 mm wide. Just below ventral sucker or slightly overlapping it, at 3.35 to 4.0 mm from anterior end of body. Receptaculum seminis small, saccular, close to ovary 0.15 to 0.16 mm long, 0.10 to 0.15 mm wide. Vitellaria lateral, follicular, discontinuous, extending from anterior end of testes up to a little anterior to termination of intestinal caeca. Transverse vitelline ducts of two sides unite to form a common vitelline duct to open at Ootype, surrounded by a large number of Mehli's gland cells. Uterus highly convoluted, intercaecal or extracaecal, extending from hind end of body up to middle of ventral sucker. Eggs oval,

operculated, 0.035 to 0.042 mm long, 0.02 to 0.035 mm wide.

Host: Common or Gray Quail, *Coturnix coturnix* (Linnaeus).

Location: Gall bladder.

Locality: Lucknow.

Discussion: Nicoll (1914) created the genus *Platynotrema* with *P. biliosum* as its type species. Tubangui (1931) created a new genus *Euparadistomum* with *E. varani* as its type species. Chatterji (1952) while describing *P. upapai* considered that the genera *Platynotrema* and *Euparadistomum* are identical except in the extension of uterus which in *Platynotrema* is confined to postacetabular region while in *Euparadistomum* it extends throughout the whole body. He, therefore, regarded *Euparadistomum* as a synonym of *Platynotrema*. Oshmarin (1952) described *Praeorchitrema praeorchis* from *Capella gallinago* in Russia. Baugh (1956) while describing *Platynotrema indica* from *Calotes versicolor* from Lucknow, considered the genus *Euparadistomum* as a synonym of *Platynotrema*. Yamaguti (1958) transferred *P. praeorchis* to the genus *Platynotrema*. Fischthal and Kuntz (1965) considered *Euparadistomum* as a distinct genus from *Platynotrema* in having a Y-shaped excretory bladder whereas in *Platynotrema* it is tubular. Padmavathi (1971) described *P. francolini* from the gall bladder of partridges from Madras.

The authors are in favour of Fischthal and Kuntz and consider *Euparadistomum* and *Platynotrema* distinct from each other. Accordingly, *Platynotrema indica* should be *E. indica* (Baugh, 1956) n. comb.

Due to the presence of tubular excretory bladder the present form is referred to the genus *Platynotrema*. The genus *Platynotrema* comprises *P. biliosum* Nicoll, 1914, *P. jecoris* Nicoll, 1914, *P. praeorchis* Oshmarin, 1952, *P. upapai*

Chatterji, 1952 and *P. francolini* Padmavathi 1971. The new form differs from all the above-mentioned species of the genus *Platynotrema* in the extension of vitellaria from anterior end of testes up to a little anterior to termination of intestinal caeca. The new form further differs from all the species except *P. upupai* and *P. francolini* in the extension of uterine coils from hind end of body up to middle of oral sucker and in having genital pore just behind intestinal bifurcation. The new form differs from both these forms in the presence of receptaculum seminis, in the arrangement of vitellaria and in having ovary entire instead of irregular. Accordingly it is regarded as a new species with the specific name *P. caballeroi* sp. nov.

The new species is named for Dr. Eduardo Caballero y Caballero in recognition of his contribution to Mexican Parasitology.

Zonorchis pastori sp. nov.
(Pl. 2. Figs. 1-2.)

Only two specimens of this form were collected from the gall bladder of a Rosy Pastor or Rosecoloured Starling, *Pastor roseus* (Linnaeus) from Lucknow.

Description: Body elongated, aspinose, 5.50 to 6.0 mm long, 1.4 to 1.62 mm wide. Oral sucker subterminal, subspherical, 0.26 to 0.28 mm long, 0.3 to 0.31 mm wide. Pharynx subglobular, 0.15 to 0.16 mm long, 0.18 to 0.21 mm wide. Oesophagus short, 0.20 to 0.30 mm long. Intestinal caeca simple, terminating at about one third distance from posterior end of body. Ventral sucker subspherical, larger than oral sucker, 0.6 to 0.65 mm long, 0.60 to 0.70 mm wide, close to intestinal bifurcation at 0.76 to 1.12 mm from anterior end of body.

Genital pore submedian, lying immediately behind pharynx at 0.42 to 0.45 mm from anterior end of body.

Excretory bladder tubular. Excretory pore terminal.

Testes entire, symmetrical, ovoidal, intercaecal, lying partly in zone of ventral sucker or slightly posterior to it at 1.32 to 1.79 mm from anterior end of body. Right testis 0.56 to 0.58 mm long, 0.39 to 0.48 mm wide. Left testis 0.51 to 0.60 mm long, 0.41 to 0.45 mm wide. Cirrus sac small, 0.43 to 0.52 mm long, 0.14 to 0.15 mm wide lying between hind end of pharynx and anterior end of ventral sucker or a little anterior to it. Vesicula seminalis coiled, 0.26 to 0.33 mm long. Pars prostatica short, surrounded by a large number of prostate gland cells. Ejaculatory duct tubular, opens at genital pore.

Ovary entire, spherical, submedian, 0.26 to 0.28 mm in diameter lying a little posterior to testes at 1.9 to 2.55 mm from anterior end of body. Receptaculum seminis saccular, lying closely posterior to ovary, 0.20 to 0.29 mm long, 0.07 to 0.20 mm wide. Vitellaria follicular, clustered, extracaecal or caecal, extending from hind end of testes up to a little anterior to termination of intestinal caeca. Transverse vitelline ducts of two sides unite to form a common vitelline duct to open at Ootype surrounded by a large number of Mehli's gland cells. Uterus compactly coiled, occupying mostly posterior two third of body. Eggs oval, 0.030 to 0.035 mm long, 0.020 to 0.022 mm wide.

Host: *Pastor roseus* (Linnaeus) Rosy pastor or Rose coloured Starling.

Location: Gall bladder.

Locality: Lucknow.

Discussion: The new form differs from all the known forms of the genus *Zonorchis* Travassos, 1944 except *Z. macrorchis* Faust, 1966 and *Z. multivittatus* Faust, 1966 in having caeca much shorter than in other species of the genus. It differs from both these forms

in having genital pore immediately behind pharynx and in having cirrus sac between hind end of pharynx and anterior end of ventral sucker of a little anterior to it. It further differs from *Z. macrorchis* in the extension of vitellaria from hind end of the testes instead of from level of ovary, in having ovary spherical and submedian instead of ovoidal and median. It can further be distinguished from *Z. multivitellatus* in the extension of vitellaria from hind end of testes up to a little anterior to termination of intestinal caeca instead of from level of testes up to finger like posterior projection of body and in the absence of finger like appendix at posterior end of body. Accordingly it is regarded as a new species with the specific name *Z. pastori* sp. nov.

Zonorchis delectans (Braun, 1901)

Travassos, 1944

(Pl. 3. Figs. 1-3)

A large number of specimens of this form were collected from the gall bladder of Blackbreasted of Rain Quail, *Coturnix coromandelica* (Gmelin) obtained locally at Lucknow.

Description: Body lanceolate, 5.8 to 10.5 mm long, 1.2 to 4.4 mm wide. Oral sucker terminal or subterminal, spherical or oval, 0.45 to 0.7 mm long, 0.45 to 0.7 mm wide. Pharynx spherical or sub-spherical, 0.1 to 0.25 mm long, 0.14 to 0.25 mm wide. Oesophagus short, tubular, 0.2 to 0.45 mm long, dividing into two simple, narrow intestinal caeca terminating a little anterior to hind end of body. Ventral sucker spherical, or sub-spherical, smaller, equal or larger than oral sucker, close or away to intestinal bifurcation, 0.5 to 0.7 mm long, 0.5 to 0.75 mm wide at 1.0 to 1.75 mm from anterior end of body.

Genital pore at pharynx or slightly posterior to it, 0.60 to 0.80 mm from anterior end of body.

Excretory bladder tubular. Excretory pore terminal.

Testes entire, spherical or oval, symmetrical or slightly diagonal in zone of ventral sucker or posterior to it. Right testis 0.2 to 0.5 mm long, 0.30 to 0.45 mm wide at 1.55 to 2.4 mm from anterior end of body. Left testis 0.20 to 0.5 mm long, 0.3 to 0.6 mm wide at 1.67 to 2.6 mm from anterior end of body. Cirrus sac 0.21 to 0.6 mm long, 0.10 to 0.20 mm wide, extending from pharynx up to intestinal bifurcation, containing vesicula seminalis, pars prostatica and ejaculatory duct opening at genital pore.

Ovary entire, spherical or oval, submedian, posttesticular, 0.28 to 0.5 mm long, 0.31 to 0.6 mm wide, lying in middle third of body at 2.42 to 4.0 mm from anterior end of body. Receptaculum seminis small, pear shaped, 0.15 to 0.28 mm long, 0.10 to 0.25 mm wide. Vitellaria follicular, lateral, extracaecal or caecal, extend either from anterior, mid or posterior region of ventral sucker up to a little anterior to termination of intestinal caeca. Uterus compact or loosely coiled throughout area between ventral sucker and hind end of body, on return, passing between gonads and beside cirrus sac to open at genital pore. Eggs oval, 0.022 to 0.028 mm long, 0.015 to 0.018 mm wide.

Host: *Coturnix coromandelica* (Gmelin)

Blackbreasted or Rain Quail.

Location: Gall bladder.

Locality: Lucknow.

Discussion: Jaiswal (1957) described *Z. singhi* from a Peacock *Pavo cristatus* from India and distinguished it from *Z. delectans* (Braun, 1901) Travassos, 1944 in having ovary and testes subequal instead of unequal, in having testes distinctly posterior to ventral sucker instead of being partly in the zone of ventral sucker and in the extension of vitellaria from hind end of ventral

sucker instead of from mid region of ventral sucker. In the authors specimens ovary and testes are subequal or unequal, testes lying either in the zone of ventral sucker or posterior to it and vitellaria extend either from anterior, mid or posterior region of ventral sucker. Accordingly *Z. singhi* is considerate a synonym of *Z. delectans*.

The present form belongs to *Z. delectans* (Braun, 1901) Travassos, 1944 but however differs from it in the extension of cirrus sac up to intestinal bifurcation instead of extending up to ventral sucker, in the extension of vitellaria either from anterior, mid or posterior region of ventral sucker instead of from mid region of ventral sucker and in the relative size of various organs. These differences are considered as individual specific variations.

No form of the genus *Zonorchis* has been described so far from Blackbreasted or Rain Quail, *Coturnix coromandelica* (Gmelin).

Family: Notocotylidae Luhe, 1909

Catatropis rauschi sp. nov.

(Pl. 4. Fig. 1)

Four specimens of this form were collected from the intestine of a Spotbill or Gray Duck, *Anas poecilorhyncha* (Forster) from Lucknow.

Description: Body elongated with attenuated anterior and rounded posterior end, aspinose, 2.11 to 2.66 mm long, 0.62 to 0.97 mm wide. Ventral glands with three longitudinal rows, median row forming continuous ridge and lateral rows separated with 4 to 6 glands. Oral sucker terminal or subterminal, spherical or subspherical, 0.09 to 0.10 mm long, 0.10 to 0.12 mm wide. Pharynx absent. Esophagus 0.10 to 0.16 mm long. Caeca simple, passing between testes, extending up to a little anterior to hind end of body.

Genital pore median, close behind oral sucker at 0.11 to 0.12 mm from anterior end of body.

Excretory bladder Y-shaped. Excretory pore subterminal.

Testes lobed, extraeacal, symmetrical, in hind region of body at 1.57 to 2.17 mm from anterior extremity. Right testis 0.47 to 0.7 mm long, 0.25 to 0.32 mm wide. Left testis 0.47 to 0.67 mm long, 0.22 to 0.35 mm wide. Cirrus sac elongated, claviform, 0.62 to 0.87 mm long, 0.09 to 0.12 mm wide, extending up to anterior third of body. Vesicula seminalis interna, 0.08 to 0.1 mm long. Vesicula seminalis externa highly convoluted. Pars prostatica 0.1 to 0.24 mm long. Ejaculatory duct 0.45 to 0.56 mm long opening into genital pore.

Ovary lobed, median, intertesticular, 0.27 to 0.35 mm long, 0.16 to 0.22 mm wide, at 1.65 to 2.37 mm from anterior end of body. Receptaculum seminis absent. Vitellaria follicular, extraeacal, extending from mid of body up to anterior end of testes. Transverse vitelline ducts of two sides unite to form a common vitelline duct to open at Ootype, surrounded by a large number of Mehl's gland cells. Uterus forms transverse coils intercaecally and runs as a thin walled tube at side of cirrus sac to form metratrum, longer than cirrus sac, 0.07 to 0.10 mm long. Eggs with thin long filaments at ends, 0.020 to 0.022 mm long. 0.01 to 0.02 mm wide.

Host: *Anas poecilorhyncha* (Forster)

Spotbill or Grap Duck.

Location: Intestine.

Locality: Lucknow.

Discussion: The new form is referred to the genus *Catatropis* Odhner, 1905. The new form differs from all the known species of the genus *Catatropis* except *C. pricei* Harwood, 1939 and *C. indicus* Srivastava, 1935 in having genital pore close behind the oral sucker. The

new form differs from these forms in having 4 to 6 ventral glands instead of 10 to 12 in *C. indicus* and 9 to 11 in *C. pricei*. The new form further can be distinguished from *C. pricei* in the extension of cirrus sac up to anterior third of body and from *C. indicus* in having metraterm longer than cirrus sac. Accordingly it is regarded as a new species with the specific name *C. rauschi* sp. nov.

The new species is named in honour of Dr. R. L. Rausch, Department of Health Education and Welfare, Fairbanks, Alaska.

Notocotylus poecilorhynchai sp. nov.
(Pl. 5. Fig. 1)

Only one specimen of this form was collected from the intestine of a Spot-bill or Gray Duck, *Anas poecilorhyncha* (Forster) from Lucknow.

Description: Body elongated with attenuated anterior and rounded posterior end, aspinose, 2.9 mm long, 0.9 mm wide. Ventral glands with three longitudinal rows; median row with 11 and lateral rows with 12 glands. Oral sucker subterminal, spherical, 0.15 mm in diameter. Pharynx absent. Esophagus short, tubular, 0.07 mm long. Caeca undulating passing between testes, terminating a little anterior to hind end of body.

Genital pore median at level of intestinal bifurcation, 0.22 mm from anterior end of body.

Excretory bladder Y-shaped. Excretory pore subterminal.

Testes lobed, extraeacal, symmetrical, in hind region of body at 2.25 mm from anterior end of body. Right testis 0.42 mm long, 0.27 mm wide. Left testis 0.58 mm long, 0.19 mm wide. Cirrus sac elongated, claviform, 0.66 mm long, 0.11 mm wide. Vesicula seminalis interna 0.15 mm long. Pars prostatica 0.17 mm long. Ejaculatory duct 0.27 mm long,

opening at genital pore. Vesicula seminalis externa absent.

Ovary bilobed, median, intertesticular, 0.17 mm long, 0.22 mm wide at 2.35 mm from anterior end of body. Receptaculum seminis absent. Vitellaria follicular, extraeacal, extending from mid level of body up to anterior end of testes. Transverse vitelline ducts of two sides unite to form a common vitelline duct to open at Ootype surrounded by a large number of Mehlis's gland cells. Uterus forms transverse coils intercaecally up to base of cirrus sac and then runs as a thin walled tube at side of cirrus sac. Metraterm smaller than cirrus sac opening at genital pore. Eggs with thin long filaments at ends, 0.014 to 0.016 mm long, 0.006 to 0.01 mm wide.

Host: *Anas poecilorhyncha* (Forster)
Spotbill or Gray Duck.

Location: Intestine.

Locality: Lucknow.

Discussion: The new form differs from all the known species of the genus *Notocotylus* Diesing, 1839 except *N. gibbus* (Mehlis in Creplin, 1846) Kossac, 1911; *N. chionis* Baylis, 1928; *N. tachyeretis* Duthoit, 1931; *N. babai* Bhalerao, 1935; *N. lucknowensis* (Lal, 1935) Ruiz, 1946; *N. micropalmae* Harwood, 1939 and *N. regis* Harwood, 1939 in having genital pore at level of intestinal bifurcation. The new form can be distinguished from all the above mentioned forms except *N. babai* in having no vesicula seminalis externa. It, however, differs from it in having 12 ventral glands in lateral row and 11 in median row instead of 17 ventral glands in lateral row and 15 in median row and in the extension of vitellaria from mid level of body instead of from anterior three fifth of it. Accordingly it is regarded as a new species with the specific name *N. poecilorhynchai* sp. nov.

Notocotylus casarca sp. nov.
(Pl. 6. Figs. 1-2)

Eight specimens of this form were collected from the intestine of a Brahminy Duck or Ruddy Sheldrake, *Casarca ferruginea* (Vroeg) from Lucknow.

Description: Body elongated with attenuated anterior and rounded posterior end, aspinose, 3.8 to 4.9 mm long, 0.85 to 1.34 mm wide. Ventral glands with three longitudinal rows. Each row with 6 to 10 glands. Oral sucker terminal, spherical or subspherical, 0.10 to 0.16 mm long, 0.11 to 0.17 mm wide. Pharynx absent. Esophagus 0.1 to 0.2 mm long. Caeca simple, passing between testes, extending up to a little anterior to hind end of body.

Genital pore median, immediately behind intestinal bifurcation, at 0.22 to 0.38 mm from anterior end of body.

Excretory bladder Y-shaped. Excretory pore subterminal.

Testes lobed, extracaecal, symmetrical in hind region of body at 2.78 to 4.05 mm from anterior extremity. Right testis 0.50 to 0.60 mm long, 0.24 to 0.28 mm wide. Left testis 0.42 to 0.65 mm long, 0.22 to 0.28 mm wide. Cirrus sac elongated, claviform, 1.05 to 1.67 mm long, 0.1 to 0.15 mm wide. Vesicula seminalis interna 0.2 to 0.3 mm long. Vesicula seminalis externa highly convoluted. Pars prostatica 0.32 to 0.35 mm long. Ejaculatory duct long, opening into genital pore. Cirrus long, protruded.

Ovary lobed, median, intertesticular, 0.20 to 0.30 mm long, 0.20 to 0.31 mm wide at 2.96 to 4.16 mm from anterior end of body. Receptaculum seminis absent. Vitellaria follicular, extracaecal, extending from mid level of body or a little behind of it up to anterior end of testes. Transverse vitelline ducts of

two sides unite to form a common vitelline duct to open at Ootype, surrounded by a large number of Mehli's gland cells. Uterus forms transverse coils intercaecally and runs as a thin walled tube at the side of cirrus sac to form metraterm about two third of length of cirrus sac, 0.8 to 0.9 mm long. Eggs with thin long filaments, 0.12 to 0.14 mm long, 0.06 to 0.08 mm wide.

Host: *Casarca ferruginea* (Vroeg) Brahminy Duck or Ruddy Sheldrake.

Location: Intestine.

Locality: Lucknow.

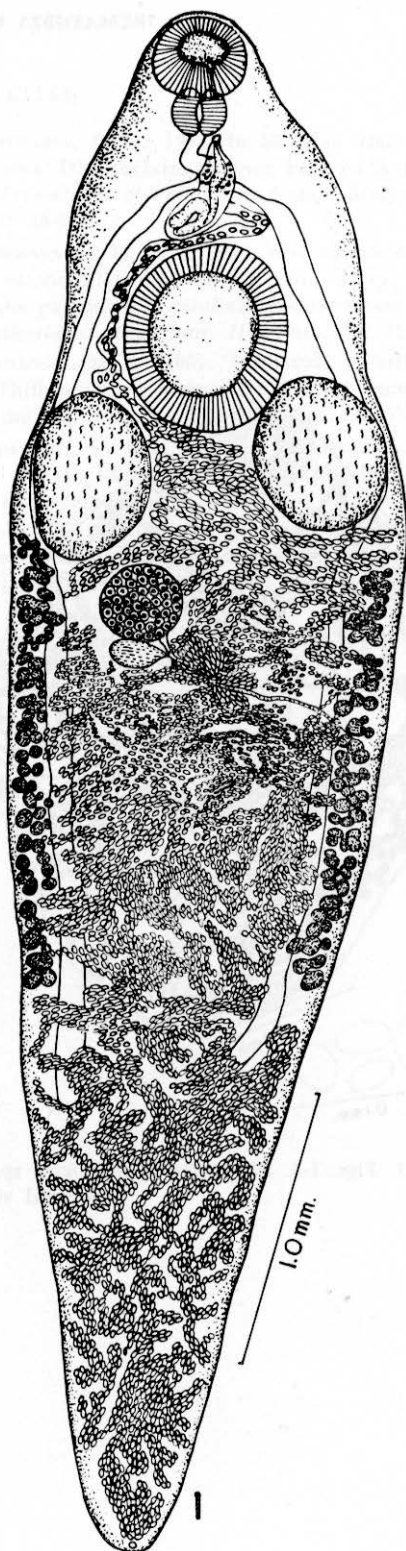
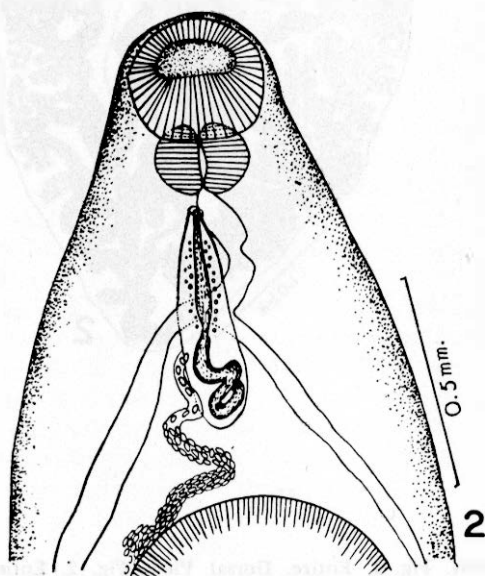
Discussion: The new form differs from all the known species of the genus *Notocotylus* Diesing, 1839 except *N. attenuatus* (Rudolphi, 1809); *N. urbanensis* (Cort, 1914) Harrah, 1922; *N. seineti* Fuhrmann, 1919; *N. noyeri* Joyeux, 1922; *N. intestinalis* Tubangui, 1932; *N. thienemanni* Szidat et Szidat, 1933; *N. parviovatus* Yamaguti, 1934; *N. magniovatus* Yamaguti, 1934; *N. indicus* Lal, 1935; *N. ralli* Baylis, 1936; *N. porzanae* Harwood, 1939; *N. dafilae* Harwood, 1939; *N. stagnicolae* Herber, 1942; *N. skrjabini* Ablassov, 1953; *N. solitaria* Singh, 1954 (Syn. of *N. babai* Bhalerao, 1935-Dubois, 1955) and *N. atlanticus* Stunkard, 1966 in having genital pore immediately behind intestinal bifurcation. The new form can be distinguished from all the above mentioned forms except *N. seineti* and *N. noyeri* in having metraterm about two third of the length of cirrus sac. It however differs from both these forms in having 6 to 10 ventral glands instead of 12 glands in each row in *N. seineti* and 15 glands in each row in *N. noyeri*. Accordingly it is regarded as a new species with the specific name *N. casarca* sp. nov.

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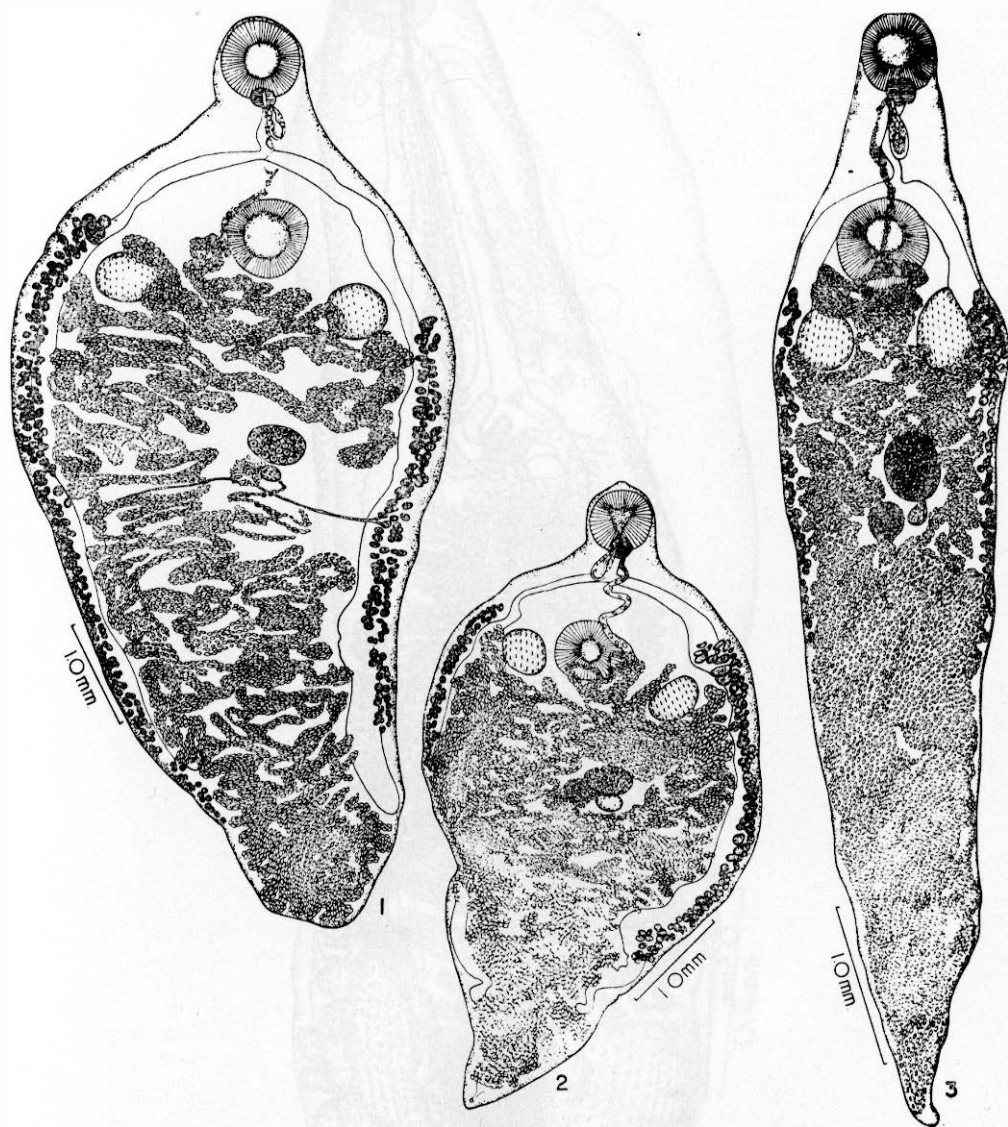
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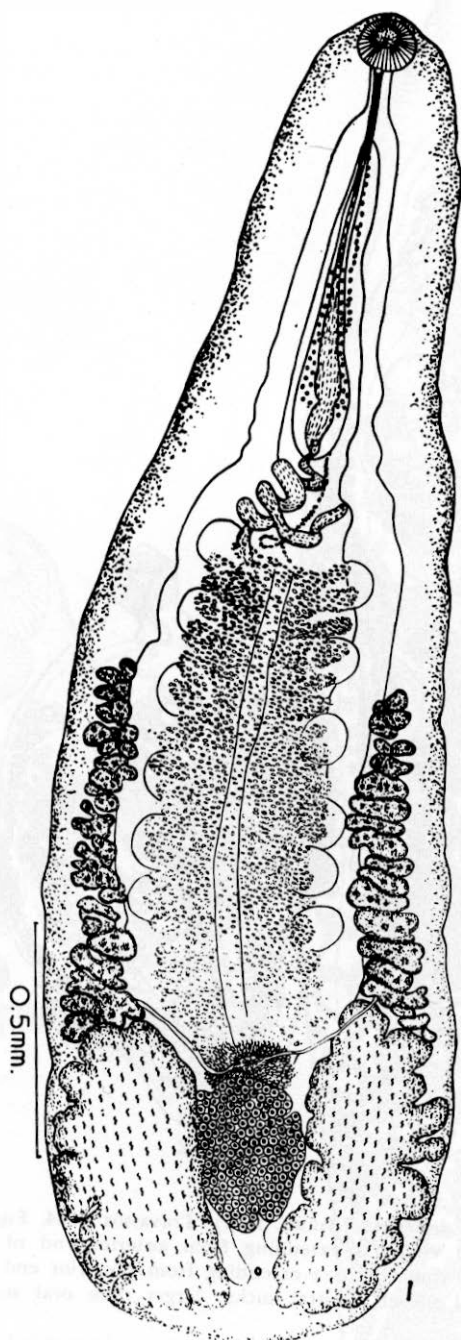
Pl. I. Figs. 1-3. *Platynotrema caballeroi* sp. nov. Fig. 1. Entire. Dorsal View. Fig. 2. Entire. Ventral view. Fig. 3. Eggs.



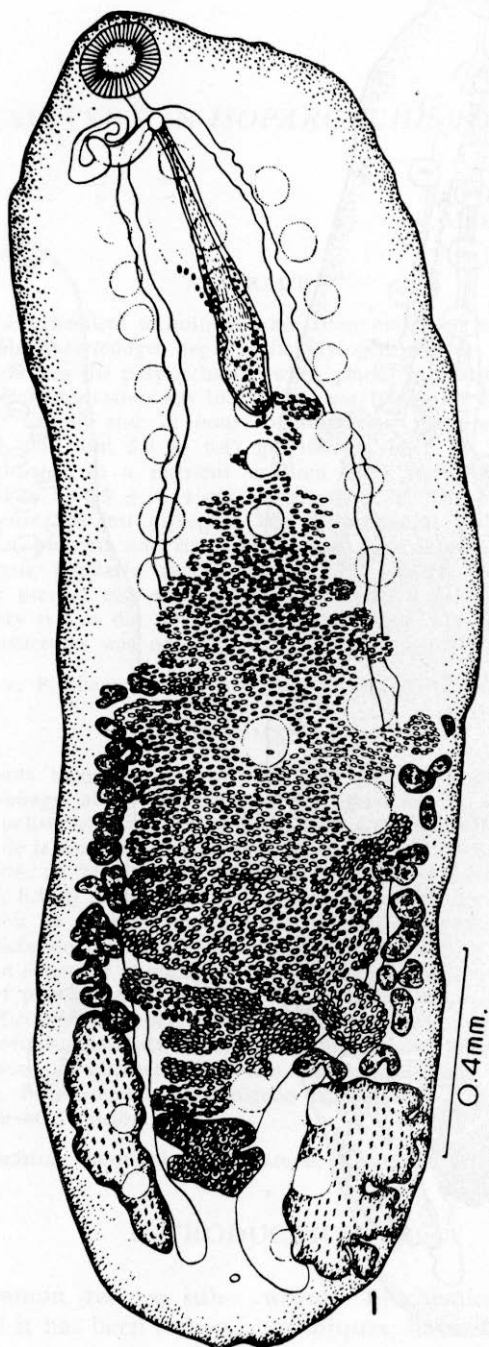
Pl. 2. Figs. 1-2. *Zonorchis pastori* sp. nov.
Fig. 1. Entire. Ventral view. Fig. 2. Anterior part of body — showing extension of cirrus sac up to a little anterior to ventral sucker. Dorsal view.



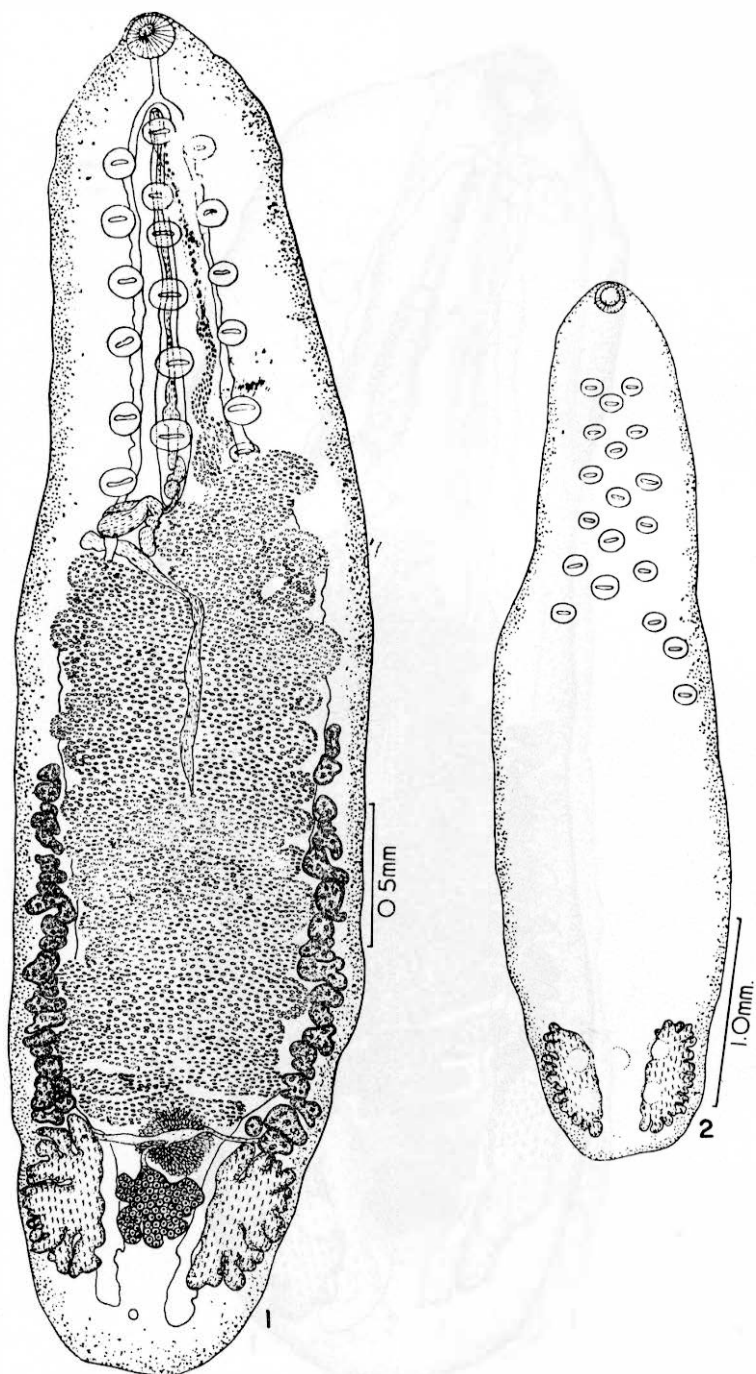
Pl. 3. Figs. 1-3. *Zonorchis delectans* (Braun, 1901) Travassos, 1944. Fig. 1. Entire. Dorsal view. Fig. 2. Entire — showing vitellaria extending from anterior end of ventral sucker. Ventral view. Fig. 3. Entire — showing vitellaria extending from posterior end of ventral sucker; testes posterior to ventral sucker; ventral sucker larger than oral sucker. Dorsal view.



Pl. 4. Fig. I. *Catalatropis rauschi* sp. nov. Ventral view.



Pl. 5. Fig. 1. *Notocotylus poecilorhynchai* sp. nov. Dorsal view.



Pl. 6. Figs. 1-2. *Notocotylus casarca* sp. nov. Fig. 1. Entire. Ventral view.
Fig. 2. Entire — showing distribution of ventral glands.