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EVELINE DU BOIS-REYMOND MARCUS

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(Presented by A. Moses; received August 8, 1952)

Two former collaborators at the Zoological Institute of the University of Berlin, Dr. *Eric A. Graetz*, Panamerican University, Panamá; and Dr. *Wolfgang K. Weyrauch*, Lima, collected freshwater and terrestrial Triclads for us. Of these the Peruvian Geoplanidae are already published (DU BOIS-REYMOND MARCUS, 1951). The remaining Paludicole and 2 Rhynchodemids are described on the following pages.

Tricladida Paludicola

DUGESIA FESTAI (Borelli)

(Figs. 1–2)

? non *Planaria aurita* Kennel (1888); *Planaria Festae* Borelli (1898); *Dugesia titicacana* Hyman (1939); *Euplanaria aurita* Beauchamp (1939).

The biggest of the very numerous preserved worms studied is 10 mm long; the breadth of the broadest is 4 mm. The more pointed or more roundish shape of the head varies according to contraction. As little as BORELLI, HYMAN, and BEAUCHAMP we have seen living worms, and therefore fig. 1 is only of approximative value for the taxonomic judgment.

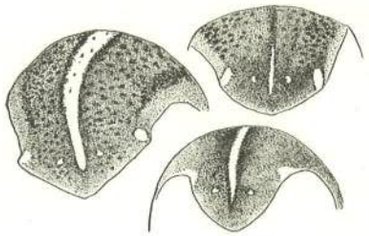

Fig. 1 — *Dugesia festai* (Borelli): three heads of preserved worms.

The back is black with white auricles. The anterior rim is sometimes white or brownish or grayish. A light

median line or a broad whitish stripe may extend over the whole back or only over the anterior part. Dark spots may occur together with a brownish or light ground colour, and are either distributed uniformly over the back or denser on both sides of the light mid-line. Also the ventral side varies from black to nearly white and is plain or stippled. Sometimes the ventro-lateral nerves are marked by light stripes.

The colouring elements studied by BEAUCHAMP (1939) are melanophores in the parenchyma and brown substances in the epidermis. In each of eight of our lots one colour type predominates, dark or light, plain or with a light band, but no correlation was obvious between the colour type and the biotopes: glacier-water; spring; brook, and river. The worms of lots 9 and 10 however from the beach of Lake Titicaca are differently coloured, as it was observed by BEAUCHAMP (1939) from the same locality.

The pharynx is light, nearly white, sometimes slightly pigmented. the distance between the eyes is equal to that between each and the border, they lie on a level with the anterior margin of the auricles. The gut projects in front of the eyes; it contained very big setae of Oligochaetes, 0,4–0,5 mm long and 0,3 mm in diameter (at the nodule 0,04 mm). The ovaries are situated near the fifth intestinal diverticle.

The testes (t) are ventral, of varying numbers, according to age and state of nourishment. Well fed worms have them more numerous, and some of the many follicles between the posterior limbs of the gut are pushed to the dorsal half of the body. In most cases the testes lie ventrally to the vitellaries and generally they extend to the posterior end. The anterior efferent ducts widen considerably on the sides of the penis, bend forward and upward as drawn by HYMAN (1939) end enter the seminal vesicles (s). The posterior efferent ducts, with a wide lumen and thin walls, unite with the anterior where these bend to the back. The entrances of the ducts into the seminal vesicle are 0,3 mm apart. The spherical vesicle lies completely inside the penial bulb (m) and receives the granular secretion from extrabulbar glands (j). In our sections this secretion is basophilous. The ejaculatory duct is wide, but can narrow towards the end.

The penis papilla, that is strongly contracted in HYMAN's specimens and extended in BEAUCHAMP's material (1939), is nearly globular in the present worms, and provided with a fold (d). Like that it was also found in the animals of the original description (BORELLI). BEAUCHAMP (1939) was right to call the penis relatively short. He found the papilla conical, rarely pointed, and also saw the fold that "marque

souvent une invagination partielle". The bulbus as well as the papilla show the muscular layers typical for the penis of the species of *Dugesia*. The epithelium of the penis and the male antrum (a) has normal, not insunk depressed nuclei. This is also recognizable in KENNEL's (1888) figure of *P. aurita*. As will be shown in the following discussion, the differences between *festai* and *aurita* refer to the female apparatus, not to the male.

The passage between the male (a) and the common antrum (u) is narrow while the penis is at rest, and widens when the latter is protruded. At rest the penis lies in horizontal, slanting, or vertical position.

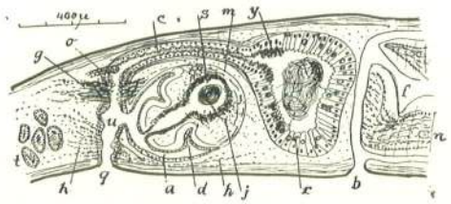

Fig. 2 — *Dugesia festai* (Borelli): combined median section of the copulatory organs. a, male antrum; b, mouth; c, bursal canal; d, fold of penis; f, pharynx lumen; g, shell glands; h, cement glands; j, glands of seminal vesicle; m, penis bulb; n, pharyngeal nerve plexus; o, ovovitelloduct; q, gonopore; r, sperms in bursal epithelium; s, seminal vesicle; t, testes; u, common antrum; y, cilia at entrance of bursa.

In the broad communications from the ovovitelloducts to the vitellaries we sometimes found spermia. In the ducts the epithelial nuclei are insunk. Behind the gonopore (q) the ducts curve first towards the back, then forward, and finally to the middle. They enter the bursa canal (c) either very near one another on its posterior surface, or (fig. 2, o) more laterally and 0,2 mm apart. The ring of shell glands (g) with bright eosinophilous secretion is a little ectal to the entrance of the ovovitelloducts (o). The cells of the common antrum (u) are club-shaped with nuclei on different levels. Ectal to the connection of the male with the common antrum the latter receives the orange secretion of the cement glands (h).

The bursa canal (c) is musculous, and the ciliated epithelium has normal nuclei. In the canal the cilia are erythrophilous; at the entrance of the bursa (y) they are cyanophilous. The greater part of the epithelium of the bursa has no cilia, it is high, and its numerous vacuoles contain coiled spermatozoa (r). The size of the bursa varies. Generally it is pear-shaped.

Occurence: Peru, from various localities (from North to South): Oxapampa, 1600 and 1700 m; near Tarma, 3400 and 4000 m; Ticlio, 4800 m; Lima; Acobamba, 2900 m; Lake Titicaca, 3815 m; Arequipa, 2300 m. All together, 140 worms and two stalked cocoons, collected by Dr. *Wolfgang K. Weyrauch*, Lima in the years from 1940 to 1948.

Further distribution: Ecuador, from Tulcan to Cuenca, up to 3900 m (BORELLI); Peru, from near Cuzco to the south, up to 4650 m; Lake Titicaca, to depths of 56 m (BEAUCHAMP); Bolivia, Lake Titicaca (HYMAN); La Paz (BEAUCHAMP).

DISCUSSION OF DUGESIA FESTAI

The name *festae* as it was written in the original diagnosis constitutes a lapsus, as it was chosen in honour of Dr. *Enrico Festa*. The identity of *D. titicacana* with *festai* was already recognized by HYMAN, who corrected the name by hand in the separate copy at my disposal. The difficulty in the systematics of the south american Dugesias was pointed out by HYMAN (1939). It is also revealed by BEAUCHAMP's (1939) union of *titicacana* with his material from the same localities, while he maintains *festai* as independent species.

Contrary to BEAUCHAMP we still hesitate to unite *aurita* Kennel and *festai*. Only with material from Trinidad, from where *aurita* was described, it would be possible to accept this synonymy; the description does not entirely favour it. The bursa canal of *aurita* opens near the gonopore, and the ovovitelloducts come out at the same point. In *festai* the bursa canal receives the ovovitelloducts entally to the shell glands, and thus there exists a short female genital canal, the vagina of previous authors. The common antrum of *festai* is not especially short, and therefore the female duct does not open very near the gonopore. Doubtless the differences are minute, but that is the rule in south american Dugesias.

Zoogeographically the occurrence of the same species on Trinidad and in the Andes of Ecuador, Peru, and Bolivia would not be quite incomprehensible, as Trinidad belongs to the Caribbean Mountains that are connected with the Andes by the Cordillera of Merida.

D. anceps (KENK 1930) (= dubia BORELLI 1895, BOHMIG 1902) and *D. andina* (BORELLI 1895) are also included in BEAUCHAMP's (1939) list of synonyms. The former is known from the system of the rivers Paraguay (river Apa and Asuncion); the latter was found at Tucumán and other northwestern argentine localities. *D. anceps* resembles *D. tigrina* (Gir.), as BORELLI (1895) stressed. BOHMIG (1902) compared his specimens with BORELLI's slides; his fig. 34 shows the far ental entrance of the ovovitelloducts into the bursa canal. Thus a long female genital canal originates, that is

incompatible with the short one in *festai*. *D. andina* has dorsal testes, by which it differs from *festai* and *aurita*.

BEAUCHAMP's list of synonyms further contains two species from Colombia, *D. paramensis* (FUHRMANN 1914) and *D. polyorchis* (FUHRMANN 1914). The former has dorsal testes and divides by paratomy, that is exceptional in *Dugesia*; in the latter the ovovitelloducts open into the antrum on both sides of the bursa canal, that is in the way described for *aurita* (KENNEL 1888).

BIPALIUM KEWENSE Moseley, 1878

To the numerous out-of-doors localities in tropical and warm-temperate countries known for this species (HYMAN 1940) northwestern Argentine (Tucumán) can be added, from where we received many specimens collected by Dr. *P. Wygodzinsky* (Tucumán) and Dr. *C. Pavan* (São Paulo). In Peru Dr. *W. K. Weyrauch* gathered worms at Oxapampa, 1700 m; and La Molina pr. Lima, 250 m.

RHYNCHODEMUS GRAETZI, n. sp.

(Figs. 3–7)

The two biggest of the 7 preserved specimens are 55 mm long, 3 mm at their broadest, and a little less high than broad. In one of them the mouth lies before the middle, 25 mm from the tip, in the other behind the middle, at 30 mm. The gonopores of these 2 specimens are situated at the beginning of the last third (38 mm), and on the limit between the third and last fourth (42 mm).

Fig. 3 — *Rhynchodemus graetzi*, n. sp.: lateral view of head. j, creeping sole.

The head (figs. 3,4) is pointed, on the ventral side flat or concave, and is separated clearly from the cylindrical body by a sudden widening. The eyes of 0,2 mm diameter lie at 1–1,5 mm from the tip; the mentioned broadening occurs at 2,5–3,5 mm. The rims of the body are slightly prominent, the back is uniformly convex, and at the borders of the creeping sole (j) there are small furrows. In sections of the pre-pharyngeal region and behind the gonopore, the breadth of which is 1,7 and 1,97 mm respectively the width of the sole is

0,6 and 0,7 mm. The back is plain, without stripes, and varies from reddish brown to dark gray. The ventral side is lighter, the creeping sole white. In the dark, almost black, anterior end the dorsal and ventral side are separated by white lateral streaks, the sensory tracts (u), and the creeping sole forms a light, mid-ventral line of 0,042 mm breadth that widens suddenly at the limit between head and trunk.

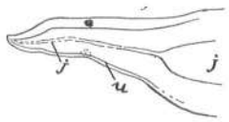

Fig. 4 — *Rhynchodemus graetzi*, n. sp.: ventro-lateral aspect of head. j, creeping sole; u, sensory furrow.

The skin contains cyanophilous and erythrophilous glands (h) and adenal rhabdites. The cilia are restricted to the sole (j), that possesses strongly cyanophilous glands (fig. 6, h). The post-pharyngeal glands of the sole are feebly stained in our sections.

The longitudinal muscles of the body wall form up to 0,12 mm high bundles that are dissolved in the region of the sole. The dorso-median bundles are weeker behind the gonopore. Dorsally to the main nerve cords (n) there are thick transverse muscles (tr). In the anterior region of the trunk numerous longitudinal muscle fibres (in) occur in the dorsal parenchyma. Dorsoventral bundles pass between the intestinal diverticles (i). Of the latter there are about 150 on either side, and they as well as the main limbs contain club-shaped cells of Minot (m).

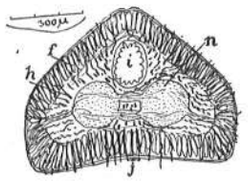

Fig. 5 — *Rhynchodemus graetzi*, n. sp.: transverse section, 2,5 mm from the tip. f, longitudinal muscles of body wall; h, skin glands; i, intestine; j, creeping sole; h, nerve cord.

The pharynx was not sectioned. In its pouch it appears cylindrical, but is bell-shaped in some worms, where it was protruded at the moment of fixation.

The testes (t) lie latero-dorsally to the nerve cords (n) and ventrally to the intestinal diverticles (i). They begin 6 mm behind the tip, a little before the ovaries, and end 4 mm in front of the hind end. On each side there are 6 pre-ovarian follicles. In the region comprising the copulatory apparatus the testicular follicles are densely distributed for an extent of 10 mm, sometimes two lie on the same level on one side. This region contains about 67 follicles on each side. In the last millimeters of the row of follicles these are more scattered. We compute the total number on each side at 250.

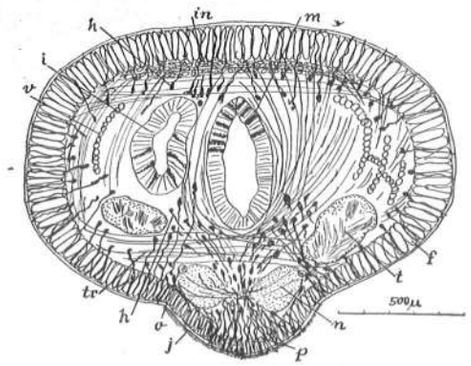

Fig. 6 — *Rhynchodemus graetzi*, n. sp.: transverse section, 9 mm from the tip. f, longitudinal muscles of body wall; h, skin glands; i, intestine; in, longitudinal muscles of parenchyma; j, creeping sole; m, club-shaped cells of Minot; n, nerve cord; o, ovovitelloduct; p, submuscular nerve plexus; t, testes; tr, transverse muscles; v, vitellaria.

The anterior efferent ducts (e) bend forward in an acute angle before they enter the muscular bulb (b) of the male copulatory organ. They open 0,1 mm apart into the seminal vesicle (s) that is 0,4 mm long and 0,1 mm wide and lined with high cells. The ejaculatory duct (d) connects the vesicle with the antral cavity. Into the duct and the antrum orange-red secretion is discharged; entally it is fine (ri) and ectally coarse (r) with granules of up to 0,004 mm in diameter. The whole zone that receives these glands measures about 1 mm in length. Eosinophilous glands (i) are still numerous in the following inner part of the antrum (x) that comprises about one third of the total length of the organ. These glands lie in the antral parenchyma inside the bulbar muscles (b). A thread of secretion pierces every cell of this epithelium that is 0,016 mm high. Beneath the epithelium lie the annular and then the longitudinal muscle fibres. In the middle third of the antrum (y) the epithelium is 0,05–0,08 mm high and the ventral parenchyma consists chiefly of muscle fibres (w). This muscular cushion corresponds to what PANTIN (1950) called penis in *Rh. bilineatus* (Meczn.). In this portion the glands are scarce. The last millimeter of the antrum's length (z) has flat epithelium (less than 0,01 mm) with a very rough and folded surface.

On the dorsal side the antral muscle mantle continues beyond the gonopore (q); ventrally it ends short before the tabular genital opening, so that a plug of loose parenchyma results. The 0,05 mm high epithelium of the tube passes gradually into that of the ciliated creeping sole.

The ovaries lie 7 mm behind the tip. The vitellaries (v) begin on the same level and surpass the testes behind, reaching to about 52 mm from the anterior end. The series of vitellarian follicles is interrupted in the region of the copulatory apparatus and reappears 2,75 mm behind the gonopore. The ciliated ovovitelloducts (o) run dorso-laterally to the nerve

tracts (n) and curve to the middle behind the gonopore, receiving the hinder vitellocytes (v). The common ovovitelloduct (c) is also ciliated and 1,5 mm long. All the shell glands (g) discharge into the short (0,25 mm) glandular duct and obscure its cilia with their massive secretion. The female antrum (a) is 0,7 mm long and narrow, its maximum width being 0,2 mm. The ciliated villous epithelium is surrounded by a cylinder of muscles, the straight fibres do not accompany the villosities of the epithelium. The female antrum communicates with the ectal part of the male antrum (z) 0,2 mm behind the gonopore.

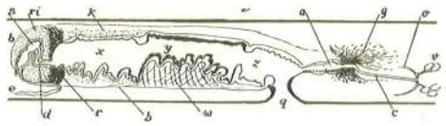

Fig. 7 — *Rhynchodemus graetzi*, n. sp; combined median section of the copulatory organs. a, female antrum; b, bulb of male antrum; c, common ovovitelloduct; d, ejaculatory duct; e, efferent duct; g, shell glands; k, antral glands; o, ovovitelloduct; q, gonopore; r, coarse granular secretion; ri, fine granular secretion; s, seminal vesicle; v, vitellaria; w, antral muscle cushion; x, y, z, inner, middle, and outer part of male antrum.

Occurrence: Republic of Panamá, 7 specimens collected by Professor Dr. *Eric A. Graetz*, and named in honour of this our old friend formerly from the University of Berlin.

DISCUSSION OF RHYNCHODEMUS GRAETZI

The species belongs to the subfamily Rhynchodeminae that is characterized by the strong bundles of longitudinal muscles (GRAFF 1899) and by the small size or absence of the penis papilla (BENDL, 1908; HEINZEL, 1929). The valid nomenclature of the Rhynchodemidae was settled by HYMAN (1943) and PANTIN (1950, 1952). The longitudinal muscles and the nerve tracts define the generic position of the present species separating it from *Dolichoplana* (muscles) and *Platydemus* (nerves).

PRUDHOE (1949) listed the american species of *Rhynchodemus*. A female antrum (vagina of several authors) bigger than the male antrum or of equal size occurs in certain species, viz. *Rh. blainvillei* GRAFF (1899), HEINZEL (1929); *Rh. pellucidus* GRAFF (1899), HEINZEL (1929). *Rh. americanus* HYMAN (1943), and *Rh. aripensis* PRUDHOE (1949). By the mentioned character all these species are clearly distinguished from *Rh. graetzi*.

In *Rh. sylvaticus* Leidy (1851), HYMAN (1943) and *Rh. bilineatus* Mecznikow (1866), PANTIN (1950), the size of the male antrum is not so much bigger than the female as in *Rh. graetzi*.

Rh. hectori Graff (1897 & 1899); HEINZEL (1929) and *Rh. samperi* Fuhrmann (1914) that are perhaps identical species (HEINZEL, 1929) have a shorter male antrum compared with the height than *Rh. graetzi*. The extension of the testes beyond the gonopore that occurs in *hectori*, *samperi*, and *graetzi*, was not found in *hectori* var. *inopinata* Beauchamp (1930).

Rh. bromelicola Beauchamp (1912) from Costa Rica seems to be the species nearest to *Rh. graetzi*. Both are big, with a uniform back (*bromelicola* sometimes), and the copulatory organs are similar. There are differences in the details of the colour pattern, in the measurements of the male antrum and the length of the common ovovitelloduct. *Rh. angustus* Hyman (1941) from the Panama Canal Zone has also a plain back, but it is black. Its reprodutive organs are not known. Two further species that certainly belong to the genus *Rhynchodemus* (HYMAN, 1943) but were also only found in immature specimens, differ from *graetzi* by the position of their pharynx far to the front of the middle (*spec. A*), and far behind (*spec. B*).

INCAPORA, gen. nov.

Rhynchodemidae of GRAFF's group *a* (1899) with two ventral orifices in the skin, from which tubes lead to the posterior limbs of the gut. These limbs form a transverse anastomosis connected to the common ovovitelloduct by the bursal canal.

Type of the genus: *Incapora weyrauchi, n. sp.*

More or less reduced bursal ampullae and a genito-intestinal communication by means of the ampulla or the bursal canal (fig. 11, d) occur in several Rhynchodemidae of MEIXNER's (1928) group *a*. Frequently the duct leads to an anastomosis of the posterior limbs of the gut. A similar organization is known from *Geopaludicolia absoloni* KOMÁREK (1919). In *Rhodax evelinae* MARCUS (1946) that is "retrobursal" the bursa opens into one of the posterior limbs. Other Paludicola with a connection between bursa and gut were mentioned in the discussion of *Rhodax* (MARCUS 1946).

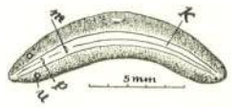

Fig. 8 — *Incapora weyrauchi*, n. g., n. sp.: ventral view of preserved specimen. k, creeping sole; m, mouth; p, gonopore; u, external pores of canals from skin to gut.

The wide ampulla of the bursa in *Diporodemus* HYMAN (1938, 1941 & 1943) opens through a ventral canal, the external pore of which lies behind the gonopore. In one of the 3 species, *D. indigenus* Hym., the bursa

communicates with the intestine. Evidently also *Rhynchodemus attemsi* BENDL (1909), re-examined by STEINBÖCK (1924), belongs to *Diporodemus*, because BEAUCHAMP (1937) discovered a canal between skin and bursa. External orifices of Lang's vesicle occur in some Polycladida too, f. ex., in *Nonatona euscopa* MARCUS (1952). Paired entrances of the vaginae in Proseriata as *Monocelis balanocephala* (BÖHMIG, 1902) and *Minona divae* MARCUS (1951), and Tricladida Maricola (Bdellouridae) can functionally be compared with the two orifices of *Incapora* . The canal between the left posterior limb of the gut and the ventral integument in *Geoplana pseudorhynchodemus* RIESTER (1938) however is a mere intestinal opening without connection with the genital organs (MARCUS, 1951), only with a possible remnant of such.

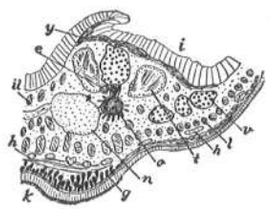

Fig. 9 — *Incapora weyrauchi*, n. g., n. sp.: obliquely transverse section in prepharyngeal section. e, efferent ducts; g, glands of creeping sole; h, submuscular nerve plexus; i, intestine; il, inner parenchymatic longitudinal muscles; k, creeping sole; l, outer parenchymatic longitudinal muscles; n, nerve cord; o, ovovitelloduct; t, testes; v, vitellaria; y, dorso-ventral parenchymatic muscles.

In *Rhynchodemus anamallensis* BEAUCHAMP (1930 *b*) a bursa-intestinal communication is combined with an intestinal diverticle of the right limb, directed to the ventral side. This "hernia", as BEAUCHAMP called it, is surrounded by strong muscles and connected with a pit in the skin. The unpaired structure that BEAUCHAMP observed in one of his three specimens is similar to the paired ones in *Incapora*.

The organization of *Incapora weyrauchi* differs from all the above mentioned species. Nevertheless one can combine the various structures theoretically. *Togarma evelinae* MARCUS (1949) of the Monocelididae, till now the only Turbellarian with an intestinal pore and a genito-intestinal communication, makes the function of the ducts in *Incapora* comprehensible. The two ducts from the skin to the gut (fig. 11, w) serve as copulatory canals (HYMAN, 1951). The sperms enter the transverse anastomosis (a) that functions as seminal bursa. From there they pass through the bursal canal into the common ovovitelloduct.

The above listed examples, and the distribution of the sperms, make this interpretation probable. The oviposture proceeds through the female genital canal (fig. 10, q). Where the eggs of the Turbellaria Coelata

are freed through the mouth, as in *Bresslauilla relicta* REISINGER (1929) and *Ethmorhynchus anophthalmus* MEIXNER (1938), either no seminal bursa exists, or it does not produce a genito-intestinal connection, f. ex. in *Baicalellia evelinae* MARCUS (1946). If the duct of *Incapora* that we call "bursal canal" led the eggs to the intestine, the tubes from the skin to the intestine would not be intelligible.

INCAPORA WEYRAUCHI, n. sp.

(Figs. 8–12)

The only present worm is 12 mm long (preserved) and 2,5 mm broad; the body is nearly cylindrical. The tip is blunt and round, the hind end a little more conical. The breadth of the creeping sole is 0,7 mm. The back is black with a brownish yellow mid line. The ventral side beside the grayish white creeping sole is as black as the back.

The two eyes are near the anterior end. The mouth (m) lies 8,5 mm, the gonopore (p) 10 mm, and the skin pores (u) 10,5 mm from the tip. The distance between the latter is at least 0,5 mm.

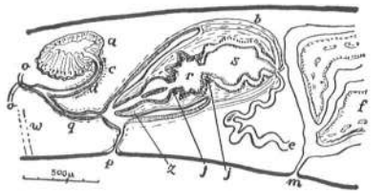

Fig. 10 — *Incapora weyrauchi*, n. g., n. sp.: combined median section of the copulatory organs. a, intestinal anastomosis; b, penial bulb; c, undifferentiated cells; d, genito-intestinal canal; e, efferent ducts; f, pharynx; j, sphincters of ejaculatory canal; m, mouth; o, ovovitelloducts; p, gonopore; q, female genital canal; r, outer part of common vesicle; s, inner part of common vesicle; w, canal from skin to gut;z, penis papilla.

The body-wall musculature consists of single layers of annular and longitudinal fibres. Inwards there follow: 1) loose fibres of diagonal muscles; 2) the submuscular nerve plexus (h); 3) a layer of thick bundles of longitudinal muscle fibres (l); 4) an inner layer of longitudinal muscles (il) with generally rather scarce bundles. The parenchymatic muscles of layers 3 and 4 are strongest developed in the region of the sole. Here the outer bundles (l) contain about 15 fibres each, dorso-medially they are finer. The internal bundles (il) are more numerous over the sole and extend to the wall of the intestine (i) between the nerve cords (n). The series of dorso-ventral muscles fibres (y) are extraordinarily strong, as in many Terricola (STEINBÖCK, 1924) and incise the intestine, forming pseudo-metameres.

The pharynx (f) is 1,4 mm. long, cylindrical, and widens bell-shaped at the border. The lateral diverticles of the intestine are narrow but very numerous and are also developed on the inner side of the posterior limbs. The latter form a broad dorsal anastomosis (a) behind the gonopore (p), lined with intestinal epithelium that contains no alimentary inclusions. Several setae of Oligochaetes (x), 0,43 mm long and 0,036 mm in diameter, were seen in the lumen of the gut.

From the ventral epidermis arise two thin and straight ducts (w) that lie inward to the ovovitelloducts (o). From their outer openings (u) to the end of the ectal third their epithelium contains rhabdites. The cutaneous muscles accompany the ducts till to their connection with the epithelium of both posterior limbs of the gut. These connections lie immediately behind the transverse anastomosis (a). The granules in the lumen of the ducts could not be identified. The splanchnic muscles are especially thick in the ventral wall of the intestine between the entrance of the mentioned canals and the connection of the anastomosis (a) with the genito-intestinal duct (d). In this region the ventral epithelium of the intestine forms some pouches that are surrounded by the muscles.

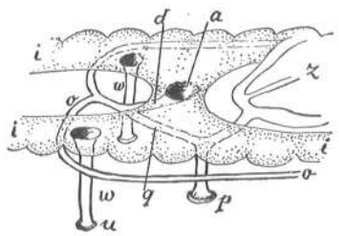

Fig. 11 — *Incapora weyrauchi*, n. g., n. sp.: diagram of female organs. a, intestinal anastomosis; d, genito-intestinal canal; i, intestine; o, ovovitelloducts; p, gonopore; q, female genital canal; u, external pores of canals from skin to gut; w, canals from skin to gut; z, penis papilla.

The testes (t) are young and small, not very numerous, and lie ventrally to the intestine. In some transverse sections there are no testes at all, in others 2–3 on the same side. The efferent ducts (e) run over the nerve cords (n), widen behind the pharynx (f), and turn to the back in a wavy course. As the worms is young they do not contain sperm. Coming from both sides the efferent ducts pierce the muscle layer of the penial bulb and unite at the entrance into the wide anterior part (s) of the common vesicle. The whole vesicle is lined with ciliated and folded epithelium, the high cells of which are filled with granular secretion. The latter is pink in the anterior and orange in the posterior part (r) of the vesicle; these parts are separated by a sphincter (j). The wide lumen of the vesicle extends from the bulb into the penis papilla (z), in the middle of which it has a second sphincter (j). Behind this latter there are no more cilia, but the wall continues folded. The papilla is strongly muscular, the nuclei of its epithelium are normal. The same is the case in the high antral epithelium with long cilia on the ventral and short ones on the dorsal side. Of the total lenght of the male copulatory organ, that is 0,98 mm, the papilla occupies 0,6 mm. On a level with the tip of the papilla a short canal leads to the gonopore (p).

The ovaries were not observed. The vitellaria (v) accompany the testes (t), and although they are young, they are already a little larger than the latter. The ovovitelloducts that run dorso-laterally over the nerve cords (n) and laterally to the efferent ducts (e) are thick and surrounded by inner longitudinal and outer annular muscles. The nuclei of the muscular fibres form a peripherical cover around the ovovitelloducts (fig. 9, o). The latter extend very far backwards. At 0,035 mm from the hind end they turn to the middle and unite to form the common ovovitelloduct. A little ectal to their uniting point a wide canal (d) runs dorso-anteriorly to the transverse anastomosis (a) of the intestinal limbs. Not-differentiated cells (c), probably young gland cells, accompany the two anterior thirds of the genito-intestinal duct. In the lumen of the latter, in the epithelium of the anastomosis, and near the inner openings of the canals to the skin, there are sperms. The young state of the reproductive organs allows us to consider these sperms as recently introduced by copulations, and not as exceeding sperm that is being eliminated. Possibly the sperms in the intestinal epithelium would in part or all be held back and absorved there; but those in the genito-intestinal duct are evidently migrating inwards. The female genital canal (q) has no glands, perhaps because it is young, and opens into the caudal wall of the antrum on a level with the tip of the penis.

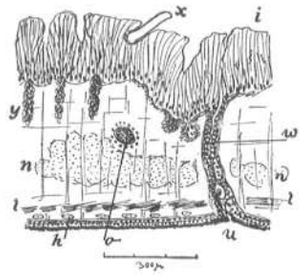

Fig. 12 — *Incapora weyrauchi*, n. g., n. sp.: sagittal section containing one of the ducts from skin to intestine. h, submuscular nerve plexus; i, intestine; l, outer parenchymatic longitudinal muscles; n, nerve cords; o, ovovitelloduct; u, external pore of canal from skin to gut; w, canal from skin to gut; x, oligochaete seta; y, dorso-ventral parenchymatic muscles.

Occurrence: Peru, Tarmatambo near Tarma, 3400 m, under stones on the bank of a brook. One worm, collected in june 1943, by Dr. *Wolfgang K. Weyrauch*, in who's honour it is named.

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