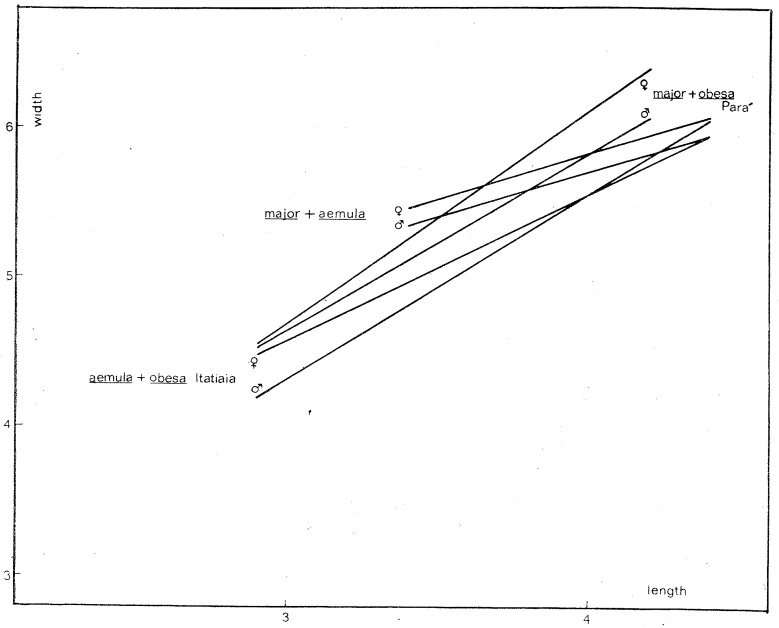
Froehlich, E.M. & Froehlich, C.G. (1972): Land planarians from the Amazonian region.
Papéis Avulsos Zool., 26(2): 29-45.



Graph 9: *Ornidia,* additions of regressions of thorax width on thorax length.

Papéis Avulsos de Zoologia

PAPÉIS AVULSOS ZOOL., S. PAULO, 26(2): 29-45 29.II.1972

LAND PLANARIANS FROM THE AMAZONIAN REGION

EUDOXIA M. FROEHLICH
CLAUDIO G. FROEHLICH

ABSTRACT

Thirty two specimens of land planarians are recorded for the Amazonian Region, 3 belonging to the Rhynchodemidae, and 29 to the Geoplanidae. Among known species, Rhynchodemus scius *du B.-R. Marcus,* Kontikia orana *Froehlich and* Geoplana hauseri *Froehlich were recorded, and four new species are described*: Diporodemus hymanae *C. G. Froehlich, sp. n.,* Geoplana ruiva *E. M. Froehlich, sp. n.,* G. mirim *E. M. Froehlich, sp. n. and* G. righii *E. M. Froehlich, sp. n.. About 9 species of* Geoplana *are not described because specimens are not sexual or for other reasons.*

Although no thorough and continuous search has been made for land planarians in the Amazonian region, the existing evidence shows they are much less common there than in wooded areas in less hot and humid areas in South and Central America. Several good collectors were frustrated in trying to collect these animals in the Amazonian Hylaea. We may quote from Bresslau (1927: 185), in the report of his Brazilian voyage:

> "Ausserdem hatten mir inzwischen zwei Kollegen, Professor Lorenz Müller — München, der 1910 das Mündungsgebiet des Amazonas bereist hatte, und Professor Hans Bluntschli — Frankfurt a.M., damals noch in Zürich, der Anfang 1913 gerade von einer Expedition in die Gegend des oberen Amazonenstroms zurückgekehrt war, berichtet, dass sie dort kaum etwas von Landplanarien und den kleinen Beutelrattenarten gesehen hätten. Auch von Dr. Ohaus — Berlin und Professor E. A. Goeldi — Bern hörte ich im Verlauf einer Korrespondenz über meine Reisepläne das Gleiche. Insbesondere bestätigte mir Prof. Goeldi, dieser vorzügliche Kenner der Fauna Brasiliens, 'dass die Landplanarien im Amazonasgebit sozusagen gänzlich fehlen, jedenfalls sehr ärmlich vertreten sind', eine Tatsache, die auch ihn überrascht habe, da doch eigentlich der feuchte Waldesboden dort ihrer Verbreitung hätte günstig sein müssen."

Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo.

In January, 1962, through the kindness of Prof. Dr. Paulo de Azevedo Antunes, of the Presidential Board of the ICOMI (Indústria e Comércio de Minérios S/A), one of us (C. G. Froehlich) had, together with Dr. M. P. Sawaya and Dr. W. Narchi, the opportunity to collect zoological material in Belém, State of Pará, and at Pôrto Santana, Pôrto Platon and Serra do Navio, three localities in the Território Federal do Amapá. At Serra do Navio is located the open-air manganese ore mining plant of the ICOMI. It is connected by rail to Pôrto Santana, on the Amazon. Pôrto Platon is situated about halfway between Pôrto Santana and Serra do Navio, and also at the limit between savannah and forest. In Belém and Pôrto Santana no land planarians were found. At Pôrto Platon, near houses, were found a small specimem of a *Geoplana,* lost before preservation, and one of *Rhynchodemus scius* du B.-R. Marcus. At Serra do Navio were collected 5 specimens of *Geoplana,* apparently belonging to 4 species, 4 of them not sexual and one sexual (in transverse sections mature testes and vitellaria present) but collected incomplete, lacking the copulatory organs; 4 specimens of *Kontikia orana* Froehlich, one further specimen of *Rh. scius;* and one specimen of a new species of *Diporodemus* a genus not previously known from South America. Both specimens of *Rh. scius,* and *K. orana* were found in places under human intervention. In southern Brazil they are found together with *Bipalium kewense* Mos. and *Dolichoplana striata* Mos., two cosmopolitan species, spread by man.

In March, 1962, Dr. E. J. Fittkau, from the Max-Plank Institute of Limmology, Plön, Germany, collected 3 examples of land planarians near Manaus, State of Amazonas. The worms were sent us alive by air mail, but only two of them arrived, dried up. Both belong to *Geoplana,* but only one had a developing copulatory apparatus.

In June, 1966, an international symposium on the Amazonian biota was held in Belém, on which occasion the second author had the opportunity to collect again at Belém (5 examples of *Geoplana* belonging to two species, all not sexual), near Pôrto Santana (1 example of *Geoplana,* not sexual), and around Serra do Navio (3 examples of *Geoplana,* each belonging to a different species, two of them sexual). On the same occasion, further examples were collected by Dr. W. Weyrauch, of Tucuman, Argentina (3 specimens of *Geoplana,* belonging to different species, 1 sexual, from Belém); Dr. G. Righi, from the Staff of our Department (2 specimens of *Geoplana,* not sexual, collected near Pôrto Santana); and Mr. J. Becker, of the Museu Nacional, Rio de Janeiro (1 specimen of *Geoplana,* not sexual, from Belém). The total is 15 specimens comprising about 8 species, all belonging to the genus *Geoplana,* but only 3 of them sexually mature.

In February, 1967, Dr. G. Righi returned to the area and collected one sexual specimen of a *Geoplana* at Serra do Navio.

We had, therefore, a total of 32 specimens of land planarians from the Amazonian region, 3 of which belong to the Rhynchodemidae and 29 to the Geoplanidae. Of the latter 4 are *Kontikia orana* and 25 belong to *Geoplana,* comprising about 13 species. This material indicates that, although relatively little abundant, land planarians do occur in the Amazonian region as a diversified group. The prevailing climatic conditions, comprising frequent rains that wet the ground, the very high air humidity, and high temperatures all the year round apparently are not entirely favourable for the existence of land planarians. It is known that contact with liquid water, if lasting for some time, is noxious to land planarians, interfering with locomotion and, possibly, creating osmotic problems.

List of the species that, being in a sexual state, could be determined or described specifically:

1. *Diporodemus hymanae* C. G. Froehlich, sp.n.
2. *Rhynchodemus scius* du B.-R. Marcus
3. *Kontikia orana* C. G. Froehlich
4. *Geoplana hauseri* C. G. Froehlich
5. *G. ruiva* E. M. Froehlich, sp.n.
6. *G. mirim* E. M. Froehlich, sp.n.
7. *G. righii* E. M. Froehlich, sp.n.

We are grateful to Prof. Dr. Paulo de Azevedo Antunes for the first trip to the Amapá Territory, and for the possibility of collecting in the area of the ICOMI in both trips. Our thanks also to all members of the Staff of ICOMI who helped us, especially Mr. J. L. A. Freire, whose knowledge of the region and field experience were of great value, both in Amapá and at Belém. For the second trip we are indebted to the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP).

Family Rhynchodemidae Graff
Subfamily Microplaninae Pantin
Genus *Diporodemus* Hyman

Diporodemus hymanae C. G. Froehlich, sp.n.
(Figs. 1-3)

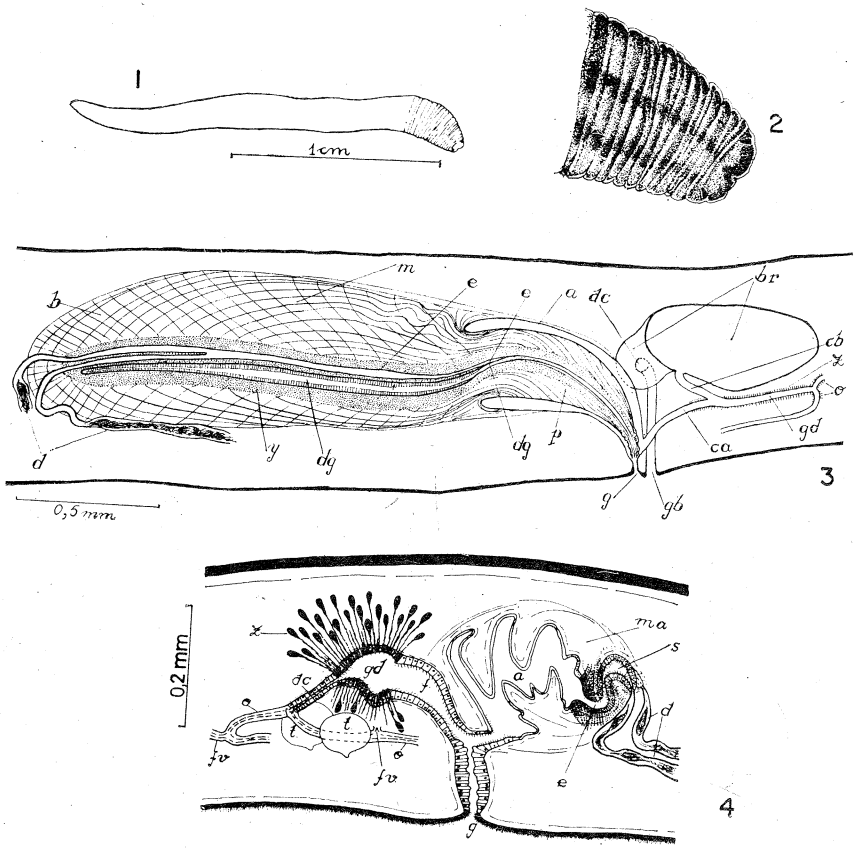
LOCALITY: Serra do Navio, Território Federal do Amapá, Brazil. One specimen under a rotting tree trunk in the forest.

MEASUREMENTS (preserved specimen): length, 18.7 mm; width, 1.8 mm; mouth at 6.7 mm, gonopore at 11.5 mm from anterior tip, slightly to the right of the midline; bursal pore 0.9 mm to the left of gonopore; length of pharynx, 1.3 mm; length of penis, 2.5 mm.

DESCRIPTION: Body elongate, subcylindrical, ovoid in cross-section. Creeping sole about one fourth as wide as body. Anterior third of body strongly retracted, surface with transverse wrinkles and anterior tip with a depression (figs. 1, 2). Dorsal colour almost black, with a lighter spot on level of copulatory apparatus. Three narrow black stripes visible under the microscope, the median one interrupted above copulatory apparatus, lateral ones disappearing caudally to the latter. Creeping sole greyish, rest of ventral side blackish. Eyes near anterior tip, with deep pigment cups (fig. 2). On either side of creeping sole, near its beginning, a short ciliated groove.

In transverse pre-pharyngeal sections, dorsal epidermis ca. 25 μm high, filled with rhabdoids, chiefly rhammites. Epidermis of sole 5-6 μm high, cilia ca. 3 μm long, shorter medially. Cyanophilous and eosinophilous glands open on whole surface but more concentrated on middle of sole. Subepidermal muscle very weak, parenchymal longitudinal ones strong, forming bundles ventrally. Pharynx cylindrical with caudally displaced dorsal insertion, approaching campanuliform type.

On left side, first testis above ovary; on the right, in front of ovary. Testes numerous, extending to the level of penis bulb, and located dorso-laterally to nerve cords; efferent ducts between testes and nerve cords. Ectally, efferent ducts (d), full of spermatozoa, advance to level of middle of penis bulb (b), then loop back and ascend to enter bulb. Within bulb, both ducts proceed separately to about one third of its length, then unite to form ejaculatory duct (e); which proceeds straight to tip of penis papilla. Bulb traversed also by a separate glandular duct (dg) running close to male ducts, all ducts surrounded by a cyanophilous coat (y) formed by ducts of numerous glands, both cyanophilous and eosinophilous, opening into glandular duct. Penis (p) strongly muscular, bulb very large, papilla relatively small, long conical, turned toward gonopore (g).



Diporodemus hymanae: 1, view of entire preserved worm; 2, anterior end showing eyes and median depression; 3, sagittal section of the copulatory complex. *Rhynchodemus scius*; 4, sagittal section of copulatory apparatus.

Ovaries ca. 1.5 mm from anterior tip. No parovaria or pregermarial oviducts. Oviducts (o) run laterally to nerve cords and contain spermatozoa mixed with eosinophilous secretion. Ectal part of oviducts, directed medially, receive the ducts of shell glands (z), and unite to form a long common glandular duct (gd) that proceeds forward to fork into Beauchamp's canal (cb) and canalis anonymus (ca). Beauchamp's canal opens ventro-anteriorly in median part of large bursa (br); anteriorly bursa bends to left side, giving of bursal canal (ductus vaginalis) (bc) from left end. Bursa-intestinal connection absent. Canalis anonymus receives shell glands entally; ectally opens into male atrium very close to gonopore.

REMARKS: The validity of the genus *Diporodemus* is still open to some doubts, for a bursal-cutaneous canal could be a temporary structure in other Microplaninae (Marcus, 1955: 121; Beauchamp, 1961: 120). As it stands now, it comprises 5 species besides the present one: *D. attemsi* (Bendl, 1909), *D. monacensis* (Heinzel, 1929), both European, and *D. yucatani* Hyman, 1938, *D. plenus* Hyman, 1941, and *D. indigenus* Hyman, 1943, from North and Central America. *D. hymanae* does not differ greatly, as regards length and colour, from the latter three, but all of them may be readily separeted by the anatomy of the copulatory organs. Characteristic for *D. hymanae* is the presence of a long glandular duct ventral to the male ducts inside the penis, and opening independently at the tip of the penis papilla. *D. plenus* also presents a glandular duct, but it is wide, dorsal to the much narrower ejaculatory duct, into which it opens at the level of the base of the papilla. The ejaculatory duct is formed by the efferent ducts as they enter the penis bulb, and after receiving the glandular duct it widens. In *D. yucatani* and *D. indigenus* the lumen of the penis (called seminal vesicle by Hyman) is simple. In having an elongate bursa deflected to the left, from where issues the bursal-cutaneous canal, *D. hymanae* also differs from the other species under discussion.

The species is dedicated to the memory of Dr. Libbie H. Hyman.

Subfamily Rhynchodeminae Correa

Genus *Rhynchodemus* Leidy

Rhynchodemus scius du B.-R. Marcus
(Fig. 4)

Rhynchodemus scius du B.-R. Marcus, 1955: 31 (Type locality: Ubatuba, State of São Paulo Brazil).

LOCALITIES: Pôrto Platon, Território Federal do Amapá, 1 specimen under a piece of wood near houses and a small stream. Serra do Navio, T.F.A., 1 specimen under a board in a clearing by the roadside used as a dump for old boards, cardboard and other rubbish.

MEASUREMENTS (preserved worms): 1) specimen from Pôrto Platon: length, 6.7 mm; width, 0.6 mm; mouth at 3.7 mm, gonopore at 4.7 mm from anterior tip; diameter of eyes, ca. 70 μm; 2) specimen from Serra do Navio: length, 9.5 mm; width, 0.8 mm; mouth at 5.1 mm, gonopore at 6.3 mm from anterior tip; diameter of eyes, ca. 60 μm; eyes at 0.5 mm from anterior tip; cephalic hood about 1.7 mm long.

DESCRIPTION: The two specimens agree well in both external and internal morphology with the original specimens. Epidermis of sole 6 μm thick, lateral cilia ca. 5 μm long, median ones shorter, about half as long as lateral ones, a condition found also in other species of the genus. Middle of sole with insunk epidermal nuclei (which I have found also to occur in the original material of *Rh. scius*).

Specimen from Pôrto Platon with 4 testes in right side, 3 on left side, from behind ovaries to space between pharynx and copulatory apparatus. Specimen from Serra do Navio with 5 testes on each side, from just behind ovaries to level of female part of copulatory apparatus (fig. 4, t).

Both specimens with well developed male copulatory organs. Bifid seminal vesicle (s) receiving fine eosinophilous glands. Ejaculatory duct (e), not delimited from vesicle, receiving numerous eosinophilous glands, coarser and more stained in ectal half. Male atrium (a) with folded walls, lined by a low cubical epithelium receiving eosinophilous secretion. Atrial muscularis (m) strong.

Ovaries at 2 mm from anterior tip in specimens from Pôrto Platon, and at 3 mm in specimen from Serra do Navio. Vitellaria large. Oviducts (o) unite ectally to form common oviduct (dc). Glandular duct (gd) enlarged. Female atrium broader entally, receiving scant glands.

Family Geoplanidae Graff

Genus *Kontikia* Froehlich

Kontikia orana Froehlich

Kontikia orana C. G. Froehlich, 1955: 201 (I consider as type locality the town of Ubatuba, on the coast of the State of São Paulo, Brasil, where the first examples of this species were collected.)

LOCALITY: Serra do Navio, Território do Amapá, 4 specimens, found together with *Rhynchodemus scius* du B.-R. Marcus in a dump of old boards, etc., 16 Jan., 1962.

REMARK: The specimens collected agree entirely with the original ones.

Genus *Geoplana* Fritz Müller

Geoplana hauseri Froehlich
(Figs. 5-7)

Geoplana hauseri C. G. Froehlich, 1959: 223 (Type locality: São Leopoldo, State of Rio Grande do Sul, Brasil).

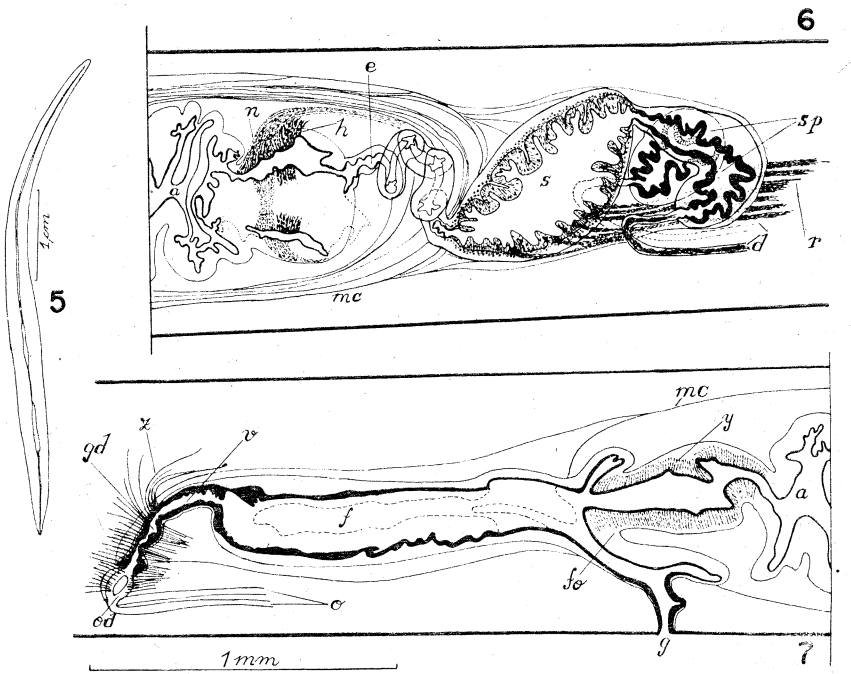
LOCALITY: Utinga, Belém, State of Pará, one specimen collected by Dr. W. Weyrauch under a fallen log, 11. June, 1966.

MEASUREMENTS (preserved worm): length, 55 mm; width, 4 mm, at level of copulatory apparatus.

DESCRIPTION: Body (fig. 5) elongate, somewhat broader than original specimens. Dorsal side brownish-grey, much darker at borders of a lighter median stripe; lateral margins light in colour. Ventral side white, except for grey anterior tip.

Seminal vesicles (fig. 6, sp.s.) distinctly outside common muscle coat of copulatory apparatus, although enclosed by some of the outer muscles fibres from coat. Ejaculatory duct (e) issueing from ventro-posterior portion of vesicle, and crossing muscle coat in a contorted path to open into male atrium (a). In female part, ectal part of oviducts, just before joining common glandular duct (gd), presenting a short double portion, that of the left side with a short blind branch. Pharynx and remainder of copulatory apparatus agreeing with original description.

REMARKS: The chief difference between the present worm and the original ones rests in the position of the set of seminal vesicles, enclosed by the common muscle coat in the latter, and outside in the present material, a condition not yet ascertained in conspecific material. In other aspects, however, both materials show a good agreement, what lead us to consider them conspecific. It is true that São Leopoldo and Belém are separeted by more than 3.000 km, a gap not met with any other species of *Geoplana*. Further material may prove them to be distinct subspecies.



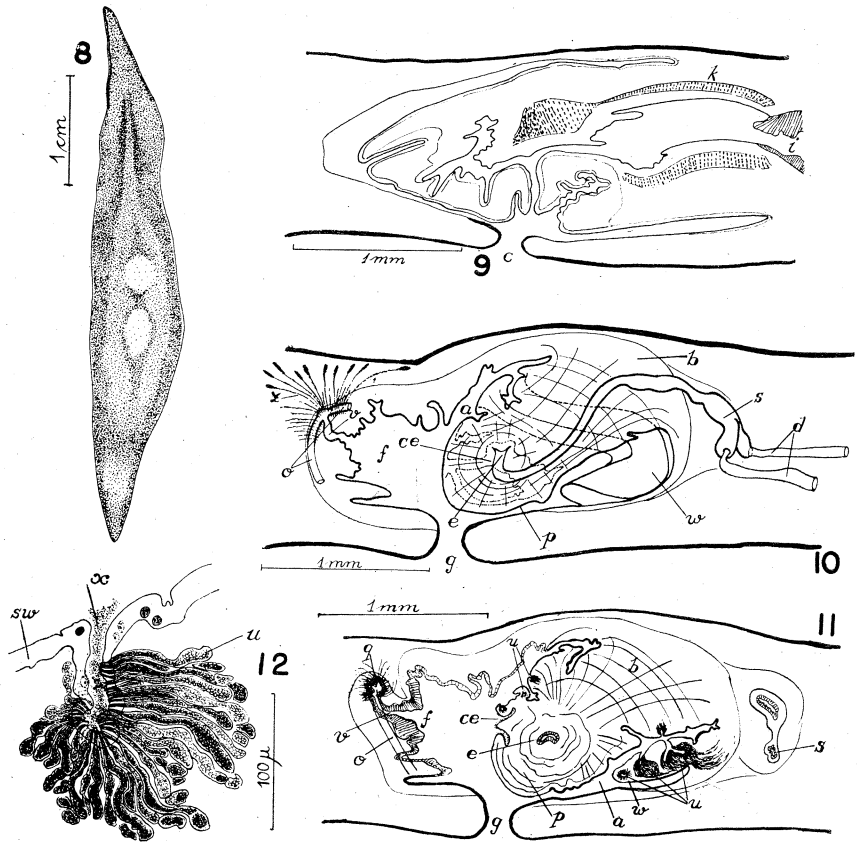
Geoplana hauseri: 5, shape of entire preserved worm; 6, 7, sagittal section of copulatory complex; 2 mm of male portion omitted.

Geoplana ruiva E. M. Froehlich, sp.n.
(Figs. 8-12)

LOCALITY: Serra do Navio, Território Federal do Amapá, 1 example in an abandoned orchard under boards, near Cachoeira da Capivara.

MEASUREMENTS (preserved worm): length, 50 mm; width (at level of copulatory apparatus), 7.0 mm; mouth at 26 mm, and gonopore at 23 mm from anterior tip.

DESCRIPTION: Body much flattened, tapering more gradually to anterior tip (fig. 8). Dorsal side reddish-brown due to brown pigment over a brick-red ground; colour lighter above pharynx and copulatory apparatus. Ventral side pale brick-red, darker at anterior tip. Eyes



Geoplana ruiva: 8, dorsal view and colour pattern of preserved worm; 9, pharynx, sagittal section; 10, combined sagittal section of the copulatory complex; 11, median sagittal section of the copulatory complex; 12, magnified view of glandular pit of the crescentic fold.

uniserial, small, around anterior tip; ca. 1 mm backward they increase in size and become crowded at margins, visible to the naked eye as a black line. Further back they decrease again in size and spread onto dorsal side to about one third of its width, and are surrounded by light halos. At level of pharynx and copulatory apparatus they are sparser, spreading onto marginal fourth of dorsal side, and behind this level they are even sparser.

Pharynx cylindrical (fig. 9)

In transverse sections covering ca. 0.6 mm in front of pharynx, one testis follicle on each side, in different transverse levels. Efferent ducts (fig. 10, d) full of spermatozoa near copulatory apparatus, opening into extrabulbar forked seminal vesicle (figs. 10, 11, s). The latter ascends to enter penis bulb, and them proceeds as the ejaculatory duct (e). On reaching penis papilla, ejaculatory duct bends to right side up to about ectal third, then loops to left side and widens into an irregular ejaculatory cavity (ce) which opens through several passages into male atrium on left face of asymmetrical penis papilla (p). Papilla filling up male atrium (a), its surface irregular. Scattered fine-grained eosinophilous glands open on whole surface of the papilla. Groups of glands of a second kind (figs. 11-12, u), with a more violet secretion (H.E.), open into pits in basal half of papilla and especially in a crescentic fold (w) of atrium extending from left upper posterior portion to beneath base of papilla.

Vitellaria mature. Oviducts (o) rise at level of female part of copulatory apparatus and turn medially to open into vagina (v). Shell glands open into ectal portion of oviducts and ental portion (q) of vagina. Female atrium (f) with deep folds around opening of vagina (v).

REMARKS: *Geoplana ruiva* may be included in the *G. applanata* group (Froehlich, 1967). The penis papilla, although irregular in shape and asymmetrical, appears to be permanent, as in *G. marmorata* Fr. Müll. (Froehlich, 1960). *G. ruiva* is readily distinguished by the combination of the brick-red dorsal colour, a branched ejaculatory cavity and the atrial fold provided with glandular pits.

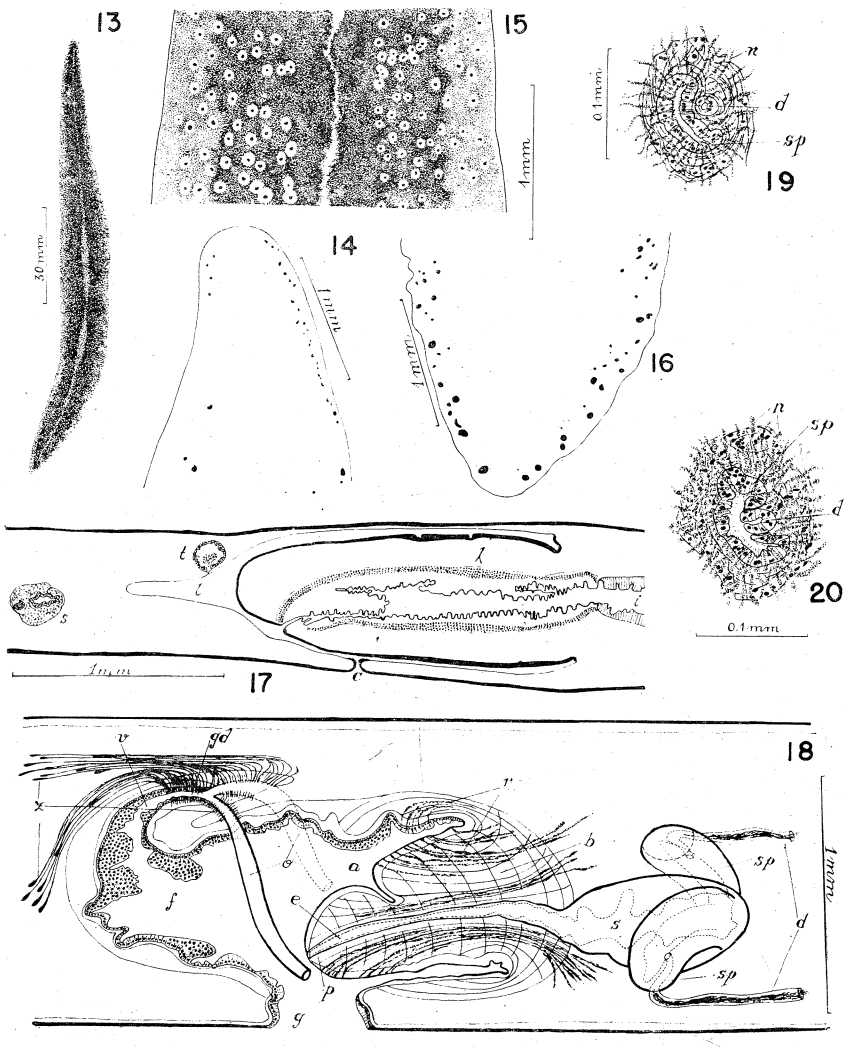
Glandular structures similar to those found in the male copulatory organs of *G. ruiva* are also known from species of *G. gigantea* group, which however do not have an upturned female common canal.

Geoplana mirim E. M. Froehlich, n.sp.
(Figs. 13-20)

LOCALITY: Serra do Navio, Território Federal do Amapá: 1 example in an abandoned orchard, near Cachoeira da Capivara. An egg capsule was laid by the worm while in the collecting vial.

MEASUREMENTS (preserved worm): length, 15 mm; width, 1.8 mm; mouth at 6.6 mm; gonopore at 9.5 mm from anterior tip.

DESCRIPTION: Dorsal side black, margins ochreish-brown. Under the stereomicroscope, a median lighter stripe, broader above pharynx and copulatory apparatus (figs. 13, 15). Ventral side milky white, anterior tip with grey border.



Geoplana mirim: 13, dorsal view, colour pattern of preserved worm; 14, anterior end with the distribution of eyes; 15, colour pattern and distribution of the eyes at 7 mm from anterior tip; 16, eyes at posterior end, some of them the largest of all; 17, sagittal section of the pharynx, showing the most posterior testis follicle; 18, combined sagittal section of copulatory complex; 19, section of one of the branches of paired seminal vesicle and of the efferent duct inside the muscle coat; 20, as above, with efferent duct opening into seminal vesicle.

At anterior tip, eyes small, in a row (fig. 14). Further back, they extend onto dorsal side, leaving free median quarter (fig. 15). At posterior tip, where some are the largest ones, they remain near margins (fig. 16). A light halo surrounds each eye (fig. 15).

Pharynx cylindrical, typical; outer surface smooth receiving numerous cyanophilous and eosinophilous glands. Mouth about middle of length of pharyngeal pocket, which extends beyond tip of pharynx (fig. 17).

Last testes follicles at level of extension of pharyngeal pocket (fig. 17). Efferent ducts (fig. 18, d) bend mesially at level of seminal vesicle, narrow considerably, enter muscle coat of vesicle, and run for a short distance parallel to paired lateral portions (sp) of vesicle to open into them (figs. 19, 20). Paired and common portions of vesicle provided with a strong muscle coat, lined by a ciliated cylindrical epithelium and receiving abundant eosinophilous glands (n). On entering penis bulb, vesicle (s) narrows gradually to ejaculatory duct (e); the latter, lined by a cubical epithelium, runs a straight course to open at tip of penis papilla. Penis papilla (p), with a deep fold dorsally, fills up male atrium (a), but does not extend beyond level of open gonopore (g). More intensely coloured eosinophilous glands (r) open on surface of papilla and on neighbouring dorsal portions of atrium. Male and female atria widely continuous.

Vitellaria spent, probably related to recent oviposition. Oviducts (o) begin to ascend at level of gonopore. Ascending portions, slightly enlarged, slope upwards and medially to open into common glandular duct (gd). Shell glands (z) discharge also in ectal portions of oviducts. Common duct runs backward into curved vagina (v). Lining of vagina and ental portion of female atrium (f) high, lacunose.

REMARKS: Some features of the copulatory apparatus of *G. mirim* should be ascribed to the recent deposition of an egg capsule. Normally the gonopore would be a narrow passage, and it is probable that the penis papilla would lose the dorsal fold and extend into the female atrium.

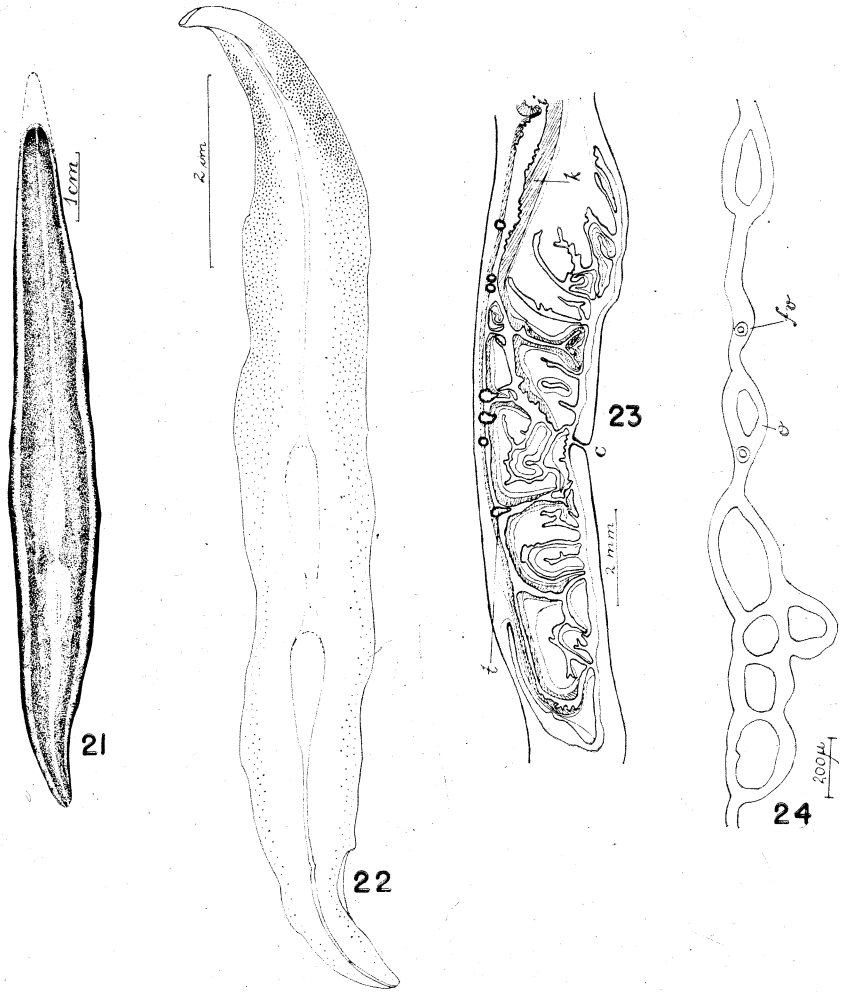
G. mirim fits into the *G. taxiarcha group* (Froehlich, 1967), among those species provided with the high lacunose lining in the ental portion of the female atrium, viz. *G. multicolor* Graff, *G. preta* Riester, *G. caapora* Froehlich, and several others. Among these are found, also, the smallest species of the group. The anatomy of the copulatory organs of all these species is similar, differing in details such as the shape of the seminal vesicle, distribution of glands, size of lacunar lining of female atrium, etc. In *G. mirim* the course of the efferent ducts within the muscle coat of the seminal vesicle is characteristic. The occurence of testis follicles beyond the level of the mouth is not common in *Geoplana*. Finally, as far as we know, this is the first species in which the largest eyes occur near the posterior end of the body.

Geoplana righii E. M. Froehlich, sp.n.
(Figs. 21-25)

LOCALITY: Serra do Navio, Território Federal do Amapá, January 13, 1967. The single specimen was found crawling in the forest. Dr. Gilberto Righi coll., to whom the species is dedicated.

MEASUREMENTS (preserved worm): length, 99 mm (anterior end lacking a small piece, fig. 21); width, at level of pharynx, 13 mm; mouth at 44 mm; gonopore at 27.5 mm from posterior tip.

DESCRIPTION: Large, broad and flat (fig. 21). To the naked eye dorsal side reddish-brown with a light median stripe, broader above pharynx and copulatory apparatus; anterior end and margins black.



Geoplana righii: 21, dorsal view, colour pattern of preserved worm; anterior tip lacking; 22, distribution of eyes along the worm; 23, sagittal section of pharynx; 24, oviducal network, left side, at ca. 40 mm from anterior tip.

Under the stereomicroscope, a straw-yellow ground colour visible along median light stripe and along a pair of para-marginal stripes, in these partly covered by brown pigment. Rest of dorsal side covered by a pair of broad brown stripes, darker laterally, black at anterior end, and reddish behind level of gonopore. Ventral side milky white.

Several cysts of gregarinids are seen in the sections, larger ones under epidermis, especially dorsally, smaller ones in intestinal wall.

Pharynx collar-shaped (fig. 23).

Testes numerous along a pair of dorsal bands, with up to four follicles in each at the same transverse level. At least one follicle behind level of mouth (fig. 23). Efferent ductules opening into a net of intermediate ductules dorsal to nerve plate; efferent ducts (fig. 25, d), full of spermatozoa, arise at sides of pharynx and before entering common muscle coat (mc) of copulatory apparatus acquire a thicker muscularis, forming "spermiducal vesicles". Within muscle coat efferent ducts, much narrower, run forward and medially to open into common male duct (sc), not forming distinct seminal vesicle and ejaculatory duct. This duct, lined by a ciliated epithelium and coated by a muscularis as thick as epithelium, receives fine-grained, weakly eosinophilous glands. Ental region of male atrium forming what could be called a prostatic apparatus (Hyman, 1955: 23, 25, fig. 31). Two glandular rings are found there, an ental (n) comprising glands similar to those opening into common canal, followed by a second (h) comprising abundant coarse-grained, heavily-stained eosinophilous glands. First ring lined by a distinct ciliated epithelium; in second, ducts so numerous as to obscure individual cells of epithelium (in cleared specimen this region appeared as a dark spot); surface ciliation, however, distinct. Male atrium (a) ample, folded, lined by a cubical ciliated epithelium receiving fine grained eosinophilous glands intermediate in colour between the two above. Attached to a broad ventral fold, a large spermatophore (sa) — masses of spermatozoa embedded in a strongly eosinophilous secretion — is found. Atrial muscularis, especially longitudinal layer, very strong from ectal limit of prostatic apparatus to level of spermatophore.

Vitellaria apparently not fully developed. Oviducts (o), up to level of pharynx, forming a network (fig. 24), some of its portions lying within the nerve plate; behind that level, simple. Shortly behind level of gonopore, oviducts begin to rise and then curve medially to unite into common duct (fig. 25, g, d). Abundant shell glands (z; seen in cleared specimen as long V-shaped dark cloud) open into ectal portions of oviducts and into common duct. The latter curves backward and downward to open into female atrium. Female atrium (f) ample, about half as long as male, with deeply folded walls, especially ventrally. Lining epithelium ciliated, cylindrical to flattened.

REMARKS: *Geoplana righii* belongs to the *G. amagensis* group (Froehlich, 1967), comprising besides the present one, 7 species from Colombia and Peru. The black borders separate *G. righii* externally from the other species. As regards the copulatory apparatus, this species stands nearer to *G. contamanensis* Hyman, 1955. The large penis papilla drawn for the latter is probably an atrial structure and not permanent, and the prostatic apparatus should correspond to the glandular portion of the male atrium of *G. righii*. Hyman (1955) could not locate a common male duct, which should open in the projection of the prostatic apparatus, but, to judge from the rest of the copulatory appa-

ratus, this could hardly be due to incomplete maturity, as suggested. The corresponding duct in *G. righii* is well defined. *G. contamanensis* apparently lacks the strong atrial muscularis that is presented by *G. righii*. On the other hand, the two cyanophilous portions of *G. contamanensis*, one in the "ejaculatory duct" and the other in the vagina, are lacking in *G. righii*.

Geoplana sp.
(Fig. 26)

LOCALITY: Manaus, Estado do Amazonas, 1 specimen collected in March, 1962 by Dr. E. J. Fittkau. As written in the introduction, three specimens were sent alive, but only two arrived, dried up. Both were sectioned. One proved to be immature and the second, the object of these notes, incipiently mature.

DESCRIPTION: Worm medium-sized. Dorsal side black, darker medially; ventral side wide sparser black pigment. Eyes crowded and larger at anterior margin, further back spreaded onto dorsal surface.

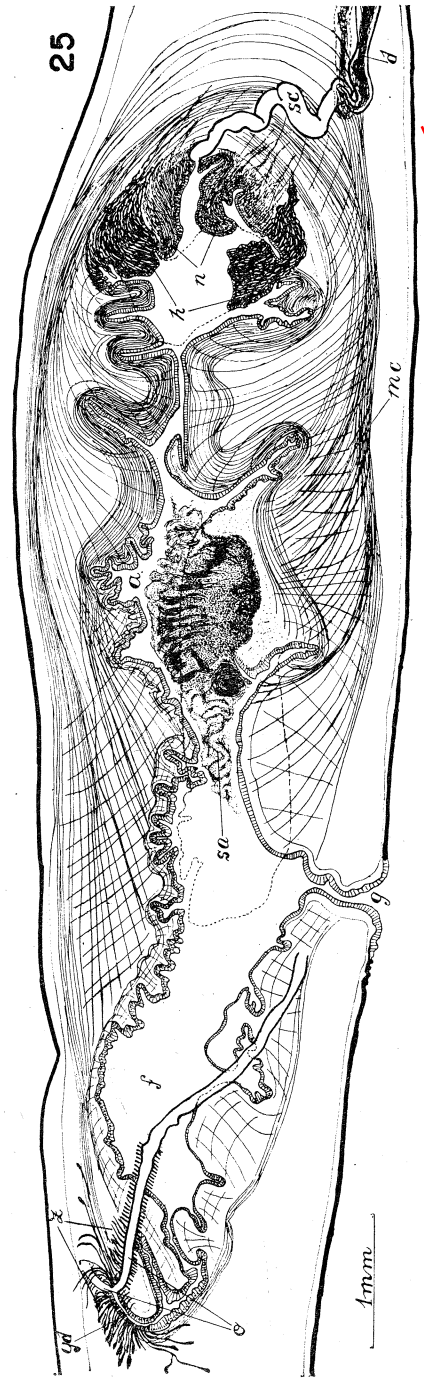
Histological conditions very bad. Pharynx cylindrical. Copulatory apparatus (fig. 26) not fully mature. Seminal vesicle (s) extrabulbar, penis papilla (p) large, filling up male atrium (a) and extending a short distance beyond gonopore (g). Female atrium (f) relatively large, receiving common female canal ento-dorsally.

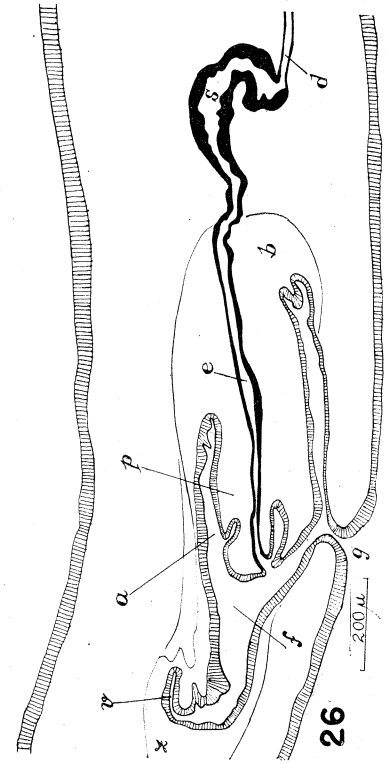
RESUMO

São registrados 32 espécimes de planárias terrestres da Amazônia. Três pertencem à família Rhynchodemidae: 2 exemplares de *Rhynchodemus scius* du B.-R. Marcus e um de *Diporodemus hymanae* C. G. Froehlich, sp.n.. 29 pertencem aos Geoplanidae: 4 exemplares de *Kontikia orana* Froehlich, 1 de *G. hauseri* Froehlich, 1 de *G. ruiva* E. M. Froehlich, sp.n., 1 de *G. mirim* E. M. Froehlich, sp.n., 1 de *G. righii* E. M. Froehlich, sp.n. e 21, compreendendo aparentemente cêrca de 9 diferentes espécies, que não puderam ser determinadas ou devidamente descritas, a maioria por ser imatura. *Rh. scius, G. hauseri* e uma espécie não denominada de *Geoplana* são estudadas morfològicamente.

Diporodemus hymanae, sp.n. é a primeira espécie do gênero a ser registrada para a América do Sul. Comprimento do exemplar conservado, 18,7 mm; largura, 1,8 mm. Dorso quase prêto com três estrias longitudinais pretas; ventre escuro, sola de rastejamento cinzenta. Aparêlho copulador com longo pênis, a maior parte formando bulbo musculoso, atravessado por um ducto glandular além dos ductos masculinos. Bursa deslocada para a esquerda, poro da bursa 0,9 mm à esquerda do gonóporo.

Geoplana ruiva, sp.n. Comprimento do exemplar conservado, 50 mm; largura, 7 mm; boca a 26 mm e gonóporo a 32 mm da ponta anterior. Dorso castanho-avermelhado, ventre mais claro. Olhos unisseriais na ponta anterior, mais para trás espalhando-se sôbre o dorso e, atrás da faringe, tornando-se progressivamente mais esparsos. Faringe cilíndrica. Vesícula seminal extrabulbar, bifurcada. Ducto ejaculatório abrindo-se em ampla cavidade ejaculatória e esta, por sua vez, no átrio por diversas





26: *Geoplana* sp., sagittal section of copulatory complex; the 25: *Geoplana righii*, sagittal section of copulatory complex. oviducts were not seen.

fendas. Papila penial assimétrica. Na base desta e em dobra atrial próxima abrem-se numerosas glândulas em pequenas depressões. Glândulas da casca abrem-se nos trechos finais dos ovidutos e na parte ental da vagina, esta dorso-posterior ao átrio feminino. A espécie pertence ao grupo de *G. applanata* (v. Froehlich, 1967).

Geoplana mirim, sp.n. Comprimento do exemplar conservado, 15 mm; largura, 1,8 mm; boca a 6,6 mm e gonóporo a 9,5 mm da ponta anterior. Dorso com margens ocráceas e restante prêto, exceto fina linha mediana. Ventre lácteo. Olhos unisseriais na extremidade anterior, mais para trás espalham-se nas margens; alguns dos posteriores são os de maior tamanho. Faringe cilíndrica. Trechos finais dos ductos eferentes correndo por curta distância paralelos aos ramos pares da vesícula seminal antes de aí desembocarem. Trecho comum da vesícula continuando-se pelo ducto ejaculatório, que atravessa com percurso simples a grande papila penial. Glândulas da casca abrem-se nos trechos finais dos ovidutos e no ducto glandular comum. Vagina dorso-posterior ao átrio feminino, provida de revestimento alto e lacunoso. A espécie pertence ao grupo de *G. taxiarcha,* entre as providas de massa celular lacunosa na parte ental do átrio feminino.

Geoplana righii, sp.n. Comprimento do exemplar conservado, 99 mm, faltando pequeno pedaço anterior; largura, 13 mm; bôca a 44 e gonóporo a 27,5 mm da extremidade anterior. Dorso castanho-avermelhado com extremidade anterior e margens negras e com estria clara mediana. Ventre lácteo. Olhos espalhados pelo dorso. Faringe do tipo em colarinho. Ductos eferentes, antes de entrar na capa comum do aparêlho copulador, adquirem muscularis espessa; no interior da capa muscular têm diâmetro pequeno e desembocam num ducto masculino comum. Porção ental do átrio com dois anéis musculares, formando "aparêlho prostático". Átrio masculino amplo, de paredes dobradas; em grande dobra ventral, um espermatóforo. Átrio feminino também amplo e dobrado, o canal feminino comum entra na parte dorso-posterior. Glândulas da casca na parte ental do canal comum e nos trechos finais dos ovidutos, êstes, antes da faringe, formando rêde simples. A espécie pertence ao grupo de *G. amagensis* sendo a primeira a ser registrada no Brasil.

References

Beauchamp, P. de

1961. *Classe des Turbellariés. In* P.-P. Grassé, *Traité de Zoologie 4* (1): 35-212, figs. 9-106, 1 pl.

Bresslau, E.

1927. Ergebnisse einer zoologischen Forschungsreise in Brasilien 1913-1914. Reisebericht. *Abh. Senckenb. Naturf. Ges. 40*: 181-235, pls. 24-25.

Froehlich, C. G.

1955. Sôbre morfologia e taxonomia das Geoplanidae. *Bol. Fac. Fil. Cien. Letr., Zool. 19*: 195-279, 14 pls.

1960. On Geoplanids from Brazil. *Ibidem 22*: 201-265, 11 pls.

1967. A contribution to the zoogeography of Neotropical land planarians. *Acta zool. Lilloana 23*: 153-162.

Hyman, L. H.

1955. Miscellaneous Marine and Terrestrial flatworms from South America. *Am. Mus. Novit.* (1742): 1-33, 42 figs.

Marcus, E.

1955. Turbellaria. South African Animal Life. *Results of the Lund University Expedition in 1950-1951 1*: 101-151, 12 pls.

Marcus, E. du B.-R.

1955. On Turbellaria and Polygordius from the Brazilian Coast. *Bol. Fac. Fil. Cien. Letr., Zool. 20*: 19-65, 6 pls.

Lettering of Details on All Figures

a — male atrium
b — penis bulb
bc — bursal canal
br — bursa
c — mouth
ca — canalis anonymus
cb — Beuchamp's canal
ce — ejaculatory cavity
d — efferent duct
dc — common oviduct
dg — penial glandular duct
e — ejaculatory duct
f — female atrium
fo — fold separating male from female atrium
fv — vitellarial funnel
g — gonopore
bg — bursal pore
gd — common glandular duct
h — heavily stained eosinophilous glands
i — intestine
k — muscularis of pharynx
l — pharyngeal pouch
m — penis bulb musculature
ma — atrial musculature
mc — common muscle coat of copulatory apparatus
n — lightly stained eosinophilous glands
o — paired oviducts
od — duble portion of the left oviduct
p — penis papilla
r — eosinophilous glands
s — seminal vesicle
sa — spermatophore
sc — common male duct
sp — paired seminal vesicle
sw — epithelium of crescentic fold
t — testis
u — violet glands opening in superficial pits
v — vagina
w — crescentic fold of male atrium
x — violet secretion in the lumen of the pit
y — cyanophilous glands
z — shell glands