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TERRESTRIAL FLATWORMS FROM THE CANAL ZONE, PANAMA

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The material of this report consists of about twenty vials of terrestrial flatworms collected on Barro Colorado Island, Canal Zone, by Mr. E. C. Williams, Jr., of Northwestern University, and one land planarian from Tabernilla, Canal Zone, lent for study by the U. S. National Museum. All of the specimens except the last, whose habitat was not stated on the label, came from the forest floor. Unfortunately some of the specimens are juvenile and hence a full description of them cannot be furnished. There were identified in the material one prorhynchid alloecocel, three species of *Geoplana*, and two rhynchodemids.

New species described in this article:

Family Prorhynchidae
Geocentrophora tropica
Family Geoplanidae

Geoplana panamensis
Geoplana aphalla
Family Rhynchodemidae
Diporodemus plenus
Desmorhynchus angustus

Information concerning the terrestrial flatworms of this region of the Americas is scanty. The most important contribution is Fuhrmann's report on the land planarians of Colombia (1914). Other articles are two papers by de Beauchamp (1912, 1913), describing one prorhynchid and three land planarians from the water held by Bromeliaceae in Costa Rica, and two papers by myself (Hyman, 1938, 1939), containing descriptions of land planarians from Mexico and Costa Rica. Several geoplanids from Colombia and Venezuela are described in von Graff's monograph of the land planarians (1899).

ORDER ALLOEOCOELA

PRORHYNCHIDAE

GEOCENTROPHORA DE MAN, 1876

Geocentrophora tropica, new species

Figures 1 to 4

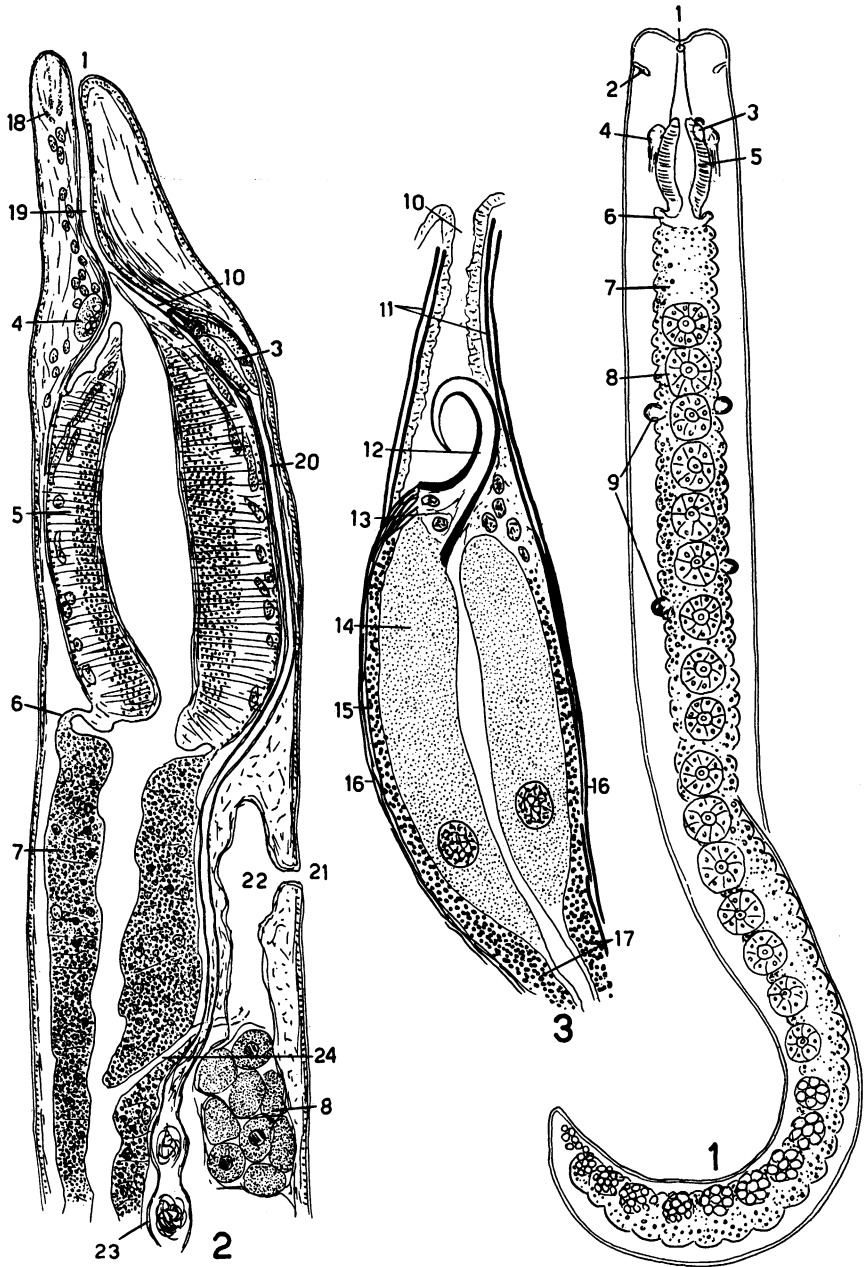
MATERIAL.—Five vials in Williams' collection, Nos. 215, 364, 768, 1124, 1299. 216 and 1350, which were lost, were probably also this species.

EXTERNAL CHARACTERS.—Long and slender, flattened, band-like, to 5 mm. in length; sides parallel through anterior body half, then tapering to posterior end (Fig. 1). Anterior end with rounded sides and central depression marking position of mouth; mouth slightly subterminal (Fig. 2). Eyes wanting; pair of deep narrow ciliated pits near anterior end at sides, opening slightly ventrally (Fig. 1). Female genital pore close behind rear end of pharynx (Fig. 2). Transverse section (Fig. 4) elongated oval, with central bulge caused by ovary. Color black, contrary to all other prorhynchids, which are white.

GENERAL HISTOLOGY.—Surface epithelium devoid of nuclei, cell walls, and rhabdites; has

fibrous appearance and is crossed by numerous gland outlets; is dark colored but definite pigment granules cannot be discerned. Epithelium heavily ciliated ventrally but devoid of cilia dorsally. Epithelium bounded internally by definite basement membrane immediately internal to which is the subepidermal musculature of outer thin circular and inner thick longitudinal layers (Fig. 4). Immediately to the inner side of the longitudinal layer is another thin circular layer (Fig. 4), best developed dorsally; but another longitudinal layer to the inner side of this found in some prorhynchids is wanting in *G. tropica*. Nuclei are first encountered in the parenchyma inclosed by the muscle layers; they are very large and conspicuous, filled with coarse granules.

Three kinds of gland cells noticed. First kind (Fig. 4, a), sparingly present in mid-dorsal region of anterior end, is long, slender, tortuous, only slightly eosinophilous; some open as frontal glands on anterior tip above mouth (Fig. 2); others open dorsally in anterior part of body. Second kind, very abundant in dorso-lateral body regions throughout body length, also sparingly present ventrally, have a



Geocentrophora tropica

Fig. 1. General form and gonads. Fig. 2. Median sagittal section through the anterior end, showing pharynx, male system, female pore, and genito-intestinal duct. Fig. 3. Sagittal section of male copulatory apparatus showing histological details.

large body filled with a network staining with haematoxylin, and a narrow neck opening through the epidermis (Fig. 4, b). These glands seemingly take the place of rhabdites. Third type of gland (Fig. 4, c), found in ventro-lateral body regions, is eosinophilous, filled with granules; apparently does not open on the surface.

Parenchyma, in addition to gland cells and nuclei mentioned above, contains dorso-ventral muscle fibers and large cells of indeterminate nature (Fig. 4).

DIGESTIVE TRACT.—Typical of the family. Slightly subterminal mouth (Fig. 2) leads into moderately elongated buccal tube which, just before widening into the pharynx, receives the male canal. Pharynx elongate, of the type termed *bulbosus variabilis intextus*, i.e., the muscle layers of inner and outer surfaces have the same orientation. Pharynx lined by a structureless membrane without nuclei or cell walls, underlain by a well-marked layer of longitudinal muscle fibers, followed to its outer side by a thick layer of circular fibers, interspersed between the radial fibers (Fig. 2). This is followed by a zone of nuclei and gland cells, to the outer side of which is a thin coat of circular, then longitudinal fibers. Numerous radial fibers course from inner to outer surfaces of pharynx. Gland cells are cyanophilous, open near free end of pharynx. Pharynx is followed by very short esophagus (Fig. 2), opening at once into long tubular slightly scalloped intestine, composed of large columnar cells, packed with spherules, representing digesting or digested food (Fig. 2). Intestine extends nearly to posterior tip (Fig. 1).

NERVOUS SYSTEM AND CILIATED PITS.—Material does not suffice for a thorough study of the nervous system and hence only a few comparisons will be made with Steinböck's figure of the nervous system of *G. baltica* (1927). Conspicuous brain of paired lateral masses connected by broad dorsal commissure above anterior tip of pharynx. Main mass of each ganglion gives off anteriorly large trunk, the main dorsal sensory nerve, which extends to anterior tip joining an extensive plexus there; ventrally each ganglion gives off a similar ventral sensory nerve which runs forward into the same plexus. From the dorsal side of each ganglion, the small dorsal nerve takes its origin, and extends both anteriorly and posteriorly throughout the body length. Extreme ventral end of each ganglion gives off the main ventral nerve trunk of that side, which turns backward and runs to the posterior end. Both ventral and dorsal nerves can be seen in cross-sections of the body. Steinböck also figures ventro-lateral and dorso-lateral trunks along the whole body length but these could not be clearly seen in my material, although I do not doubt their presence. The nervous system of *G. tropica* is thus very similar to that of *G. baltica* but the dorsal and ventral anterior sensory nerves are much more massive than figured by Steinböck

for *G. baltica* and the dorso-lateral and ventro-lateral trunks appear to be less developed than in the latter species.

The bases of the ciliated pits lie close to the dorsal sensory nerves from which they obtain a generous nerve supply. Each pit has the shape of a florentine flask with narrow neck and expanded round basal chamber. Steinböck (1927) has given detailed descriptions and figures of the ciliated pits of several prorhynchid species and Kepner and Taliaferro (1916) described those of a form which they called *Prorhynchus applanatus*.

The ciliated pits of *G. tropica* closely resemble Steinböck's figure of those of *G. baltica* except that the end chamber is larger in *tropica*. The neck is lined by a heavily ciliated syncytial epithelium containing three nuclei on each side. The rounded end chamber consists of the same syncytial epithelium, without nuclei, bearing stiff rod-like cilia, probably sensory bristles, and penetrated by the necks of numerous gland cells. The end chamber is embraced by nervous tissue coming from the adjacent dorsal sensory nerve; this nervous mass was mistakenly regarded by Kepner and Taliaferro as a "gland cell." The numerous dark granules in the nervous mass are cross-sections of the necks of the elongated gland cells. The mistake of Kepner and Taliaferro was already noted by Steinböck. The gland cells supplying the end chamber are similar to the first type described above.

REPRODUCTIVE SYSTEM.—Typical of the genus. All specimens were sexually mature. Testes very few in number, apparently only one pair in the smaller specimens; these form a pair of small sacs not far posterior to the level of the female pore (Fig. 1). Larger specimens have another pair of testes behind the first pair (Fig. 1) but I have found no certain evidence of more than two pairs. Other known species of *Geocentrophora* have 6-14 pairs of testis follicles. Male duct as in other members of the genus (Fig. 2); vas deferens expands into elongate seminal vesicle at level of anterior end of ovary; from this duct runs forward immediately below pharynx and enters male copulatory apparatus (Fig. 3), an elongate body provided with a hard curved stylet. This lies just beneath the anterior end of the pharynx. The male copulatory apparatus of *G. baltica* has been carefully described by Steinböck and that of *G. tropica* is very similar. It differs chiefly in that the lining epithelium consists of about four very elongate cells (Fig. 3) whereas in *G. baltica* the lining is a multinucleate syncytium. Outside the epithelium is a coat of circular muscles, thickened to a sphincter at the proximal end of the apparatus and outside this are longitudinal muscle bands. On the dorsal side some of the latter insert on the base of the stylet while others run alongside the penis pocket. Ventrally the muscle bands run forward along the penis pocket as protractors and backward as retractors. The stylet is a hard curved spine whose base attached to the dorsal side of the apparatus, contains two cells, apparently secretory cells of

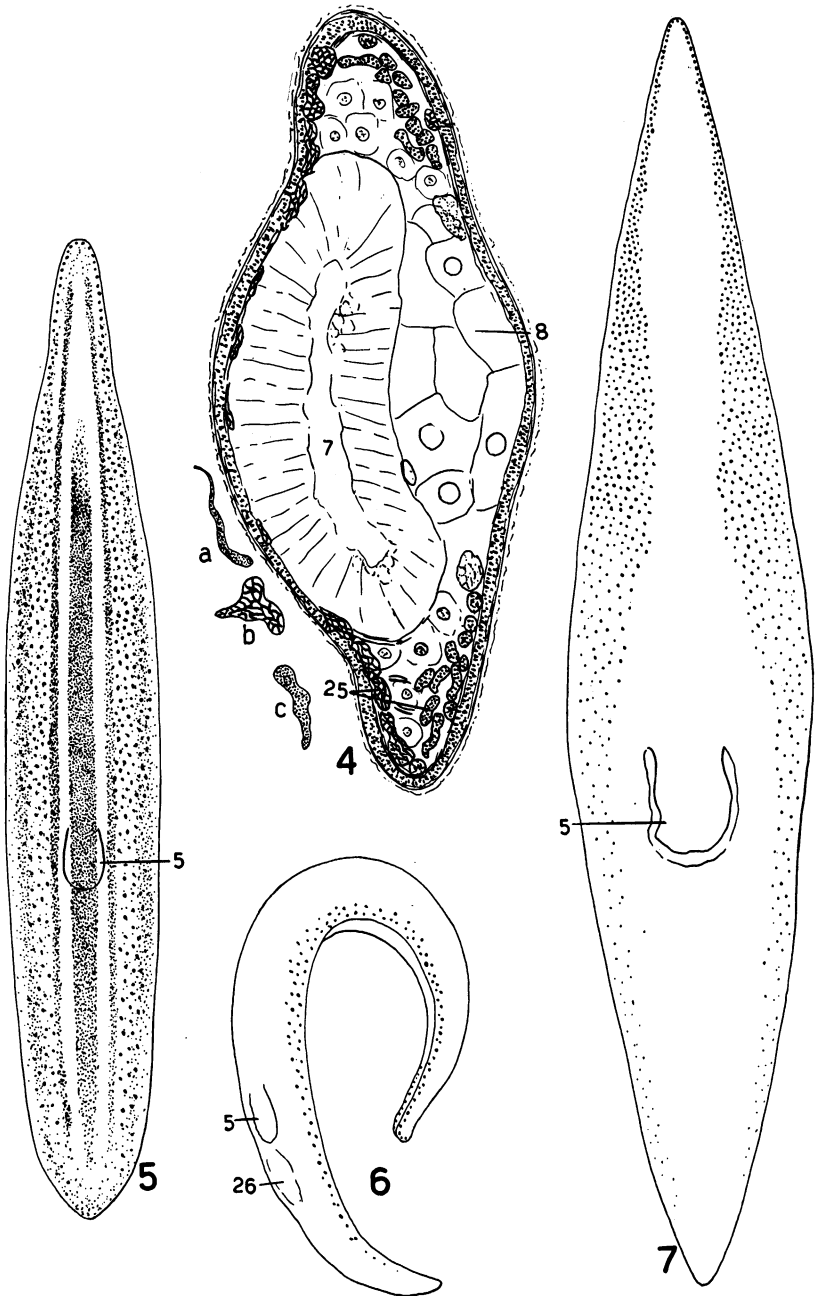


Fig. 4. Transverse section of *Geocentrophora tropica*; to the left the three types of gland cells enlarged (a, b, c).

Fig. 5. *Geoplana panamensis*, showing distribution of eyes and color pattern.

Fig. 6. *Geoplana aphalla*, showing eye arrangement.

Fig. 7. *Geoplana cameliae*, showing shape and eye arrangement.

the stylet. In the opposite wall is a cluster of nuclei. Beyond the stylet the male canal continues as the penis pocket which opens into the buccal tube just in front of the anterior end of the pharynx.

The single female sex gland is alike in all known prorhynchids. It is really a germovitelarium and extends from the posterior end of the body forward in midventral position below the intestine (Fig. 4) to the level of the seminal vesicle. The youngest part of the gland is at the posterior end where it consists of clusters of like cells. As one proceeds anteriorly this breaks up into follicles or egg balls, each of which consists of a central ovocyte and a peripheral layer of follicle cells, corresponding to the yolk cells of other Turbellaria (Fig. 1). These egg balls and the contained ovocyte increase in size anteriorly so that the largest is nearest the female pore. Anterior to the terminal egg ball, there is an elongated chamber, the female antrum, which opens ventrally in the median line by the female genital pore (Fig. 2).

The usual genito-intestinal canal is present (Fig. 2), extending from the lumen of the intestine through the thick epithelium of the latter, passing in front of seminal vesicle, to one side of the male duct, and entering the rear end of the female antrum, just in front of the terminal egg ball.

DIFFERENTIAL DIAGNOSIS.—*G. tropica* differs from all other known species of the genus except *G. baltica* in its elongated, band-like shape; it differs from *G. baltica* in its black color, details of the male copulatory apparatus, lack of anteriorly projecting intestinal diverticulum above the rear end of the pharynx, more posterior position of male copulatory apparatus and its connection with the buccal tube, and fewer number of testis follicles.

REMARKS.—There were previously reported from the American continents three prorhynchid species: *Prorhynchus stagnalis* M. Schultze, 1851, *P. applanatus* Kennel, 1888, and *P. metameroïdes* de Beauchamp, 1913. *P. stagnalis* is cosmo-

politan and is well known to occur in the eastern United States. I have several times collected specimens in streams and ponds near Yonkers, N. Y. One sexually mature was found in November, 1939, and sectioned; study of the sections showed that it is indeed identical with European specimens. *P. applanatus* was described from Trinidad. Kepner and Taliaferro (1916) applied this name to a prorhynchid which they found in the vicinity of the University of Virginia. I am in agreement with Steinböck that their identification is very doubtful; in all probability they had an undescribed species. However, I have collected near Yonkers specimens that correspond in every detail with Kennel's description and I do not doubt that they were *P. applanatus*. I also failed to see any male organs in pressed live specimens but unfortunately I did not section any of the specimens. *P. metameroïdes* was described by Beauchamp from water collected in the leaf bases of Bromeliaceae in Costa Rica. There does not seem to be any possibility that it could be identical with the present species. Steinböck is of the opinion that both *applanatus* and *metameroïdes* belong to the genus *Geocentrophora* but as the male apparatus is not known for either and as this apparatus constitutes the distinction between *Prorhynchus* and *Geocentrophora*, the grounds of his decision appear inadequate, consisting merely of the external similarity to *G. sphyrocephala*.

COTYPES.—Three specimens mounted whole on slide. A.M.N.H. Cat. No. 283.

ORDER TRICLADIDA

GEOPLANIDAE

GEOPLANA STIMPSON, 1857

Geoplana cameliae Fuhrmann, 1914

Figures 7 to 9

MATERIAL.—Two juvenile specimens in Williams' collection, vial No. 1015; one specimen in early sexuality, lent by U. S. National Museum.

EXTERNAL CHARACTERS.—A large species, reaching a length (preserved) of 50 mm., and a width of 5 mm. according to Fuhrmann (1914); the largest specimen available to me was 33 mm.

long and was only at the beginning of sexual development. Form (Figs. 7, 9) typically geoplanid; anterior end narrow; body quickly widening to broad flat shape, broadest at the level of the pharynx, then decreasing to the bluntly pointed posterior end. Relative positions of mouth and genital pore shown in Fig. 9. Eyes numerous (Fig. 7) in single file around the anterior end, soon widening to a broad band several eyes deep, extending about one-third the body width; this greatest breadth of the eyes is reached at about the anterior third of the body; from there the band decreases in width to the level of the pharynx; from the pharynx to the

posterior end, the band consists of few scattered eyes. Color (Figs. 8, 9) consists of a black mottling on a dark brown ground and corresponds entirely to Fuhrmann's description. In all three specimens, as also in Fuhrmann's description, there is a tendency to a light mid-dorsal band, caused by the absence of black pigment here so that the ground color shows. This band is unequally developed in the three specimens and in any case is evident only on the middle part of the worm, fading away toward the ends (Fig. 9).

COPULATORY APPARATUS.—Unfortunately none of the available specimens was sexually mature. The sexual region of the U. S. National Museum specimen was sectioned and although this specimen had an obvious genital pore, the copulatory apparatus was only partially developed. In so far as the development had proceeded, the apparatus was in agreement with Fuhrmann's figure (Fig. 4, p. 758), so that the identification is reasonably certain.

SPECIMEN.—One whole mount deposited in A.M.N.H. Cat. No. 284.

REMARKS.—This species must be fairly common throughout a considerable geographical range, since Fuhrmann took 20 specimens in the central mountains of Colombia, at 1400–1800 meters' altitude, and 3 specimens have been taken in the Canal Zone. I am also of the opinion that *Geoplana plana* Schirch, 1929, from Teresopolis, Brazil, is identical with *Geoplana camelinae*. Riester, 1938, had a land planarian 110 mm. long in life, which he assigned to *G. plana* and gives a colored figure which closely resembles my specimens. Neither Schirch nor Riester describe the arrangement of the eyes or the copulatory apparatus so that the synonymy must remain uncertain at present. Apparently neither author was aware of Fuhrmann's work on the land planarians of Colombia.

Geoplana panamensis, new species

Figure 5

MATERIAL.—Three vials, each with one specimen, Nos. 1175, 1368, 1387, juvenile.

EXTERNAL CHARACTERS.—Shape typically geoplanid, anterior end narrow, quickly widening to flattened body; available specimens to 12 mm. in length but as they are juvenile with no trace of sex organs, the size at maturity must be considerably greater. Eyes numerous, similar in arrangement to that of the preceding species, forming a single file around the anterior end; this soon widens to a band four or five eyes deep occupying the region between the lateral stripe and the margin (Fig. 5); eyes decrease in number

and become more scattered in posterior body half. Color pattern consists of three black stripes on a brown ground. The median stripe is broad and dies out some distance from the anterior tip. To either side of this is a narrow lateral stripe which continues forward onto the head. From the lateral stripe the black pigment again increases toward the margins which are quite dark but do not bear a definite stripe. Ventral surface drab.

DIFFERENTIAL DIAGNOSIS.—This species is recognizable by the combination of eye arrangement and color pattern.

REMARKS.—In the absence of sexual material, it is not possible to furnish an adequate description of this species. In general it is not desirable to base new species of land planarians on external characters only, because of the large number of species already described. However, the color pattern and eye arrangement of this species are so distinctive that a description seems justifiable.

TYPE.—One whole mount (No. 1368), A.M.N.H. Cat. No. 285.

Geoplana aphalla, new species

Figures 6, 10

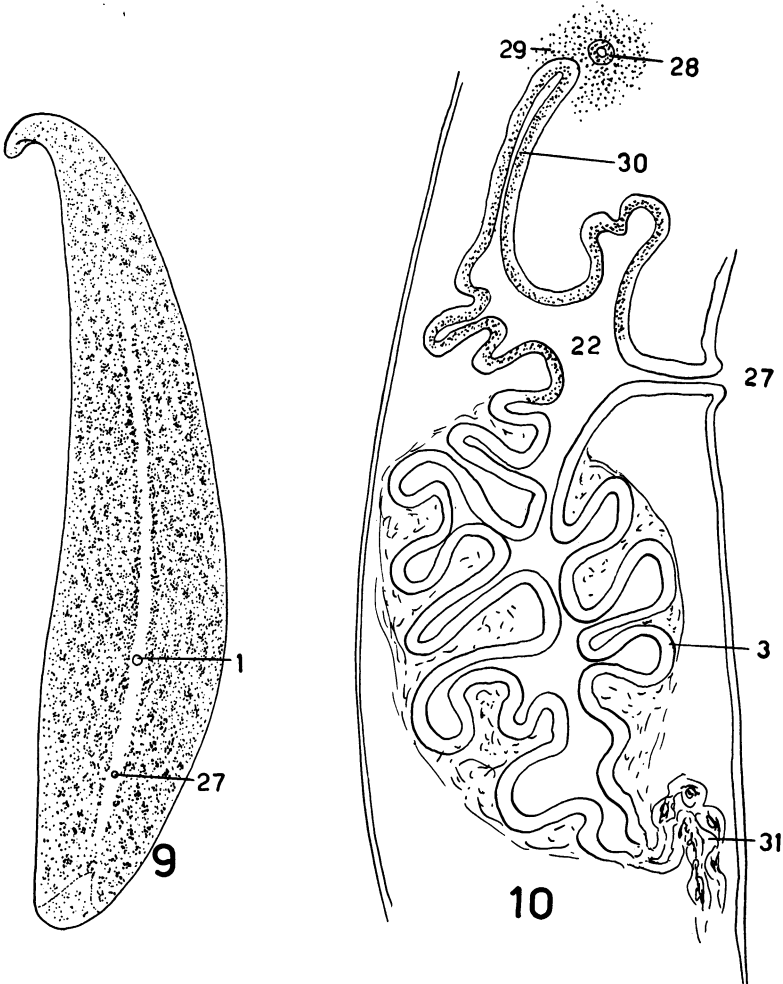
MATERIAL.—One specimen, sexually mature, vial No. 208.

EXTERNAL CHARACTERS.—A small species, length of mature specimen about 5 mm., anterior end blunt, posterior slightly pointed, body thin and flat (Fig. 6); curvature due to preservation prevented getting exact idea of shape. Eyes moderately numerous in band along body margin, arranged in single file around the anterior end, widening to about anterior third where the band of eyes is about three eyes deep; thence declining and dying away toward the posterior end. Color uniformly black above, consisting of a fine black granulation on a dark brown ground. Position of pharynx and copulatory apparatus shown in Fig. 6.

COPULATORY APPARATUS.—The specimen was cut into serial sections and although in bad condition because of accidental drying nevertheless permits the sexual apparatus to be studied. Copulatory apparatus shown in sagittal section in Fig. 10. Male apparatus lacks definite penis papilla; consists of elongated chamber with greatly folded walls receiving two vasa deferentia at its anterior end; a slightly muscular tissue incloses the apparatus. Female apparatus also consists of chamber with irregularly folded walls; from postero-dorsal angle of this glandular duct extends posteriorly and receives oviduct encircled by cement glands. The epithelium of the entire female chamber and glandular duct is very glandular filled with secretion granules. Tubular canal leads from copulatory apparatus to genital pore.



8



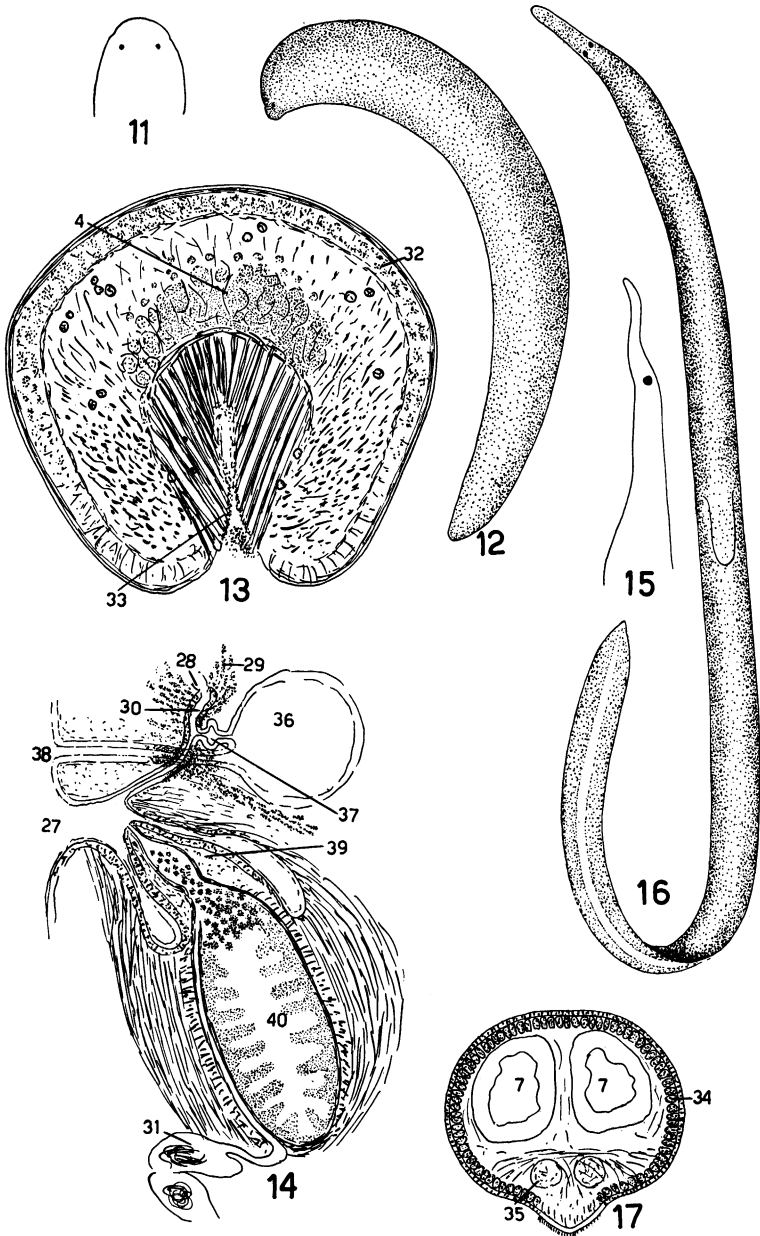
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10

Fig. 8. Enlarged view of color pattern of *Geoplana cameliae*.

Fig. 9. Largest available specimen of *Geoplana cameliae*, showing general color pattern, and location of mouth and genital pore.

Fig. 10. Sagittal section of the copulatory apparatus of *Geoplana aphalla*.



Diporodemus plenus

Fig. 11. Head. Fig. 12. Shape. Fig. 13. Cross-section, through head, showing the glandulo-muscular organ. Fig. 14. Sagittal section of the copulatory complex.

Desmorhynchus angustus

Fig. 15. Anterior end. Fig. 16. View of entire animal. Fig. 17. Cross-section through body, showing layer of longitudinal muscle bundles.

DIFFERENTIAL DIAGNOSIS.—This species is distinguished by the combination of small size, black color, and details of the copulatory apparatus.

REMARKS.—There appear to be a large number of species of *Geoplana* in which a penis papilla is lacking and the male apparatus consists simply of a chamber with folded walls. Riester figures a number of such male apparatuses in his work on Brazilian *Geoplanas*. It is probable, however, that the folds of the wall may be so manipulated during erection as to form a functional penis papilla. I have shown that this is the case in *Rhynchodemus atropurpureus* (Graff) 1899 where one specimen showed a male copulatory apparatus like that of *G. aphalla* and another has a penis papilla formed by erection of the folds adjacent to the entrance of the vas deferens (Hyman, 1940).

TYPE.—One set of serial sections. A.M. N.H. Cat. No. 286.

RHYNCHODEMIDAE

Rhynchodeminae Heinzl, 1929

DIPORODEMUS HYMAN, 1938

Diporodemus plenus, new species

Figures 11 to 14

MATERIAL.—One specimen, No. 357, sexually mature.

EXTERNAL CHARACTERS.—Plump, cylindroid (Fig. 12), about 15 mm. long; slight indentation near anterior tip; eyes small, two, near anterior tip, shortly behind level of indentation (Fig. 11); color uniform brownish black above shading to a lighter yellowish brown tone below; midventral line with white ridge, formed by the creeping sole.

CROSS-SECTION.—Anterior end sectioned transversely, posterior half containing copulatory apparatus sectioned sagittally. As the genera of the Rhynchodemidae cannot be distinguished without study of the arrangement of the musculature, transverse sections are essential. Transverse sections through the body are approximately circular. Epidermis of low columnar form; beneath epidermis thin layer of circular fibers followed by very thin layer of longitudinal fibers; next comes a wide zone containing abundant pigment granules and rhabdiforming cells; internal to this is an equally wide zone of muscle fibers, chiefly diagonal. This inner muscle zone incloses the intestine and nerve cords. The absence of a strong subepidermal longitudinal muscle layer arranged in bundles places the animal in the subfamily Rhynchodeminae, and the structure of the copulatory apparatus indicates the genus *Diporodemus*.

Cross-sections through the head show an absence of the ciliated grooves found in *D. yucatani*, the only other species of the genus. However, on the ventral surface of the head, beginning shortly behind the eyes and extending posteriorly for a brief distance there is a glandulo-muscular depression (Fig. 13). The regular epidermis ceases at the borders of the depression, the lining of which is of indefinite nature. The depression has the form of a longitudinal cleft to which strong bundles of muscle fibers run from a bounding muscular stratum. Gland cells run among the muscle bundles and open into the cleft, which contains a mass of glandular material. The gland cells supplying the depression extend some distance posterior to its level as paired groups lying just above the ventral nerve cords. These groups of gland cells lie behind the level of the section illustrated in Fig. 13. This section also does not show the strong muscle zone to the inner side of the pigment zone, as this gradually appears in more posterior sections. The masses of diagonal muscles to either side of the depression (Fig. 13) become continuous with this muscle zone. The glandulo-muscular depression of *D. plenus* is apparently some form of adhesive organ.

COPULATORY APPARATUS.—Closely resembles that of *D. yucatani* Hyman, 1938. Penis large, muscular, with well-developed papilla, and elongate muscular bulb. Penis bulb with thick outer layer of lengthwise muscle fibers, internal to this layer of circular fibers, then a thin stratum of longitudinal fibers next the lining epithelium (Fig. 14). Muscle layer very thin over anterior end of penis bulb. Common vas deferens enters from below anterior end of penis bulb, then courses backward inside the inner longitudinal muscle layer, ventrally, just beneath the lining epithelium, to base of penis papilla where it opens into lumen (Fig. 14). Penis papilla moderately muscular, with longitudinal layer next to lining and thick layer of transverse fibers in outer wall. Lining of penis bulb and penis papilla consists of very glandular epithelium, more or less disintegrated in the specimen; appeared to be much folded in penis bulb. Distal end of lumen of penis bulb and lumen of penis papilla filled with rounded eosinophilous masses of secretion. Common genital pore large; fold descends from dorsal wall between male atrium housing the penis papilla and female canal. Latter opens into posterior wall of common genital atrium, slants dorso-posteriorly and continues as short glandular duct into whose posterior end oviducts open. Glandular duct receives along its course numerous eosinophilous cement glands, and gives off a short Beauchamp's canal connecting it with the seminal bursa. The latter is a large sac, lined by a tall epithelium, but without any definite muscular layers outside the epithelium. Just in front of the entrance of Beauchamp's canal, its ventral surface narrows into a stalk, the bursa stalk, which proceeds directly to the ventral surface and opens there by a special female pore, the vaginal pore, shortly

behind the normal common genital pore. This opening of the bursa on the ventral surface is diagnostic of the genus *Diporodemus*. As in *D. yucatani*, the common genital pore opens in the midventral line, in the creeping sole, but the vaginal pore opens laterally, to one side of the sole.

DIFFERENTIAL DIAGNOSIS.—*D. plenus* differs from *D. yucatani*, the only other member of the genus, in the presence of a glandulo-muscular adhesive organ on the ventral surface of the head, absence of cephalic ciliated grooves, in the histology of the penis, absence of muscular coat on the seminal bursa, and proximity of the vaginal pore to the common genital pore.

REMARKS.—In 1938, I founded the genus *Diporodemus* on two specimens collected in Yucatan, Mexico. It is interesting to find another species of the genus, practically identical in external appearance, in a locality not far removed from the type locality.

TYPE.—One specimen, anterior end as transverse serial sections, posterior half as sagittal serial sections, remainder of body as piece left in original vial. A.M.N.H. Cat. No. 287.

Desmorhynchinae Heinzl, 1929

DESMORHYNCHUS HEINZEL, 1929

Desmorhynchus angustus, new species

Figures 15 to 17

MATERIAL.—Four vials, each with 1-3 specimens, Nos. 1016, 1105, 1206, 1385, all juvenile; Nos. 190, 647, 847, probably also are this species.

EXTERNAL CHARACTERS.—Long and slender, to 30 mm. long, cylindroid, cross-section (Fig. 17) broadly oval, dorsally flattened. Anterior end with a pair of large eyes (Fig. 15); head anterior to eyes remarkably long and flat, somewhat wavy. Shortly behind level of eyes, the body quickly becomes plump (Fig. 15), continues of about the same diameter to near posterior end which tapers slightly (Fig. 16). Color uniformly black above, shading to lighter grayish drab hue below. Median ventral line with white ridge of creeping sole. Position of pharynx shown in Fig. 16.

CROSS-SECTION.—Shows that the animal belongs to the genus *Desmorhynchus* as beneath the epidermis there is a thick stratum of longitudinal muscle bundles. These bundles appear in cross-sections as closely placed oval masses immediately internal to the thin layer of circular

muscles next the epidermis (Fig. 17). There are no other noteworthy features of the cross-section.

DIFFERENTIAL DIAGNOSIS.—In the absence of sexual material, diagnosis rests on the black color, long slender shape, large eyes, elongated head anterior to the eyes.

REMARKS.—Of a number of rhynchodemid species transferred by Heinzl (1929) to the genus *Desmorhynchus*, very few concern the region here under consideration. *Desmorhynchus bromelicola* (Beauchamp) 1912 from Costa Rica has the same large eyes and elongated head as *D. angustus* but differs decidedly in color. Of the rhynchodemids described from Colombia by Fuhrmann (1914), two species, *samperi* and *maculatus*, probably should be placed in *Desmorhynchus*, although as noted above this cannot be decided without study of transverse sections. These two species also differ from the present one in color.

TYPE.—Preserved specimen (No. 1385), A.M.N.H. Cat. No. 288.

Numbering of Details on All Figures

1, mouth	21, female genital pore
2, ciliated pit	22, female atrium
3, male copulatory organ	23, seminal vesicle
4, brain	24, genito-intestinal canal
5, pharynx	25, gland cells, a, b, and c, the three types mentioned in text
6, esophagus	26, copulatory complex
7, intestine	27, common genital pore
8, egg ball	28, oviduct
9, testes	29, cement glands
10, penis pocket	30, glandular duct
11, protractor muscles of penis	31, vasa deferentia
12, penis stylet	32, pigment layer
13, formative cells of stylet	33, glandulo-muscular adhesive organ
14, two of the four large cells lining penis lumen	34, longitudinal muscle bundles characteristic of Desmorhynchinae
15, circular muscle layer of penis	35, ventral nerve cords
16, longitudinal muscle layer (retractors)	36, seminal bursa
17, sphincter	37, Beauchamp's canal
18, frontal glands	38, vaginal pore
19, buccal tube	39, penis papilla
20, male canal	40, penis bulb

LITERATURE

- BEAUCHAMP, P. DE
 1912. Planaires terrestres des Broméliacées de Costa-Rica recueillies par M. C. Picado. Arch. Zool. Expér. Gén., (5) X, Notes et Revue, pp. i-x.
 1913. Planaires des Broméliacées de Costa-Rica recueillies par M. C. Picado. 2me note. Arch. Zool. Expér. Gén., LI, Notes et Revue, pp. xli-liii.
- FUHRMANN, O.
 1914. Planaires terrestres de Colombie. Voyage d'Exploration scientifique en Colombie. Mém. Soc. Neuchateloise Sci. Natur., V, pp. 748-792.
- GRAFF, L. VON
 1899. Monographie der Turbellarien. II. Tricladida terricola. Leipzig.
- HYMAN, L. H.
 1938. Land planarians from Yucatan. In Fauna of the Caves of Yucatan. Carn. Instit. Wash., Publ. No. 491, pp. 23-32.
 1939. New species of flatworms from North Central, and South America. Proc. U. S. Nat. Mus., LXXXVI, pp. 419-439.
1940. Land planarians from the Palau and Caroline Islands, Micronesia. Ann. Mag. Nat. Hist., (11) V, pp. 345-362.
- KEPNER, W. A., AND TALIAFERRO, W. H.
 1916. Organs of special sense of *Prorhynchus applanatus* Kennel. Jour. Morph., XXVII, pp. 163-177.
- RIESTER, A.
 1938. Beiträge zur Geoplaniden-Fauna Brasiliens. Abhandl. Senckenberg. Naturf. Gesell., 441, pp. 3-88.
- SCHIRCH, P. F.
 1929. Sobre as planarias terrestres de Brasil. Bol. Mus. Nacion. Rio de Janeiro, V, pp. 27-38.
- STEINBÖCK, O.
 1927. Monographie der Prorhynchidae (Turbellaria). Zeitschr. Morph. Ökol. Tiere, VIII, pp. 538-662.

