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LA FAUNE TERRESTRE DE L'ÎLE DE SAINTE-HÉLÈNE

—
QUATRIÈME PARTIE
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MUSEE ROYAL DE L'AFRIQUE CENTRALE — Tervuren, Belgique
Annales — Série in-8° — Sciences Zoologiques — n° 220, 1977

ADDENDUM

The only material received from St. Helena since closure of my MS on the megadrile oligochaetes was obtained from an area where LOVERIDGE had not previously collected. The data are as follows: « Under stone by upper gate to Broad Bottom, 4.IV.1972, A. Loveridge.

Contents of the single tube were as follows: *Aporrectodea turgida*: 1-2-1; *Pheretima loveridgei*: 0-0-1.

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2. TURBELLARIA

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INTRODUCTION

The collections of Turbellaria resulting from the two expeditions to St. Helena organized by the Musée Royal de l'Afrique Centrale have been entrusted to me for investigation. They consist of two samples of macrostomid turbellarians of the genus *Macrostomum*, which appear to consist of a single species new to science, and several samples of aquatic and terrestrial triclad turbellarians among which are two new species.

A history of the faunistic studies of St. Helena, from its discovery in 1502, has been provided by P. BASILEWSKY and P. BENOIT (1970), and it appears that there have been no previous studies of the Turbellaria of this Island. The aquatic triclads especially are proving to be of systematical and biogeographical importance. Although they were collected in the freshwaters of the Island, the two species found are both members of the infraorder Maricola. Their freshwater counterparts within the Haploneura, the Paludicola, appear not to be represented.

MATERIALS AND METHODS

MACROSTOMIDA :

Preliminary examinations were made on entire preserved specimens, wholemounts stained in CMC-S, and squash preparations of the penial apparatus. For detailed studies sagittal, frontal, and transverse serial sections were prepared, and stained according to the Mallory-Heidenhain schedule (GURR, 1963). The sections were at 6µm intervals.

MARICOLA :

For preliminary examination wholemounts were prepared, either unstained, or by overstaining in alcoholic borax carmine and then destaining rapidly in acidified 70 % alcohol. For detailed studies serial sections were prepared, from paraffin embedded material, at a thickness of 5µm or 8µm. The sections were cut in the sagittal or transverse plane; the curvature of most specimens prohibited the preparation of useful frontal sections. The stains used were Mallory-Heidenhain, phosphotungstic acid haematoxylin (DRURY and WALLINGTON, 1967), and Ehrlich's acid haematoxylin with eosin. Regrettably, some of the specimens proved to be incompatible with one or more of these stains, even when mordants were used, and thus they had to be reprocessed with a second or third stain. Inevitably, in a few cases these sections were displaced or lost, so that neat series were not obtained. Nevertheless, positive identification was possible in all cases, and neat, complete series of sections were obtained from the majority of specimens selected for processing.

TERRICOLA :

With the exception of the Rhynchodemidae most of the Terricola showed considerable coiling and distortion. The two rhynchodemids were transected, and the posterior portions sectioned sagittally, and the anterior portions sectioned, in part, transversely. The sections were at 8µm intervals, and were stained in Mallory-Heidenhain. Of the Bipaliidae that were mature sagittal sections of two specimens were made. The parts containing the copulatory apparatus were excised and sectioned at 10µm intervals. The sections were stained in Mallory-Heidenhain.

Order **MACROSTOMIDA** Meixner, 1924

Fam. **MACROSTOMIDAE** Beneden, 1870

Gen. **Macrostomum** O. Schmidt, 1848

Macrostomum parvum sp. nov. (fig. 179)

Holotype : One set of sagittal sections on one slide (M.T. 33.344) from lot 33.344. Type locality : Sandy Bay, St. Helena South, from freshwater. Collected 11 January 1966. Paratypes : M.T. 35.507 and 35.508. One set of transverse sections, one set of frontal sections, one wholemount, and one squash preparation of the penial apparatus, together with two entire specimens, all from lot 33.344. A single specimen in lot 33.335.

from the same locality, is probably the same species. This is preserved as a permanent squash preparation. Occurrence : known only from the type locality.

Etymology : The trivial name is from the Latin, *parma*, a small shield, and refers to the general appearance of the species.

External features (fig. 179a) : Preserved specimens of maximum length 1.2 mm, width 0.6 mm at the widest point, immediately anterior to the female atrium. Translucent or transparent; with two eyes. Body broad and shield like; convex medially and flattened laterally. Anterior end broad and subtriangular in shape; posterior end rounded and much narrower than the rest of the body. The rhabdoids are well distributed over the body, are up to 15µm long, and usually occur in bundles. Anterior rhabdoid tracts are present. Sensory hairs, about 8µm long, are also widely distributed. Epidermis typical of the genus. The granular vesicle, the penis stylet, and the glands surrounding the female atrium are the only conspicuous features of the reproductive organs that are visible in entire specimens.

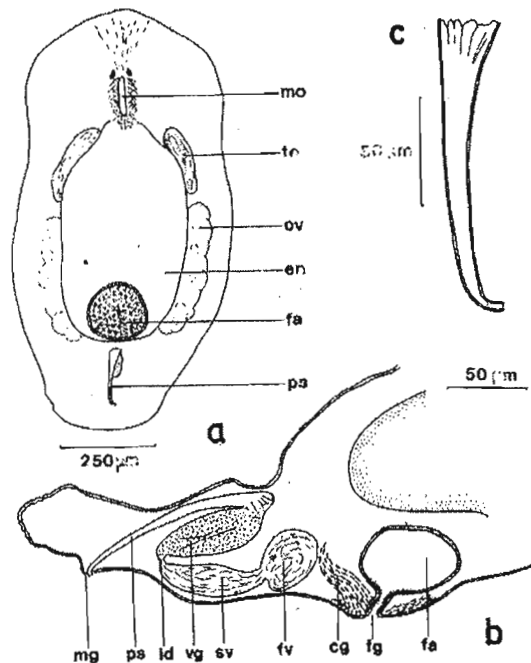


Fig. 179. — *Macrostomum parma* sp. nov. : a, composite drawing from wholemounts and sections. en, enteron; fa, female atrium completely filled with an egg; mo, mouth; ov, ovary; ps, penis stylet; te, testis; b, diagrammatic sagittal section of the copulatory apparatus viewed from the right side. cg, cement glands; fa, female atrium; fg, female gonopore; fv, false seminal vesicle; id, intervesicular duct; mg, male gonopore; sv, seminal vesicle; vg, granular vesicle; c, penis stylet drawn from a squash preparation.

Male reproductive system (fig. 179b, c) : The testes are moderately large and elongate bodies lying latero-ventrally to the anterior part of the enteron. The vasa deferentia run ventrally caudad and unite behind the female atrium to enter the false seminal vesicle. The latter lies ventrally and is globular in shape. It opens by a duct into the more elongate true seminal vesicle, which also occupies a ventral position. From the posterior face of the true seminal vesicle runs an intervesicular duct opening into the granular vesicle. This elongate vesicle is reflected dorsally and anteriorly so that it lies

somewhat obliquely above the seminal vesicle. The penis stylet opens into the anterior face of the granular vesicle and is directed ventro-posteriorly, lying dorsal to the granular vesicle. The stylet has a crenate base about 25µm wide, and may be up to 160µm long. The shaft is almost straight in squash preparations, but in sections has a very gentle curvature. Always the distal tip is bent at right angles to the main shaft, in the plane of curvature, and is truncate. The stylet opening is terminal, and there is no terminal thickening of the walls.

Female reproductive system (fig. 179a, b): The slightly lobulate ovaries lie behind the testes, alongside the posterior part of the enteron. The oviducts are inconspicuous. The female atrium lies beneath the blind tip of the enteron. It is spacious, roughly spherical in shape, and is lined with a thin epithelium with very indistinct cell boundaries. In several specimens it contains a large spherical egg. There is no « Verschlussapparat ». The state of ciliation of the female apparatus could not be determined with accuracy because of the poor histological condition of the specimens. It seems that only the ectal region of the female atrium is ciliated. The female gonopore is surrounded by a large ring of very dense eosinophil cement glands.

Discussion of *Macrostomum parvum*.

The monograph of FERGUSON (1939-1940) is a useful starting point for specific comparisons. It is in the male copulatory apparatus that the most distinctive features of the new species are found. The form of the penis stylet with its long, almost straight shaft, and the distal acute flexure with a terminal opening unaccompanied by local thickening of the walls, is unusual. It is paralleled only in such forms as *M. mystrophorum* Meixner (as described by PAPI, 1953), *M. japonicum* Okugawa, *M. curvistylum* Ferguson and *M. hamatum* Luther, 1947. All these are holarctic species. *M. parvum* does not show strong relationships with the hitherto known species from South America or Africa.

The stylet of *M. curvistylum* is only 68µm long; moreover the species does not possess a false seminal vesicle nor an intervesicular duct. *M. japonicum* is a pigmented species, and the stylet is more sinuous than that of *M. parvum*, and it lacks a crenate base. *M. mystrophorum* is very similar to the new species in the length of the stylet, and in its possession of a large globular false seminal vesicle and a well developed intervesicular duct. It differs in the ventral position, lateral to the false seminal vesicle, of the penis stylet, which lacks a crenate base and has a completely recurved tip. Nor is the granular vesicle elongated as in *M. parvum*. *M. mystrophorum* also possesses a « Verschlussapparat ». In *M. hamatum* the false seminal vesicle is elongate and the granular vesicle is small and spherical, which is quite unlike the condition found in the new species. As in *M. mystrophorum* the tip of the stylet is recurved and the base is smooth, not crenate.

Thus, *Macrostomum parvum* sp. nov. may be distinguished from all other species in the genus, as follows: up to 1.2 mm long, lacking pigment, with two eyes. Adrenal rhabdoids present in the epithelium of the entire body. Rhabdoid tracts present. Ovaries slightly lobed. Female atrium a simple spherical sac, without « Verschlussapparat », and with extensive cement glands surrounding the female gonopore. Penis stylet up to 160µm long, straight, or gently curved without spiraling, with a wide crenate base, acute flexure at the tip, and with a truncate terminal opening unaccompanied by local thickening. Granular vesicle elongate. Well developed intervesicular duct present.

Suborder **TRICLADIDA** Lang, 1884

Infraorder **MARICOLA** Hallez, 1892

Fam. **PROCERODIDAE** Diesing, 1862

Gen. **Dinizia** Marcus, 1947

Procerodidae in which the vasa deferentia unite at the base of the penis bulb to form a small accessory seminal vesicle which empties into the primary intra-bulbar vesicle. Penis pointed, without a stylet. Testes numerous, ventral, prepharyngeal, and arranged in a single row on each side of the anterior ramus of the intestine. Ovaries situated ventrally, immediately behind the brain. Oviducts enter the female genital canal (vagina, bursal stalk) separately, or after union to form a short common oviduct; the shell glands enter the female genital canal ectally to the oviducts. Bursa copulatrix absent. Anterior ramus of the intestine extends anteriorly between the lensed eyes, without forming pre-ocellar diverticula (modified from MARCUS, 1947).

Type : *Dinizia divae* Marcus, 1947, São Paulo, Brasil.

Dinizia sanctaehelenae sp. nov. (fig. 180)

Holotype : One set of sagittal sections on one slide (M.T. 33.928). Type locality : Rose Hill, St. Helena. Collected April 1967. Paratypes : M.T. 33.339, 33.340, 33.926, 33.927, 33.928, 33.930, 35.385, and 35.505. These are held as sagittal or transverse sections, wholemounts, or preserved specimens in alcohol. Occurrence : known only from St. Helena.

External features (fig. 180a) : Preserved specimens small and slender in appearance, of maximum size 3.25×0.75 mm. Colour a uniform fawn, but since no pigment granules could be discerned in sections it is probable that in life they are white. Anterior end rounded or truncate, without distinct auricles, and sharply delimited in that it is narrower than the rest of the body. Body margins smooth and parallel, tapering rapidly to a broad, blunt posterior end. Eyes two, about 14 % of the body-length from the anterior margin, about level with the constriction which delimits the head, and equidistant from each other and their respective nearest lateral body-margins. The root of the pharynx is about 60 %, and the pharyngeal pore about 80 %, of the body-length from the anterior margin. In the available specimens the pharynx often had been thrust out of the pharyngeal pore beyond the posterior margin of the animal.

Epidermis and glands : The dorsal epithelium ($8\mu\text{m}$) is nucleate and clothed in very short cilia. It contains numerous, densely packed, rhabdites. The ventral epithelium is thinner and contains fewer rhabdites. There is a small zone immediately beneath the frontal margin, about $40\mu\text{m}$ thick, which is devoid of nuclei, and which contains very few rhabdites. The submarginal adhesive glands, which are eosinophil in nature, are well developed throughout the length of the body, but especially so in a small band immediately anterior to the eyes.

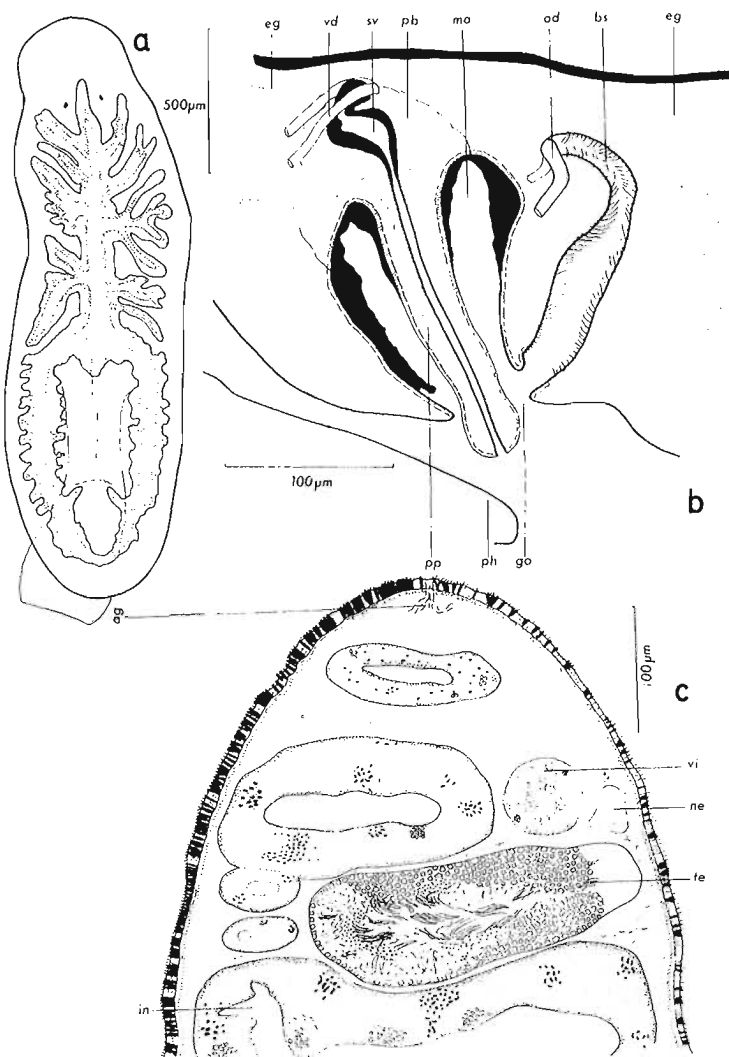


Fig. 180. — *Dinizia sanctaehelena* sp. nov.: a, dorsal view of entire animal drawn from a cleared wholemount; b, holotype. Diagrammatic sagittal section of the copulatory apparatus, viewed from the left side. bs, bursal stalk; eg, eosinophil glands (shell glands?); go, gonopore; ma, male atrium; od, oviduct; pb, penis bulb; ph, pharynx; pp, penis papilla; sv, seminal vesicle; vd, vas deferens; c, diagrammatic transverse section through the prepharyngeal region. ag, marginal adhesive glands; in, intestine; ne, ventral nerve cord; te, testis. vi, vitellaria.

Body musculature : The sub-epidermal musculature is very weak, and consists of a single layer of circular muscle fibres underlain by a thin layer of longitudinal fibres, which are most strongly developed on the ventral surface. Diagonal fibres were not seen. The parenchymal muscles are principally dorso-ventral, and at the anterior end they pass through the brain.

Alimentary system (fig. 180a) : The anterior ramus of the intestine extends anteriorly between the eyes, but there are no pre-ocellar diverticula. The anterior branches of this ramus are also directed forwards to the level of the eyes. The two posterior rami unite at the hind end of the body. The pharynx is constructed as follows :

outer infranucleate epithelium ($<1\mu\text{m}$) with cilia (ca $1.5\mu\text{m}$), single layer of longitudinal muscles ($<1\mu\text{m}$), thin layer of circular muscle fibres (ca $4\mu\text{m}$), parenchymatous zone containing nervous elements, and both cyanophil and eosinophil glands ($60\text{--}90\mu\text{m}$), inner longitudinal muscles (ca $4\mu\text{m}$), inner circular muscles ($8\text{--}12\mu\text{m}$), and an inner ciliated, infranucleate, and highly folded epithelium varying in thickness from 3 to $8\mu\text{m}$. The terminal quarter of the pharynx has reduced musculature, and the overall weakness of the outer musculature is noteworthy.

Female reproductive system (fig. 180b, c): The paired ovaries are small ovoid bodies (ca $150 \times 50\mu\text{m}$) situated ventrally immediately behind the brain. The oviducts run ventrally, above and lateral to the ventral nerve cords, to the level of the pharyngeal pore. Here they turn dorsad and mediad, laterally to the copulatory organs, and unite above the male atrium to form a long common duct, the female genital canal (vagina, bursal stalk) which opens into the atrium at the gonopore. The oviducts are lined with a nucleate ciliated epithelium. The female genital duct is histologically delimited in that it possesses an infranucleate epithelium with very long prominent cilia, and is clothed with a muscular sheath which appears to consist entirely of circularly oriented fibres. Shell glands are very weakly developed in a few specimens only, and when present they open into the female genital duct. There is no bursa copulatrix, and the female genital canal, here considered to be comparable with the bursal stalk of other Procerodidae, recurves anteriorly above the gonopore or the copulatory apparatus, and is not directed posteriorly as is usual in the Maricola. The vitellaria extend from the level of the ovaries to the region of the pharyngeal pore. Although they extend between the intestinal diverticula they are principally ventral in position, opening directly to the oviducts, and lateral to the testes with which they alternate along the body-axis.

Male reproductive system (fig. 180b, c): The testes are dorso-ventrally large, and lie alongside the anterior ramus of the intestine between, and ventral to, the intestinal diverticula. There are 5-7, usually 7, follicles on each side, and they extend from a position a little posterior to the ovaries and stop short of the root of the pharynx. Immediately behind the posterior pair of testes, and anterior to the root of the pharynx, the vas deferens on each side is greatly enlarged to form a false seminal vesicle which is filled with sperm. Each vas deferens then narrows and follows a sinuous course, ventral and lateral to the pharynx, towards the copulatory apparatus. Immediately posterior to the pharyngeal pore they begin to curve mediad and dorsad towards the penis bulb, and just above the latter they unite to form a small common vas deferens which is slightly enlarged to form an accessory seminal vesicle at the base of the penis bulb. This is partially clothed in muscle fibres, and it opens directly into the penis bulb, sometimes recurving slightly, and widens to form the intrabulbar seminal vesicle. From the latter runs the straight ejaculatory duct which opens at the tip of the penis papilla. The bulb itself is relatively large and muscular, and the papilla is in the form of an elongate cone, sometimes with a swollen tip. The male atrium is just large enough to accommodate the penis papilla, which in many of the specimens is projecting from the gonopore. The male atrium is lined with a papillate nucleate epithelium underlain by a thin layer of circular muscle fibres, followed by weak longitudinal musculature. The penis papilla is covered with a flat nucleate epithelium underlain with circular and then longitudinal muscles. The ejaculatory duct is lined with a ciliated nucleate epithelium covered with circular muscle fibres only. Eosinophil glands of the penis could not be traced.

Differential diagnosis: *Dinizia sanctaehelenae* is readily distinguished from the only other species of this genus, *D. divae* Marcus, 1947, by the absence of a common oviduct, and in the anterior curvature of the well developed female genital canal.

Discussion of *Dinizia sanctaehelenae*.

The generic assignment of the new species has been made principally on the basis of four characters: the absence of a bursa copulatrix, the unusual course of the vasa deferentia, the ventral prepharyngeal location of the testes, and the presence of a distinct lens to the eyes. Ventral testes are not common in Maricola, but they occur also in *Foviella affinis* (Oersted) Bock, 1925, a holarctic form that also has lensed eyes, but it differs from *Dinizia* in other ways. The numerous testes are distributed posteriorly to the copulatory apparatus and the vasa deferentia do not unite before entering the penis bulb. Furthermore, *Foviella* possesses pre-ocular diverticula of the anterior ramus of the intestine, and these are lacking in *Dinizia*. Finally, recent evidence suggests that *Foviella* is really an uteriporid and not a procerodid at all (BALL, 1975).

The occurrence of *Dinizia* in both Brasil and St. Helena is further evidence of the fact that the Procerodidae of the southern hemisphere form a natural group characterized by their ventral testes, by the opening of the shell glands into the bursal stalk ectally to the oviducts (MEIXNER, 1928), and by their possession of lensed eyes (LEHMENSICK, 1937). Other monotypic genera from Brasil, *Leucolesma* and *Vatapa*, are clearly very closely related to *Dinizia* in that their ventral testes are prepharyngeal, which is unusual in the Procerodidae, and *Leucolesma* also lacks a bursa copulatrix (MARCUS, 1948). The latter is clearly distinct from *Dinizia* in that it possesses a muscular gland organ, ovaries that are situated far behind the brain, and a reduced number of testes.

The exact position of *Dinizia* within the family Procerodidae is problematical. MARCUS (1947: 166) assigned the genus to the Cercyrinae because the vasa deferentia unite before entering the penis bulb and even though both *D. divae* and *D. sanctaehelenae* differ from other members of that subfamily in that the intestine presents no pre-ocular diverticula and the posterior rami unite behind the copulatory apparatus (cf. BÖHMIG, 1906; WILHELM, 1909). It is doubtful, however, that this is still a valid character for the delimitation of this subfamily because *Cerbussowia* does not meet this requirement even though it shows other close relationships with the Cercyrinae (WILHELM, 1909). Furthermore, *Procerodes kerguelensis* Hyman, 1958, is described as having a long common vas deferens, and in other species, such as *P. asahinai* Kato, 1943, *P. japonica* Kato, 1955, *Micaplana misae* Kato, 1937, and possibly *Procerodes dahli* Marcus and Marcus, 1959, the vasa deferentia unite so closely to the base of the penis bulb that it is possible to argue that there is a short common vas deferens in these forms. These data seem to indicate that the current concept of the Cercyrinae and the Procerodinae is inadequate, and they confirm MEIXNER's (1928) view of the general unsuitability of the male copulatory apparatus for higher taxonomic purposes. Such problems in the classification of the Procerodidae are considered further in the discussion of *Tryssosoma jennyae* sp. nov.

Gen. *Tryssosoma* gen. nov.

Procerodidae in which the vasa deferentia unite at the base of the penis bulb to form a small accessory vesicle which empties into the primary intra-bulbar seminal vesicle. Penis blunt, without a stylet. Testes numerous, ventral, pre-pharyngeal, arranged in a double row on each side of the anterior ramus of the intestine. Ovaries situated ventrally, immediately behind the brain. Oviducts enter the bursal stalk separately; the shell glands enter the bursal stalk ectally to the oviducts. Bursa copulatrix

present, situated behind the penis. Anterior ramus of the intestine extends anteriorly between the lensed eyes without forming preocellar diverticula.

Type : *Tryssosoma jennyae* sp. nov.

Etymology : From the Greek, *Tryssos*, meaning dainty, and referring to the general appearance of the type species.

***Tryssosoma jennyae* sp. nov. (fig. 181)**

Holotype : One set of sagittal sections on two slides from lot 33.929 (M.T. 33.929A-B). Type locality : the « milieu hypothelminorhéique » of St. Helena. Collected 30 May 1967. Paratypes : M.T. 33.345, 33.346, 33.926, 35.379, 35.380, 35.381, 35.382, 35.383, 35.384, 35.386 and 35.506. These are held as sagittal or transverse sections, wholemounts or preserved specimens in alcohol. Occurrence : known only from St. Helena.

External features (fig. 181a) : Maximum size of preserved specimens 3.25×1.5 mm. The dorsal surface is pale streaky brown which is darkest in the region of the copulatory apparatus. The ventral surface is pale. A few specimens had lost their colour in the preservative, and in nearly all specimens traces of the intestine and gonads could be discerned through the pigment. The anterior end is rounded or truncate, somewhat broader than the preceding species, without any traces of auricles. The body margins are smooth, and the body-width increases gradually from the level of the eyes to the copulatory apparatus. The posterior end is very blunt. There are two eyes, situated more anteriorly than in *Dinizia sanctaehelenae*. The root of the pharynx is a little less than halfway along the body, and the pharyngeal pore is about 80 % of the body-length from the anterior margin.

Epidermis and glands : The nucleate dorsal epithelium is of varied thickness (2-6 μ m) and is packed with rhabdites. Cilia could not be discerned. The ventral epithelium contains fewer rhabdites, and is clothed with cilia ca 4 μ m long. Rhabdites are absent from a small area of epithelium immediately beneath the centre of the frontal margin, and from the cells immediately medial to the marginal adhesive glands. The latter are eosinophil and occur without interruption throughout the body-length. They are most strongly developed anterior to the eyes. The marginal adhesive zone marks the boundary of the ventral ciliation.

Body musculature : The subepidermal musculature is similar to that of the preceding species. The longitudinal muscles of the dorsal body-wall are partially obscured by numerous pigment granules. These latter are lacking ventrally.

Alimentary system (fig. 181a) : The anterior ramus of the intestine extends anteriorly between the eyes, without forming pre-ocellar diverticula, and the anterior branches of this ramus extend laterally to the eyes. The two posterior rami unite immediately behind the bursa copulatrix. The pharynx is constructed as follows : outer infranucleate epithelium (<1 μ m) with cilia (ca 1.5 μ m), longitudinal muscles (4-6 μ m), circular muscles (2-5 μ m), parenchymatous zone containing the usual nervous and glandular elements, but with especially well developed eosinophil glands (40-70 μ m), inner longitudinal muscles (8-20 μ m), inner circular muscles (30-50 μ m), and the usual infranucleate and ciliated inner epithelium. The musculature is reduced over the terminal quarter of the pharynx.

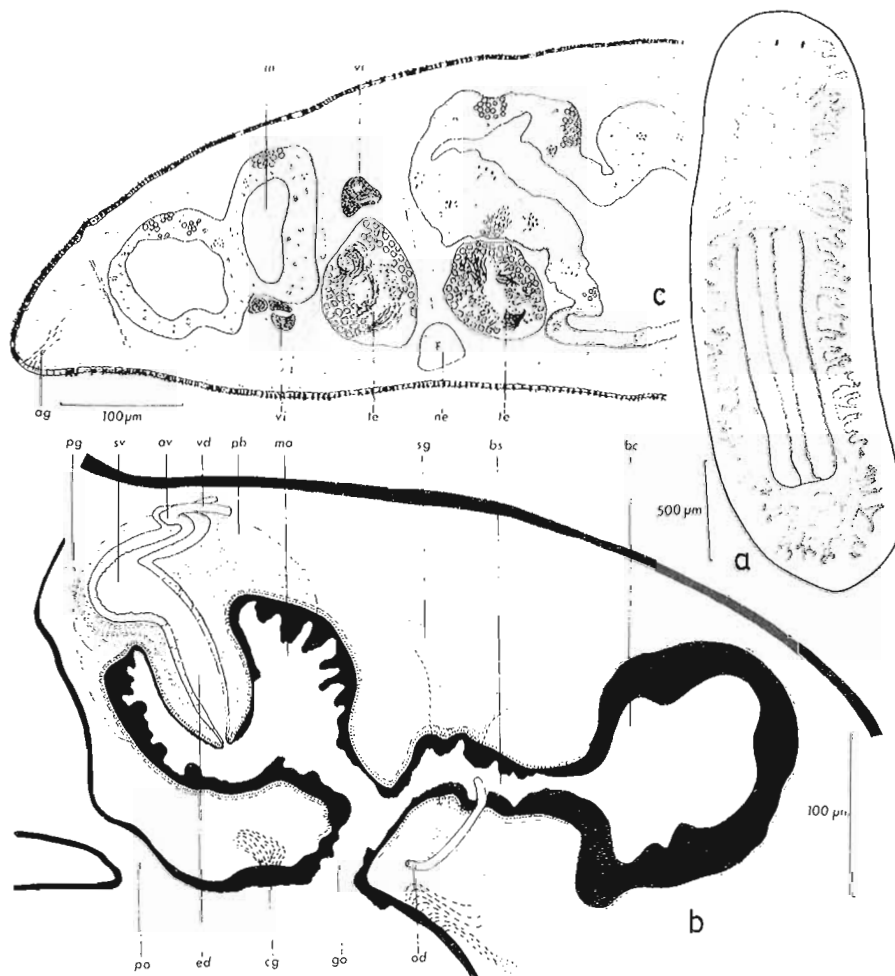


Fig. 181. — *Tryssosoma jennyae* gen. et sp. nov.: a. dorsal view of entire animal drawn from a cleared wholemount; b. holotype. Diagrammatic sagittal section of the copulatory apparatus, viewed from the left side. av, accessory seminal vesicle; bc, bursa copulatrix; bs, bursal stalk; cg, cement glands; ed, ejaculatory duct; go, gonopore; ma, male atrium; od, left oviduct; pb, penis bulb; pg, penis glands; po, pharyngeal pore; sg, shell glands; sv, seminal vesicle; vd, vas deferens; c. diagrammatic transverse section through the prepharyngeal region. ag, marginal adhesive glands; in, intestine; ne, ventral nerve cord; te, testis; vi, vitellaria.

Female reproductive system (fig. 181b, c): The paired ovaries ($130 \times 95 \mu\text{m}$) are situated ventrally, immediately behind the brain. The oviducts run ventrally, lateral to the nerve trunks, to the copulatory apparatus where they turn mediad and enter directly the bursal stalk, one from each side, at about the mid-point of the latter. The oviducts are lined with a nucleate, ciliated, epithelium. The bursa copulatrix is a sacciform organ situated dorsally behind the penis, and the bursal stalk runs from its antero-ventral wall to the atrium just above the gonopore, receiving the oviducts as described. The epithelium of the bursa copulatrix consists of tall vacuolated and nucleate cells, which are virtually indistinguishable from those that line the intestinal lumen. The bursal stalk is lined with a ciliated infranucleate epithelium that is overlain by a layer of circular muscles several fibres thick, and a thinner layer of longitudinal fibres. The eosinophil shell glands are extensive, and open into the bursal stalk immediately ectal to the

openings of the oviducts. The vitellaria, rich in inclusions, extend from a point just anterior to the ovaries to behind the bursa copulatrix, and occupy much of the available dorso-ventral space. They are principally lateral and dorsal to the testes in the prepharyngeal region; in the postpharyngeal region they are largely ventral to the intestinal diverticula.

Male reproductive system (fig. 181b, c): The testes are smaller than those of the preceding species, and are situated ventrally. They form two rows on each side of the anterior ramus of the intestine, pseudometamerically arranged such that each pair of testes straddles the corresponding ventral nerve trunk. There are 7-9 follicles in each row, and they extend from a position a little posterior to the ovaries and stop short of the root of the pharynx. Each vas deferens forms a narrow duct which runs ventrally, just above the nerve trunks, to the copulatory apparatus. At the level of the penis bulb they curve dorsad and mediad, and recurve to unite above the penis bulb forming a small accessory seminal vesicle which is partially clothed in muscle fibres. This opens, usually in an anterior direction, into the large intrabulbar seminal vesicle, from which runs the straight ejaculatory duct which opens at the tip of the penis. The penis bulb is strong and muscular, and the penis papilla is in the form of a broad, blunt cone. The male atrium is quite large, roughly spherical, and lined with a papillate nucleate epithelium underlain by circular, and then longitudinal, muscle fibres. The wide ejaculatory duct is lined with a ciliated infranucleate epithelium and receives the openings of the eosinophil penis glands for most of its length. The penis papilla itself is covered with a relatively flat nucleate epithelium underlain with circular and longitudinal muscles. Extensive eosinophil cement glands open from the ventral epithelium surrounding the gonopore.

Discussion of *Tryssosoma jennyae*.

In the anatomy of the male reproductive system, particularly in the course of the vasa deferentia and the distribution of the testes, *Tryssosoma jennyae* is similar to *Dinizia sanctaehelenae*. It is readily distinguished from the latter by a number of features, apart from its more bulky appearance, and its pigmentation. Thus, the penis is blunt, not pointed, and the testes are arranged in double, not single, rows on each side of the anterior ramus of the intestine. The most important differences are in the female reproductive system, particularly in the possession of a well-developed bursa copulatrix. Furthermore, the vitellaria extend more posteriorly in *Tryssosoma*; in *Dinizia sanctaehelenae* they do not extend beyond the pharyngeal pore. In addition, the musculature of the bursal stalk of *Tryssosoma* is typical of the Procerodidae, whereas the equivalent duct, the female genital canal, of *D. sanctaehelenae* is clothed only in circular fibres, the usual outer longitudinal layer being absent. The much stronger inner musculature of the pharynx of *T. jennyae* is a useful character that may be used to distinguish it from *D. sanctaehelenae* in the absence of sexually mature material.

Tryssosoma jennyae is also very similar to *Procerodes harmsi* Lehmensick, 1937, a problematical species, of uncertain relationships, known only from Java. The architecture of the copulatory apparatus is very similar in both species, but *P. harmsi* differs from *T. jennyae* in that the testes extend to the copulatory apparatus and the shell glands enter the bursal stalk both above and below the oviducts.

Under currently accepted classifications of the Procerodidae, *Tryssosoma jennyae* would be considered a member of the genus *Procerodes*. A justification for the erection of a new genus is therefore necessary.

That the classification of the Procerodidae and related forms is in an unsatisfactory state is an opinion that has been alluded to by HOLMQUIST and KARLING (1972), MITCHELL

and KAWAKATSU (1972) and by BAILL. (1973, 1975). I agree with MITCHELL and KAWAKATSU (1972: 12) in their view that the Procerodidae probably contains several valid family groups, but their recognition requires first a re-assessment of current generic concepts. Only in this way are newly discovered species to be incorporated satisfactorily into our general body of systematic knowledge.

The organization of the female reproductive organs of *Tryssosoma* conforms in most essentials to the type I of MEIXNER (1928), which is characterized by the separate entrances of the oviducts into the bursal stalk entally to the shell glands. The male gonads, however, like those of *Dinizia*, are most similar to those of the species comprising MEIXNER's type IIA a group of Procerodidae widely distributed in the southern hemisphere and also represented by more recently described forms from South America and from Japan. It is noteworthy that HYMAN (1931), in considering MEIXNER's scheme with relation to the Paludicola only, concluded that type IIA was best considered a subdivision of type I, a view with which I am inclined to agree. In this case the Procerodidae may be divided into two large subgroups. In one, corresponding to MEIXNER's type IIB, we find all *Procerodes* species of the *littoralis*-type in which the shell glands and oviducts enter into a diverticulum of the bursal stalk. This organization represents one possible way in which separation of the glandular and copulatory functions of the female genital canal is achieved and it is paralleled in some recently discovered freshwater forms (BAILL., 1974a). The unity of type IIB is further emphasized by the fact that all the contained species possess numerous dorsal testicular follicles distributed throughout the body-length. It would seem sensible to restrict the generic name *Procerodes* to this well defined group.

If the restriction of the genus *Procerodes* is accepted then those « *Procerodes* » species of MEIXNER's types I and IIA, in which the oviducts open directly into the bursal stalk, or the equivalent female genital duct in those forms that lack a bursa copulatrix, above the zone of the shell glands, must receive new generic names. Such is the case with the new species here assigned to the new genus *Tryssosoma*. Some other groups are readily recognized. Thus type IIA, consisting of certain antarctic species with strong circular musculature of the penis, with numerous ventral testes extending to the gonopore, and with two lensed eyes, could form a distinct genus. The contained species would be *P. ohlini* (Bergendal, 1899), *P. hallezi* Böhmig, 1908, *P. wandeli* Hallez, 1906 and *P. gerlachei* Böhmig, 1907. Two Japanese species, *P. japonica* and *P. asahinai*, form another group characterized principally by the unusually strong development of the circular muscles of the bursal stalk. *Tryssosoma* shares similarities with both the *P. ohlini*-group and the *P. japonica*-group such as the ventral prepharyngeal testes and the lensed eyes. But it differs from the former in penial structure and from the latter in the normal musculature of the bursal stalk and in its possession of distinctly separate oviducts. Moreover, the *P. japonica*-group possess certain features strongly suggestive of relationships with *Nesion arcticum* Hyman, 1956 (BAILL., 1975) and thence to other Pacific genera such as *Ectoplana* Kaburaki, 1917, and *Miroplana* Kato, 1931 (BAILL., 1973).

Thus, while *Tryssosoma* certainly belongs within a group of Procerodidae characteristic of the southern hemisphere, a proper assessment of its phylogenetic relationships can be made only in concert with a general revision of the Procerodidae. That such a revision is needed is quite evident from the difficulties experienced in correctly placing, taxonomically, species of both *Tryssosoma* and *Dinizia* from St. Helena, and there are many other extant genera and species that are difficult or impossible to place satisfactorily according to accepted schemes of the subfamilial classification of the Procerodidae.

Ecology and biogeography

According to the collectors all the specimens were taken from the «milieu hypothelminorhéique», or from the other freshwaters of the Island. No collections were from the marine or intertidal habitat. That all the aquatic specimens should be marine triclads is therefore interesting. Hitherto there have been few records of *Maricola* occurring in freshwaters. *Procerodes ohlini* has been recorded above the highwater mark in Tierra del Fuego (BÖHMIG, 1902), on Kerguelen Island (DE BEAUCHAMP, 1940), and on Gough Island (HOLDGATE, 1960), and *P. gerlachei* has been found in a freshwater pool on Possession Island in the Crozets (HYMAN, 1958). It is unusual for a single species to occupy both habitats and it is my opinion that the species of St. Helena, which are typical southern hemisphere forms, are more closely related to *P. ohlini* and *P. gerlachei* than to the holarctic species of the *P. littoralis*-type. Mention may also be made of *Bdellasimilis* Richardson, 1968. Ectoconsortic on Australian freshwater turtles (RICHARDSON, 1970), which was originally assigned, but with severe reservations, to the *Paludicola*. It is undoubtedly a «marine» triclad, and it further emphasizes that the ecological and morphological criteria distinguishing the *Paludicola* from the *Maricola* are being eroded.

The «milieu hypothelminorhéique» comprises pools of water formed from streamlets percolating through the rock fissures and collecting in shallow depressions at the rock bases. They are found in the central crater of the Island, in areas of high humidity which frequently are enshrouded in mist. The temperature varies between 15 and 20 °C. It is unlikely, therefore, that the salinity of this habitat is much elevated, if at all, above that of the normal freshwaters. As it is likely that the *Paludicola* are historically absent from St. Helena it may be supposed that the *Maricola* here, in the absence of competition, have been able to invade successfully a new and unoccupied niche. Regrettably the marine littoral triclads of St. Helena are unknown, although COLMAN (1946) records three unidentified *Turbellaria* from dredge samples. Thus it cannot be determined if there is any possibility of interchange between the marine and freshwater populations. On Gough Island HOLDGATE (1960) thought such interchange unlikely for *P. ohlini*. This species was present in the freshwaters of that Island, but absent from the marine littoral zone where *P. variabilis* dominated.

As discussed earlier, both *Dinizia sanctaehelenae* and *Tryssosoma jennyae* show many similarities with species from South America and southern hemisphere islands such as the Kerguelen, Crozet, and Macquarie Islands, and few similarities with northern hemisphere forms. The relationships with South America are not surprising for studies of Bryozoa (MARCUS, 1938) and marine molluscs, echinoderms and fishes (COLMAN, 1946) indicate that the faunal connections of St. Helena are strong with South America, and very weak with West and South Africa, even though the oceanic currents here are generally westward from the Cape. The decapod crustaceans form an exception to this rule in that they seem to be more closely allied to the West African fauna (CHACE, 1966). It is unfortunate that we know so little of the *Maricola* of South Africa.

In the absence of a good phylogenetic classification of the *Maricola*, the biogeographical relationships of the St. Helena forms cannot be discussed meaningfully in detail. Certainly the circumaustral distribution of those *Procerodidae* characterized by ventral prepharyngeal testes and lensed eyes, as discussed above, may be taken as being consistent with hypotheses of dispersal involving continental drift which have been advocated for many groups of organisms. With respect to St. Helena, Ascension Island, and the coasts of South America and West Africa, the homogeneity of a certain species

group of shorefishes in this area has been used as evidence in support of such a view point (SPRINGER, 1967). However, to be really valid, such evidence is dependent upon a sound classification in which clear distinctions are made between the ancestral and derived states of taxonomic characters, as has been demonstrated for the Paludicola (BALL, 1974b), because only assemblages defined by derived characters are of full taxonomic and biogeographical significance. Unfortunately our knowledge of the Maricola is insufficient to permit true phylogenetic analysis.

The Maricola probably are more primitive than the Paludicola (MEIXNER, 1928; BALL, 1974b), and it is interesting to note that in the southern hemisphere they show transoceanic connections at the specific level, whereas the Paludicola do not. Moreover, the Maricola show strong amphi-atlantic connections at both the specific and generic levels, the Paludicola less so. Historical explanations of these contrasts are not possible until there has been a great deal more work performed on both the Paludicola and the Maricola, and the further study of island forms, particularly in the southern hemisphere, may well prove to be the key.

Infraorder TERRICOLA Hallez, 1892

Fam. **RHYNCHODEMIDAE** von Graff, 1896

Subfam. RHYNCHODEMINAE Corrêa, 1947

Gen. **Rhynchodemus** Leidy, 1851

The taxonomy of triclad is based largely upon characters afforded by the copulatory apparatus. In the genus *Rhynchodemus* this is very much reduced and consequently its taxonomy is in a somewhat confused state. The numerous described species are separated on very minute, and probably very variable, character differences (EV. MARCUS, 1955). I do not wish to add to this confusion by describing a single preserved specimen as a new species, especially as the apparent lack of testes indicates that it may not be fully mature. Since this one specimen from St. Helena now exists only as sections, except for one small fragment, a description of its external features is given below, together with some other remarks, so as to draw the attention of future monographers of this genus to the present specimen collected from a biogeographically important locality.

Rhynchodemus species incertae

Material examined : single specimen M.T. 33.925. Posterior end sectioned sagittally and mounted on two slides; anterior end sectioned, in part, transversely and mounted on one slide; remainder of the anterior end contained in a wax block. All material deposited in the Musée Royal de l'Afrique Centrale.

External features : Preserved specimen 9.0 × 0.7 mm. Eyes two, about 0.4 mm from the anterior margin. Anterior seventh very much narrower than the rest of the

body. Dorsal surface pale grey, without stripes; ventral surface paler with a distinct narrow creeping sole. Pharyngeal pore halfway along body; genital pore not visible. General habitus very similar to that of *R. sylvaticus* and *R. americanus* as described by HYMAN (1943).

Remarks : Although the vitellaria and shell glands are well developed no traces of testes could be discerned. Therefore, the following remarks on the reproductive apparatus must be regarded as provisional. In the morphology of the copulatory organs the specimen clearly belongs to that group of *Rhynchodemus* species in which the female copulatory apparatus is very much larger than the male apparatus. The group comprises *R. bilineatus* (Mecznikow, 1866) from Europe and the Azores (MARCUS and MARCUS, 1959); *R. ijimai* Kaburaki, 1922 from Japan, *R. nematopsis* (de Beauchamp, 1930) from Java; and a large number of North, Central, and South American species, viz., *R. americanus* Hyman, 1943; *R. aripenis* Prudhoe, 1949; *R. blainvillei* von Graff, 1899; *R. pellucidus* von Graff, 1899; *R. piptus* Marcus, 1952; *R. sciurus* Ev. Marcus, 1955; and *R. misus* Ev. Marcus, 1965.

I find it impossible to identify this single specimen with certainty, but its affinities do seem to be closest, at least phenetically, with some species from the New World. The expansion of the shell gland duct, at the point of entry of the oviducts, to form a small chamber is similar to the condition found in *R. misus* (Ecuador), *R. pellucidus* (Brazil) and *R. americanus* (North America). The musculature of the copulatory apparatus is closest to that of the two latter, and the proportions of the male and female apparatus are most similar to those of *R. pellucidus*.

***Rhynchodemus* ? sp.**

Material examined : single specimen M.T. 33.333. Posterior end sectioned sagittally and mounted on five slides; part of anterior end sectioned transversely and mounted on two slides; remainder sectioned sagittally and mounted on three slides. All material deposited in the Musée Royal de l'Afrique Centrale.

External features : Preserved specimen 25 × 1.0 mm. Eyes two, laterally placed very close to the truncate anterior margin. Colour, uniform buff with a prominent, pale, creeping sole occupying the central third of the ventral surface. Pharyngeal and genital pores not visible.

Remarks : The arrangement of the subepidermal musculature identifies this specimen as a member of the Rhynchodeminae, and probably of the genus *Rhynchodemus*. In the absence of sexual organs specific identification is not possible.

Fam. BIPALIIDAE von Graff, 1899

Gen. *Bipalium* Stimpson, 1858

***Bipalium* cf. *kewense* Moseley, 1878**

Material examined : M.T. 33.334, 33.336, 33.337, 33.338, 33.341, 33.342, 33.343, 33.924. Sagittal sections of the reproductive apparatus of specimens from lot 33.334 (9

slides) and lot 33.341 (10 slides). All material deposited in the Musée Royal de l'Afrique Centrale.

Remarks : It is customary to refer any large, elongate, *Bipalium* species with five dorsal and dorsolateral longitudinal stripes to the species *B. kewense*. Most of the present specimens were discoloured in the preservative and only the two specimens from lot 33.924 have retained their distinctive markings. Whether or not *Bipalium kewense* sensu lato is in fact a single species is difficult to decide for it has not often been studied in the sexual state. It is evident from a perusal of the figures provided by VON GRAFF (1899), DE BEAUCHAMP (1939; 1961), and LUTHER (1956) that the copulatory apparatus is very variable. Two specimens from the St. Helena collection were sectioned. One (33.334) compares closely to the figure provided by LUTHER (1956) of a specimen from the Cape Verde Islands which he tentatively identified as *B. kewense*. The second (33.341) shows an enormously elongated and folded seminal vesicle; but the female apparatus is not discernible. The structure and proportions of the male organ appear similar to those of *B. moseleyi* de Beauchamp (1961 : fig. 63) from Borneo, although there do not appear to be any ramifications of the vasa deferentia. Most of the specimens, however, including the two sectioned, are very distorted or in poor histological condition, and their peculiarities may be a function of this.

Bipalium kewense is said by DE BEAUCHAMP (1961) to be indigenous to Indo-China. Largely as a result of passive distribution by the activities of man it is widely distributed in temperate and tropical parts of the world.

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LIST OF LOCALITIES

- 33.333 : St. Helena South, Sandy Bay Beach, 11 January 1966, *Rhynchodemus* sp.
- 33.334 : As 33.333, *Bipalium* cf. *kewense*.
- 33.335 : As 33.333, *Macrostomum* *parvum*.
- 33.336 : St. Helena Centre, Bonfire Bridge, Fisher's Valley, 1500', January 1966, *Bipalium* cf. *kewense*.
- 33.337 : St. Helena Centre, Fisher's Valley, 1700', 19 December 1965, *Bipalium* cf. *kewense*.
- 33.338 : As 33.337, 31 December 1965, *Bipalium* cf. *kewense*.
- 33.339 : Spring Head, Fisher's Valley, 2000-2100', December 1969, *Dinizia sanctaehelenae*.
- 33.340 : As 33.339, *Dinizia sanctaehelenae*.

- 33.341 : St. Helena East. Bottom of Fisher's Valley, 1000', December 1965, *Bipalium* cf. *kewense*.
- 33.342 : St. Helena Centre. Lemon Tree Gut, 1800', December 1965, *Bipalium* cf. *kewense*.
- 33.343 : St. Helena Centre, Scotland, 1700', January 1966, *Bipalium* cf. *kewense*.
- 33.344 : St. Helena South, Sandy Bay, 11 January 1966, *Macrostomum* *parvum*.
- 33.345 : Peak Hill, 1400', 8 January 1966, *Tryssozona jennyae*.
- 33.346 : Peak Hill, « milieu hypothelminorhéique », 1400', 8 December 1965, *Tryssozona jennyae*.
- 33.924 : St. Helena Centre, Lemon Tree Gut, 30 January 1967, *Bipalium* cf. *kewense*.
- 33.925 : Thompson's Wood, 10 April 1967, *Rhynchodemus* sp. incertae.
- 33.926 : « Milieu hypothelminorhéique », 17 April 1967, *Dinizia sanctaehelenae* (single specimen lost during processing), *Tryssozona jennyae*.
- 33.927 : Sandy Bay, 15 May 1967, *Dinizia sanctaehelenae*.
- 33.928 : Rose Hill, April 1967, *Dinizia sanctaehelenae*.
- 33.929 : « Milieu hypothelminorhéique », 30 May 1967, *Tryssozona jennyae*.
- 33.930 : Deep Valley, April 1967, *Dinizia sanctaehelenae*.
- 35.385 : As 33.929, *Dinizia sanctaehelenae*.
- 35.379 to 35.384 and 35.386 : As 33.929, *Tryssozona jennyae*.
- 35.505 : *Dinizia sanctaehelenae*.
- 35.506 : As 33.929, *Tryssozona jennyae*.
- 35.507 : As 33.344, *Macrostomum* *parvum*.
- 35.508 : As 33.344, *Macrostomum* *parvum*.

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3. NEMERTINA

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INTRODUCTION

The expedition of the Musée Royal de l'Afrique Centrale to St. Helena recovered a single nemertine from the freshwaters of the island. The identification of a single preserved specimen is a hazardous venture at best, but it seemed worthwhile to make the attempt because of the biogeographical importance of St. Helena. Further detailed studies of the nemertine fauna of this island should yield valuable results.

MATERIALS AND METHODS

The single specimen was studied whole, without staining. It was then transected and the anterior part sectioned transversely, and the posterior part sagittally, at 8 μ m intervals. The sections were stained according to the Mallory-Heidenhain schedule (GURR, 1963). The purpose of the sagittal sections was to obtain longitudinal views of the stylet apparatus, which could not be seen in the entire specimen. Regrettably, however, the stylet was contained in the anterior part which was sectioned transversely.

Class **ENOPLA**

Order **HOPLONEMERTINI**

Suborder **MONOSTYLIFERA**

Family TETRASTEMMATIDAE

Gen. *Prostoma* Dugès, 1828

Prostoma eilhardi (Montgomery, 1895)

Material Examined : Single specimen from Station 33927, Sandy Bay, St. Helena, Centre, in company with the triclad turbellarian *Dinizia sanctaehelenae*. Collected 15 May 1967. Anterior half, including stylet apparatus, now as transverse sections on two slides, posterior half now as sagittal sections on one slide. Material deposited in the Musée Royal de l'Afrique Centrale.

Remarks : From a single preserved specimen it is impossible to obtain a full complement of data concerning all the taxonomic characters of specific importance. The present specimen, when entire, was 8 mm long and about 0.4 mm wide. It is a uniform creamy white in colour and has six eyes. The rhynchocoel is long; more than two thirds of the body-length. The cephalic grooves and proboscis armature were not determinable in the entire specimen.

Valuable reviews of the freshwater genus *Prostoma* have been provided by SHASKY-WIJNHOF (1938), CORRÊA (1951) and GIBSON and YOUNG (1971). A general synopsis of freshwater nemertines is given by DU BOIS-REYMOND-MARCUS (1948). Using these, together with data derived from the serial sections, I have concluded that the present specimen is most probably *Prostoma eilhardi*. It is true that certain characters must be used with extreme caution when derived from preserved specimens. Thus, the absence of parenchymatic calcareous granules and of sensory spines in the present specimen, these being characters which distinguish *P. eilhardi* from the similar *P. graecense*, may be a product of the killing and fixation techniques used. However, particular characters which identify the present specimen with *P. eilhardi* are the presence of a rhynchodeal oesophagus, absence of rhynchodeal musculature, and the lateral openings of the cerebral organs between the two anterior pairs of eyes. The single central stylet has an unstricted base and there are lateral pouches containing two accessory stylets. The plane of the sections prohibits the accurate determination of length ratios within the stylet apparatus. I could not determine the number of proboscis nerves.

The observed characters are consistent with *P. eilhardi* as described and figured by CORRÊA (1951). Histologically they appear the same also. Two unusual features of the present specimen are its small size, even though sexually mature, and the large cross sectional area of the rhynchocoel which reduces considerably the amount of parenchymatic tissue. The significances of these observations, which could be fixation or contraction artifacts, must remain equivocal until the recovery of further specimens from St. Helena.

Freshwater nemertines are known from all continents and the genus *Prostoma* is especially widely distributed (GONTCHAROFF, 1961; GIBSON, 1972). *P. eilhardi* has been found in Europe, Brazil, and South Africa, and possibly occurs also in Uruguay and Argentina (CORRÊA, 1951). To this broad amphi-atlantic distribution pattern St. Helena may now be added.

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4. NEMATODES LIBRES

Les deux expéditions ont recueilli un certain nombre d'échantillons renfermant une vingtaine d'espèces; ces tubes ont été égarés par le spécialiste à qui ce matériel avait été confié.