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PARASITIC TURBELLARIA FROM TASMANIAN ECHINOIDEA

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(WITH NINE TEXT FIGURES)

ABSTRACT

A new Acoel turbellarian, *Avagina vivipara* n. sp., found in the oesphagus of the common heart-urchin, *Echinocardium cordatum* (Pennant) is described. Two new rhabdocoel turbellarians belonging to the family Umagillidae are also described. One occurs in the intestine of *Echinocardium cordatum* (Pennant) and has been named *Marcusella pallida* n. sp.; the other occurs in the intestine of the sea-urchins *Heliocidaris erythrogramma* (Valenciennes) and *Amblypneustes ovum* (Lamarck) and has been named *Syndesmis punicea* n. sp. A comparison of the new species with the known species in the genera is made. The Echinoids from which the parasites were taken were collected at Blackman's Bay and Ralph's Bay in the estuary of the River Derwent, Tasmania.

INTRODUCTION

Only seven species of Turbellaria appear to have been recorded as endoparasites of Echinoidea. They are as follows:—

(1) *Avagina incola* Leiper (1904) from the "accessory canal" of the heart-urchin, *Echinocardium cordatum* (Pennant) taken in the Firth of Clyde, Scotland. Also from the intestine of *Echinocardium flavescens* (O. F. Müller) and *Spatangus purpureus* O. F. Müller from Plymouth and the Scandinavian coast (Westblad 1949 and 1953).

(2) *Avagina glandulifera* Westblad (1953) from the intestine of *Spatangus purpureus* O. F. Müller at Plymouth.

(3) *Syndesmis echinorum* François (1886) from the intestine of *Strongylocentrotus lividus* (Lamarck) and *Echinus acutus* Lamarck in the Mediterranean; also from the coelom of *Echinus sphaera* O. F. Müller at Roscoff, France (Cuénot, 1892), from the intestine of *Sphaerechinus granularis* (Lamarck) at Naples (Russo, 1895), from the intestine and coelom of *Echinus esculentus* Linnaeus at Plymouth (Shipley, 1901) and the intestine of *Strongylocentrotus dröbachiensis* (O. F. Müller) at Alexandrowsk (von Graff, 1903).

(4) *Syndesmis antillarum* Stunkard and Corliss (1951) after Powers (1936) from the coelom of *Diadema antillarum* Philippi in the Gulf of Mexico.

(5) *Syndesmis franciscana* (Lehman, 1946) from the intestine of *Strongylocentrotus franciscanus* (A. Agassiz) at Monterey Peninsula, California.

(6) *Syndesmis dendrastorum* Stunkard and Corliss (1951) from *Dendraster excentricus* (Eschscholtz) from coast of California.

(7) *Marcusella atriovillosa* Westblad (1953) from the intestine of *Spatangus purpureus* O. F. Müller at Plymouth.

It will be noticed that of the species mentioned above *Syndesmis echinorum* François has been recorded from a number of different hosts and from widely separated localities. Stunkard and Corliss (1951) have already pointed out that the descriptions of this species given by different authorities do not always agree and that they may be dealing with more than one species.

Westblad (1953, p. 270) regards *Syndesmis antillarum* as identical with *Syndesmis franciscana* (Lehman).

In the present paper a new acoel and two new rhabdocoels are added to the list of endoparasitic turbellarians found in echinoids. They are described in the following pages.

Descriptions

Order: ARCHOOPHORA

Sub-order: ACOELA

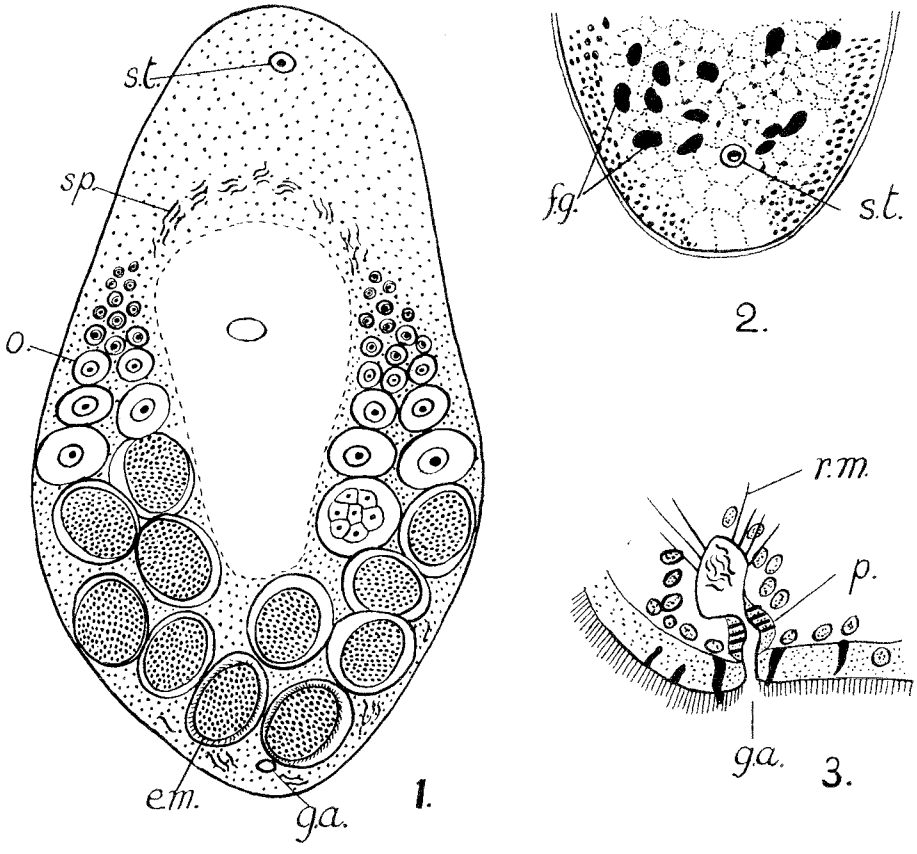
Genus: *Avagina* Leiper (1902), 1904

Avagina vivipara n. sp.

(TEXT FIGURES 1-3)

The body is white, translucent and completely covered with cilia. It is somewhat leaf-shaped, convex dorsally and flat or slightly concave ventrally. In fixed specimens there is a tendency for the posterior end to curve round ventrally. The length is 1·09-1·37 mm. and the width at the widest part, which is just behind the middle, is 0·62-0·64 mm. The mouth is ventral and median, situated in the anterior half about three-eighths of the body-length from the front. The male genital aperture is ventral and slightly in front of the posterior end. No female genital aperture is present. Frontal glands discharge through an opening at the anterior end. There are no eyes but the usual statocyst is situated about one-sixteenth of the body-length from the anterior end and can be seen through the translucent tissues of the living animal. In some specimens large developing embryos lodged in cavities in the parenchyma of the posterior third may also be seen through the body wall. In other specimens, which appear to be protandrous forms, no such embryos are visible.

The cilia covering the body are about 5 μ in length. They arise from a thin basal layer that has the appearance of a cuticle. Below this layer is the epithelium which is about 6 μ in thickness. Cell walls are more distinct and nuclei more numerous in the epithelium of the ventral surface than in that of the dorsal surface. A few scattered epithelial gland cells are present.



Avagina vivipara n. sp.

FIG. 1.—General organization of animal.
FIG. 2.—Frontal section of anterior end showing frontal glands.
FIG. 3.—Sagittal section through genital aperture.

Below the epithelium are the usual transverse, oblique and longitudinal muscle layers. In the cortical region of the parenchyma, immediately below the muscle layers, numerous nuclei and cells rich in cytoplasm are present. In the medullary region the cells are larger, the nuclei less numerous and large vacuoles are evident. In the posterior third of the animal the vacuoles become extremely large. Anteriorly large glands, which discharge through the frontal aperture are present. These glands are in the form of rounded masses which stain deeply with haematoxylin and which are lodged mainly in the parenchyma of the anterior quarter. Between the front of the body and the digestive tract, the parenchyma is traversed by a number of longitudinal and dorso-ventral muscles. Long oblique fibres, which function as frontal retractors, extend from the front of the body posteriorly and are inserted in the body-wall almost half way from the front.

The digestive region lies in the middle half of the animal. It is delimited by numerous nuclei and cells rich in cytoplasm, as well as by longitudinal muscle fibres. Its length measures about 0·5 mm. and its diameter at the widest part, which is above the mouth, measures 0·26 mm. The digestive region normally consists of a cellular reticulum containing diatoms and other food particles but owing to the fact that the animals often disgorge the reticulum and its contents during fixation, the digestive region sometimes appears as an empty space in the parenchyma. The mouth opens directly into the digestive reticulum, no pharynx being present.

The brain consists of two widely separated ganglia and gives rise to the usual longitudinal nerves, namely, two dorsal, two ventral and two lateral. The statocyst lies in close contact with the brain and is about 79 μ from the front and 69 μ above the ventral surface. In the resting condition it is spherical measuring 21 μ in diameter. It encloses a spherical statolith, 10 μ in diameter. Under the action of haematoxylin one-half of the statolith becomes deeply stained, while the other half remains unstained in fixed material.

The ovaries are paired and lie one on each side of the body in the middle third. They do not unite posteriorly. The anterior oocytes are small. They arise in the parenchyma on each side of the front part of the digestive region. There is a gradual increase in size of the oocytes posteriorly. Mature ova occur slightly behind the middle of the body. They measure 108 μ by 89 μ and have a nucleus measuring 47 μ by 39 μ. Behind the mature ova the parenchyma of the body contains large vacuoles or cavities, which measure about 130 μ by 120 μ. These cavities enclose developing embryos, each of which is surrounded by a delicate membrane. Only one embryo occupies a cavity. Those immediately behind the ovaries are usually at an early stage of development, whilst those in the more posterior cavities are frequently well advanced and ready to leave the parent. These well advanced embryos measure about 111 μ long and 84 μ wide. They have a ciliated epithelium, statocyst, frontal glands, and musculature. The maximum number of embryos in one individual appears to be twelve. Whilst examining gravid specimens of the turbellarian in sea-water, embryos were observed to escape from the parent by rupture of the body wall. No vagina or other accessory female organs are present.

The testes are diffuse. They occur in front of the digestive region and also dorso-laterally. Spermatozoa at various stages of formation occur in individuals carrying mature ova and embryos, but are more abundant in individuals which appear to be protandrous hermaphrodites. In the latter the ovaries are very small with immature oocytes. The diffuse testes, however, are strongly developed and, although no male ducts are present, a trail of spermatozoa can be traced extending through the parenchyma on each side from in front of the digestive region to the posterior end of the body. In both gravid and protandrous individuals the spermatozoa enter a vesicula seminalis, which has the form of a pyriform sac about 63 μ long and 26 μ in diameter. The narrow ventral end of the vesicle opens at the genital aperture, which is about 60 μ in front of the posterior end of the body. Weak circular

muscles surround the narrow part of the vesicle and it is provided with retractor muscles which pass upwards through the parenchyma. It seems probable therefore that the narrow neck of the vesicle can be slightly everted to form a penis. This, however, has not been observed.

HABITAT: *Avagina vivipara* n. sp. occurs in the oesophagus of the common heart-urchin, *Echinocardium cordatum* (Pennant), and is usually found a short distance inside the mouth. It does not occur in other parts of the alimentary canal. Of 68 heart-urchins examined 18 were found to contain the parasite. Usually only two or three specimens of the turbellarian are found in the one host, the greatest number present in a single heart-urchin being five.

LOCALITY: The heart-urchins containing the parasite were taken by dredging in Ralph's Bay, Derwent Estuary, August, 1955.

AFFINITIES: *Avagina vivipara* n. sp. is closely related to *A. incola* Leiper and *A. glandulifera* Westblad but differs from them in the position of the male genital aperture, in the ovaries not being united posteriorly and in its viviparous habit.

Order: NEOOPHORA

Sub-order: NEORHABDOCOELA

Family: *Umagillidae* Wahl, 1910

Genus: *Marcusella* Westblad, 1953

Marcusella pallida n. sp.

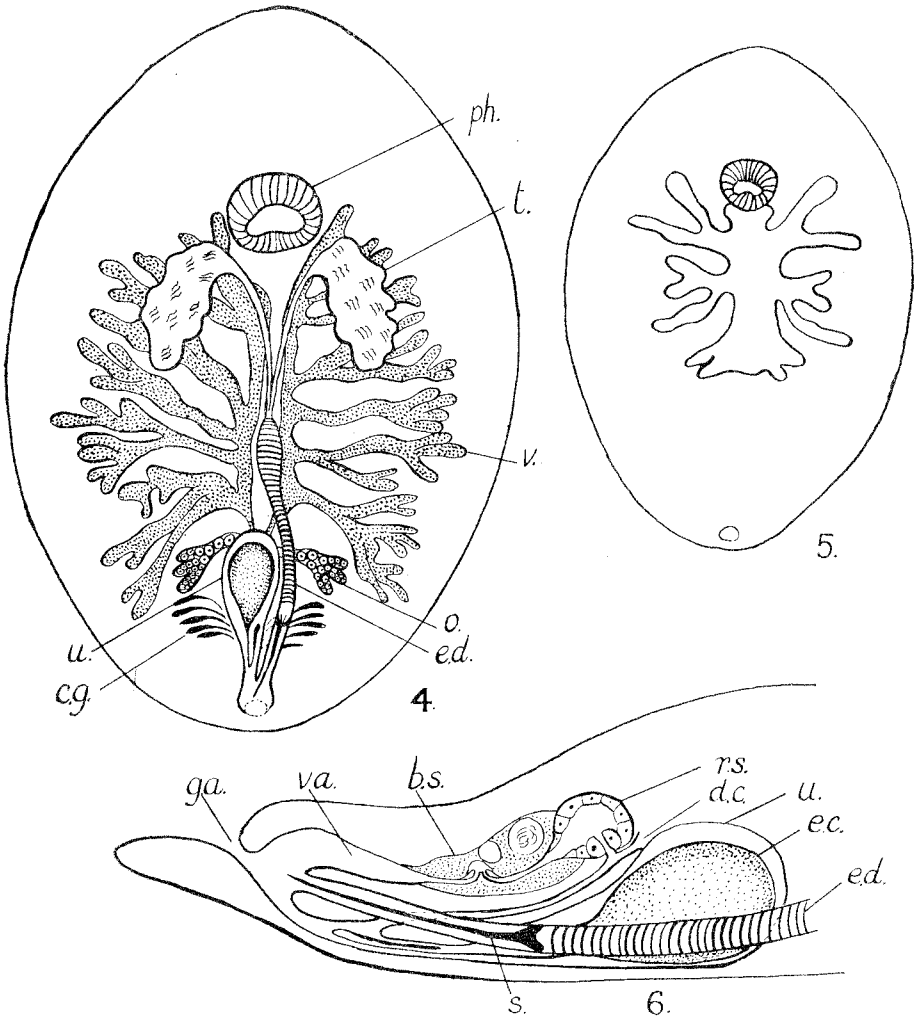
(TEXT FIGURES 4-6)

The turbellarian is grey and translucent in appearance. It is broadly leaf-shaped to almost circular in outline. After fixation specimens measure 1·3-1·7 mm. in length and 0·8-1·16 mm. in width at the widest part. The dorsal surface is slightly convex, the ventral surface flat or concave. The body is very thin dorso-ventrally at the margin. Dorsal and ventral surfaces are completely ciliated. The mouth is ventral and about one-third of the body-length from the front. The genital aperture is dorsal and almost at the posterior end of the body.

The dorsal epithelium is about 5 μ and the ventral epithelium about 3 μ in thickness. The cilia of the dorsal surface are slightly shorter than those of the ventral surface. The subdermal muscular sheath is composed of the usual layers, the transverse fibres being fine and very numerous. The diagonal and longitudinal fibres are much stronger and less numerous. The body parenchyma is composed of large cells, which in transverse sections appear as a loose reticulum with little cytoplasm and few nuclei.

The mouth leads into a pharynx doliiformis which projects downwards and forwards from the oesophagus. The pharynx measures about 0·14 mm. in diameter and 0·16 mm. in length. Its lumen is about 52 μ wide and is lined by the extension of the long necks of the oesophageal gland cells. The oesophagus measures about 65 μ long and 105 μ in diameter. It is surrounded by the usual glands. The intestine is short, its length in the mid-line being about 0·328 mm. It lies in the middle third of the body and gives off four pairs of lateral diverticula, which are often only clearly seen when they contain food. The anterior pair extend forwards on each side of the pharynx. The lumen of the intestine contains numerous isolated cells enclosing food particles. These cells appear to have

become detached from the intestinal wall. In some cases the lumen of the intestine and that of the diverticula is obliterated by cells. Parts of the diverticula become separated from the main part of the intestine and form cavities which lie in the parenchyma and often contain food.



Marcusella pallida n. sp.

FIG. 4.—Ventral view of general organization of animal.
FIG. 5.—Showing the form of the intestine.
FIG. 6.—Lateral view of end organs of reproductive system.

The testes are paired, compact and slightly lobed organs measuring about 197 μ long and 90 μ wide. They are situated one on each side in the anterior part of the middle third of the animal. In specimens that are not fully extended they may be level with the pharynx. The vasa deferentia arise from the anterior ends of the testes and on the inner side. They are short and pass obliquely backwards, converging and uniting at the anterior end of the ejaculatory duct (common sperm duct). They lead into the ejaculatory duct through a common aperture surrounded by a sphincter muscle. The anterior end of the ejaculatory duct is slightly enlarged to form a seminal vesicle, which is 21 μ-26 μ in diameter, the greater part of the duct being 16 μ in diameter. The position of the seminal vesicle depends on the degree of extension of the animal and the degree of extrusion of the stylet. In contracted specimens it may lie close behind the pharynx. In extended specimens it usually lies below the posterior half of the intestine or just in front of the uterus. The ejaculatory duct passes posteriorly at the left of the uterus. Here it may or may not form a loop. The wall of the duct is provided with strong bands of circular muscles and also with longitudinal muscles. Posteriorly the duct ends in a cuticular stylet, which lies in the antrum masculinum. The stylet measures 134 μ-137 μ long and is about one-tenth the length of the animal. At its junction with the ejaculatory duct its base forms a strongly cuticularized ring, into which the longitudinal muscles of the duct are inserted. The base of the stylet measures 18 μ in diameter. From the base the stylet gradually tapers to a fine point. The antrum masculinum is about 110 μ long and 16 μ in diameter. It opens into the atrium genitale immediately below the vaginal aperture.

The vitellaria are paired and dendritic, forming four or five pairs of main branches, which divide to give rise to secondary and tertiary branches. The anterior branches extend on either side of the pharynx and the posterior branches slightly beyond the lobes of the ovaries. There is a marginal zone into which the vitellaria do not penetrate.

The ovaries are paired and lie between the bulbous part of the uterus and the posterior branches of the vitellaria. Each ovary gives rise distally to two or three small lobes. The number of lobes is variable. The ovaries and vitellaria open close together into the anterior end of the ductus communis (ovovitelline duct) at a position above the anterior end of the uterus.

The uterus is short and lies in the posterior third of the body. It occupies a median position close to the ventral surface and extends from the vitellaria to the antrum femininum. Including the latter its total length measures 368 μ-458 μ. The anterior bulbous part of the uterus is 157 μ-236 μ long and about 118 μ in width. The wall is 13 μ in thickness. The narrow neck of the uterus is about 34 μ in diameter. Only a single egg capsule is contained in the uterus. It is yellow and pyriform with a short polar filament at one end. The free end of the filament is bent back in the neck of the uterus and is thickened by secretion from the cement glands. The bulb of the capsule is 184 μ long and 94 μ wide. The polar filament is 197 μ in length.

The vagina leads forward from the upper part of the genital atrium and is about 131 μ in length. Posteriorly it has a diameter of about 30 μ and is lined with long slender cells. As it extends forwards it gradually narrows to form a cuticularized bursal canal, which enters the bursa seminalis posteriorly and for the whole of its length is contained within the bursa. Near the centre of the latter it ends in a cuticular dome-shaped structure similar to that described and figured by Lehman (1946) for *Syndesmis franciscana*, and which he designates as the bursal valve.

The bursa seminalis is a fusiform structure about 132 μ long and 60 μ in diameter at its widest part. It is bounded by a membranous wall and seems to consist of a syncytium containing a few nuclei and a number of vacuoles. The latter usually contain spermatozoa. The anterior end of the bursa is on the left of the receptaculum seminis. The latter indents the right side of the bursa and communicates with it by a short cuticularized canal, which enters the bursa laterally and terminates in the bursal valve immediately in front of the termination of the bursal canal from the vagina. The receptaculum seminis is pyriform when slightly extended and measures 121 μ long and 66 μ in diameter at its widest part. The lumen of the bulbous anterior portion of the receptacle is 31 μ in diameter and bounded by a wall of large cells with granular cytoplasm. The wall is 13-15 μ in thickness. Given off antero-ventrally from the receptacle is a very short duct which opens into the dorsal side of the ductus communis immediately behind the openings of the ovaries. As in other Umagillidae the ventral aperture of the receptacle is surrounded by very large gland cells.

The ductus communis (ovovitelline duct) lies between the uterus and the receptaculum seminis. It originates immediately behind the vitellaria and above the bulbous part of the uterus. It passes posteriorly to open by a wide aperture into the dorsal side of the neck of the uterus at a distance of about 65 μ from the genital atrium. Here also the accessory glands of the ductus communis open into it immediately before it joins the uterus.

The antrum femininum extends from the junction of the ductus communis and uterus to the genital atrium. It measures about 65 μ in length and 42 μ in diameter. Close behind the aperture of the ductus communis the antrium femininum receives the ducts of the cement glands. These glands are situated on either side in the posterior part of the body immediately behind the ovaries. They are not very strongly developed. The antrum femininum, antrum masculinum and the vagina are lined with cells having a frayed-out appearance. Similar cells line the genital atrium. The latter cavity is of the usual form. Its wall is provided with circular and longitudinal muscles. Retractor fibres extend from it to the body wall. It opens dorsally at the genital aperture immediately in front of the posterior end of the body. There is no vestibulum atrii.

HABITAT: *Marcusella pallida* n. sp. occurs in the second spiral of the alimentary canal, that is in the intestine of the common heart-urchin, *Echinocardium cordatum* (Pennant). The turbellarian is not very common.

Sixty-eight heart-urchins were examined and only ten found to be infected. These yielded eleven specimens of the parasite, the maximum number found in one host being four.

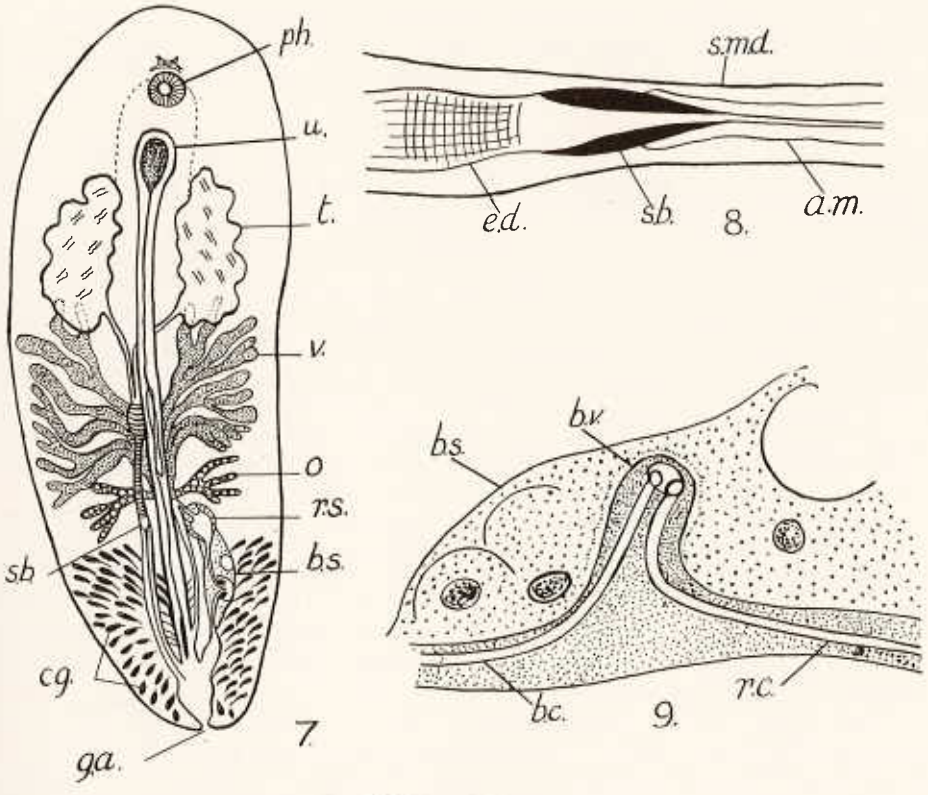
LOCALITY: The heart-urchins from which the turbellarians were obtained were collected by dredging in Ralph's Bay, the Derwent Estuary, during August, 1955.

AFFINITIES: *Marcusella pallida* n. sp. resembles the only other recorded species, *Marcusella atriovillosa* Westblad, in having a short uterus, small testes, short vasa deferentia, a long ejaculatory duct and a short stylet. It differs from that species in the form of the intestine and ovaries and in the extent of the vitellaria.

Genus: *Syndesmis* Silliman, 1881

Syndesmis punicea n. sp.

(TEXT FIGURES 7-9)



Syndesmis punicea n. sp.

FIG. 7.—General organization of animal.
FIG. 8.—Longitudinal section through base of stylet and adjacent structures.
FIG. 9.—Longitudinal section through part of bursa seminalis and bursal valve.

Living specimens of this turbellarian are orange red in colour. The long intestine shows through the translucent body-wall as a median yellow tube. The vitellaria appear pink. The body is somewhat leaf-shape in outline, being broadly rounded in front and pointed posteriorly. The dorsal surface is convex and the ventral surface usually flat. The length of mature specimens carrying an egg capsule varies from 2·0 mm. to 4·7 mm. and the width at the widest part of the body from 1·2 mm. to 2·4 mm. In the following description all measurements, unless otherwise stated, are based on an extended specimen having a length of 3·4 mm.

Dorsal and ventral surfaces of the body are completely ciliated. The cells forming the dorsal epithelium are about 15 μ in height. Their cytoplasm is finely granular and their oval nuclei measure 8 μ by 6 μ. A few pyriform gland cells open on the dorsal surface. The cells of the ventral epithelium are about 5 μ in height and their nuclei measure 6 μ by 3 μ. The cilia of both upper and lower surfaces are about 3 μ in length. A delicate basement membrane underlies the epithelia. The usual dermal musculature consisting of transverse, oblique and longitudinal fibres forms a sheath round the body below the basement membrane.

The brain is situated immediately in front of the pharynx and about 18 μ above the ventral surface. Numerous ganglion cells are present. Their nuclei are oval and measure 10 μ by 8 μ.

The mouth is ventral and median, situated about one-tenth of the body-length from the front. It opens into a small prepharynx which leads into a typical pharynx doliiformis measuring 0·15 mm. long in its dorso-ventral axis and 0·16 mm. in diameter. The usual muscles are present, the inner circular fibres and radial fibres being strongly developed, whilst the outer circular fibres and the inner and outer longitudinal fibres are much weaker. A well developed basement membrane surrounds the pharynx. Radially arranged protractor muscles extend from the sides of the pharynx to the basement membrane of the ventral epithelium. Somewhat weaker retractor muscles extend from the sides of the pharynx to the dorsal epithelium. Between the pharynx and the intestine is a short oesophagus, which is surrounded by a mass of elongate pyriform gland cells. The long necks of these cells extend downwards into the lumen of the pharynx and form the lining of the latter.

The intestine, which lies in the mid-line close below the dorsal surface, extends from the oesophagus to the genital atrium. It is a straight tube without diverticula and has a transverse diameter of about 0·28 mm. and a length about three-quarters that of the animal. It is surrounded by a fibro-muscular sheath and its lumen is lined by long club-shaped cells, the cytoplasm of which contains numerous vacuoles enclosing ingested food particles. The vacuoles measure up to 32 μ in diameter.

The testes are paired and lobed. They lie one on each side in the anterior half of the body. In some specimens they are behind the level of the pharynx, in others they extend forwards so that their anterior ends lie at the sides of the pharynx. Each is about 0·7 mm. long and 0·4 mm. wide. They are separated from the parenchyma by a fibrous investment. Each lobe is divided into a series of compartments, which contain spermatozoa at various stages of development. The vasa deferentia leave the testes on the inner side and near the posterior end of the gonad.

In well extended specimens the two ducts converge and lie side by side at the right of the uterus. They pass posteriorly and near the centre of the body they unite and enter the anterior end of the ejaculatory duct, which enlarges slightly to form a seminal vesicle. The diameter of the vesicle is about 34 μ and the length 92 μ. The vesicle lies almost below the middle of the intestine. The ejaculatory duct passes posteriorly at the right side of the uterus. Its diameter is about 26 μ and its length including the seminal vesicle is about 0·85 mm. At its posterior end it opens into the base of the hollow stylet usually below the middle of the bursa or receptaculum seminis. The stylet measures 0·668 mm. long and is about one-fifth the length of the animal. The base of the stylet is rather narrow and elongated, differing in this respect from the usual wide ring-like base of other species. The diameter of the base is about 18 μ. The rest of the stylet is a very fine cuticularized tube extending the full length of the antrum masculinum.

The vitellaria are dendritic and lie mainly in the middle third of the body. There are four or five primary branches on each side. Some of the anterior branches overlap the posterior part of the testes. The left and right vitellaria converge and open into the anterior end of the ductus communis at about one-third of the body length from the posterior end.

The ovaries are paired and lie immediately behind the vitellaria. Each is produced into four or five finger-like lobes. The two ovaries open laterally into the ductus communis immediately behind the openings of the vitellaria. The largest ova in the ovary are about 39 μ in diameter and their nuclei about 18 μ in diameter.

The uterus is medio-ventral in position. Its total length including the antrum femininum is 2·27 mm. The anterior bulbous part is near the pharynx and measures 223 μ long and 137 μ in diameter. The neck of the uterus is about 53 μ in dorso-ventral diameter. A single yellow egg capsule is contained in the uterus. It is pyriform and produced at one end into a long slender polar filament, which is coiled up in the neck of the uterus. The bulbous part of the capsule is 210 μ long and 131 μ in diameter. Its wall is about 13 μ thick.

The vagina passes forwards from the dorsal part of the genital atrium. It lies immediately below the posterior part of the intestine. Posteriorly it is a wide tube with a lining of long slender cells resembling those lining the genital atrium. After proceeding forward for a distance of about 158 μ it narrows and its wall becomes cuticularized forming a tube about 3 μ in diameter. This tube enters the bursa seminalis postero-ventrally and terminates in a cuticularized bursal valve as in the preceding species.

In extended specimens the bursa is more or less spindle shaped and measures 0·524 mm. long and 0·105 mm. in diameter. In contracted specimens it is indented in front by the receptaculum seminis. The wall of the bursa has a fibrous appearance. It encloses a protoplasmic syncytium in which there are large vacuoles, some of which contain spermatozoa. Arising in the bursal valve, and close in front of the end of the bursal canal from the vagina, is a shorter cuticularized duct, which passes

downwards and forwards into the receptaculum seminis. The latter organ when extended is pyriform and elongate but when contracted it is almost spherical. Antero-ventrally it opens by a short duct into the dorsal side of the ductus communis immediately above the junction of the latter with the ovaries. The aperture leading from the receptaculum is surrounded by the usual large gland cells. When extended the receptaculum is 0·784 mm. long and 79 μ in diameter at its widest part.

The ductus communis (ovovitelline duct) passes posteriorly between the receptaculum seminis and the neck of the uterus. Below the posterior end of the bursa the ductus communis opens into the dorsal side of the neck of the uterus. Just before so doing it receives the ducts of the accessory glands.

The antrum femininum, which extends from the posterior end of the ductus communis to the atrium as a continuation of the uterus, is perforated by the numerous ducts from the cement glands. The genital atrium measures about 158 μ long and 105 μ in diameter. It is lined with the usual long slender cells. The wall is furnished with circular and longitudinal muscles as in other species. The atrium opens to the exterior by the genital aperture situated at the posterior end of the body.

HABITAT: *Syndesmis punicea* n. sp. occurs in the intestine of the sea-urchins *Heliocidaris erythrogramma* (Valenciennes) and *Amblypneustes ovum* (Lamarck). The turbellarian was present in seven out of nine specimens of *H. erythrogramma* and in five out of five specimens of *A. ovum* examined. The largest number found in a single specimen of *H. erythrogramma* was eighteen and in *A. ovum* forty-five.

LOCALITY: Infected specimens of *H. erythrogramma* were collected at Blackman's Bay and Ralph's Bay during April and August, 1955. Infected specimens of *A. ovum* were dredged at Ralph's Bay during August, 1955.

AFFINITIES: The relationship of *Syndesmis punicea* n. sp. to other members of the genus is shown in the following key to the species:—

1. Uterus extends into anterior half of body 2
   Uterus does not extend into anterior half of body ... *S. dendrastrorum* Stunkard & Corliss.
2. Ejaculatory duct with several coils ... *S. echinorum François.*
   Ejaculatory duct with one or no coils 3
3. Stylet about one-third body length 4
   Stylet about one-fifth body length ... ... *S. punicea* n. sp.
4. Base of stylet near middle of body ... ... *S. antillarum* Stunkard and Corliss.
   Base of stylet below receptaculum seminis ... ... *S. franciscana* (Lehman).

In connection with the above key it should be mentioned that the distinction between *S. antillarum* and *S. franciscana* is based on the figures given by Powers (1936, p. 319) and Lehman (1946, p. 300). Westblad (1953) regards the two species as identical.

Acknowledgments

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Abbreviations Used in Text Figures

a.m.—Antrum masculinum
b.c.—Bursal canal
b.s.—Bursa seminalis
b.v.—Bursal valve
c.g.—Cement glands
d.c.—Ductus communis
e.c.—Egg capsule
e.d.—Ejaculatory duct
e.m.—Embryo
f.g.—Frontal glands
g.a.—Genital aperture
O.—Ovary
p.—Penis
r.c.—Canal from bursa to receptaculum seminis
r.m.—Retractor muscle
r.s.—Receptaculum seminis
s.—Stylet
s.b.—Stylet base
sp.—Spermatozoa
st.—Statocyst
s.m.d.—Sheath of male duct
t.—Testis
u.—Uterus
v.—Viteliaria
va.—Vagina