

SIX NEW SPECIES OF TREMATODES BELONGING TO THE GENUS *PRICEA* CHAUHAN.

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INTRODUCTION.

The genus *Pricea* was established by Chauhan in 1945 with the type species *Pricea multae*. While studying a collection of trematodes from about 28 seer-fish, *Cybium guttatum*, which is netted at Madras from August to November 1950, the present author found that they belonged to seven distinct species of the genus *Pricea*. Of these one was *P. multae* Chauhan, while the rest appear to be new. Therefore a full account of these six species *P. tetracanthum*, *P. armatum*, *P. tricanthum*, *P. melane*, *P. minutum*, and *P. robustum* was deemed fit. In the present paper a key to the species of this genus and also certain additions to the generic characters made by Sporston (1946) are added. Of Chauhan's three species, the type species *Pricea multae* was taken from *Cybium lanceolatus*, while the other two were from *Thynnus pelamys* and *Scomber microlepidotus*. The present record of the type species as well as six others is from the gills, in some cases more than one species infesting the gill on the same side of the host fish. It may also be added that the gills of this fish were infested by trematodes belonging to *Pseudomicrocotyle elegatis*, *Thoracocotyle* sp., *Microcotyle* species as well as copepods of the genus *Pseudocycnus*. The type specimens are lodged in the Zoological Survey of India, Calcutta.

Family GASTROCOTYLIDAE Price, 1943.

Genus *Pricea* CHAUHAN, 1945.

Pricea tetracanthum, sp. nov.

(Text-Fig. 1, a—e.)

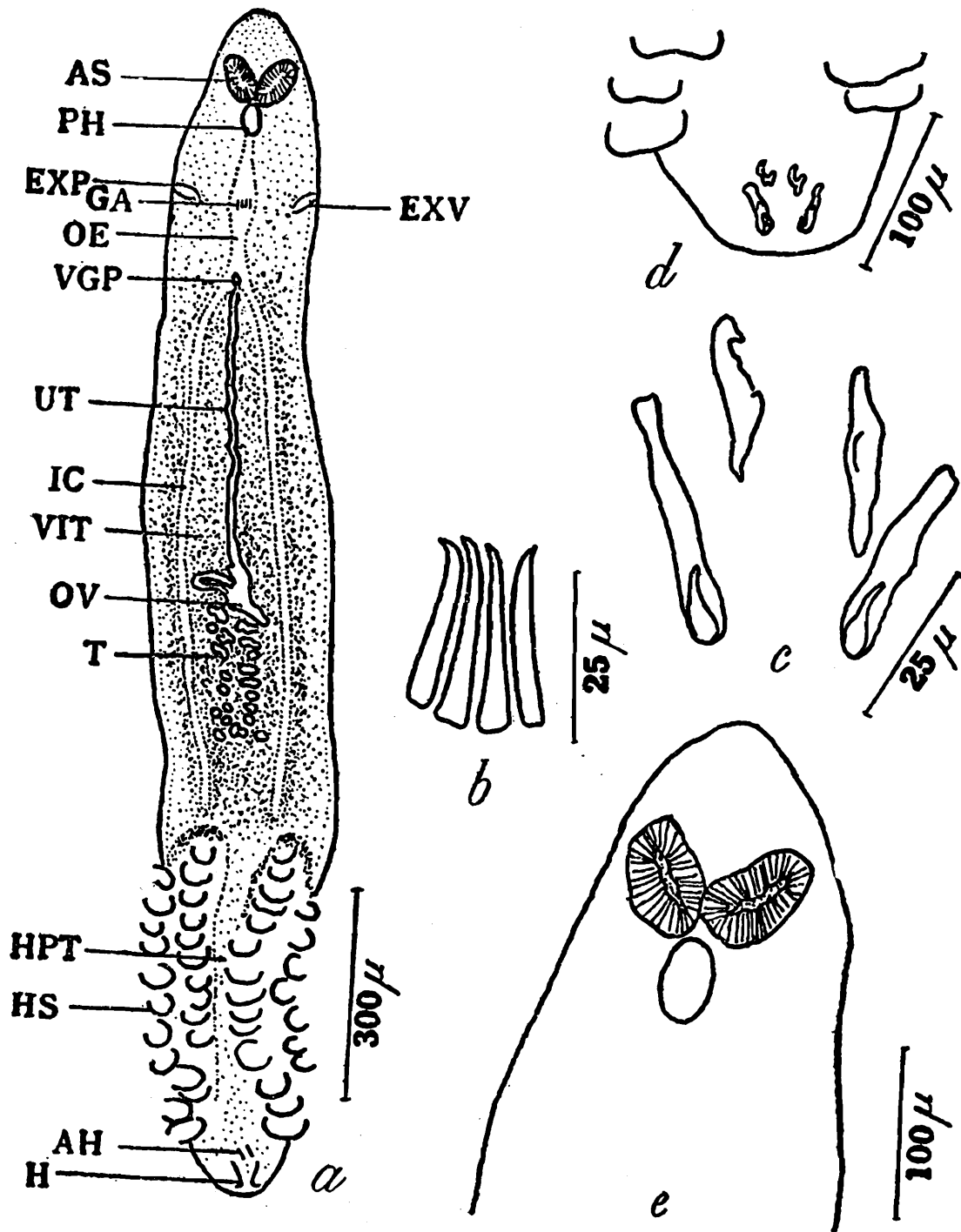
Host and record.—Of the seven *Cybium guttatum* examined in August 1950, only one of the parasite of this species was collected.

Site of infection.—Gills.

Locality.—Madras.

The form measures 1.678 mm. in length and .357 mm. in its maximum breadth near the region of the ovary. The shape of the form is elongate and cylindrical, with the sides of the body almost parallel. The haptor (HPT) is at the posterior end of the body and measures .499 mm. in length and .258 mm. in breadth. The ratio of the size of the haptor to the body is roughly 1 : 3. The haptor bears 42 clamps (HS), arranged in two rows on each side. The clamps are all pedunculated and measure $39\mu \times 59\mu$. The clamp structure is of the same type as described for the type species *P. multae* and consists of twenty four skeletal pieces, a pair of two thin long bars bent upon themselves (X and Y) in the Text Fig. 6c., a pair of transverse bars (TRB) located within the bent extrinity of the

inner lateral pieces (Text Fig. 6, D) situated outside the three pronged middle piece, giving support to the transverse ribs. The haptor ends in a blunt extension in which is borne a pair posterior hooks or anchors (H). In addition to them a little in front and in between them a pair of additional hooks is present. They measure 39μ and 27μ respectively. The additional hooks may be both situated close together in the



TEXT-FIG. 1.—*Pricea tetracanthum*, sp. nov.

a. Entire specimen; b. Genital hooks; c. One pair of posterior hooks and a pair of additional hooks; d. Position of hooks *in situ*; e. Anterior portion of the body showing asepsate and speculate suckers and pharynx.

AH, additional hook; AS, anterior sucker; EXP, excretory pore; EXV, excretory vesicle; GA, genital atrium; H, posterior hook, or anchor; HPT, haptor; HS, haptoral sucker; IC, intestinal crura; OE, oesophagus; OV, ovary; PH, pharynx; T, testes; UT, uterus; VGP, vaginal pore; VIT, vitellaria.

middle or front or hind region of the haptor, or they may be separately situated one in front of the other, in front or middle or hind regions of the haptor.

Digestive System.—The sub-terminal mouth leads into the buccal cavity in which is situated a pair of oval, elongated, aseptate and spiculate oral suckers or anterior suckers (AS). The oral sucker measures $36\mu \times 68\mu$. The buccal cavity leads to the pharynx (PH) $42\mu \times 36\mu$ which is located immediately behind and in between the pair of oral suckers, $\cdot 132$ mm. from the anterior end. The pharynx is led by the oesophagus $\cdot 272$ mm. in length and bifurcates at $\cdot 446$ mm. from the anterior end. It extends down as two diverticula (IC) ending blindly just in front of the haptor. The diverticula give out branches both on their inside and outside.

The vitellarian follicles (VIT) are not dense, are scattered very loosely and extend from the anterior region just behind the vaginal opening to the end of the diverticula. Few follicles are scattered in the region of the genital atrium. Vitellarian follicles do not extend into the haptor. The size of the follicle is $4\mu \times 4\mu$. There is no deposit of pigment granules (PG).

Reproductive System.—The male reproductive system consists of the testes (T), post-ovarian in position, lying in the posterior region of the body in between the intestinal diverticula and anterior to the haptor arranged in two lateral rows. The testes, 20 in number are situated, $\cdot 874$ mm. from the anterior end and extend $\cdot 196$ mm. posteriorly. The size of the follicles varies from $21-27\mu \times 14-16\mu$.

The course of the vas deferens (VD) is not seen well, but it opens in the genital atrium (GA), situated in the middle line on the oesophagus at a distance of $\cdot 259$ mm. from the anterior end. The genital cornua consists of twelve crochets (CH), long and slender 29μ in length.

The female reproductive system consists of the ovary (OV) pretesticular in position, lying in the middle of the body, in the middle line in between the diverticula at a distance of $\cdot 794$ mm. from the anterior end and extends over a distance of 62μ posteriorly. The uterus (UT) proceeds from the ovary, running along the middle line anteriorly and opens at the unarmed vaginal opening (VGP) situated in the region of the intestinal bifurcation, $\cdot 420$ mm. from the anterior end. No U-shaped vaginal hook is present. No eggs were present.

Excretory system.—Two excretory vesicles (Ex V) which open by marginal pores, are situated at the level of the genital pore.

Remarks.—*P. tetracanthum* resembles the species *P. multae*, *P. minimae* and *P. microcotylae* established by Chauhan, 1945 in the general shape of the body and the haptor and in the general structure of the clamps of the haptor. It agrees with *P. multae* and *P. microcotylae* in having 12 genital hooks. It is unique in having four hooks in the haptor, two as additional hooks and two as posterior hooks or anchors, but differs from the rest in the absence of the vaginal hook, in having 20 testes and haptoral suckers 42 in number. This species is distinguished by the presence of four hooks in the haptor.

Pricea armatum, sp. nov.

(Text-Fig. 2, a—g.)

Host and record.—Of the five *Cybium guttatum* examined one parasite of this species was got.

Site of infection.—Gilis.

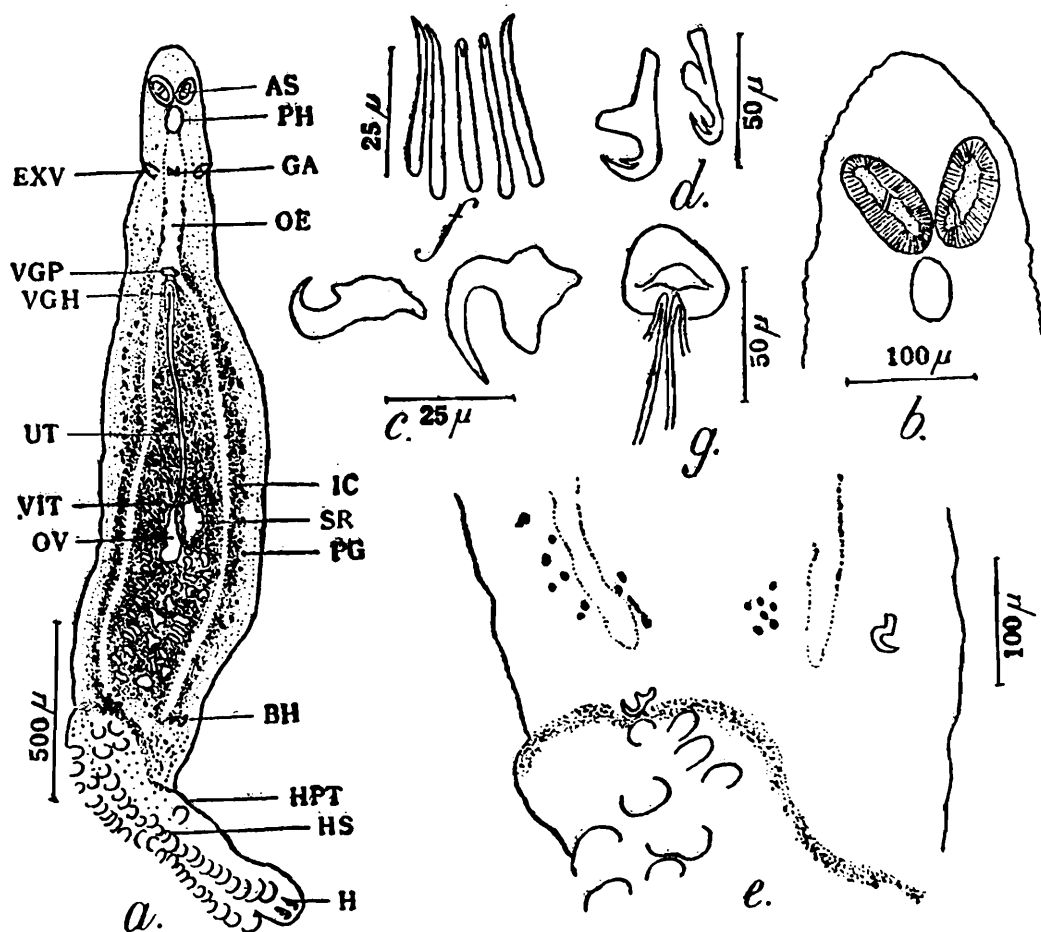
Locality.—Madras.

Body length 2.695 mm., breadth .473 mm., Haptor length .757 mm., breadth .170 mm. Number of clamps 50, measuring $50\mu \times 71\mu$. 5 or 6 transverse ribs. The anchors measure 48μ . There are two body hooks of pre-haptor hooks, one situated just below the left diverticula, a little above the haptor and the other is situated on the right side of the right diverticula and measures 21μ .

Digestive System.—Anterior suckers septate and spiculate, measure $43\mu \times 91\mu$. Pharynx $30\mu \times 39\mu$. Oesophagus .457mm. long.

Vitellarian follicles in dense clusters; size of the follicle $7\mu \times 5\mu$. Normal amount of pigment deposit.

Reproductive System.—Testes 31 in number, disposed irregularly and not in two lateral rows, in the inter-caecal area behind the ovary; situated



TEXT-FIG. 2.—*Pricea armatum*, sp. nov.

a. Entire specimen; b. Anterior part of the body showing the septate and spiculate anterior suckers and pharynx; c. Body hooks or pre-haptor hooks; d. Posterior hooks; e. Position of the body hooks *in situ*; f. Genital hooks; g. Pseudogenital sucker and the vaginal hook.

BH, body hook; PG, pigment granules; SR, receptaculum seminis; VGH, vaginal hook. (Rest of the lettering as in Text-fig. 1.)

1.284 mm. from the anterior end. Size of the follicles ranging from $23\mu \times 32\mu \times 35\mu$ — 60μ . Genital atrium .348 mm. from the anterior end, consists of 14 hooks, 32μ in length.

Ovary situated 1.284 mm. from the anterior end. Vaginal opening is armed with an U-shaped hook, one of its arm measuring 61μ and is provided with fleshy muscular flaps giving the appearance of a pseudo-genital sucker.

Two excretory vesicles a little above the level of the genital opening.

Remarks.—The present species *P. armatum* agrees with the other forms in the general shape of the body, the haptor and in the general pattern of the clamp structure. It agrees with Chauhan's species in having armed vaginal pore and two body hooks. But it differs from *P. tetracanthum* in having vaginal hook and in the absence in the additional hooks and differs from all the species in having 31 tests, 50 clamps in the haptor and in the position of the body hooks, one just below left intestinal diverticula and the other on the right side of the right diverticula.

***Pricea tricanthum*, sp. nov.**

(Text-Fig. 3, *a—f.*)

Host and record.—Out of the six *Cybbium guttatum* examined only one of this species was got.

Site of infection.—Gills.

Locality.—Madras.

Body length 2.1 mm., breadth .24 mm. Haptor .66 mm. in length and .24 mm. in breadth ; 20 pairs of pedunculated clamps measuring $43\mu \times 66\mu$. Six transverse ribs. Posterior hooks or anchors 27μ in length. There is an additional hook (AH) in the haptor and the other as pre-haptoral hook in front of the haptor and measures 30μ and 23μ . The position of the additional hook as well as the body hook varies in their position in the haptor and in the body respectively.

Digestive System.—Anterior suckers septate and spiculate, measure $36\mu \times 77\mu$. Pharynx $36\mu \times 32\mu$. Oesophagus .316 mm. in length. Bifurcation of the intestine .446 mm. from the anterior end.

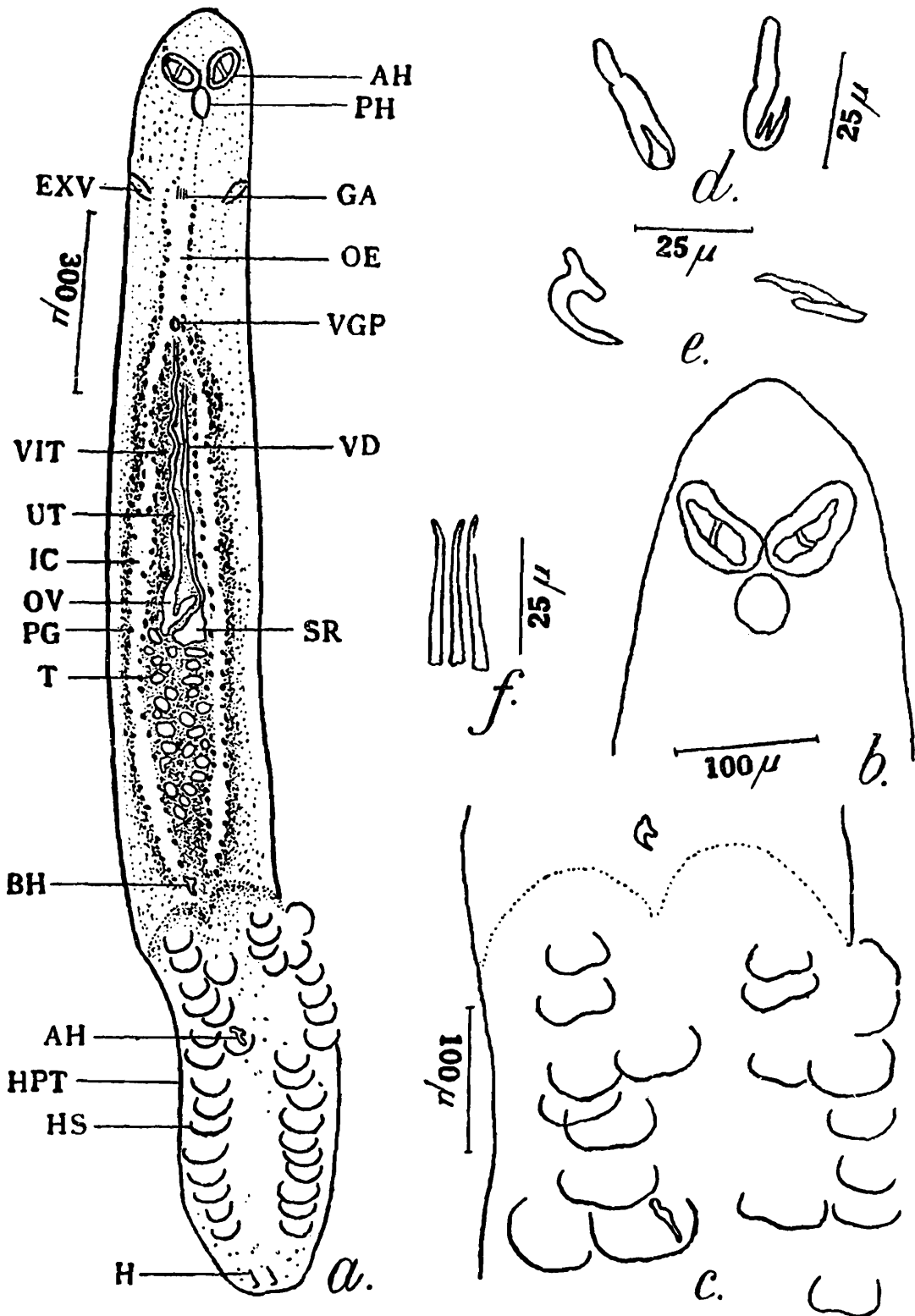
Vitellarian follicles uniformly spread and not in dense clusters, Pigment deposit very little along the sides of the diverticula.

Reproductive System.—Testes 28 in number, in two irregular lateral rows, follicle size ranging from 12μ — $29\mu \times 21\mu$ — 39μ . Testes located .893 mm. from the anterior end and extend .401 mm. posteriorly. Genital atrium .256 mm. from the anterior end and has 14 hooks measuring 29μ in length.

Ovary .775 mm. from the anterior end. Uterus opening, at the unarmed vaginal opening, .428 mm. from the anterior end.

Two excretory vesicles opening by marginal pores, a little above the level of the genital opening.

Remarks.—The present form resembles the other species in the general shape of the body, the haptor and in the structure of the clamps. It agrees with *P. armatum* sp. nov. and *P. minima* Chauhan, 1945 in having 14 genital hooks, with *P. tetracanthum* in having the vaginal pore unarmed. It differs from all the species in having one body-hook and three hooks in the haptor, one as additional hook and two as anchors or posterior hooks and also in having 28 testes and 40 clamps. The presence of three hooks characterizes *P. tricanthum*.



TEXT-FIG. 3.—*Pricea tricanthum*, sp. nov.

a. Entire specimen; b. Anterior part of the body showing the septate and spiculate anterior suckers and pharynx; c. Additional hook and pre-haptor hook *in situ*; d. Posterior hooks; e. Pre-haptor hook (left) and additional hook (right); f. Genital hook.

VD, vas deferens (rest of lettering as in text-figs. 1 and 2).

Pricea melane, sp. nov.

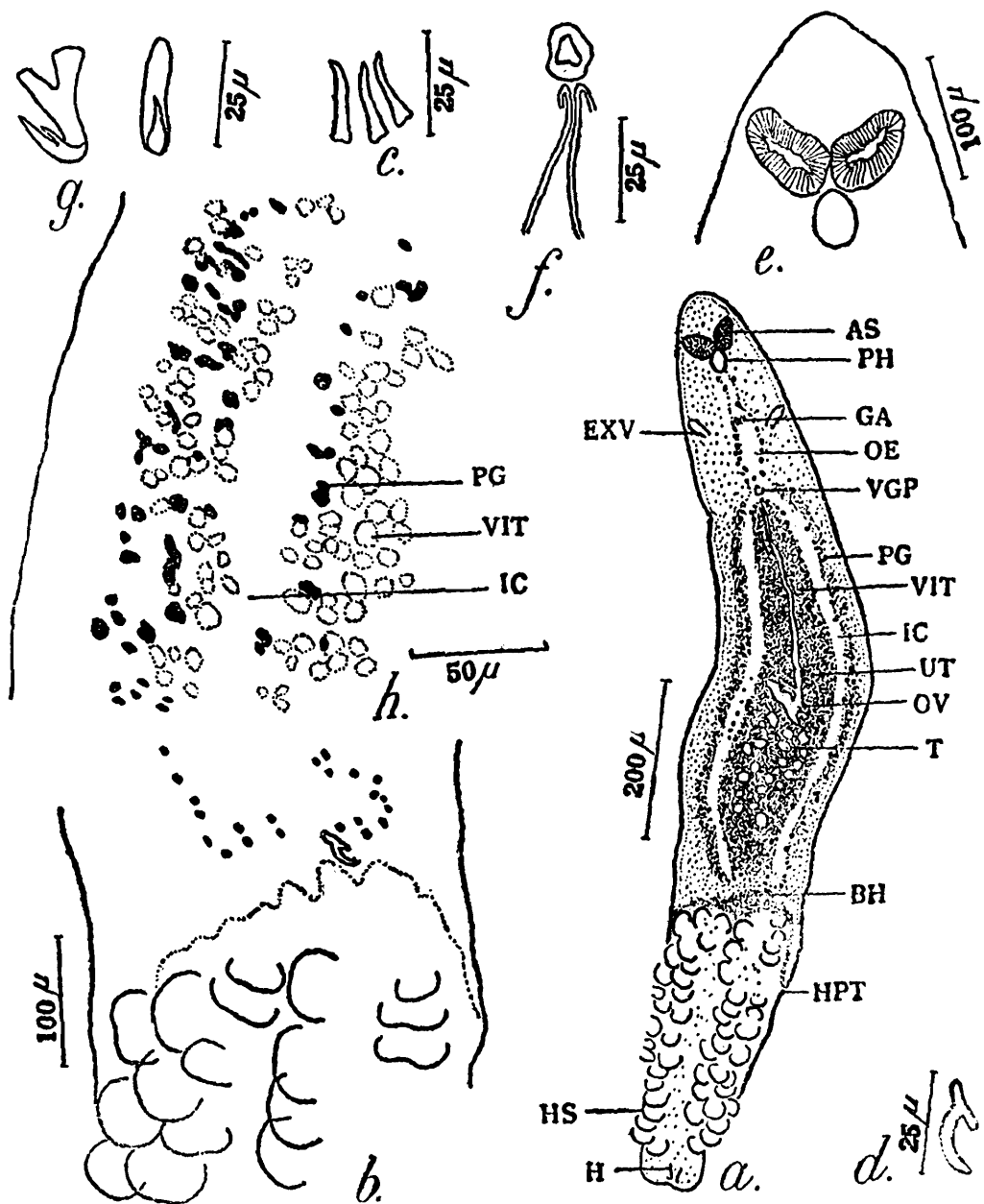
(Text Fig. 4, a—h.)

Host and record.—Out of the four *Cybium guttatum* examined on parasite of this species was got.

Site of infection.—Gills.

Locality.—Madras.

Body length 1.981 mm. and breadth .393 mm. Haptor length .660 mm. and breadth .295 mm., 56 pedunculated clamps measuring $37\mu \times 66\mu$. Six to eight transverse ribs. Posterior hooks or anchors measure 33μ . A single pre-haptor hook alone is present just anterior to the haptor and in the body region, measuring 25μ .



TEXT-FIG. 4.—*Pricea melane*, sp. nov.

a. Entire specimen; b. Body hook or pre-haptor hook *in situ*; c. Genital hook; d. Body hook; e. Anterior part of body showing the aseptate and spiculate anterior suckers and pharynx; f. Pseudogenital sucker and vaginal hook; g. Posterior hooks; h. A portion of the body enlarged to show distribution of the vitellaria and pigment granules.

(Lettering as in Text-figs. 1 and 2.)

Digestive System.—Anterior suckers aseptate and spiculate $39\mu \times 71\mu$; pharynx $50\mu \times 39\mu$. Oesophagus .271 mm. in length. Intestinal bifurcation .446 mm. from the anterior end.

Vitellarian follicles in dense clusters. Pigment deposit very heavy along the sides of the diverticula.

Reproductive System.—Testes 23 in number, disposed irregularly in the intercaecal area behind the ovary. Testicular follicles size ranging from 14μ — $39\mu \times 21\mu$ — 48μ , situated .973 mm. from the anterior end and extend .223 mm. posteriorly. Genital atrium .259 mm. from the anterior end and consists of 12 hooks, 21μ long.

Ovary situated .866 mm. from the anterior end. Uterus opens at the armed vaginal opening, situated .439 mm. from the anterior end, one of its arm measuring 48μ .

Two excretory vesicles opening by marginal pores a little above the level of the genital opening.

Remarks.—Like the previous species the present species agrees with other forms in the general shape of the body and the haptor. It differs from *P. minima*, *P. armatum*, and *P. tricanthum* in having 12 genital hooks, agrees with Chauhan's species and *P. armatum* in having U-shaped vaginal hook. It differs from all the species in having only one body hook, 23 testes and 56 haptoral suckers. The numerous pigment granules all along the intestinal diverticula render the species *P. melane* dark coloured.

Pricea minutum, sp. nov.

(Text-Fig. 5, a—f.)

Host and record.—Out of the three *Cybbium guttatum* examined only one parasite of this species was got.

Site of infection.—Gills.

Locality.—Madras.

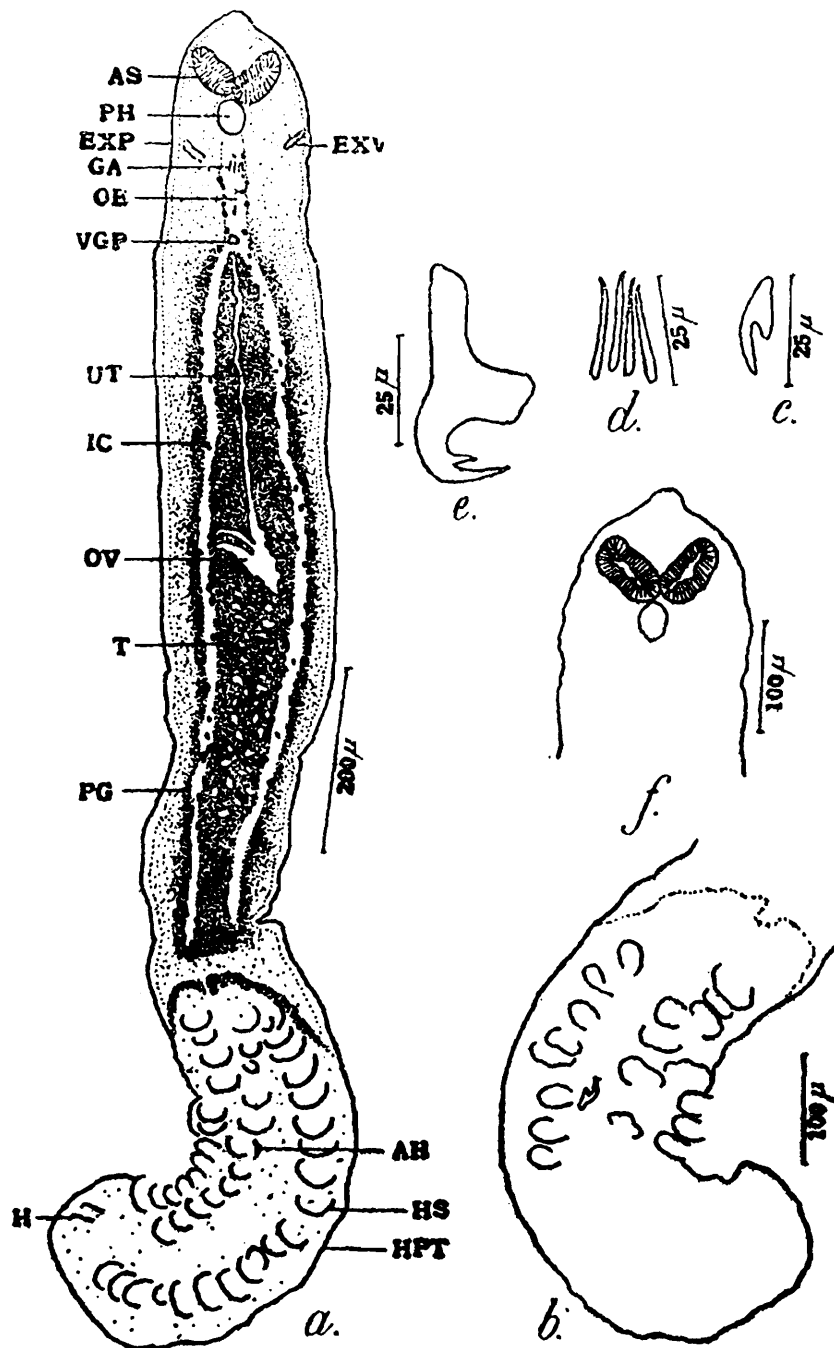
Body length 1.464 mm. and breadth .201 mm. Haptor length .384 mm. and breadth .170 mm. 46 pedunculated clamps measuring $21\mu \times 47\mu$. Five or six transverse ribs. Posterior hooks or anchors measure 36μ in length. An additional hook near the middle of the haptor, measuring 27μ in length, whose position may be located in front, middle or hind region of the haptor.

Digestive system.—Anterior suckers aseptate, spiculate and measure $36\mu \times 68\mu$. Pharynx $25\mu \times 25\mu$. Oesophagus length .127 mm. and the intestinal bifurcation .259 mm. from the anterior end.

Vitellarian follicles not so much dense. Pigment granules along the sides of the diverticula.

Reproductive System.—Ovary situated 0.571 mm. from the anterior end, uterus opening at the unarmed vaginal opening, situated 0.253 mm. from the anterior end.

Remarks.—The species resembles the other forms in the general shape of the body, the haptor and in the general pattern of the clamp. It agrees with *P. tetracanthum* and *P. tricanthum* in the absence of the



TEXT-FIG 5.—*Pricea minutum*, sp. nov.

a. Entire specimen; b. Additional hook *in situ*; c. Additional hook; d. Genital hooks; e. Posterior hooks; f. Anterior portion of body showing the aseptate and spiculate anterior sucker and pharynx.

(Lettering as in Text-figs. 1 and 2.)

U-shaped vaginal hook, with *P. multae*, *P. microcotylae* Chauhan, 1945, *P. tetracanthum* and *P. melane* in having 12 genital hooks, with *P. armatum* in having 31 testes, differing from all the species in having only one additional hook and also differs in having 46 clamps. *Pricea minutum* is the smallest recorded so far.

Pricea robustum, sp. nov.

(Test fig. 6, a—b).

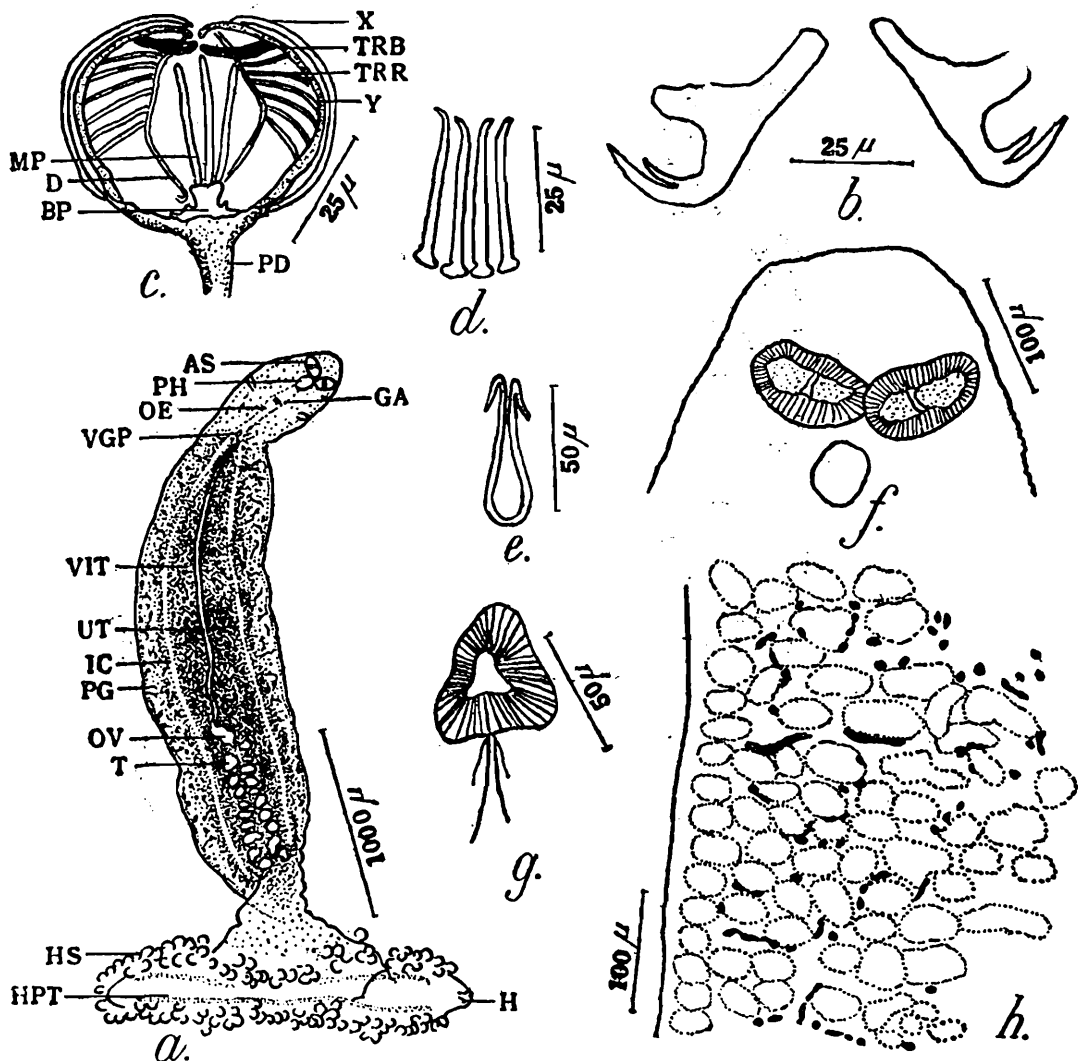
Host and record.—Out of the three *Cybbium guttatum* examined many parasites of this species were got.

Site of infection.—Gills.

Locality.—Madras.

This species was collected alive and presented an appearance as shown in Text Fig. 6.a. with the haptor at right angles to the long axis of the body. The other forms described and sketched were not alive and the haptor appears in line with the axis of the body, probably due to post-mortem contraction.

Body length 3.53 mm. and breadth .75 mm. Haptor 1.88mm. in length and .35 mm. in breadth. 110 pedunculated clamps measuring 46μ — 51μ \times 58μ — 69μ . Neither pre-haptoral hooks nor additional hooks present. Posterior hooks or anchors present, 23μ in length.



TEXT-FIG. 6.—*Pricea robustum, sp. nov.*

a. Entire specimen ; b. Posterior hooks ; c. A haptoral sucker or clamp ; d. Genital hooks ; e. Vaginal hook ; f. Anterior part of the body showing the septate and spiculate anterior suckers and pharynx ; g. Pseudo-genital sucker and vaginal hook ; h. A portion of the body enlarged to show the distribution of the vitellaria and pigment granules.

BP, basal piece ; D, innermost thin and lamellar latera and picea ; MP, piece ; PD, peduncle ; TRB, transverse bar ; TRR, transverse rib ; X, median outermost picea Y middle piece, (Rest of lettering as in Text-figs. 1 and 2).

Digestive System.—Anterior suckers septate and spiculate, measuring $35\mu \times 75\mu$. Pharynx $45\mu \times 35\mu$. Oesophagus .382 mm. in length and the intestinal bifurcation .552 mm. from the anterior end.

Vitellarian follicles in dense clusters and heavy deposit of pigment granules all over the body behind the region of the vaginal opening and in front of the haptor.

Reproductive System.—Testes 19 in number, in two lateral rows, situated 2.12 mm. from the anterior end and extend .62 mm. posteriorly. Testicular follicles, size ranging from 44μ — $54\mu \times 49\mu$ — 98μ . Genital atrium 14 hooks, measuring 30μ in length situated .31 mm. from the anterior end.

Ovary situated 1.96 mm. from the anterior end and the uterus open at the armed vaginal opening .545 mm. from the anterior end, one arm of the vaginal hook measuring 39μ . Vaginal opening with fleshy muscular flaps, giving the appearance of pseudo-genital sucker.

The excretory vesicles two in number open by marginal pores situated a little above the level of the genital atrium.

Remarks.—*P. robustum* resembles the other forms in general form of the body, the haptor and in the general structure of the clamps. It agrees with Chauhan's species and *P. armatum* and *P. melane* in having U-shaped vaginal hook, with *P. armatum*, *P. tricanthum* and *P. minimae* in having 14 genital hooks. But differs from all the species in the absence of both body hooks as well as additional hooks, in having 19 testes and 110 haptor suckers. *Pricea robustum* is the largest described in this paper.

KEY TO THE SPECIES OF THE GENUS *Pricea* CHAUHAN.

In addition to the characters given by Chauhan, 1945 and Sproston 1946—'46 for this genus, the presence of one or two body hooks and the presence of one or two additional hooks are features of this genus which have been included.

1. Body hooks present	2	
Body hooks absent	5	
2. Number of hooks two	3	
Number of hooks one	4	
3. Number of testes 26, genital hooks 12		<i>P. multae</i> Chauhan.
Number of testes 28, genital hooks 10		<i>P. minimae</i> Chauhan.
Number of testes 25, genital hooks 12		<i>P. microcotylac</i> Chauhan.
Number of testes 31, genital hooks 14		<i>P. armatum</i> , sp. nov.
4. One hook in the body only	.	<i>P. melane</i> , sp. nov.
One hook in the body and other hook in the haptor	.	<i>P. tricanthum</i> , sp. nov.
5. Additional hooks present in the haptor	6	
Additional hooks absent in the haptor	.	<i>P. robustum</i> , sp. nov.
6. Two additional hooks in the haptor	.	<i>P. tetracanthum</i> , sp. nov.
One additional hook in the haptor only	.	<i>P. minutum</i> , sp. nov.

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