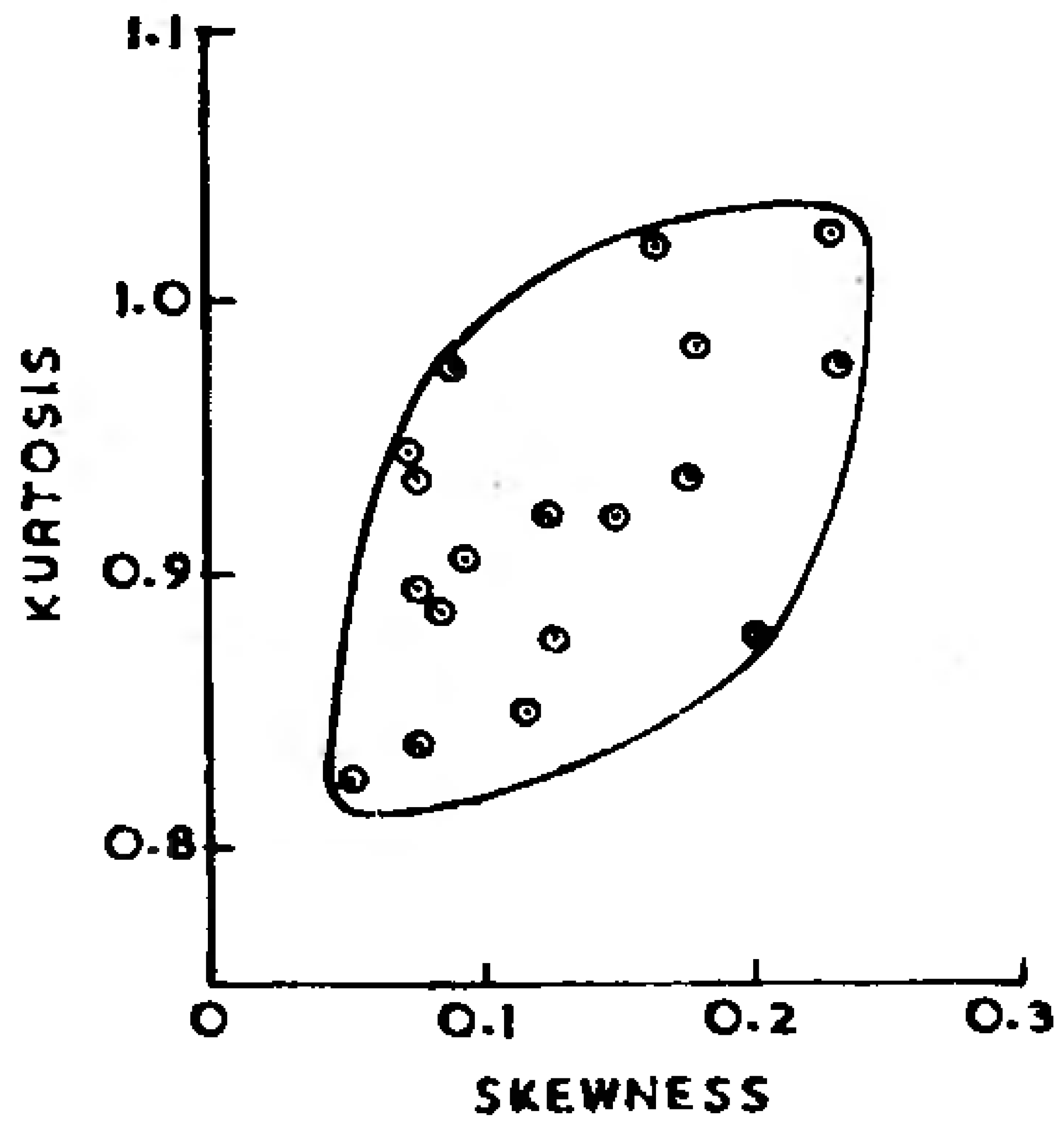

FIG. 2. Scatter plot of skewness *versus* kurtosis.

(4) The scatter plots, such as mean size *vs.* standard deviations, and kurtosis *vs.* skewness obtained which are considered to be very sensitive for the differentiation of environments, are very much similar to the plots obtained for the dunes of Mustang Islands, and thus confirm a typical dune environment for Waltair Highlands.

Dept. of Geology, M. VISHNUVARDHANA RAO.
Andhra Univ., N. V. N. DURGAPRASADA RAO.
Waltair (A.P.),
April 30, 1968.

1. King, W., *The Geological Sketch of Vizagapatam District Record*, G.S.I., 1886, **19**, 143.
2. Mahadevan, C. and Sathapathi, N., "The origin of the Waltair Highlands," *The Indian Geographical Journal*, 1949, **24**.
3. Mason, C. C. and Folk, R. L., "Differentiation of Beach Dune and Aeolian Flat Environments by size analysis," Mustang Island, Texas, *Journal of Sedimentary Petrology*, 1958, **28**.
4. Folk, R. L. and Ward, W. C., "Brazos River Bar: A study in the significance of Grain Size Parameters," *Ibid.*, 1957, **27**.

OCCURRENCE OF A TRYPANORHYNCHAN LARVA IN AMPHIOXUS (*BRANCHIOSTOMA LANCEOLATUM*)

THE life-cycle of any marine trypanorhynchid is incompletely known. However, records of their occurrence in various invertebrates and vertebrates have been mentioned by several authors.[1-8]

In a routine examination of *Branchiostoma lanceolatum* dredged from the inshore waters of Madras coast three specimens were found to be infected. Figure 1 shows, in a sagittal section of amphioxus, a larva (T) in the midgut region (G). As a result of a critical examination of the histological details of 63

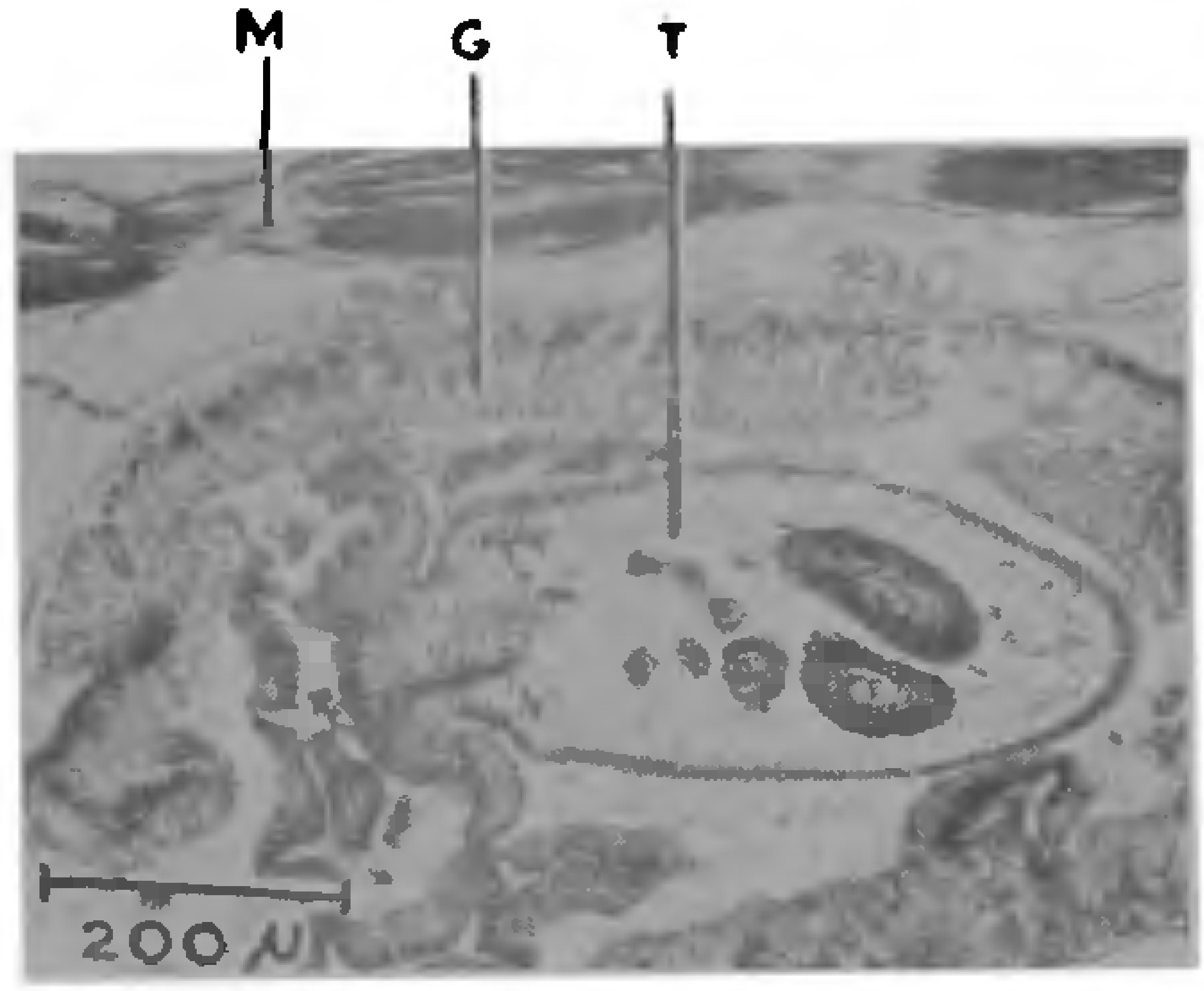

FIG. 1. Trypanorhynchan larva in the midgut of amphioxus. M, myotome. Rest of the letterings are referred in the text.

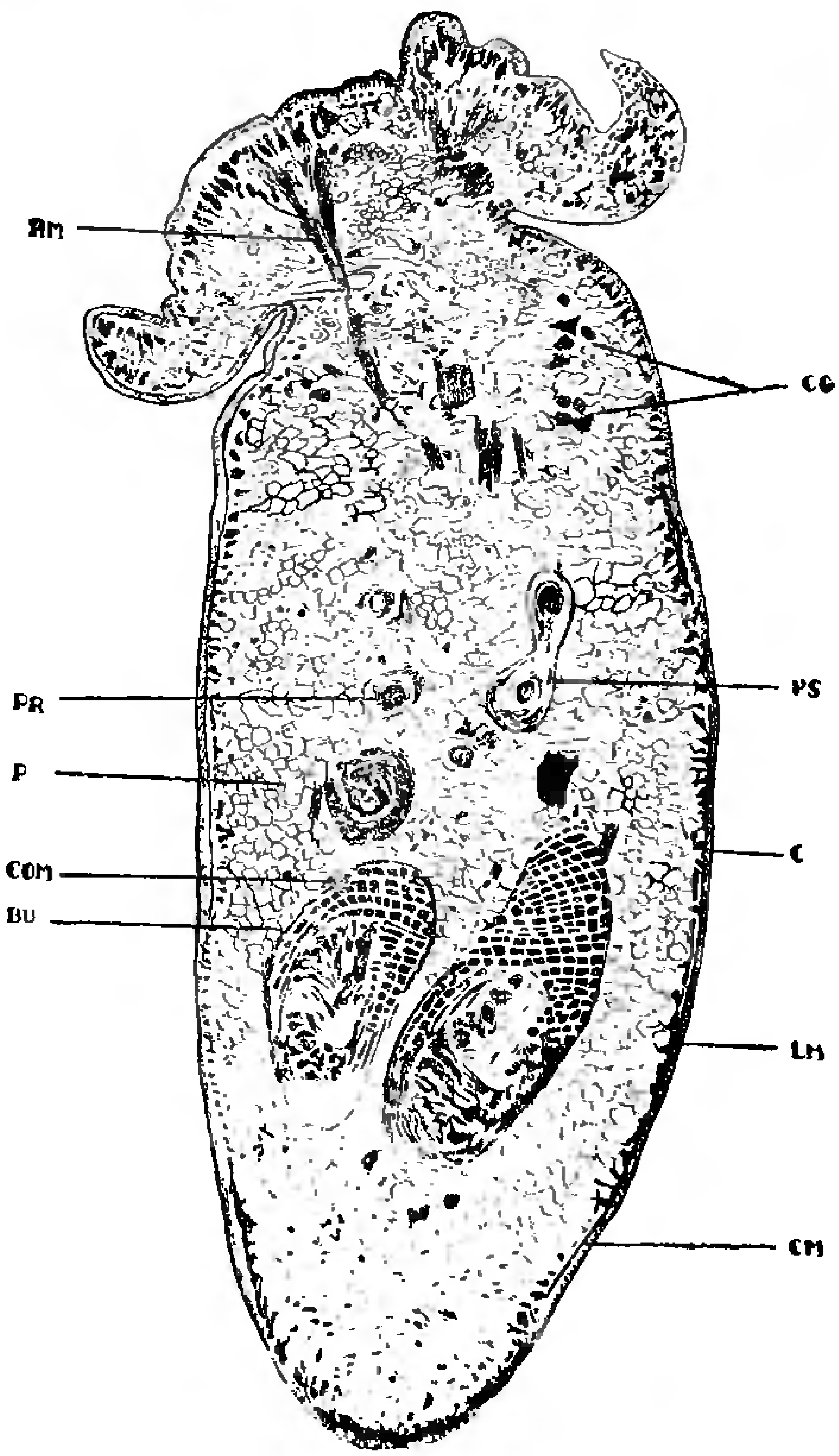

FIG. 2. Camera lucida drawing of trypanorhynchan larva.

sections, a reconstruction of the entire structure of the larva was possible. It was found to recall the morphology of a Trypanorhynchan larva, differently called plerocercoid or plerocercus.

The larva (Fig. 2) is solid with an external conspicuous cuticle (C) underlying which are the circular (CM) and longitudinal muscles (LM). The substance of the larva, the parenchymal tissue (P) appears as a spongy matrix containing a good amount of calcarious granules (CG). At the anterior end are four bothria each having a typical sucker-like appearance. The body showed four pear-shaped bulbs (BU) at the posterior end, each clothed with a set of strong concentrically laid out muscle (COM) bands and leading to a convoluted proboscid sheath (PS). The proboscides (PR) were all kept in a retracted state inside the sheath by the retractile muscle (RM) and they did not show any armature. They reach the anterior end in the apical area encircled by the bothria.

The identification of the larva is hardly possible, but it could be expected without doubt to reach the adult stage in some other marine animal probably a selachian, which should injest the amphioxus along with various other marine organisms.

I am thankful to Prof. G. Krishnan, for his interest in the work and to Prof. M. Ananthararaman, Madras Veterinary College, for identifying the larva and for helpful suggestions.

Department of Zoology, JAYAPAUL AZARIAH.
University of Madras,
Madras-5, *May* 1, 1968.

1. Hyman, L. H., *The Invertebrates*, Vol. II, *Platyhelminthes and Rhynchocœla*, McGraw-Hill, New York, 1951.
2. Southwell, T. *Cestoda*, Fauna of British India, London, 1930.
3. Subhapradha, C. K., "Helminth parasites of the economic fishes of the Madras coast," *M.Sc. Thesis*, Madras University, 1948.

TISSUE ASCORBIC ACID CONTENTS IN THE SCORBUTIC BULBUL (*PYCNONOTUS CAFER*)

ROY AND GUHA[1] have reported that the red-vented bulbuls (*Pycnonotus cafer*, family: Pycnonotidæ, order: Passeriformes) is the only bird amongst non-mammalian species, which cannot synthesize vitamin C like man, monkey, guinea-pig and Indian fruit bat because of the lack of an enzyme, L-gulono-oxidase (Chatterjee *et al.*[2]). These authors have shown that neither the liver nor the kidney (sites of synthesis in vertebrates) of bulbuls could normally synthesize vitamin C. Roy and Guha[3] have further shown that the bulbuls can be made scorbutic experimentally when they develop certain patho-morphological changes like general debility, drooping of head, sloughing of feathers, loss of body-weight, internal hemorrhage, etc. Although these symptoms are somewhat typical for scurvy, a study on the concentration of the ascorbic acid in tissues would finally confirm the scorbutic condition of the animal. As *Pycnonotus* is the only avian species developing scurvy symptoms, it seems desirable to quantitate the vitamin C concentration of various tissues belonging to the scorbutic bulbul.

Twenty-four red-vented bulbuls were used in the present investigation. The scorbutogenic diet (*vide* Roy and Guha[3]) was given to both the control and the treated birds *ad libitum* for twenty-one days. The control birds' diet was supplemented with vitamin C (3 mg. each daily) during the course of the experiment. Different tissues (*vide* Table I) were quickly dissected out, cleaned and weighed on a torsion balance. Ascorbic acid concentration of these tissues were estimated following the method of Roe and Kuether.[4]

TABLE I

Tissue ascorbic acid contents of scorbutic bulbul

(mg./100 gm. fresh wet tissue)

Tissue	Control (12)*	Scorbutic (12)	Per cent. depletion	P-value
Adrenal	248·78±20·07†	45·28±8·95	81·72	< ·001
Spleen	98·28± 9·01	23·73±5·16	75·85	< ·001
Pancreas	89·05±10·22	20·79±4·26	76·65	< ·001
Kidney	77·95±10·77	40·96±7·97	47·45	< ·025
Liver	71·95± 9·31	33·62±6·80	53·27	< ·005
Uropygial gland	138·97±12·15	32·21±6·11	76·82	< ·001

* Number of animals shown in parenthesis.
† Standard error of the mean.

A perusal of Table I reveals a significant depletion of tissue ascorbic acid following scurvy. The depletory pattern of this species in the bulbul appears to be almost similar to that of the guinea-pigs (Banerjee[5]). A close inspection of Table I further reveals that the kidney and the liver of scorbutic bulbuls retain a large amount of the vitamin. It may not be