

ON A NEW INDIAN LEECH, *HEMICLEPSIS VIRIDIS*, SP. NOV.

By JOHN E. CHELLADURAI, M.A., Department of Zoology, The Science College, Trivandrum.

Material.—Two specimens of the new species were first obtained on December 8, 1927; both were young and were seen in a basin of water containing *Hydrilla* collected from a freshwater tank at Trivandrum, Travancore. Since then water with *Hydrilla* was regularly examined and on January 30, 1928, a full grown specimen with young ones clinging to its ventral side was obtained. Though a periodical search was thereafter maintained no further specimens were obtained till August 15, 1929, when a medium-sized specimen was collected. The stomachs of all the four specimens were empty and colourless and therefore indistinct. Later in November, 1929, specimens were seen on the common tank frogs, *Rana hexadactyla* and *R. tigrina*. Since then several specimens of different sizes were obtained from time to time from these frogs. All of these had their stomachs fully gorged with blood.

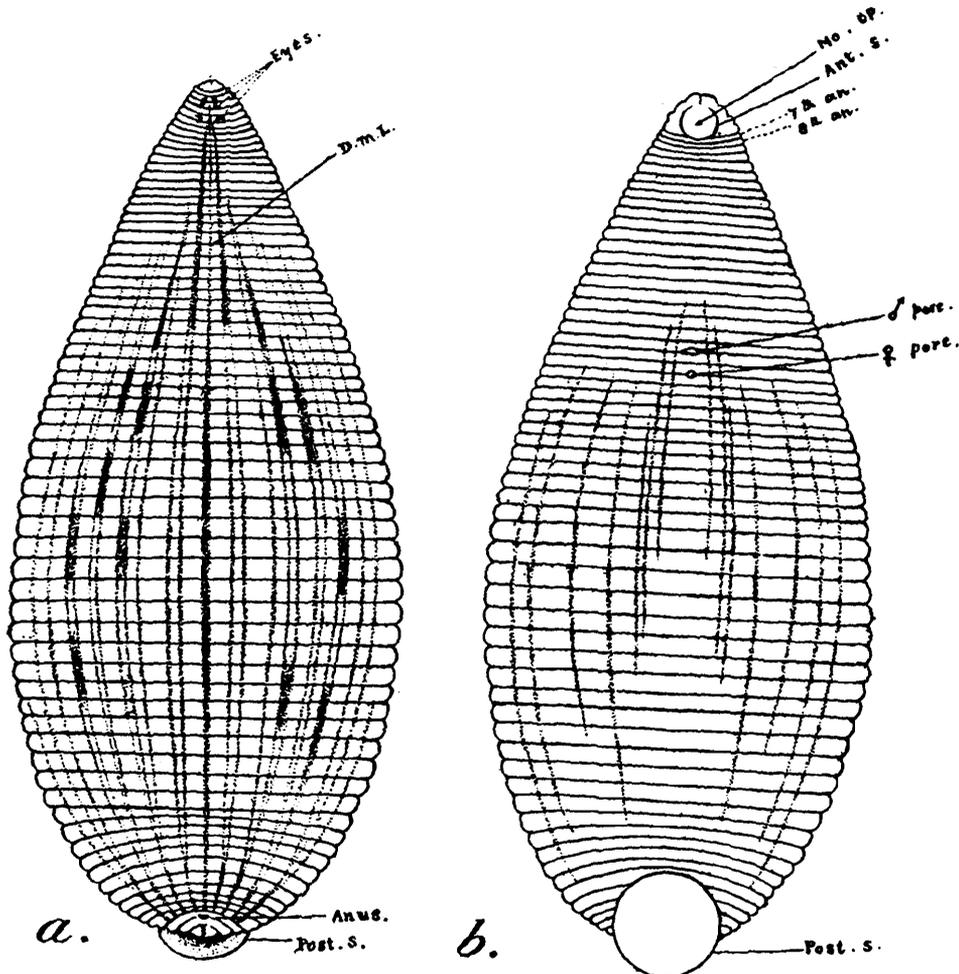
Chief features.—(1) Eyes three pairs. (2) Stomach with more than seven pairs of caeca. (3) Mouth opening in the middle of the oral sucker. (4) Fifteen to twenty-five pea-green sub-parallel longitudinal lines on the dorsal surface.

Dimensions.—(1) Of a full grown preserved specimen:—Length, 8 mm., greatest breadth, 3.7 mm., width of posterior sucker, 1.2 mm.

(2) Of a living specimen resting in a dish of water:—Length, 24 mm., greatest breadth, 3 mm.

Description.—When at rest the body is ovate-lanceolate. The head is faintly dilated. The dorsal surface bears minute uniform papillae in a transverse line across the middle of each annulus. The colouration is characteristic of the species. The dorsal surface of a full grown specimen bears fifteen to twenty-five bright pea-green longitudinal sub-parallel lines, which have the following arrangement: mid-dorsally there is a bright dark green line, this begins between the second and third pairs of eyes and runs to the peduncle of the posterior sucker. On either side there are seven to twelve lines which are most distinct about the middle region of the body. Of these, the two paramedian lines converge and unite posteriorly. Anteriorly they unite with each other and merge into the dorso-median line behind the last pair of eyes. The other lines tend to converge and unite in groups posteriorly but in front they remain distinct. All are composed of numerous close-set pigment spots. When these are well developed the lines are distinct and continuous; otherwise they appear as dotted lines. In very young specimens all the lines appear as serial rows of dots. The ventral surface also bears a few lighter lines. There is no ventro-median line. In a full grown specimen seven to nine lines of unequal length are seen on either side. They are mostly confined to the post-gonoporal region. In some specimens the ventral surface is diffusely pigmented throughout.

Eyes.—There are three pairs of eyes arranged in two sub-parallel rows in annuli three, four, and six. The eyes of the first pair are the smallest and their pigment cups are directed forward with a slight oblique tilt. The eyes of the second pair are large and are but a shade smaller than those of the third. Their pigment cups are directed obliquely forward. The eyes of the third pair are the largest and are directed obliquely backward. The ratios between the diameters of the first, the second and the third pair of eyes are as 3·5 : 6 : 7.



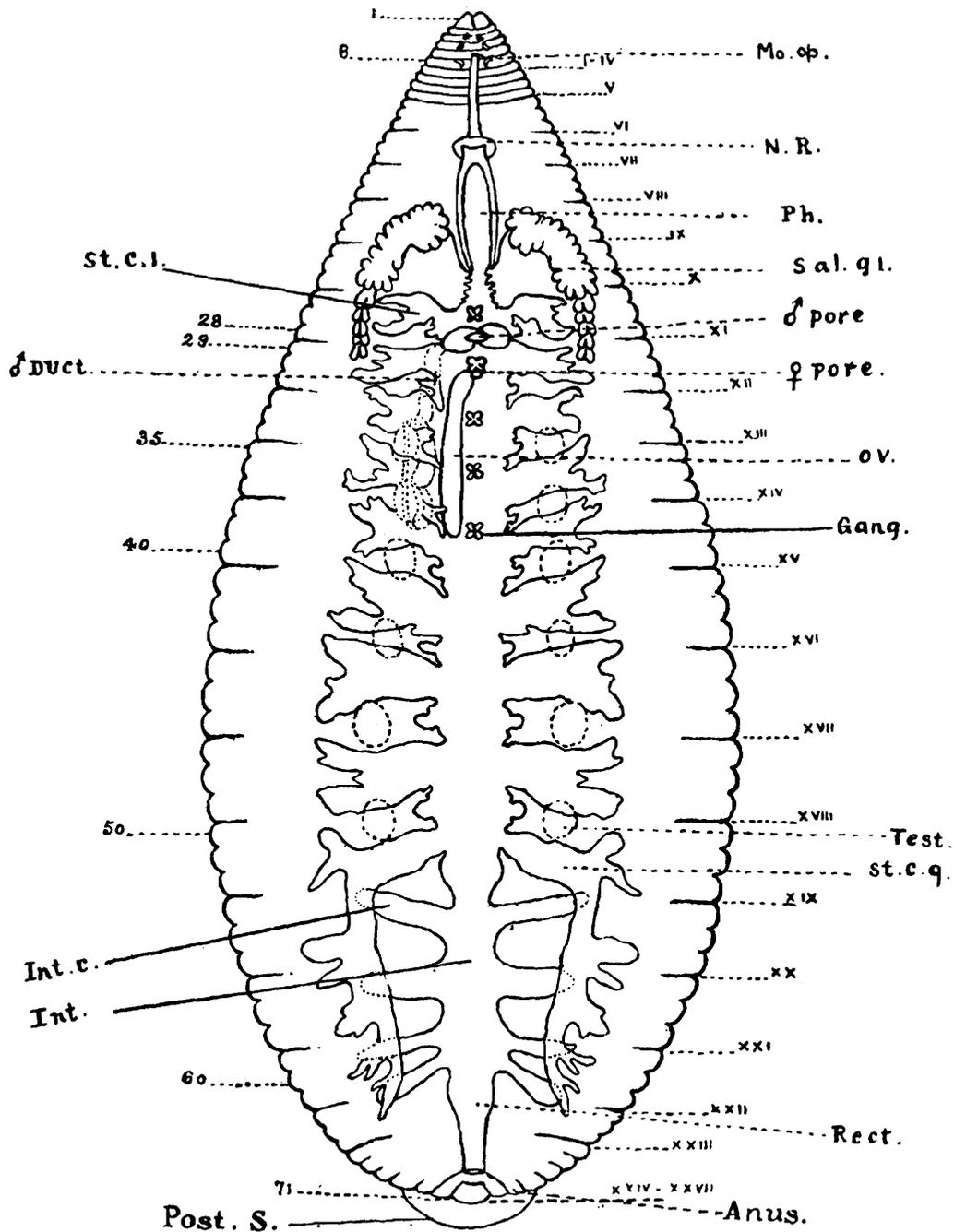
TEXT-FIG. 1.—*Hemiclepsis viridis*, sp. nov. $\times 11\frac{1}{2}$.

a. Colour pattern of dorsal side; b. Colour pattern of ventral side.

Ant. S. = anterior sucker; *D. M. L.* = dorso-median line; *Mo. op.* = mouth opening; *Post. S.* = posterior sucker; *7th an.* = seventh annulus; *8th an.* = 8th annulus.

Annulation.—The annuli are 71 in number. Two annuli, the first and the second, are pre-ocular. Somites I to IV are formed by the first seven annuli. Somites V to XXIII are complete and each is triannulate. Somites XXIV to XXVII are formed by the last seven annuli. Between annuli 69 and 70 is placed the anus, and there are two post-anal annuli. On the ventral side the seventh annulus forms the posterior margin of the oral sucker. The male pore is conspicuous and is placed between annuli 28 and 29, *i.e.*, between somites XI and XII. The female pore is minute and is placed two annuli behind the male in the interannular furrow between the second and the third annuli of somite XII.

Suckers.—The anterior sucker bears the minute mouth aperture in its centre. In a freshly killed specimen, the position of the mouth is clearly visible. The posterior sucker is, as usual, circular in outline.



TEXT-FIG. 2.—Annulation and internal structure of *Hemiclepsis viridis*, sp. nov. $\times 17$.

1 to 71=annuli; I to XXVII=somites; *Gang.*=ganglion; *int.*=intestine; *Int. C.*=intestinal caecum; *Mo. op.*=mouth opening; *N. R.*=nerve ring; *Ov.*=ovary; *Ph.*=pharynx; *Post. S.*=posterior sucker; *Rect.*=rectum; *St. C. 1*=first stomach caecum; *St. C. 9*=ninth stomach caecum; *Sal. gl.*=salivary gland; *Test.*=Testes.

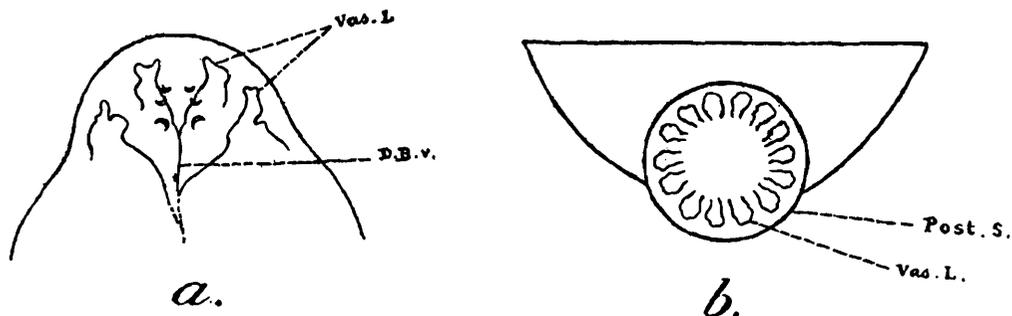
Alimentary System.—The mouth is placed in the centre of the oral sucker. Since the position of the mouth is an important feature, its location in the middle of the oral sucker was carefully noted. Living specimens were observed under a microscope and as the anterior end was waved about on the slide before fixation, the mouth was distinctly visible in the middle of the oral sucker. In freshly fixed specimens also

the mouth appeared as a triradiate pore in the middle of the oral sucker. Finally from longitudinal serial sections of the anterior half of the body the position of the mouth within the anterior sucker was confirmed.

When the anterior sucker contracts, its margin becomes slightly wrinkled and presents an undulating line. Due to the wrinkling there is a constant and comparatively more distinct furrow in the antero-medial edge of the sucker.

The pharynx is slender. The salivary glands are well developed and form on either side a compact mass. They extend from the middle of the retracted pharynx to the posterior limits of the second pair of the caeca of the stomach. A distinct salivary duct opens behind the caudal termination of the pharynx. The stomach has nine pairs of lobed caeca. When the stomach is fully distended with blood, the inter-caecal regions also become expanded into the lateral lobed pockets. The first pair of caeca is small. The remaining caeca show a gradual increase in size from front to back. The last pair is the largest and extends far back towards the posterior sucker. The intestine has the usual complement of four pairs of caeca. They are directed laterally, the first pair with a slightly forward and the last pair with a slightly backward inclination. The rectum opens through the anus which is placed two annuli in front of the posterior sucker.

Vascular System.—The following few points were noted regarding the vascular system. The dorsal blood vessel at its anterior end bifurcates just behind the level of the third pair of eyes. Each of its two branches runs forward below the second pair of eyes. Near the margin of the sucker it bends back, the backward arm of the loop being



TEXT-FIG. 3.—*Hemiclepsis viridis*, sp. nov.

a. Vascular loops of anterior sucker $\times 34$; b. Vascular loops of posterior sucker $\times 16\frac{2}{3}$.

D. B. V.=dorsal blood vessel; Post. S.=posterior sucker; Vas. L.=vascular loops.

external to the forward one. A second pair of vascular loops from the dorsal blood vessel, which starts a little behind the first pair, also enters the anterior sucker, the two arms of each loop being disposed as before. The posterior sucker is provided with the full complement of seven vascular loops.

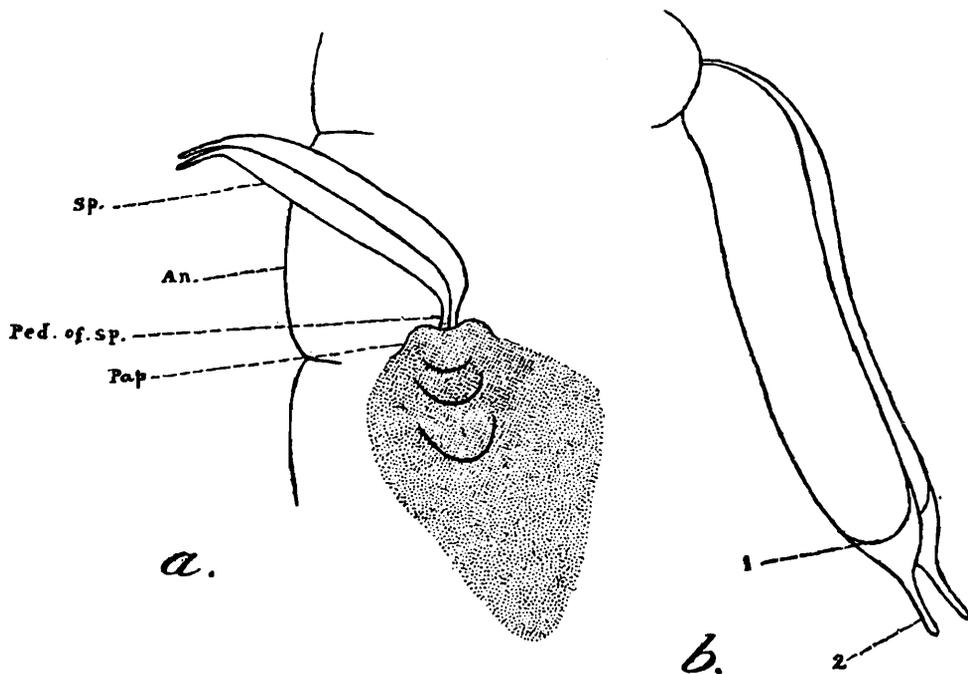
Nervous System.—The nerve ring is placed in somite VII.

Reproductive System.—The testes are six pairs. The two ovarian tubes are distinct. Their length depends upon the state of development

of the ova. When the ova are immature the ovarian tubes extend back only a short distance behind the female pore. When, however, the ova are ripe and ready for laying, they are very long and extend far backwards, their hind ends reaching the level of the origin of the last pair of caeca of the stomach.

The number of eggs laid at a time is variable and probably depends upon the condition of nutrition of the specimen before egg laying. In two specimens the count was 82 (specimen obtained on September 4, 1932) and 52 (specimen obtained on September 12, 1932).

A periodical search for specimens with spermatophores proved eventually successful. Three specimens with spermatophores were obtained, two on September 12, 1932, and one on September 13, 1932. One of these bore a single spermatophore on its left lateral border; and each of the others bore three spermatophores. Of the latter, one had all the spermatophores attached to the ventral side and the other had two on the ventral and one on the dorsal side. The spermatophores appear to be scattered without any apparent order and more than one spermatophore may be deposited on a single leech. The freshly attached



TEXT-FIG. 4.—*Hemiclepsis viridis*, sp. nov.

a. Spermatophore $\times 60$; b. Empty spermatophore. Diagrammatic.

An. = annulus; *Pap.* = papilla on body wall to which spermatophore is attached; *Ped. of sp.* = pedicle of spermatophore; *Sp.* = spermatophore; 1 = convex surface of sperm mass; 2 = finger-like termination of spermatophore.

spermatophore has the outline of a minute double cucumber. Its proximal end, which forms a common pedicle, is attached to a papilliform projection of the skin. The distal end of each half terminates in a slender finger with a very narrow lumen. The tips of the two finger-like ends are covered over by a quantity of mucus. Since the spermatophore is fixed only by the pedicle, it freely waves about whenever the leech moves. The wall of the spermatophore is thin and transparent.

Dimensions of the spermatophore in a fixed specimen :—

Length excluding the distal finger	440 μ
Width	100 μ
Length of distal finger	77 μ
Width of finger near its base	11 μ

One of the spermatophores appeared to be newly fixed. It was nearly full and whitish in colour. Near its distal end at the base of each of the finger-like processes there was a clear, crescentic space which indicated that the spermatophore had just begun to empty its contents.

This spermatophore was kept under observation and the process of the discharge of the sperm mass was continuously watched. The sperm mass at the distal end of the spermatophore presented a distinct convex surface which gradually moved towards the pedicle, as the sperm mass passed into the body wall of the leech. In twenty-five minutes the spermatophore was completely empty and allowing a few minutes for what was expelled before the observation began, one is led to conclude that it takes about half an hour for a spermatophore to empty itself.

The sperm mass that passed into the body wall of the leech could be seen for a time as a spreading white drop.

Observations on habits, etc.—The leech often rests on the stem or on a leaf of *Hydrilla*. In the latter case it places itself lengthwise on the leaf fitting itself snugly in the upper angle of the slightly folded leaf. In either position, its dark green colour blends with that of the plant and the leech cannot be easily distinguished.

If disturbed while resting on *Hydrilla* or on the side of a dish, the leech détaches itself, curls up into a ball with the ventral side inside and drops down. This is a habit common to most Glossiphonids.

While resting on the side of a dish or when attached to a frog, the little leech often keeps up a gentle oscillation of its body which helps to renew the water surrounding it. This movement is probably useful in respiration.

For sucking blood, the leech attaches itself to any part of the frog's skin. I have picked off specimens from near the eye, the middle of the back, the sides of the legs and the web between the toes. A few were found on the lower side also, where alone they were conspicuous against the whitish background of the frog's skin. Fixing itself by both its suckers, the leech continues to suck blood till its stomach is filled to its utmost capacity. Then the stomach region shows itself through the body wall as a very distinct dark red region. The caeca of the stomach are so much expanded that they press against each other, and their limits are not clear. The dilated caeca also extend very close to the lateral margin of the body wall. Even the intercaecal lobes of the stomach become distended into lateral lobed pockets. When such a specimen is mounted alive on a slide, the gentle pressure of the cover slip is sufficient to force a little of the blood into the pharynx. A specimen with an empty stomach was observed from time to time while feeding and it was seen that the last pair of caeca of the stomach became filled first and then the others in order from back to front. But when a specimen with a full stomach was kept in a basin of water and examined

from day to day, it was found that the first pair of caeca which were the last to fill were the first to become empty and the other caeca became empty in order from front to back.

The leech moves off from the frog when the ova are ripening and attaches itself to the leaf or the stem of some water plant. Here it slowly digests its full meal of blood and the caeca of the stomach become gradually empty. Then the maturing ovary can be seen through the body wall, the outline of each developing ovum being distinctly visible. By the time the ova are ripe for laying, the stomach has become completely empty. It is while resting on the water plant that the eggs are laid and these adhere to the ventral side of the leech. During this period, though the stomach is quite empty, the leech does not feed. Specimens carrying eggs, when gently dropped on a frog resting in a basin of water, promptly moved off and fixed themselves to the sides of the basin. As long as the ova cling to the parent's body, the ventral surface of the leech forms a shallow concave surface in which the ova are accommodated. Should the leech now gorge itself with blood, the ventral surface would flatten out and the ova would be in danger of being rubbed off whenever the leech moved about. It is possible that the starvation habit during this period is to safeguard the eggs.

After hatching, the young ones cling by both their suckers to the body of the parent. A freshly hatched young is colourless with the exception of the pigment cups of the eyes. Its stomach with its caeca is distinct but it is completely filled with yolk granules. It cannot feed for a time till all the yolk is absorbed. Specimens with young ones, when dropped on a frog, fix themselves to it, but after a partial meal of blood move off from the frog. That the meal was partial was decided by the condition of the stomach which was bright red in colour with distinct caeca, the full stomach being dark red in colour with indistinct caecal limits.

Occurrence.—Trivandrum and Ootacamund. The specimens that I collected were all obtained from Trivandrum, either from the local fresh-water tanks from among *Hydrilla*, or from the local frogs. Prof. Percy Moore, when he was in India three years ago on his collecting tour, was shown one of my slide specimens and my sketches. He then told me that he had collected similar leeches from Ootacamund which he picked off from the under side of the leaves of the water lily. He also presented me two of his specimens for comparison with mine.

Position of the present Species.—The genera *Hemiclepsis* and *Paraclepsis* agree in having more than seven pairs of stomach caeca, but differ in the following respects :—

Hemiclepsis.

Paraclepsis.

- | | |
|---|---|
| (1) Eyes typically two pairs. | Eyes typically three pairs. |
| (2) Mouth opening within the oral sucker. | Mouth opening subterminal, leaving the oral sucker imperforate. |

The present species agrees with *Hemiclepsis* in having the mouth opening within the oral sucker, and with *Paraclepsis* in having three pairs of eyes ; but as the position of the mouth within the oral sucker is a more important feature than the number of eyes, I have placed my new

species for which I propose the name *viridis* in the genus *Hemiclepsis*. *H. viridis*, however, tends to lessen the differences between the genera *Hemiclepsis* and *Paraclepsis*.

I am indebted to Prof. J. Percy Moore who read through the manuscript and made various corrections.

The type of *H. viridis* is deposited in the Indian Museum, Calcutta.

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