



## Taxonomical identification of *Jalauka* used for *raktamoksha* in Kerala

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**ABSTRACT:** According to *ayurveda* *raktamoksha* is one among the *sodhana* therapy. *Jalaukaavacarana* is the simplest form of *raktamoksha* and one among *anusastra-karma* which is indicated in *pitta* predominant conditions. It is easy, cost effective and safe to use. *Acaarya* *Suśruta* has detailed the morphological features of poisonous and non poisonous leeches. There are more than 700 species identified so far at global level. Out of them *Hirudo medicinalis*, *Hirudo nipponia*, *Hirudo troctina*, *Hirudo quinquestriata*, *Hirudinaria javanica*, *H. manillensis*, *Poecilobdella granulosa*, *Macrobodella decora*, *Hirudo verbena* and *Haementeria officinalis* are most commonly used in clinical practice<sup>[1]</sup>. The families found in India are Piscicolidae, Glossiphonidae, Erpobdellidae, Hirudidae, Haemadipsidae and Ozobranchida<sup>[2]</sup>. Among them medicinal leeches in general are expected to belong in the species *Hirudo medicinalis*.

The present study was done for the species determination of commonly used *jalauka* from different areas of Kerala. For that, the leech samples were collected from 17 different Ayurveda colleges in Kerala and three natural habitat zones. The leech samples were put in separate bottles and clearly labelled (Designated sites as A1 to A20). The samples were morphologically identified. All the specimens were examined morphologically and it was found from detailed study that the specimens belonged to the Genus “*Hirudinaria*” and species “*bpling*”, *Hirudinaria bpling*.

**Key words:** *Jalauka*, Medicinal leech, *Hirudinaria bpling*, Kerala

### Introduction

Medicinal leech therapy or hirudo therapy is a kind of complementary treatment method applied with non poisonous leeches. One or more leeches are attached to the skin of affected area and the purpose is to gain potential utilities of leech saliva that is secreted.

There are more than 700 species identified so far at global level. Out of them *Hirudo medicinalis*, *Hirudo nipponia*, *Hirudo troctina*, *Hirudo quinquestriata*, *Hirudinaria javanica*, *H. manillensis*, *Poecilobdella granulosa*,

*Macrobodella decora*, *Hirudo verbena* and *Haementeria officinalis* are most commonly used in clinical practice. The families found in India are Piscicolidae, Glossiphonidae, Erpobdellidae, Hirudidae, Haemadipsidae and Ozobranchida. Among them medicinal leeches in general are expected to belong in the species *Hirudo medicinalis*.

Ayurvedic classics also provide a detailed description on leech therapy; *Acaaryas* include it under the heading of *raktamoksha* which is one among the *pancakarma*.

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*Aacaarya* Suśruta details twelve types of *jalaukaa*. Among them six are *savisha* and six are *nirvisha*<sup>[3]</sup> (see tables 1,2). The category has been decided by their habitat and morphological features. Leeches dwelling in places having plenty of clean water and fragrance, water sources having lotus, lily, other fragrant flowers and algae are non poisonous. The poisonous ones live in dirty water contaminated by putrefied bodies and also by excretion of snakes, frogs, fish and other aquatic animals. Generally, the leeches which are

expanded in the middle, which are ugly, flat or dull in movement and which do not stick well, suck little blood are unfit to use. Those having coloured, white or too black, very thin or thick, very much mobile and slimy, stout and hairy in the middle or having streaks of varied colours like a rainbow, are of poisonous variety. Their bites cause oedema, excessive itching, pyrexia, burning sensation, vomiting, feeling like intoxication and sinking. Therefore these must not be used for the therapeutic purposes<sup>[3]</sup>. The names and

Table 1

*Savisha-jalaukaa*

<i>Savisha-jalaukaa</i>	Features
1. Kṛshṇā	Colour of antimony powder and big head
2. Karburā	Snake like and has abdomen depressed and elevated
3. Alagardā	Hairy, has broad flanks and black mouth
4. Indrāyudhā	Variegated like rainbow with upward streaks
5. Saamudrikā	Slightly black-yellow variegated with various flower marks
6. Gocandana	Bifurcated in lower part like bull's scrotum and with small mouth

Table 2

*Nirvisha-jalaukaa*

<i>Nirvisha-jalaukaa</i>	Features
1. Kapilā	Flanks looks like painted with realgar, unctuous back, colour like green gram
2. Pingalā	Slightly red with round body, brown and swiftly moving
3. Śankhamukhi	Livery colour, swiftly sucking and with long sharp mouth
4. Mooshikā	Appearance and colour that of rat with disagreeable smell
5. Pundareeka mukhi	Colour like that of green gram and mouth like that of lotus
6. Saavarikā	Unctous with colour like that of lotus and eighteen fingers in length, applicable in animals

morphological features of the leeches as explained by *Aacaarya* Suśruta are as stated below in the table.

Tracing the literature, it is clear that an abundant collection of study references are available pertaining to medicinal leech identification and its utility in therapeutics. But scientific identification of the medicinal leeches based on morphology and taxonomy is mandatory for bringing up a standard protocol for leech therapy especially in ayurvedic practice, where leech therapy is widely used. In ayurvedic texts detailing of the non-poisonous leeches are done mainly based on their colour and length. But this information is deficient in specific and accurate identification of the leeches. So as

a stepping stone for bring a standardized parameters for medicinal leeches, this study aims to morphologically and taxonomically identify medicinal leeches used in different areas of Kerala.

### Materials and methodology

Sample collection: For morphological and taxonomical identification:

Leech samples, two each in number, were collected from 17 Ayurveda colleges registered under KUHS. Besides these, two samples each were also collected from three main natural habitat zones of Kerala namely - Aakulam lake (Trivandrum), Attapady (Palakkad) and Kaattikkulam (Waynad).

### Morphological and taxonomical identification of the leech samples

Samples used in present study included 58 leeches from 20 sampling sites designated A-1 to A-20. All the specimens were examined morphologically and in taxonomic identification it was found that the specimens belonged to the Genus “Hirudinaria” and species “bpling”, *Hirudinaria bpling*. The two forms of this Asian buffalo leech; the Asian buffalo leech and the dark Asian buffalo leech were observed from the 20 different sampling sites under study. Though variations in pigmentation are observed for both the Asian buffalo leech and the dark Asian buffalo leech, both fall under the same species name *Hirudinaria bpling*.

### Observations of the specimen analyzed

#### Sample A - 1

4 samples were studied and 4 of them though different in size were identified as Asian buffalo leech, *Hirudinaria bpling* (Fig 1)

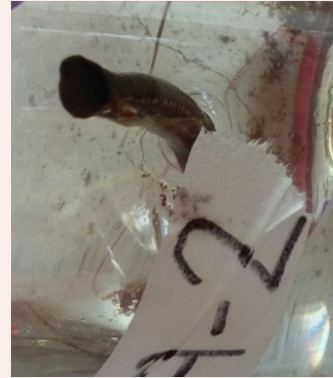
Fig 1: Sample observed from Site A-1 (showing ventral view) adhered to bottle with anterior and posterior suckers.



#### Sample A - 2

3 samples were studied and all the 3 samples were olive Asian pigmented with lateral yellow markings belonging to Asian buffalo leech –*Hirudinaria bpling* (Fig: 2).

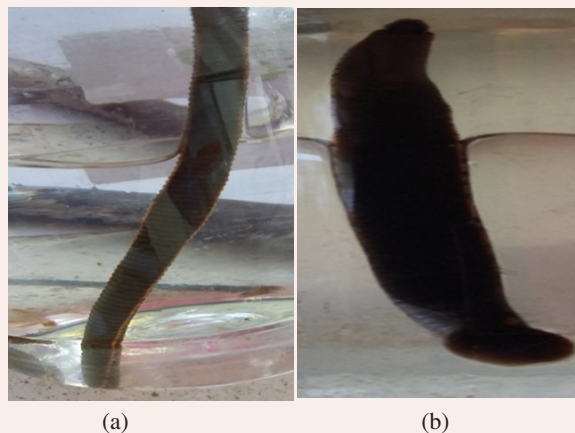
Fig 2: Sample attached to bottle using its posterior sucker



#### Sample A-3

Only one sample was studied from this site and the specimen is Asian buffalo leech –*Hirudinaria bpling* (Fig : 3).

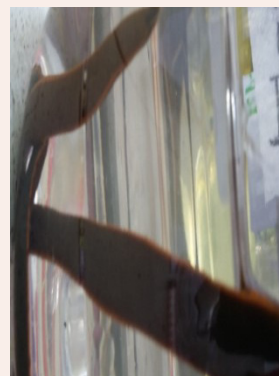
Fig 3 : a) Ventral view of the sample showing elongated/ stretched body of the organism. b) Same sample attached to bottle with its anterior and posterior sucker.



#### Sample A – 4

3 samples were studied. More or less of uniform size. Dark Asian buffalo leech-*Hirudinaria bpling* (Fig : 4).

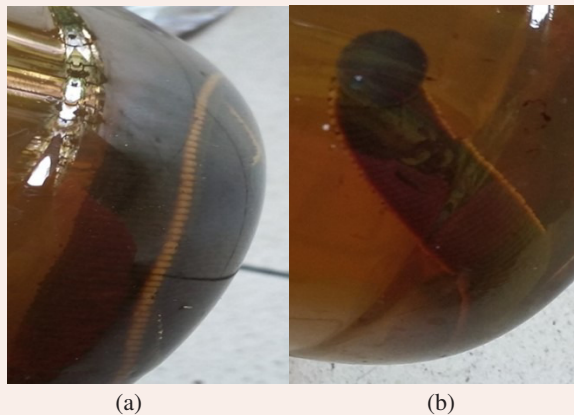
Fig 4: Picture showing three of the samples under study



**Sample A – 5**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 5).

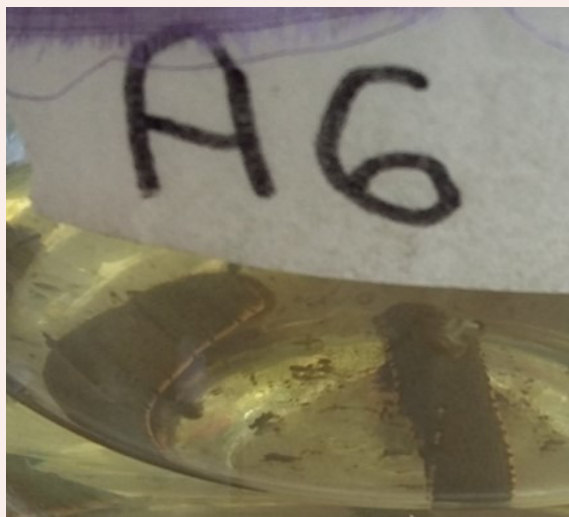
Fig 5 : a) showing lateral view of the specimen  
b) showing ventral view of the specimen clinging to bottle with posterior sucker



**Sample A – 6**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 6).

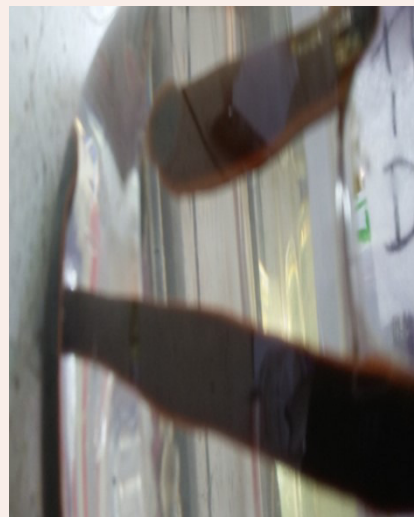
Fig 6: Dorsal view of the two specimens studied



**Sample A – 7**

4 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig: 7).

Fig 7: Ventral view of three of the specimen studied from A-7



**Sample A – 8**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig:8).

Fig 8: Showing the dorsal view of the three specimen under study from site A -8



**Sample A – 9**

2 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 9).

Fig 9 : Showing the ventral view of the two specimen studied at site A – 9.





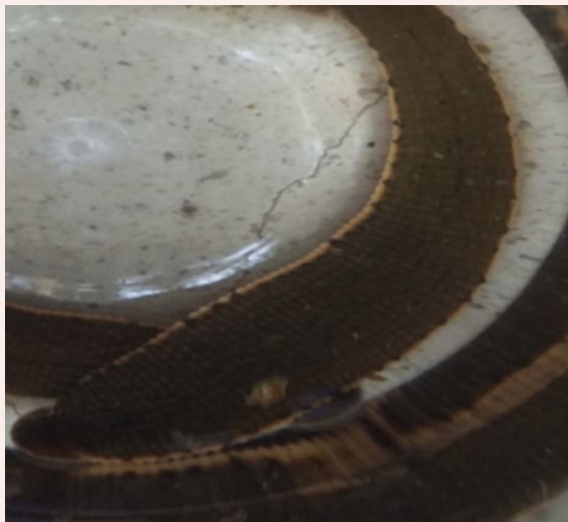
**Sample A – 10**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 10).

Fig 10: a) showing ventral view of the specimen studied b) showing dorsal view of specimen studied



(a)



(b)

**Sample A – 11**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 11).

Fig 11 : a) showing dorsal view of specimen  
b) showing ventral and dorsal view of specimen



(a)



(b)

**Sample A – 12**

3 samples were studied. Asian buffalo leech -*Hirudinaria bpling* (Fig : 12).

Fig 12: Dorsal view of the specimen studied from site A-12



**Sample A – 13**

2 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 13).

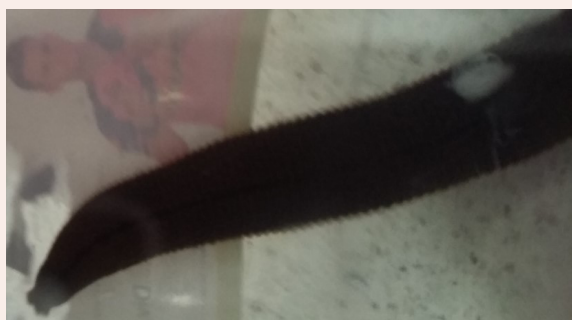
Fig 13: Ventral view of specimen studied from site A-13



**Sample A – 14**

4 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 14).

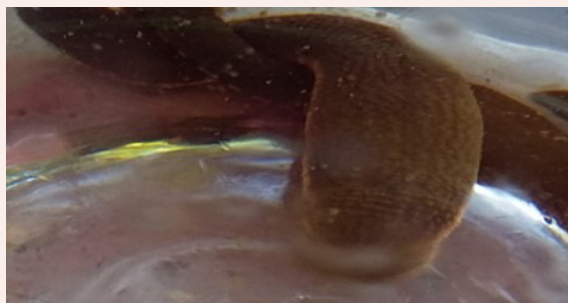
Fig 14: Dorsal view of the specimen studied from site A -14



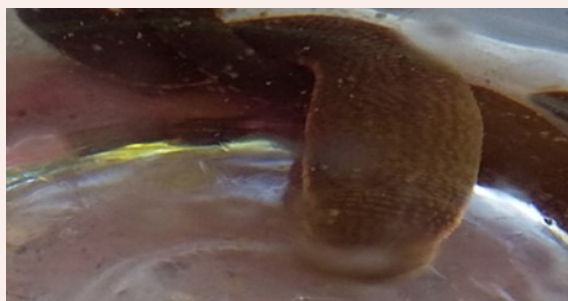
**Sample A – 15**

2 samples were studied. Asian buffalo leech - *Hirudinaria bpling* (Fig : 15).

Fig 15: Showing posterior sucker and dorsal view of the specimen studied from site A – 15



(a)



(b)

**Sample A – 16**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 16).

Fig 16 : Showing ventral view of the specimen studied from site A -16



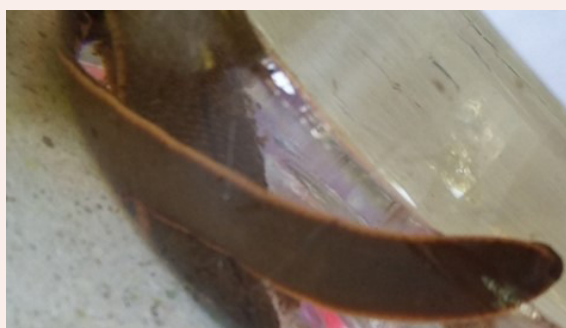
**Sample A – 17**

3 samples were studied. Dark Asian buffalo leech -*Hirudinaria bpling* (Fig : 17).

Fig 17 : a) showing the three specimen studied b) showing the ventral view of one of the specimen studied from site A – 17



(a)



(b)

**Sample A – 18**

2 samples were studied. Asian buffalo leech - *Hirudinaria bpling* (Fig : 18).

Fig 18 : Showing the dorsal view of the sample



**Sample A – 19**

3 samples were studied. Asian buffalo leech - *Hirudinaria bpling* (Fig : 19).

Fig 19: Dorsal view of the specimen studied from site A – 19



**Sample A – 20**

3 samples were studied. Dark Asian buffalo leech - *Hirudinaria bpling* (Fig :20).

Fig. 20 : a) Specimen studied from site A-20  
b) Dorsal view



(a)



(b)

**Morphological features**

Of the 58 leeches examined, the body was cylindrical, dorsoventrally flattened divided into thirty-four segments and 102 annuli having an anterior sucker and a posterior sucker.

The body of the dark brown leech was observed to have dark brownish body colour with a dark black stripe mid dorsally, which extended from anterior end to posterior end of the body. Black lines forming square pattern were also observed along the either sides of this mid dorsal line. Yellow stripes on lateral side and light brown colour on ventral side (Fig 21 a & b).

The lines of black spot pattern of the body were observed to spread from the middle line and becoming less prominent towards the lateral side.

Fig. 21 : a) Dorsal view of Asian buffalo leech  
b) Ventral view of Asian buffalo leech



(a)



(b)



As for Asian leech, the dorsal colour was dark Asianish, dark olive, or dark brownish. It also contains longitudinal, black or grey, mid-dorsal stripe. Next to the mid dorsal stripe, there are two longitudinal lines with orange yellowish colour at the lateral side of the body. Between the orange yellowish margin and the mid-dorsal stripe on each side, there are 3-4 narrow and more or less broken stripes, of the dark brown or dark olive dorsum. For the ventral side, the colour pattern is fully dark brown in colour (Fig. 22).

Fig 22 : Doral view of Asian buffalo leech



Both dark brown leech and Asian leech have at least 10 eyes which are arranged in pairs of 2. The eyes can be observed under the microscope as multiple large black spot on the head arranged in parabolic arc. Five pairs of eyes are located on dorsal side towards the lateral side which is arranged closely for the first 3 pairs starting at 2nd annulus to 4th annulus. Meanwhile, the 4th pair is located on the 6th annulus and the last pair is located on the 9th annulus.

Both dark and Asian buffalo leech had 102 annuli. Annulus found at the middle of the body was larger compared to the annulus at the end of the body. Both types were observed to have papillae on the body surface which appear as small protruding stub on the dorsal side of the body, that give the body its rough appearance on its dorsal side (Fig. 23 a & b).

Fig. 23: a) Lateral view of *Hirudinaria bpling* showing the arrangement of papillae on its body b) Dorsal view of *Hirudinaria bpling* showing the arrangement of papillae giving the organism a rough appearance



(a)



(b)

The jaws of *Hirudinaria bpling* are relatively small, rounded and soft, rough-surfaced teeth, and arranged in a Y-shape. The Y-shape arrangement is referred to the three pointed star (Fig. 24 a, b & c).

Fig. 24 a: Anterior sucker exhibiting the jaws arranged in Y shape





Fig. 24 b: Anterior sucker as seen in dorsolateral view



Fig. 24 c: Anterior sucker as seen in lateral view



Fig. 26a : Caudal sucker with posterior somites of the body.



Fig. 26 b : Dorsal view of caudal sucker with posterior somites of the body



The number of segments is 34 and remains constant in the group irrespective of size of the organism (Fig. 25). They are designated by the Roman numerals and are grouped into five or six well marked regions. The head or cephalic region is represented by segments I to VI (Fig. 26); preclitellar region includes 3 segments, VII to IX ; the middle body region is represented by 5 segments, X to XXIV which is further subdivided into clitellar or genital region of somites(X to XIII) and post clitellar region of 11 segments(somites XIV to XXIV); the anal region of XXV to XXVII; and the caudal region or sucker of somites is seen from XXVIII to XXXIV (Fig. 26a & 26b).

Fig. 25 : Head or cephalic segment.



## Results

The specimen obtained from the 20 sites of study belong to the species "*Hirudinaria bpling*".

## Discussion

*Aacaarya* Suśruta has given a detailed description on the morphology of leeches. He has classified leeches into poisonous and non poisonous ones. Non poisonous leeches are used for blood letting procedures. Use of poisonous leeches results in many complications and adversely affects the patients. This highlights the importance of right selection of leeches used for the treatment. *Aacaarya* Suśruta details six varieties of non poisonous and six varieties of poisonous leeches. A more scientific explanation is the need of the hour; this compels to make a detailed study of the leeches used for ayurvedic treatment. Treatment efficacy depends on correct selection of non toxic leeches and its precise use.

In this study, the type of leeches used for treatment in different regions of Kerala was identified as *Hirudinaria bpling*. The body of the dark brown

leech was observed to have dark brownish body colour with a dark black stripe mid dorsally which extended from anterior end to posterior end of the body. Yellow stripes were found on lateral side and light brown colour on ventral side. As for Asian leech, the dorsal colour was dark olive, or dark brownish. There were longitudinal lines with orange yellowish colour at the lateral side of the body. In fact, both the dark brown leech and the Asian Buffalo leech show close resemblance with the features explained by *Acaarya* Sushruta in the context of *nirvisha jalaukaa*. The *kapilaa* type of *nirvisha jalaukaa* has its flanks looks painted with realgar colour, unctuous back, colour like green gram. Thus, the scientific study on medicinal leeches parallels with a ayurvedic textual reference on leeches.

As already seen, descriptions given in ayurvedic classics are mostly based on the colour and length of the leeches. But this is a bit vague. The identification of the leeches based on its colour, number of annuli and jaws, makes the selection of medicinal leeches more vivid and specific. This can effectively prevent the complications to patients that arise on using poisonous leeches. Generally the leeches used for treatment are scientifically coined as *Hirudo medicinalis* and believed to drink non oxygenated or vitiated blood from the diseased. Ayurvedic practitioners widely use the leech therapy for the treatment of various diseases and consider that the leech species used belonged to *Hirudo medicinalis*. But the findings of the study proved that the species named

*Hirudinaria bpling* which included dark brown and Asian buffalo leeches are being used effectively for leech therapy in *ayurveda*. This is an important outcome measure of the study and gives a scientific alignment to the leech therapy in *ayurveda*.

### Conclusion

The leech specimens collected from different areas of Kerala were examined morphologically and taxonomic identification was done. The specimens belonged to the Genus "*Hirudinaria*" and species "*bpling*", *Hirudinaria bpling*. The two forms of this Asian buffalo leech, the Asian buffalo leech and the dark Asian buffalo leech were observed from the 20 different sampling sites under study. Though variations in pigmentation are observed for both the Asian buffalo leech and the dark Asian buffalo leech, both fall under the same species name "*Hirudinaria bpling*".

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