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Taxonomic studies of the last instar nymph of *Lathrecista asiatica asiatica* (Fabricius 1798) (Family: Libellulidae, Order: Odonata) by using its Exuvia

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ABSTRACT

Lathrecista asiatica asiatica, the Asiatic Blood Tail, is a monotypic cosmopolitan dragonfly species of the genus *Lathrecista* belonging to family Libellulidae, reported from peninsular India to Australia. No literature is available on the description of the nymph of this species, and the present paper describes the nymphal features of the last instar of *Lathrecista asiatica asiatica* by using its exuvia which was collected at the time of emergence of adult from a temporary pond in Ammadam, Thrissur district, Kerala, India.

Keywords: Taxonomy, Odonata, Nymph, Exuvia, *Lathrecista asiatica asiatica***1. Introduction**

The odonate nymphs are almost entirely aquatic in habitat; living among macro vegetation and littoral sediments, and burrowing into surficial deposit^[1]. At the end of aquatic life, the nymph finds a support where it can climb such as shoots of the marginal vegetation and exposed rocks, and tear up its skin (exuvia). The emerged adults (teneral adults) are incapable of immediate flight so they perch either on the same exuvia or nearby vegetation spending a maximum of two hours for expanding and drying out its wings and abdomen. Usually nymphal studies are conducted either by rearing them in the laboratory by collecting the eggs from ovipositing female adults or gathering them directly from the natural aquatic habitat. Both methods are time consuming and will affect the population of nymphs in nature. In India, Arun Kumar conducted an extensive study on odonate nymphs and their life histories by rearing them in the laboratories (1970-2000). In his studies, he provided descriptions of the life history and nymphal characters of the last instar of many species of Indian Dragonflies and Damselflies such as *Orthetrum brunneum brunneum*^[3], *Orthetrum taeniolatum*^[3], *Trithemis festiva*^[4], *Anax nigrofaciatus nigrolineatus*^[5], *Anax parthenope parthenope*^[5], *Tramea virgata*^[6], *Pseudagrion rubriceps*^[7], *Ceriagrion coromandelianum*^[8], *Acisoma panorpoides panorpoides*^[9], *Diplacodes trivialis*^[10], *Pantala flavescens*^[11], *Anax immaculifrons*^[12], *Ictinogomphus rapax*^[13], *Neurothemis tullia tullia*^[14] and *Orthetrum sabina Sabina*^[15].

Since the exuviae are the nymphal skin of the last instar, it possesses almost all the nymphal characters that can be used for the taxonomic studies. It is understood that from the available Odonate nymphal literature no attempts have been made to describe the nymphal features of *Lathrecista asiatica asiatica*. *Lathrecista asiatica asiatica*, (Fabricius 1798) the Asiatic Blood Tail, is a monotypic cosmopolitan dragonfly species of the genus *Lathrecista*^[2] belonging to family Libellulidae, reported from peninsular India to Australia. The adult males (Fig.1A) have a black or metallic blue black head. Prothorax blackish brown with anterior lobe yellowish, thorax dark coppery brown dorsally and bright yellow laterally. Legs dark reddish brown to black. Wings are hyaline with reddish-brown pterostigma covering four cells. Abdominal segments 3-8 are bright crimson red with fine black apical sutures. Segments 9 and 10 are black. Anal appendages black. Females (Fig.1B) resemble male closely except for the color of the abdomen which is rich olivaceous brown. They are endowed with very rapid flight and usually breed in jungle pools^[16] but the specimens for this study were collected from a pond near a paddy field.

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Plate 1***Lathrecista asiatica asiatica*****Fig. 1 A MALE****Fig. 1 B FEMALE**

The present paper is an attempt to provide the maximum details of the last instar nymph of the same species.

Table 1: Identifying characters of exuvia of different families of Anisoptera ^[17]

S. No	FAMILIES	MORPHOLOGICAL FEATURES			
		ANTENNA	LABIUM	ABDOMEN	LEGS
1.	Gomphidae	4 segmented	Flat, without setae, palpus ends in hook, no crenations	Flattened dorso-ventrally	Short and robust
2.	Aeshnidae	7 segmented	Flat or concave, no setae but well developed movable hook and end hook,	Very elongated with lateral spines on segments	Slender and elongated
3.	Cordulegasteridae	7 segmented	Concave or spoon shaped palpus with irregular teeth	Elongated	Long and slender
4.	Cordullidae	7 segmented	Concave or spoon shaped palpus with regular teeth	Elongated	Long and slender
5.	Libellulidae	7 segmented	Enormous ,setae along prementum and palpus which varies from species to species	Short or elongated, with or without mid dorsal spines, lateral, Spines may be present	Legs are generally short

2. Materials and Methods

The study site is a temporary pond near a paddy field in Ammadam, a small village located 8 km away from Thrissur town, Kerala. The pond is muddy bottomed and has a maximum depth of 1.5 m. Since the flight period of *Lathrecista asiatica asiatica* confined to south west monsoon period exuvial collection was done during June-August 2012. The mass emergence usually occurs during early morning of intermittent sunny days. A total of 26 exuviae were collected, and put in the containers of photographic film and brought into the laboratory for dissection and identification. Some of the exuviae were wet due to monsoon rain

and were dried by placing them under incandescent lamp. The total body length of the exuviae was measured from the tip of the head to the anal appendage for all the specimens. The width of the specimens for the 6th abdominal segment was measured. The exuviae were dissected using forceps and needle by observing through the Stereo Dissection Microscope (CZM 4, LABOMED). Nymphal features present on exuviae were noted. The dissected parts were photographed using the digital camera (Nikon D 70) and Stereo Research Microscope (Lx 400, LABOMED).

3. Results

Table 2: Characters observed in the collected Exuviae of *Lathrecista asiatica asiatica*

S. No	MORPHOLOGICAL FEATURES OBSERVED IN THE EXUVIAE	
1.	Mean length	16.31 mm
2.	Mean width	5.54 mm
3.	Colour	Muddy brown
4.	Head	Triangular with laterally positioned eyes.
5.	Antenna	Filiform, seven segmented
6.	Labium	Large, Extending upto the base of coxae of first pair of legs
7.	Palpal setae	11+11
8.	Pre-mental setae	14+14
9.	Crenations	Present. Crenations are regular bearing pair of spines.
10.	Wing pads	Extending upto the 5 th segment.
11.	Mid dorsal spines/ hooks on abdomen	Absent
12.	Abdominal Lateral spines	Present on segments 8& 9
13.	Epiproct	Present
14.	Paraproct	Present
15.	Legs	Long and slender, bearing tuft of hairs. Possess stripes.
16.	Additional features	9 th segment of abdomen bears tuft of hairs ventro-laterally

4. Discussion

Since the exuviae were collected for this study at the time of mass emergence, and the association of teneral adults on the exuviae helped to confirm as that of *Lathrecista asiatica asiatica*. The mean length is 16.31 (standard deviation of 0.68) and width is 5.54 (standard deviation of 0.51). The colour of the exuviae is muddy

brown (Fig 2A) and the body was covered with mud. Therefore it is presumed to be a bottom dweller. Head is typical libellulidan with triangular shape having eyes projected laterally. The antennae is 7 segmented. The labium is large extending up to the end of first pair of legs. Prementum possess 14+14 setae on either side (Fig 3B).

Plate 2

Lathrecista asiatica asiatica



Fig. 2 A ENTIRE DORSAL



Fig. 2 B ENTIRE VENTRAL



Fig.2 C LABIUM DORSAL

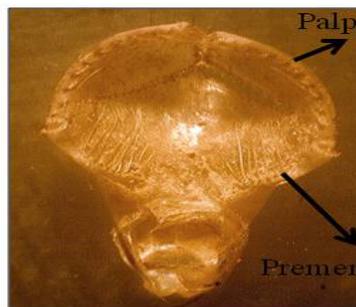


Fig.2 D LABIUM VENTRAL

Palpal setae 11+11 (Fig.3A).The distal end of the palpus bear spiniform crenations (Fig.3C).The wing pads reaching up to the 5th segment of abdomen. Hairs on the mid dorsal line aggregated together to give the appearance of spines. Lateral side of the abdominal segments (4 to 9) bears an array of small hairs and minute spines are present on segment 8 and 9 (Fig.3F). The 9th segment possess a tuft of hairs ventro- laterally (Fig.3E). Legs are long and slender bearing hairs on femur and tibia (Fig.3D) and also

having discontinuous black spots (Fig.2A).

Comparing the available descriptions of nymphs of twenty species of Family Libellulidae, (Appendix 1) it is noticed that three nymphal characters such as the specific number of premental setae on either side (14 + 14), the palpal setae (11+11) and the presence of tuft of hairs on the ventro-lateral position of the 9th abdominal segments can be considered as typical species specific characters of *Lathrecista asiatica asiatica*.

Plate 3

Lathrecista asiatica asiatica



Fig.3 A PALPAL SETAE

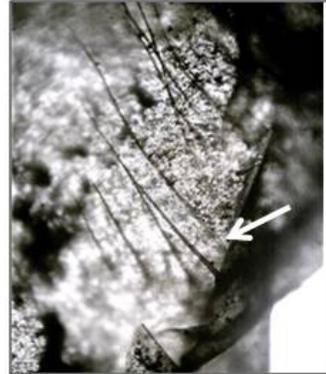


Fig.3 B PREMENTAL SETAE



Fig.3 C CRENATIONS



Fig.3 D LEG

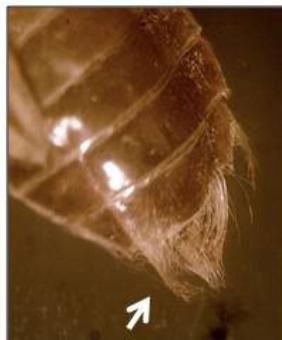


Fig.3 E ABDOMEN WITH TUFT OF HAIRS

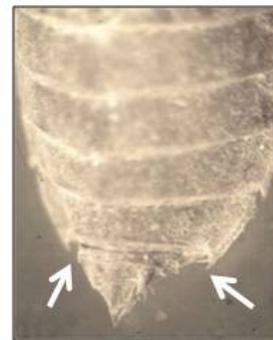


Fig.3 F ABDOMEN WITH LATERAL SPINES

5. Conclusion

The nymphal characters of the last instar of *Lathrecista asiatica asiatica* were studied and described for the first time in India by

using their exuviae collected from a pond. The nymphal features described in this paper can be utilised for the identification of the last instar of *Lathrecista asiatica asiatica*.

APPENDIX I

MORPHOLOGICAL FEATURES	COLOUR	HEAD	ANTENNA	LABIUM
<i>Pantala flavescens</i>	Pale yellow	Triangular	7 segmented	Enormous
<i>Tramea basilarisburmeisteri</i>	Yellowish green			Large
<i>Diplacodes trivialis</i>	Dark brown			Spoon shaped
<i>Acisoma panorpoides panorpoides</i>	Dark dirty grey			
<i>Crocothemis servilia servilia</i>	Yellowish brown			
<i>Rhodothemis rufa</i>	Dark green to dark brown			Large
<i>Bradinophyga geminata</i>	Greyish black			Spoon shaped
<i>Tholymis tillagra</i>	Light brown			Large
<i>Ryothemis variegata variegata</i>	Blackish grey			
<i>Brachthemis contaminata</i>	Pale green to brown	Rectangular		Spoon shaped
<i>Zyomma petiolatum</i>	Brown black	Triangular		Large
<i>Urothemis signata signata</i>	Straw yellow			Enormous
<i>Zygonyx iris ceylonics</i>	Brown			Short
<i>Trithemisaurora</i>	Yellowish			
<i>Trithemis festiva</i>	Dark			
<i>Brchydiplax sobrina</i>	Light brown		Quadrilateral	Large
<i>Orthetrum sabina sabina</i>	Brown black			
<i>Orthetrum pruniosum neglectum</i>	Sepia brown	Triangular		
<i>Potamarcha congener</i>	Rust colored			
<i>Sympetrum fonscolombeii</i>	Olivaceous			

PALPAL SETAE	PRE-MENTAL SETAE	CRENATIONS	WING PADS	MID DORSAL SPINES/ HOOKS ON ABDOMEN
13+13	17+17	Large crescentric crenations	Upto the 6 th segment	Absent
10+10	13+13	Present	Upto the 5 th segment	
10+10	14+14	Present	Upto 6 th segment	
8+8	11+11	Present	Upto 7 th segment	
10 to 11	13 to 15	Present	Upto 6 th segment	
8+8	13-14	Present	Upto 7 th segment	
14-16	19-21	Present	Upto 6 th segment	
5 to 6	7 to 10	Present	Upto 5 th segment	Present on 4 to 9
5+5	2+2	-	Upto 5 th segment	Present on 3 to 9
7+7	12+12	8 palpal crenations Present	Upto 5 th segment	Present on 2-8
8+8	13+13	Present	Upto 5 th segment	Present 4-9
8 to 10	12+12	Present	Upto 7 th segment	Present on 3 or 4 to 8
8 to 9	8 to 10	-	-	Present on 3 to 9
7+7	10+10	Present	Upto 6 th segment	Present on 3 to 9 spine like
6+6	11+11	Present	Upto 6 th segment	Present on 3 to 9 hook like
12+12	14+14	Absent	Upto 6 th segment	Present on 4 to 8
9+9	11+11	Beak like crenations	Upto 5 th segment	Present on 5-9
6+6	21+21	Few	Upto 6 th segment	Present on 4 to 8
8+8	11+11	Present	-	-
14+14	18+18	-	Upto 7 th segment	Absent

ABDOMINAL LATERAL SPINES	EPIPROCT	PARAPROCT	LEGS	ADDITIONAL FEATURES IF ANY
Large spines on 8&9	Longer than paraproct	Shorter than epiproct	Mid&hind pair have black marking	Hairs on epiproct¶proct
Large spines on 8&9	Shorter than paraproct	Longer than epiproct	Longer	Hairs present dorso - laterally on Anal appendage
Spines on 9 th segment	Shorter than paraproct		Hairy, long & slender	
Absent	Present	-	Long & slender	Tuft of long mid dorsal setae on abdomen
Small spines on 8&9	Shorter than paraproct	Longer than epiproct	Long slender with dark bands	Eyes whitish with lower region darker
Present on 9 th segment	Shorter than paraproct		Hairy, long and slender	Hairy body
Small lateral spines on 8&9	Shorter than paraproct		Short slender	Bands on wings and abdomen
Present on 8&9	Shorter than paraproct		Short and slender	Abdomen with a dark broad mid dorsal stripe.
Small spines on 8&9	Equal size of paraproct	Equal size of epiproct	Short & slender	Abdomen strongly convex dorsally
Small spines on 8&9	Shorter than paraproct	Longer than epiproct	Slender long	Lateral setae present on segments 6-8
Present on 8&9	Shorter than paraproct		Slender long	Markings present on dorsal side of head, thorax and abdomen
Small spines on 8&9	Shorter than paraproct		Slender long	Long hairs on ventral and lateral surface of segments
Spines on 8&9	Shorter than paraproct		Slender long	Anterior region of labium possess bristles
Small spines on 8&9	Shorter than paraproct		Long slender	Abdomen with dark mid dorsal stripe
-	Shorter than paraproct		Long, slender	-
Small spines on 8&9	Much smaller than paraproct		Double length than epiproct	Long and slender
Small spines on 8&9	Slightly shorter than paraproct	Longer than epiproct	Legs short and robust	Abdomen strongly convex dorsally hairy posterior
Spines on 8&9	Present		Legs are hairy, moderately Long	Anal appendages dark & hairy
Present on segment 8&9	Shorter than paraproct		Long slender	Anal appendages dark & hairy
Spines on 8&9	-	-	Long & slender	Anal appendages are short & hairy

*The Data presented in this table has been compiled from the following source
Terence de Fonseca. The Dragonflies of Sri Lanka 2000; WHT publications, Sri Lanka, 295p.

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