

*Rec. zool. Surv. India* : **109**(Part-3) : 79-84, 2009

**A COMPARATIVE REVIEW OF THREE CLOSELY RELATED  
CALICNEMIA SPECIES – *C. PULVERULANS* SELYS, *C. IMITANS*  
LIEFTINCK AND *C. SUDHAAE* MITRA (ODONATA : ZYGOPTERA :  
PLATYCNEMIDIDAE)**

**R. BABU AND SUPRIYA NANDY**

*Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053*

**INTRODUCTION**

The Genus *Calicnemia* Strand 1926, comprising ten Indian species occurs from Indo-China to Indo-Burma region. Among these, three species, *Calicnemia pulverulans* Selys, *Calicnemia imitans* Lieftinck and *Calicnemia sudhaae* Mitra occurring in Eastern India-Myanmar region are very closely related in morphological characters. According to Lieftinck (1984) *Calicnemia* radiated from the Himalayan region. *C. pulverulans* was first described by Selys (1886) from Sikkim and North Bengal. Kumar and Prasad (1981) and Prasad (2002) have also reported it from Uttar Pradesh (now Uttarakhand). Later on Lieftinck (1948) described *C. imitans* from Burma (Myanmar), but recognized as closely allied to *C. pulverulans* with some dissimilarities. *C. imitans* was recorded later from Meghalaya (Lahiri, 1987). Another species of genus *Calicnemia* has been described by Mitra (1994) as *C. sudhaae* from Mizoram and the description is provided in Mitra (2002). These three species of genus *Calicnemia* are similar in various morphological characters though they are still recognized as different species (Prasad and Varshney, 1995; Tsuda, 2000). In this present study, attempt has been made to compare the morphological characters of these closely related species, finding their degree of similarities and variations for determination of their actual status.

**MATERIAL EXAMINED**

***Calicnemia sudhaae* Mitra**

*Holotype* : Mizoram : Aizwal : Teirei, 1G, 24.x.1991, Coll. J.K. Jonathan (ZSI Reg. No. 4133/H13); *Allotype* : Mizoram : Aizwal : Teirei, 1E, 24.x.1991, Coll. J.K. Jonathan (ZSI Reg. No. 4134/H13); *Paratypes* : Mizoram : Aizwal : Teirei, 1G, 24.x.1991, Coll. J.K. Jonathan (ZSI Reg. No. 4135/H13); Aizwal: Lunglei Road (15 km from Aizwal), 2G, 26.x.1991, Coll. J.K. Jonathan (ZSI Reg. No.4136/H13; 4137/H13); Aizwal : Dampa Wildlife Sanctuary, 1G, 24.x.1991, Coll. J.K. Jonathan (ZSI Reg. No. 4138/H13).

***Calicnemia pulverulans* Selys**

Sikkim : Lingjok, 1G, 20.v.1962, Coll. G. Ramakrishna (ZSI Reg. No. 3946/H13); Uttarakhand (Western Himalaya) : Chamoli : Debal, 1G, 1E, 03.ix.1972, Coll. T.K. Chakraborty (ZSI Reg. No. 4752/H13; 4753/H13).

***Calicnemia imitans* Lieftinck**

No specimen could be obtained for study. Hence the morphological characters and measurements are included here on the basis of the description provided by Lieftinck (1948).

**FINDINGS**

The comparative study has been made and the morphological characters are provided in Table-1.

**Table-1.** Comparative morphological characters of three species of Genus *Calicnemia* Strand

<b>Morphological characters</b>	<b><i>C. pulverulans</i> Selys</b>	<b><i>C. imitans</i> Lieftinck</b>	<b><i>C. sudhaae</i> Mitra</b>
<b>Male</b>			
Labium	White	Brownish - yellow	Blackish brown
Labrum	Blackish brown, broadly bordered with yellow	Dark brownish black	Black
Bases of mandible	Glossy black	Glossy black	Black
Clypeus	Glossy black	Black	Black
Frons	Broad black	Greyish blue	Black
Prothorax	Black, the middle lobe pruinose purplish, the posterior lobe black, elongate, rounded, projecting back over front of thorax.	Black, sides pruinose grayish blue, the posterior lobe trapezoidal, lateral edges rounded, its border straight on middle.	Black, the middle lobe pruinose purplish, the posterior lobe black, rounded, projecting back over front of thorax.
Thorax	Black, appearing blue from pruinescence except dorsum, which is black, and encloses narrow antehumeral pruinose blue stripes, laterally the whole of the side bluish due to pruinescence, except postero-lateral suture; black beneath.	Velvet-black, but appearing grayish-blue from pruinescence; a pair of narrow, straight antehumeral pruinose stripes; laterally the whole of the sides bluish due to pruinescence, except an indefinite stripe over the second suture.	Black, the antehumeral stripe pruinose blue, laterally the posterolateral suture black; otherwise the lateral side is blue due to pruinescence; black beneath.
Legs	Black	Black	Black
Abdomen	Black, thinly pruinose, unmarked; 32-34 mm in length.	Black, basal segments thinly pruinose, intermediate segments with steely blue reflections; 29-30.5 mm in length.	Black, thinly pruinose, unmarked; 28-30 mm in length.

<b>Morphological characters</b>	<b><i>C. pulverulans</i> Selys</b>	<b><i>C. imitans</i> Lieftinck</b>	<b><i>C. sudhaae</i> Mitra</b>
Wings	Hyaline; pterostigma dark reddish-brown, covering a more than one cell, braced; three cells between the discoidal cell and nervure descending from the subnode. 17-18 postnodal nervure in fore-wings, 15 in the hind-wing. Hind-wing 25-27 mm in length.	Hyaline; pterostigma dark reddish-brown, covering about 1½ cell; 15-16 postnodal nervure in fore-wings, 13-14 in the hind-wing. Hind-wing 19.5-22 mm in length.	Hyaline; pterostigma brownish black, covering a more than one cell, braced; three cells between the discoidal cell and nervure descending from the subnode. 16-18 postnodals in fore-wings, 13-17 in the hind-wing. Hind-wing 20-22 mm in length.
Anal appendages	Black, inferiors pale yellow at base and apex; superiors slightly longer than segment 10, inferiors slightly longer than superiors.	Black both, superiors slightly longer than segment 10, inferiors longer than superiors.	Black, inferiors pale yellow at apex, black at base; superiors longer than segment 10, inferiors longer than superiors.
<b>Female</b>			
Labium	White	Light yellow	Yellow
Labrum	Blackish brown, broadly bordered with yellow	Yellow with a black mid-basal point	Brownish yellow
Prothorax	Black with large hook-shaped pale yellow spot on each side of middle lobe; posterior lobe very small, rounded black.	Black above, clear yellow laterally; posterior lobe trapezoidal, lateral edges rounded.	Black, lateral sides yellow; posterior lobe small, rounded black.
Thorax	Black on dorsum, with a narrow antehumeral pale yellow stripes on each side of dorsum; laterally pale bluish green or greenish yellow with moderately broad black stripe on the postero-lateral suture; beneath pale yellow.	Black, a pair of narrow, parallel clear yellow antehumeral stripes; laterally the posterior border black on dorsum, the lower remaining yellow and traversed by thick deep black stripe over the second suture. Venter of thorax yellow.	Black on dorsum, narrow olivaceous yellow antehumeral stripes, laterally olivaceous yellow except a black band on the postero-lateral suture; beneath pale yellow.

Morphological characters	<i>C. pulverulans</i> Selys	<i>C. imitans</i> Lieftinck	<i>C. sudhaae</i> Mitra
Legs	Yellow, extensor surface of legs black, spines black.	Yellow, all femora heavily striped with black posteriorly; tibiae and tarsi brown.	Yellow, extensor surface of legs black, spines black.
Abdomen	Deep black except segment 1 which is pale yellow with a small basal dorsal black spot; segment 2 striped with yellow laterally. 31 mm in length.	Segment 1 bright yellow with blackish mid-dorsal spot, 2-5 metallic blue-black with broad yellow lateral stripe. 25-25.5 mm in length.	Black, first segment yellow broadly on sides, yellow lines on the lateral side extends up to the fifth segment; 6 to 10 <sup>th</sup> segment black on all sides. 28 mm in length.
Wings	Hyaline, pterostigma blackish brown; covering 1½. 16 post-nodal nervures in fore-wing and 15 in hind-wing. Hind-wing 25 mm in length.	Hyaline, pterostigma dark brown. 14-16 postnodal nervures in fore-wing and 13-15 in hind-wing. Hind-wing 20.5-21 mm in length.	Hyaline, pterostigma dark brown, covering more than one cell, 16 postnodal nervures in fore-wing and 15 in the hind-wing. Hind-wing 22 mm in length.

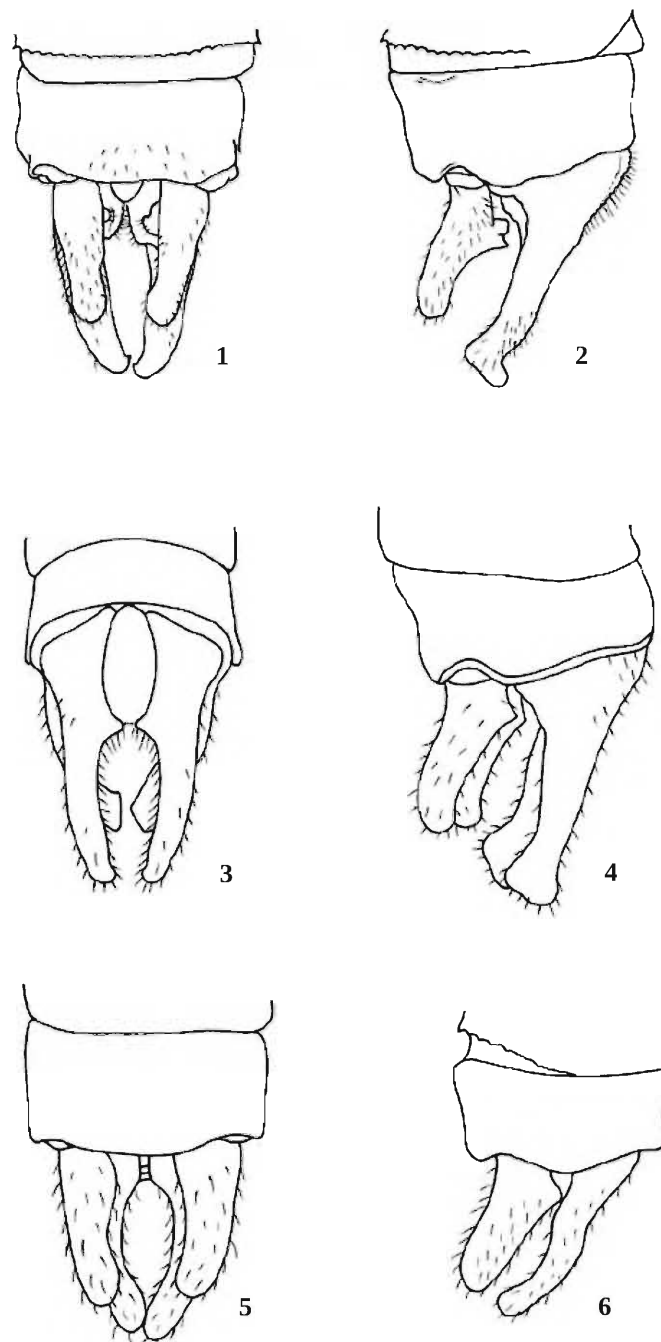
### DISCUSSION

Mitra (1994) described *C. sudhaae* and Mitra (2002) provided a detailed description and also compared with specimens of *C. pulverulans* Selys and mentioned the differences, but he did not cite comparison between *C. sudhaae* and *C. imitans* Lieftinck.

*C. imitans* and *C. sudhaae* are considerably smaller than the *C. pulverulans* and differ further from *C. pulverulans* in having the labrum not bordered with yellow in both sexes. In male, the colour of labium are brownish-yellow in *C. imitans* and blackish-brown in *C. sudhaae*, whereas in *C. pulverulans* it is white in male and female. The female of *C. imitans* and *C. sudhaae* have greater amount of yellow colour on the head and basal abdominal segments when compared to *C. pulverulans*. The anal appendages of these three species are being cited here (Figs. 1-6). These species distinctly differ in their anal appendages, although agrees superficially with other morphological features. From the above, it appears that *C. imitans* and *C. sudhaae* are apparently similar in characters but distinct species as was believed by earlier workers.

### SUMMARY

A comparative study of morphological characters of three species of Genus *Calicnemia* Strand i.e. *C. pulverulans*, *C. imitans*, and *C. sudhaae* has been made and found that they are very closely allied, but dissimilarities are there in the length of the hind-wing and abdomen, colour of the



**Figs. 1-6.** 10<sup>th</sup> abdominal segment and anal appendages of male: 1. *Calicnemia imitans* Lieftinck (Dorsal view); 2. Lateral view of *C. imitans* (From Lieftinck, 1948); 3. *Calicnemia sudhaae* Mitra (Dorsal view); 4. Lateral view of *C. sudhaae*; 5. *Calicnemia pulverulans* Selys (Dorsal view); 6. Lateral view of *C. pulverulans*.

labium and labrum, differences in their anal appendages and conclusion was made that these three species are distinct ones.

#### ACKNOWLEDGEMENTS

Authors wish to express their deep-felt gratitude to Dr. Ramakrishna, Director, Zoological Survey of India for providing facilities and Dr. Animesh Bal, Scientist-E and Head, Entomology Division-B, ZSI, Kolkata for his suggestions and encouragement. Thanks also due to Dr. M. Prasad, Retd. Scientist- C of the same department for critically going through the manuscript.

#### REFERENCES

- Kumar, A. and Prasad, M. 1981. Field ecology, zoogeography and taxonomy of the Odonata of Western Himalaya, India. *Rec. zool. Surv. India, Occ. Paper No.*, **20** : 1-118.
- Lahiri, A.R. 1987. Studies on the Odonate fauna of Meghalaya. *Rec. zool. Surv. India, Occ. Paper No.* **99** : 1-402.
- Lieftinck, M.A. 1948. Odonata. In Entomological results from the Swedish Expedition 1934 to Burma and British India. *Ark. Zool.*, **41**(A. No. 10) : 1-23.
- Lieftinck, M.A. 1984. Further notes on the specific characters of *Calicnemia* Strand, with a key to the males and remarks on some larval forms (Zygoptera: Platycnemididae). *Odonatologica*, **13** : 351-375.
- Mitra, T.R. 1994. Observations on the habitats of adult dragonflies of Eastern India with special reference to the fauna of West Bengal. *Rec. zool. Surv. India, Occ. Paper No.* **166** : 1-40.
- Mitra, T.R. 2002. Geographical distribution of Odonata (Insecta) of Eastern India. *Memoirs zool. Surv. India*, **19**(1) : 1-208.
- Prasad, M. 2002. Odonata diversity in Western Himalaya, India. In: *Current Trends in Odonatology* (Ed. Arvind Kumar), pp. 221-254. Daya Publishing House, Delhi.
- Prasad, M. and Varshney, R.K. 1995. A check-list of the Odonata of India, including data on larval studies. *Oriental Insects*, **29** : 385-428.
- Selys Longchamps, E. De, 1886. Revision du synopsis des Agrionines. *Mem. Cour. Acad. Roy. Belgique*, **38** : 1-233.
- Tsuda, S. 2000. *A distribution list of World Odonata*, Osaka Pref. : 1-430.