SHORT COMMUNICATION

SANDRACOTTUS VIJAYAKUMARI (COLEOPTERA: DYTISCIDAE), A NEW AQUATIC BEETLE SPECIES FROM LANDSLIDE HIT AREA OF NELLIYAMPATHY FOREST RANGE, WESTERN GHATS, KERALA, INDIA

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**Sandracottus vijayakumari** (Coleoptera: Dytiscidae), a new aquatic beetle species from landslide hit area of Nelliyampathy Forest Range, Western Ghats, Kerala, India

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**Abstract:** The present study deals with the description of a new species *Sandracottus vijayakumari* from Nelliyampathy forest range, southern Western Ghats, Kerala, India with a comparative key of closely related species *S. dejeani* Aube, 1838. Only one species is known from the genus *Sandracottus* Sharp, 1882, from southern Western Ghats, Kerala. The Nelliyampathy forest areas are hilly and the altitude of the hills range 40–1,530 m. The region experiences several types of landslides especially during the monsoon (August to September 2018). The new species was discovered in one of the worst landslide hits area in Nelliyampathy forest, Kundrachola region. The new aquatic beetle species is moderately large in size and often very attractively marked dorsally with complex maculations. Additionally, the new species shows a strong synapomorphy along with Eretini, Hydaticini, and Aubehydrini tribes.

**Keywords:** Aquatic beetle, insect, Kundrachola, monsoon, southern Western Ghats.

The adephagan beetles are one of the most successful groups of insects, distinguished by their adaptive nature in diverse ecological and geographical ranges. Most aquatic beetles are considered ecological indicators and their diversity is directly correlated with the ecosystem (Hutchison 1959; Boughey 1968; Benetti et al. 2003; Benetti & Regli-Cueto 2004). The factors like wave action, wind velocity, and scarcity of emergent vegetation presumably discourage the colonization of aquatic beetles. The abundance of macrophytic vegetation provides necessary shelter, shade, and substrate for colonization of aquatic beetles in the rainy and post-rainy season (Fernando 1968). Seasonal variation of the insect community in the rain pools, biotic patterns, some physical and meteorological variables were analyzed and found that the maximum taxonomic richness was observed at the end of summer (Fischer et al. 2000).

In India, the aquatic beetle diversity is poorly known. Dytiscidae is a large family of aquatic beetles, harbouring over ~300 species in India and adjacent countries. The Indian dytiscids have been chiefly studied by Vazirani (1968–1977) where he dealt with 233 species from...
India, out of which 69 species are from southern India. Till date, the majority of southern Indian species have been recorded from Tamil Nadu including Nilgiri Hills (Mukherjee & Sengupta 1986). During the biodiversity documentation of the flood and landslide hit area of Nelliyampathy, the authors came across a new species of *Sandracottus* Sharp, 1882 to science which has been described here and its comparison with the closely related species *S. dejeani* Aube, 1838 is also provided along with identification keys.

**Materials and Methods**

**Study area**

The present study was conducted at various locations in the Nelliyampathy Hills, Western Ghats, Kerala, India in view of the floods and landslides that occurred as a result of the heavy downpour of August and September 2018 that resulted in heavy damage in Kerala, India.

**Specimen collection**

Specimens were collected from a small rock of pool habitat in the landslide hit area of Nelliyampathy forest range in Kundrachola region (515m, 10°30’58”N & 76°37’51”E) of southern Western Ghats (Image 1, 2). An aquarium hand net (Miller & Bergsten 2016) was used to collect the samples during the cool dry season from January to March 2019; a total of seven specimens were collected from the field and preserved in 80% ethanol prior to mounting. The holotype and paratype is deposited in the Department of Zoology, University of Calicut (DZUC). Specimens were imaged with a Canon EOS 5D Mark IV camera with MP-E 65mm lens, f/2.8 1-5X. Morphological terminology is according to Miller & Bergsten (2016). Identification was done based on available literature and taxonomic keys (Regimbart 1899; Mukherjee & Sengupta 1986; Nilsson 2001; Miller & Bergsten 2014; Miller & Bergsten 2016).

**Results**

**Systematic position**

Family: Dytiscidae Leach, 1815
Subfamily: Dytiscinae Leach, 1815
Tribe: Aciliini Thomson, 1867
Genus: *Sandracottus* Sharp, 1882

*Sandracottus vijayakumari* sp. nov. (Image 3A–D)

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**Material examined:** Holotype: DZUC/Dyt01/2020, 17.iii.2019, male, India: Kerala, Palakkad, southern Western Ghats, Nelliyampathy forest range- Kundrachola (10°30’58”N & 76°37’51”E), coll. P.P. Anand.

Paratype: DZUC/Dyt02/2020, 1 male with same data as holotype.

**Description:** Holotype male: length= 16.0mm;
New Dytiscidae species from Western Ghats

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width= 13.5mm. Body oval, elongated; surface shiny; latteral reddish-orange colored line become reduced by reaching the posterior end of the pygidium; not dorso-ventrally flattened. Deep punctures on the pronotum and elytra. Dorsal surface black with distinct reddish-orange patches and with four dark-orange-colored spots parallelly arranged in elytra. All patches on each elytron are mirror images of other elytron. The first three dark orange patches are interconnected and other two are distinct (Image 3A). Head capsule is dark orange black colored with clypeus and frons testaceous. Elytron contains numerous punctures, a coarse puncture line pass through the middle of elytra in antero-posterior direction. Ventral surface is predominantly black with

Image 2. Kundrachola region (Nelliampathy forest range) landslide hit area (Habitat of Sandracottus vijayakumari sp. nov.). © P.P. Anand

Image 3. Sandracottus vijayakumari sp. nov. Holotype (male): A—dorsal view with distinct color patches | B—ventral view | C—head, ventral view with mouth parts with pro and mesolegs, protarsus expanded to adhesive pads | D—posterior side of abdomen. © Y. Shibu Vardhanan
Key to genera (Miller & Bergsten 2016)

1  Mesofemur with longer ventral setae, at least some as long as ½ width of mesofemur; body length greater (11.0–15.5 mm) .......................................................... Sandracottus Sharp, 1882

1’ Mesofemur with shorter ventral setae, less than ½ width of mesofemur; body length shorter (7.5–11.0 mm) .......................................................... Rhantaticus Sharp, 1880

Key to species (modified from Miller & Bergsten 2016)

The new species Sandracottus vijayakumari sp. nov. is morphologically similar to S. dejeani Aube, 1838.

1  Head being reddish-yellow; posterior border of vertex black; head without fine microreticulation and setiferous punctures; pronotum with a few black and comparative coarse puncture; elongated protarsus with adhesive disc without distinct spur; meso and meta tarsomeres have series of golden setae along the apical margins; dorsal elytra darkish orange colored patches largely separated and connect by narrow bridges .......................................................... Sandracottus dejeani Aube, 1838.

1’ Head dark black with yellowish patch; Head with fine microreticulation and numerous small setiferous punctures; pronotum and elytra with well distinct punctures and presence of longitudinal punctures (Image 3a); protarsus expanded and rounded suckers with distinct spur, adhesive disc (Image 3c); Meso and meta tarsomeres with a series of black setae along the apical margins (Image 3c,d). The dorsal elytral darkish-orange patches are distinctly separated from each other (Image 3a) .......................................................... Sandracottus vijayakumari sp. nov.

distinct organization of appendages (Image 3B).

Structure: Large black color compound eye and cranium, not emarginated; scutellum clearly visible with elytra closed. Filiform antennae and antennomeres 11 (Image 3C); posterior margin of pronotum elevated with dark orange colored mark. Pronotum without lateral bead. In ventral part, distinct prosternal process and discern; elytral epipleuron ends in 4th ventrites. Well distinct metatibial spur with numerous long setae present. Ventral surface of pro- and meso-tarsomeres broadly expanded into rounded platelet with ventral adhesive setae; male median lobe symmetrical, protected by numerous spurs. Protarsi distinctly pentameric, tarsomere IV is smaller than the others (Image 3C). Apices of both metatibial spurs bifid; series of bifid setae along dorsal surface of metatibia oblique. Margins of sternites 6 & 7 are somewhat bordered. Mesotibiae with four natatorial setae (Image 3C); metatibiae is found without natatorial setae (Image 3D).

Female: Unknown

Diagnosis: This species shows close relation with Sandracottus dejeani Aube, 1838 except in the case of presence of head with fine microreticulation and numerous small setiferous punctures.

Distribution: Known only from the type locality.

Etymology: The species is named in honor of Mr. Vijayakumar PK (Aka. Vijayakumar Blathur), Popular science writer in Malayalam for his ardent passion towards insects.

Ecology: Most of the seven specimens of Sandracottus vijayakumari sp. nov. were collected in a partly shaded, shallow, ditch-like forest pool which was rich in decaying leaves and twigs; lentic habitat.

Discussion

Dytiscinae contains five tribes, and 12 genera in total. These are among the largest of all diving beetles in the world. They are characteristic of pond and lakes, but they can be found in different ecosystems, with extensive marginal vegetation. Many of the largest have been involved in predation on vertebrates, some of them may rarely act as competition in fish farming (Wilson 1923; Bishat & Das 1979, 1985; Balke & Hendrich 1996; Adeyemo et al. 1997; Megna et al. 2019). In each biogeographic region, there are groups of Dytiscinae with main groups that are endemic to certain areas. They are well distributed in temperate and high altitude to tropical low land habitats (Miller & Bergsten 2014).

Until now, one species of Sandracottus was known, i.e., S. dejeani Aube, 1838 from Silent Valley National Park, southern Western Ghats, Kerala, in 1979 (Mukherjee & Sengupta 1986). Sandracottus vijayakumari sp. nov. shows a high similarity with the other tribes, however, analyzing the morphological taxonomic characters of this species shows close affinity to the tribe Aciliini. The strong resemblance between the two species (S. vijayakumari and S. dejeani) can be explained by the multiple convergence arising from a similar shift in
habitat. Throughout most biogeographical regions, Aciliines are found worldwide with distinct fauna and sometimes uncommon genera, with the exception of Australia, where Aciliines comprises rare species of *Sandracottus* and the extremely common *Rhanaticus congestus* (Klug, 1833) (Balke & Hendrich 1996).

Historically, Dytiscinae has been placed under Cybistrininae, which share a number of synapomorphies in both adult and larvae (Alarie et al. 2011; Miller & Bergsten 2014). The tribe Aciliini may act as connecting link between other diving beetles. The new species *S. vijayakumari*, may play a vital role in the evolutionary lineage of Dytiscinae. Ribera et al. (2002 & 2008) suggested that either *Eretes Nottaticus* is nested within Aciliini, but the current evidence shows that *Eretes* is sister to Aciliini (Bukontaite et al. 2014) and Aubehydrini (*Notaticus*) is sister to that clade (Miller & Bergsten 2014). *Sandracottus* showed synapomorphy together with several other taxa such as *Eretes*, *Hydatocini*, and Aubehydrini, especially in the case of both metatibial spurs are apically bifid. Also, the line of bifid setae on the posterior surface of the metatibia is distinctly oblique with resected to the long axis of the tibia. More molecular and evolutionary studies are needed to assess the evolutionary origin and diversification of these taxa, and *S. vijayakumari* will help to the understand the convergent or divergent evolutionary pattern of *Sandracottus* genus. In past few years nobody studied the genus, and this genus is currently under revision (Miller & Bergsten 2014).

**Conclusion**

*Sandracottus vijayakumari* sp. nov. shows close morphological similarity with *S. dejeani*; however the latter is from Silent Valley, which is north of the Palghat gap of the Western Ghats, where as the new species is from south of the Palghat gap.

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