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. dejeани 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 & Regil-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 Nelliampathy, 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 Nelliampathy 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 Nelliampathy 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)  
urn:lsid:zoobank.org:act:5885D8BA-1045-4CEE-A42C-4D2496FCB5F9

**Material examined:** Holotype: DZUC/Dyt01/2020, 17.iii.2019, male, India: Kerala, Palakkad, southern Western Ghats, Nelliampathy 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;
width = 13.5 mm. Body oval, elongated; surface shiny; lateral 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...
New Dytiscidae species from Western Ghats

Anand et al.

Key to genera (Miller & Bergsten 2016)

1 Mesofemur with longer ventral setae, at least some as long as \( \frac{1}{2} \times \) width of mesofemur; body length greater (11.0–15.5 mm) .......................................................................................................................... Sandracottus Sharp, 1882

1’ Mesofemur with shorter ventral setae, less than \( \frac{1}{4} \times \) 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 adhering disc without distinct spur; meso and meta tarsomeres have series of golden setae along the apical margins; dorsal elytra darkish-orange 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 discrimen; 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 palette with ventral adhesive setae; male median lobe symmetrical, protected by numerous spurs. Protarsus distinctly pentameric, tarsomere IV is smaller than the others (Image 3C). Apices of both metatibial spurs bifid; series of bifid seta on posterior 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 *Rhamtaticus congestus* (Klug, 1833) (Balke & Hendrich 1996). Historically, Dytiscinae has been placed under Cybistriniae, 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 (Bukontaitė et al. 2014) and Aubeyhrdrini (*Notaticus*) is sister to that clade (Miller & Bergsten 2014). *Sandracottus* showed synonymoporphycoy together with several other taxa such as *Eretes*, *Hydaticini*, and Aubeyhrdrini, 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 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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Article


Conservation Application

Relocation of a GPS collared conflict Sloth Bear Melursus ursinus (Mammalia: Carnivora) in Karnataka, Indiat

Communications

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– M. Najmul Hossain, Anita Rani Dey, Nurjahan Begum &thsin Farjana, Pp. 17889–17894

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– Christoph Zöckler, Solofo Ndrina Rasanamaheninina & Matthais Markolf, Pp. 17895–17905

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– Swastik Mahato, Sudipta Mandal & Dipanwita Das, Pp. 17906–17917

An annotated checklist of amphibians in and around Dampa Tiger Reserve, Mizoram, India

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A new taxon of Noccudobe Moore, 1881 (Lepidoptera: Lycaenidae: Polyommatinae) from Agasthyamalais of the Western Ghats, India

Does the size of the butterfly enhance detection? Factors influencing butterfly detection in species inventory surveys
– Anju Veelayuthan, Ashokkumar Mohanarangam, George Chandy & S. Biju, Pp. 17950–17962

Distribution and diversity of climbing species in Papum Pare District of Arunachal Pradesh, India

Short Communications

Occurrence of mammalian small carnivores in Kalakad-Mundanthurai Tiger Reserve, Western Ghats, India

 Changed avian assemblage of Savitribai Phule Pune University campus in last four decades
– Kiran Choudaj & Varsha Wankhade, Pp. 17990–17998

Sondracottus vijayokumari (Coleoptera: Dytiscidae), a new aquatic beetle species from landslide hit area of Nelliampathy Forest Range, Western Ghats, Kerala, India

The genus Basirio Siddiqi, 1959 (Nematoda: Tylenchidae) from Desful region, Iran

A new species of braconid wasp Meteorus Haliday (Hymenoptera: Braconidae: Meteorinae) from India
– Zaheer Ahmed, Altaf Hussain Mir & Mohammad Shamim, Pp. 18011–18014

Addition of four woodland species (Crustacea: Isopoda) to the checklist of Iranian Oniscidea

Catalogue of selected insect groups of Lalwan Community Reserve and Ranjit Sagar Conservation Reserve, Punjab, India

Potential phytophagous insects of Pteridium revolutum (Blume) Nakai, an invasive fern
– M.S. Arjun & S. Gopakumar, Pp. 18030–18034

Notes

Freshwater medusae Limnocoela indica Annandale, 1911 in the Cauvery Wildlife Sanctuary, Dubare Reserve Forest and Shivanasamudrum in Karnataka, India, with a commentary note on the exotic Craspedacusta sowerbii Linnaeus, 1800
– Naren Sreenivasan & Joshua Barton, Pp. 18035–18038

Actinor radians (Moore, 1878) (Hesperidea: Hesperininae: Aeromachini): addition to the butterfly fauna of Haryana, India
– Bitupan Boruah, Rajesh Chahal & Abhijit Das, Pp. 18039–18041

Rediscovery of the rare Desert Grizzled Skipper Spialia doris evanida Butler, 1880 (Hesperidea: Pyrginae) from the Thar Desert, Rajasthan, India
– Shyam Sundar Meena, Anil Tripathi & M. Akram Awan, Pp. 18042–18044

Habitat association and hybridization in woodbrowns (Lethes nicetas, L. sidonis, & L. dawsoni) (Lepidoptera: Nymphalidae: Satyrinae) in Kedarnath Musk Deer Reserve, western Himalaya
– Arun Pratap Singh & Tribhuwan Singh, Pp. 18045–18049

Begonia flaviflora Hara (Begoniaceae): a new record to the flora of Bhutan
– Phub Gyeltshen, Sherab Jamtsho, Sangay Wangchuk & Dhan Bahadur Subba, Pp. 18050–18053

Revisiting the taxonomy of Strobilantes lawsonii and S. pushpangadanii (Acanthaceae), two endemic taxa of Western Ghats, India
– Biessy Cherian, K.M. Prabhukumar, R. Jagadeesan, V.V. Naveen Kumar & Indira Balachandran, Pp. 18054–18058