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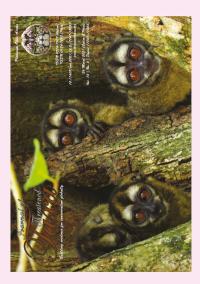
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SHORT COMMUNICATION

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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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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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 & 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

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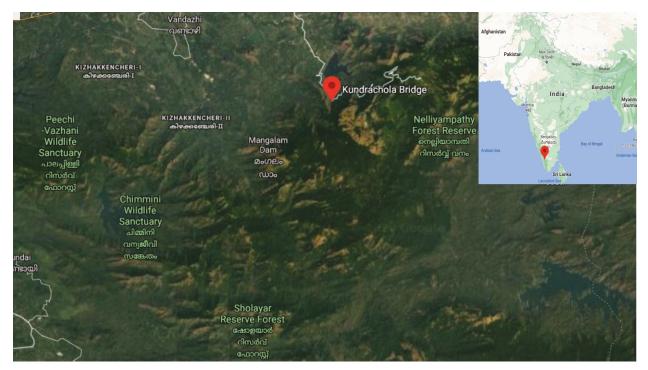


Image 1. Nelliyampathy forest with holotype collection locality (red colour).

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





Image 2. Kundrachola region (Nelliyampathy 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

width= 13.5mm. Body oval, elongated; surface shiny; latteral reddish-orange colored line become reduced by reaching the posterior end of the pygidium; not dorsoventrally flattened. Deep punctures on the pronotum and elytra. Dorsal surface black with distinct reddishorange 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

Key to genera (Miller & Bergsten 2016)

Key to species (modified from Miller & Bergsten 2016)

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

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. Protarsi distinctly pentamerous, tarsomere IV is smaller than the others (Image 3C). Apices of both metatibial spurs bifid; series of bifid setae on posterior surface of metatibia obligue. 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

New Dytiscidae species from Western Ghats

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 *Rhantaticus congestus* (Klug, 1833) (Balke & Hendrich 1996).

Historically, Dytiscinae has been placed under Cybistrinae, 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 Eretesor Nottaticusis nested within Aciliini, but the current evidence shows that Eretini 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 Eretini, Hydaticini, 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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Short Communications

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

Western Ghats, India – A. Venkatesh, N. Sridharan, S. Agnes Jeya Packiavathi & K. Muthamizh Selvan, Pp. 17984– 17989

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

Sandracottus vijayakumari (Coleoptera: Dytiscidae), a new aquatic beetle species from landslide hit area of Nelliyampathy Forest Range, Western Ghats, Kerala, India – P.P. Anand, P.P. Ashiq, M. Smitha, M. Adhithya, T. Tibin & V. Suresh, Pp. 17999–18003

The genus Basiria Siddiqi, 1959 (Nematoda: Tylenchidae) from Dezful region, Iran – Manouchehr Hosseinvand, Ali Eskandari & Reza Ghaderi, Pp. 18004–18010

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 woodlice species (Crustacea: Isopoda) to the checklist of Iranian Oniscidea – Yaser Bakhshi, Saber Sadeghi, Hamid Darvishnia & Meysam Dashan, Pp. 18015–18019

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

 Amar Paul Singh, Agni Chandra, Virendra Prasad Uniyal & Bhupendra Singh Adhikari, Pp. 18020–18029

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

Notes

Freshwater medusae Limnocnida indica Annandale, 1911 in the Cauvery Wildlife Sanctuary, Dubare Reserve Forest and Shivanasamudram in Karnataka, India, with a commentary note on the exotic Craspedacusta sowerbii Lankester, 1880 – Naren Sreenivasan & Joshua Barton, Pp. 18035–18038

Actinor radians (Moore, 1878) (Hesperiidae: Hesperiinae: 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 (Hesperiidae: Pyrginae) from the Thar Desert, Rajasthan, India – Shyam Sundar Meena, Anil Tripathi, Vijay Kumar Koli & M. Akram Awan, Pp. 18042–18044

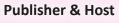
Habitat association and hybridization in woodbrowns (*Lethe nicetas, L. sidonis, & L. dakwania*) (Lepidoptera: Nymphalidae: Satyrinae) in Kedarnath Musk Deer Reserve, western Himalaya

– 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 *Strobilanthes lawsonii* and *S. pushpangadanii* (Acanthaceae), two endemic taxa of Western Ghats, India

 Blessy Cherian, K.M. Prabhukumar, R. Jagadeesan, V.V. Naveen Kumar & Indira Balachandran, Pp. 18054–18058





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Article

Decline of White-throated Bushchat *Saxicola insignis* Gray J.E. & J.R. Gray, 1847 (Aves: Passeriformes: Muscicapidae) in Nepal: implications on its global status – Hem Sagar Baral, Tek Raj Bhatt, Bed Kumar Dhakal, Dhiraj Chaudhary, Hemanta Kumar Yadav, Laxman Prasad Poudyal, Hathan Chaudhary, Pradeep Raj Joshi, Carol Inskipp & Rajan Amin, Pp. 17847–17855

Conservation Application

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

 Attur Shanmugam Arun, Shanmugavelu Swaminathan, Yogaraj Pannerselvam, Thomas Robert Sharp, Sydney Rae Stephens, Kartick Satyanarayan & Geeta Seshamani, Pp. 17856– 17864

Communications

Not all gone: the rediscovery of Jaguar (Carnivora: Felidae: Panthera onca) and records of threatened monkeys (Primates: Mammalia) in the Magdalena River Valley of Caldas Department in Colombia, a call for their conservation

– Leonardo Mendieta-Giraldo, Sergio Escobar-Lasso, Esteban Grajales-Suaza & José F. González-Maya, Pp. 17865–17874

First confirmed sightings of Blue Whales Balaenoptera musculus Linnaeus, 1758 (Mammalia: Cetartiodactyla: Balaenopteridae) in the Philippines since the 19th century – Jo Marie Vera Acebes, Joshua Neal Silberg, Timothy John Gardner, Edna Rex Sabater, Angelico Jose Cavada Tiongson, Patricia Dumandan, Diana Maria Margarita Verdote, Christine Louise Emata, Jean Utzurrum & Arnel Andrew Yaptinchay, Pp. 17875–17888

Parasitic infection in captive wild mammals and birds in Bangabandhu Sheikh Mujib Safari Park, Cox's Bazar, Bangladesh

- M. Najmul Hossain, Anita Rani Dey, Nurjahan Begum & Thahsin Farjana, Pp. 17889-17894

A rapid assessment of waterbirds and the mangrove status in the Menabe Antimena Protected Area, Madagascar

- Christoph Zöckler, Solofo Ndrina Razanamaheninina & Matthias Markolf, Pp. 17895-17905

An appraisal of avian species diversity in and around Purulia Town, West Bengal, India – Swastik Mahato, Sudipta Mandal & Dipanwita Das, Pp. 17906–17917

An annotated checklist of amphibians in and around Dampa Tiger Reserve, Mizoram, India – Ht. Decemson, Sushanto Gouda, Lalbiakzuala, Lalmuansanga, Gospel Zothanmawia Hmar, Mathipi Vabeiryureilai & H.T. Lalremsanga, Pp. 17918–17929

Redescription of the bug Aschistocoris brevicornis (Heteroptera: Coreidae) and first report on its life history from northern Maharashtra, India

– Digvijay R. Jadhav, Renuka R. Khairnar, Balasaheb V. Sarode, Swapnil S. Boyane & Hemant V. Ghate, Pp. 17930–17938

A new taxon of *Nacaduba* Moore, 1881 (Lepidoptera: Lycaenidae: Polyommatini) from Agasthyamalais of the Western Ghats, India

- Kalesh Sadasivan, Baiju Kochunarayanan, Rahul Khot & S. Ramasamy Kamaya Naicker, Pp. 17939–17949

Does the size of the butterfly enhance detection? Factors influencing butterfly detection in species inventory surveys

- Anju Velayudhan, Ashokkumar Mohanarangan, George Chandy & S. Biju, Pp. 17950-17962

Dragonflies and damselflies (Insecta: Odonata) of the Kole Wetlands, central Kerala, India – A. Vivek Chandran, Subin K. Jose & Sujith V. Gopalan, Pp. 17963–17971

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

- Soyala Kashung, Padma Raj Gajurel & Binay Singh, Pp. 17972-17983

Member

