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Cover: *Geodorum laxiflorum* Griff.—inflorescence (Orchidaceae) © Ashish Ravindra Bhoyar.

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SHORT COMMUNICATION

New records of odonates (Insecta: Odonata), *Archibasis oscillans* Selys, 1877 and *Merogomphus tamaracherriensis* Fraser, 1931 from Maharashtra, India

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Abstract: *Archibasis oscillans* Selys, 1877 is reported for the first time from Maharashtra, India; and first record of *Merogomphus tamaracherriensis* Fraser, 1931, based on photographic evidence taken from Sindhudurg, Maharashtra. We report the range extension of both the species in the northern Western Ghats.

Keywords: Kalse stream, Kudal taluka, photographic evidence, Sindhudurg.

The genus *Archibasis* Kirby, 1890 is distributed from India to northern Australia including Sri Lanka, southeastern Asia, Papua New Guinea, Solomon Islands (Connif & Bedjanic 2013). *Archibasis oscillans* Selys, 1877 is the only species currently known from India (Subramanian et al. 2018; Kalkman et. al 2020). Initially, this species was described as *A. mimetes praeclara* by Fraser, 1933. Later it was revised by Lieftinck (1949) as *A. oscillans*. Including this, Lieftinck (1949) listed six more species, which included *A. incisura* Lieftinck, 1949, *A. melanocyana* Selys, 1877, *A. mimetes* Tillyard, 1913, *A. tenella* Lieftinck, 1949, and *A. viola* Lieftinck, 1948 (Conniff & M. Bedjanič 2013). A few years later, *A. rebeccae* was described by Kemp (1989). Recently in 2013, *A. lieftincki* and *A. oscillans hanwellanensis* was described by Conniff & M. Bedjanič (2013).

Genus *Merogomphus* comprises a total of 11 species worldwide which includes *M. chaoi* Yang & Davies, 1993, *M. femoralis* Laidlaw, 1931, *M. parvus* Kruger, 1899, *M. pavici* Martin, 1904, *M. tamdaoensis* Karube, 2001, *M. torpens* Needham, 1930, *M. vandykei* Neddham, 1930, and *M. vespertinus* Chao, 1999. Among these, Fraser (1933) introduced three species from India, *M. longistigma*, Fraser 1922, *M. tamaracherriensis* Fraser, 1931, and *M. martini* Laidlaw, 1930. Recently, Kosterin (2016) rearranged the species *M. martini* and described a new combination *Euthygomphus martini* (Kalkman et al. 2020). However, only two Western Ghats endemic species of this genus have been currently known from India (Kalkman et al. 2020).

Till date various worker surveys Odonate fauna of Maharashtra and succeeded to enlist about 134 species (Kulkarni et al. 2012; Tiple et al. 2013; Tiple & Koparde 2015). In this paper we report the first record of *A. oscillans* and new distributional record of *M. Tamaracherriensis* from Maharashtra.

Material and Methods

In July 2021, Akshay Dalvi (Hereafter AD) first observed and photographed *Archibasis oscillans* at Kalse

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stream (16.024N & 73.601E), situated in Kudal taluka, Sindhudurg, Maharashtra. The specimen was preserved in 70% alcohol and deposited at the Zoological Survey of India (ZSI), Pune. At the same time in July 2021, Amol Kambli first observed and photographed a female of *Merogomphus tamaracherriensis* at Varavde, Kankavali, Sindhudurg district (16.268N & 73.677E). In August 2021, an additional field record of a male was taken by AD at Bambarde, Dodamarg taluka and successively at Koloshi, Devgad taluka, on 08 October 2021. All the field photographs were taken using Canon 760D camera and 100 mm micro. Microscopic photos of *A. oscillans* male were taken using model LM-52-3621 at Shivaji University, Kolhapur. The morphological characters of the collected specimen matched with that of the male specimen described earlier by Fraser (1933, 1934). Morphological terms refer to Garrison et al. (2006). Map used in Image 5 is created using QGIS v3.10.2.

***Archibasis oscillans* Selys, 1877 (Image 1 & 2)**

Material examined: Ent.4/2934, 12.viii.2021, male, Kalse, Kudal Taluka, Sindhudurg District, Maharashtra, India (16.024N & 73.601E), Akshay Dalvi leg.

Brief description of male (Image 1, 2)

Description: Head (Image 1a–d): Labium, labrum, base of mandibles pale blue; postclypeus blue with two small broad black circles joined each other, two triangular blue postocular spots connected with a thin blue band; eyes black above and blue beneath. Thorax*:* prothorax (Image 1d) blue with a combination of broad black bands making an 'M' shape structure at the middle lobe; synthorax (Image 1c,d) broadly black on dorsum with azure blue ante humeral stripes. Wings (Image 1f, g): hyaline, 10 to 15 post nodal nervures in the fore wing. Abdomen (Image 1a,e): segment 1 entirely blue, segment 2 black on dorsum and blue laterally, segment 3 to 6 black on dorsum and yellowish on sides, last three segments entirely blue with black apical ring. Caudal appendages (Image 2a,b): black, superiors as long as segment 10, apical notch at the tip, inferiors two-third the length of superiors.

Diagnosis: Diagnostic characters are based on available literature (Fraser 1933; Connif & Bedjanic 2013) and after comparing our specimen with the original description and photographic evidence available on the website 'Odonata of India'. This genus can be easily differentiated from *Pseudagrion* Selys, 1876 by following characters: (i) Pterostigma almost square and slightly convex (Image 1f) in *Archibasis* Kirby, 1890 and rectangular in shape, longer than broad in *Pseudagrion*; (ii) 8 to 15 postnodal nervures in *Pseudagrion* whereas *Archibasis* have 10 to 13 post nodal nervures; (iii) *Archibasis* has distinct blue colouration with black markings and species included in the genus *Pseudagrion* are found in various colours like red, blue, orange and green with black markings; (iv) Superior anal appendages in *Archibasis* are shorter with tiny apical notch (Image 2b) whereas in the case of *Pseudagrion*, they are longer and deeply notched (Image 2d).

It can be distinguished from *A. melanocyana* by: (i) Inferior two thirds the length of superior in *A. oscillans* whereas inferiors are less than half of superior in *A. melanocyana*; (ii) In case of *A. Melanocyana*, inferiors have a small spine on the inner side which is absent in *A. oscillans*. However, the markings on the head, synthorax, and abdomen (Image 1a,e) appear to be more or less the same among these two species. *A. oscillans*is morphologically very similar in comparison with the original description of *A. oscillans hanwellaanensis* Conniff & Bedjanič, 2013 and *A. lieftincki* Conniff & Bedjanič, 2013. The tip of superior anal appendages in *A. oscillans*is flat hollow and curved inwards (Image 2a) which is similar with *A. lieftincki.* Two main differences that distinguish *A. lieftincki* from *A. oscillans* are: (i) They have considerably expanded flap-like superiors which is never seen in case of *A. oscillans*; (ii) Also, inferiors are less than half of superiors which are the same as in the case of *A. melanocyana* whereas *A. oscillans* have inferiors two thirds of the length of the superior. *A. viola* Lieftinck, 1948 and *A. rebeccae* Kemp, 1989 can also be distinguished from the *A. oscillans* by their distinct violet colour and clubbed cerci, respectively.

Distribution (Image 5a,b): The previous western limit of this species was confined to Coorg, South Kanara, southern Malabar, and parts of the Wynaad (Fraser, 1933) (Image 5a). Further records of this species were taken by iNaturalist from several other locations in Kerala, Karnataka as well as Goa (Image 5b). Our records extend the range of this species further north. Apart from India, this species is also found in Indonesia, Lao People's Democratic Republic, Sri Lanka, and Thailand (Subramanian et al. 2018).

Habitat (Image 4a): This species was found in a small seasonal stream in Kalse village, Sindhudurg district. This locality is situated close to the Karli River, surrounded by paddy fields and wetland. Five to six males were found near small shrubs adjacent to this stream.

***Merogomphus tamaracherriensis* Fraser, 1931 (Image 3)**

Material examined: Male, 25.viii.2021, Bambarde,

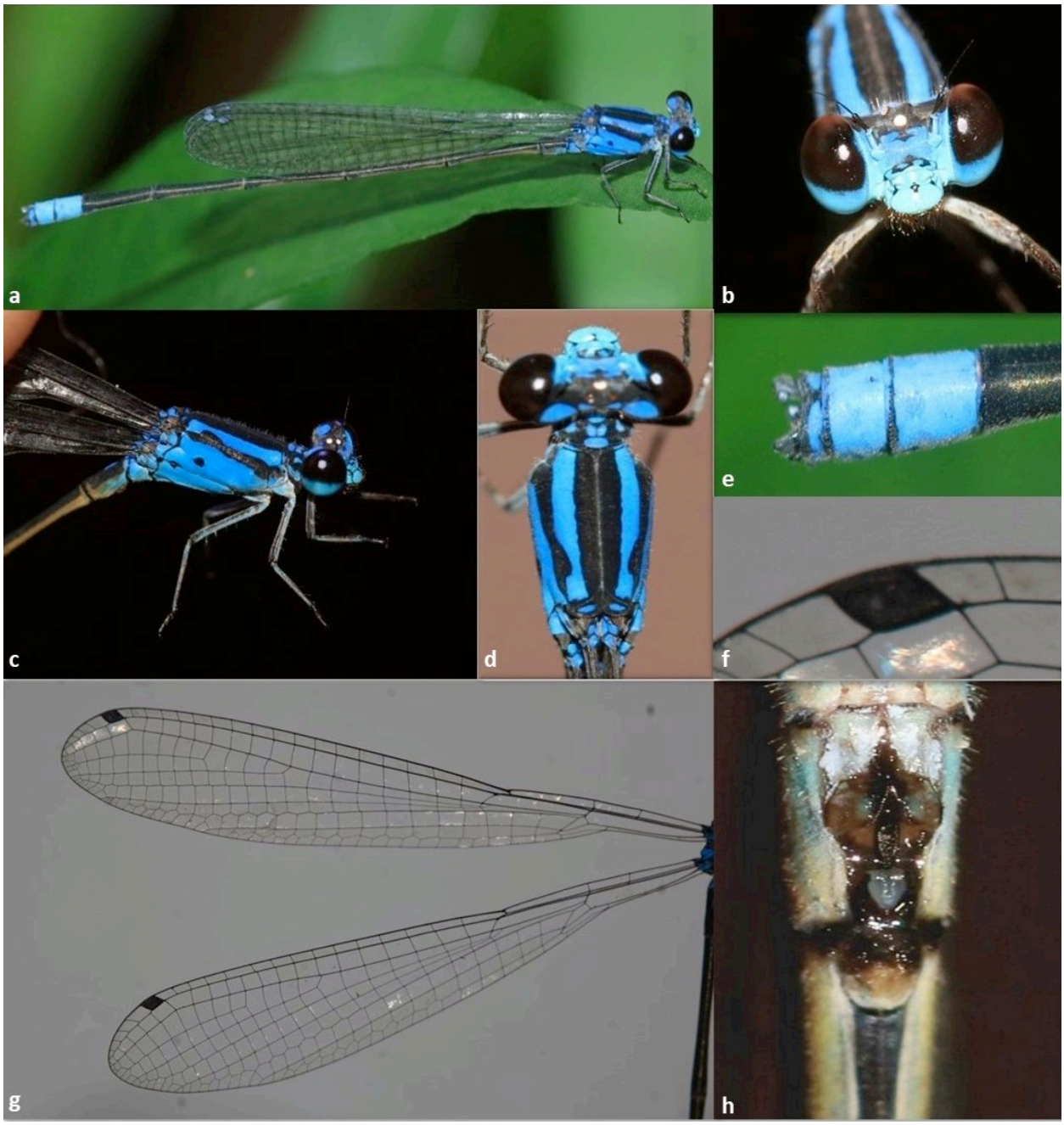

Image 1. *Archibasis oscillans* (Selys, 1877) male: a—habitus, lateral view | b—face | c—thorax, lateral view | d—thorax, dorsal view | e—abdomen, lateral view | f—pterostigma, left FW| g—left FW and HW | h—secondary genitalia | © a–h—Akshay Dalvi.

Dodamarg, (16.268N, 73.677E); male, 8.x.2021, Koloshi, Devgad (16.384N, 73.625E); female, 29.vii.2021, Varavade, Kankavali (16.024N, 73.601E).

Brief description of male (Image3a–d)

Head (Image 3b): Eyes apple green; labium, labrum, and occiput entirely black; broad yellow stripe above frons. Thorax (Image 3a): prothorax black with yellow marking, synthorax (Image 3a) black with yellow antihumeral stripes running along the dorsal carina. Mesepimeron and Metepimeron with broad yellow stripes with thin yellow line on metepisternum. Abdomen (Image 3a): segment 1 to 3 with broad yellow stripe on dorsum and quadrate or triangular spot-on lateral, Segment 4 to 6 with no mid dorsal spot. Segment 7 has its basal half broadly yellow; segment 8 with small diamond shaped spot-on dorsal side; segment 9 to 10 unmarked. Caudal appendages (Image 3d): cerci milky

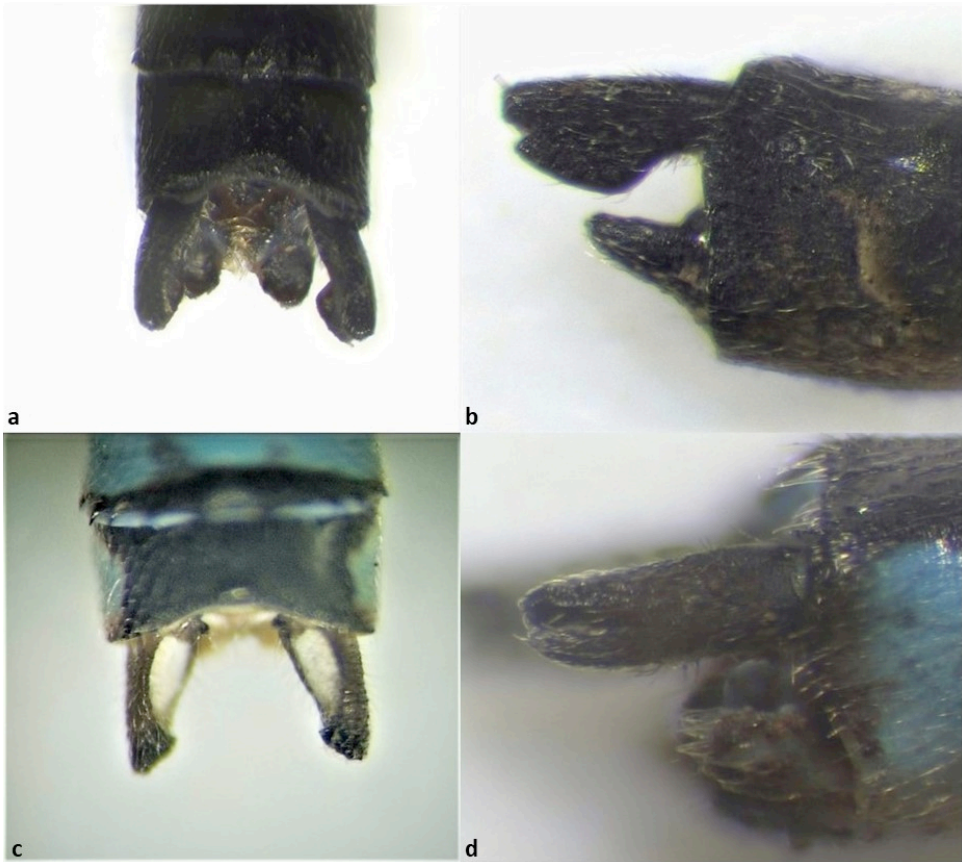

Image 2. Caudal appendages of *Archibasis oscillans* (Selys 1877) male: a—dorsal view | b—lateral view. *Pseudagrion microcephallum* (Rambur 1842): c—dorsal view | d— lateral view | © a–d—Yogesh Koli.

Image 3. *Merogomphus tamaracherriensis* (Fraser, 1931): a—male, habitus, lateral view | b— male, habitus, frontal view, | c— female, habitus, dorsal view| d— male, caudal appendages | © a—Gurunath Kadam | © b, d—Akshay Dalvi | © c—Amol Kambli.

Image 4. Habitat photos of: a—Kalse stream | b—Bambarde| c— Koloshi | d—Varavde | © a—c Akshay Dalvi © d—Amol Kambli

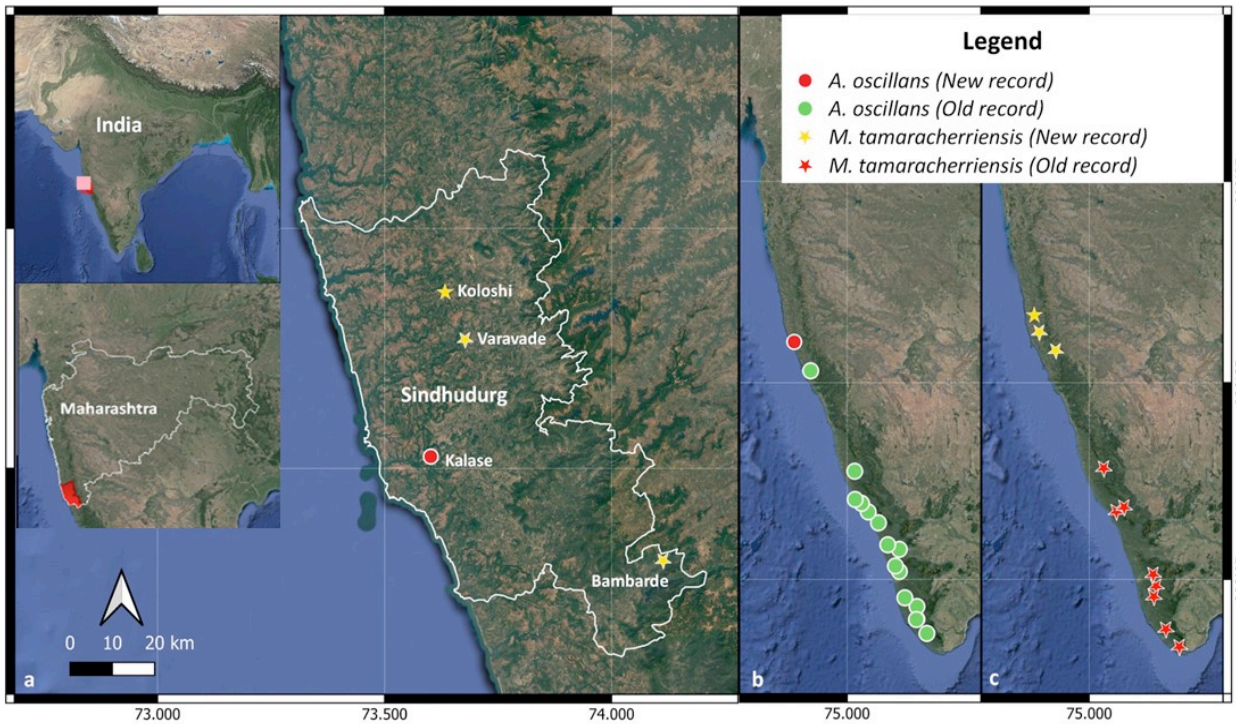

Image 5. Mpas of: a—Sindhudurg District with distribution of *Archibasis oscillans* (Selys 1877) and *Merogomphus tamaracherriensis* (Fraser, 1931) | b—*A. oscillans* | c—*M. tamaracherriensis.* Map created using QGIS v3.10.2 by Akshay Dalvi.

white pointed at the tip with finely distributed black hairs, curled like the horns of a bull; base slopes sharply away from the inner side;

Female (Image 3c): very similar to the male as far as head, thorax and abdominal colour pattern. Abdomen is broader at the base and shorter as compared to the male. Anal appendages simple, white, and pointed.

Diagnosis: Fraser initially described this species as a subspecies of *Merogomphus longistigma* in 1931. Later he revised it in 1953 as advised by D.E. Kimmans (Fraser 1953). Following diagnostic characters are based on Fraser 1934 and specimens that we observed during

the survey. *M. tamaracherriensis* can be distinguished by *M. longistigma* by following characters: (i) Occiput entirely black, while greenish-yellow in *M. longistigma*, (ii) Mid dorsal spot-on segment 3 is isolated and absent on segment 3 to 6 in *M. tamaracherriensis*, present in others, (iii) A diamond-shaped yellow spot appears on segment 8, no marking is seen on segment 9 and 10, whereas in *M. longistigma* only mid dorsal carina appears on segments 8 to 10, (iv) Lateral spine of cerci is more pointed than *M. longistigma* and base sharply away on the inner side, while depressed for the distal half and apices turn sharply upwards in others.

Habitat (Image 4b,c,d): This species prefers slow moving streams, marshy land or riverside habitat. Female of this species firstly observed near the riverside area in Varavade village Kankavli. This region is surrounded by seasonal flowing streams with tree canopy and small patches of paddy field surrounding it. First male record of this species was taken in Bambarde village, Dodamarg. This particular locality is surrounded by Myristica swamp on one side and paddy fields on the other. More records were also taken from Koloshi stream, Devgad. It is a seasonal stream surrounding the tree canopy and grassland at the edges. Male specimen was found resting on vegetation along the stream and small rocky areas between the stream.

Distribution (Image 5a,c): Earlier records were limited to parts of Karnataka, Kerala, and Tamil Nadu. These records extend the distribution range of this species to the further north.

Discussion: We recorded two odonate species from northern Western Ghats, both are in addition to the Odonata fauna of Maharashtra. The presence of *Archibasis oscillans* in northern Western Ghats is not quite surprising as it was already reported near Goa in recent years (Subramanian et al. 2018). This study area was never surveyed before by any means and surprisingly this species was found in a human disturbed area. More surveys will surely reveal the actual geographical distribution of this cryptic species in northern Western Ghats.

M. tamaracherriensis is a Western Ghats endemic species whose earlier records were confined to southern parts of the Western Ghats only. For the first time since then, a female and successively a male were found in Sindhudurg district, Maharashtra. The male of this species was found just outside the Myristica swamp, Dodamarg. The government of Maharashtra has already declared this region as a Biodiversity heritage site in the year 2021 which would definitely help protect such infrequent species. Many new records and newly described odonata species from Sindhudurg district greatly signify the true potential of this region (Joshi & Sawant 2019, 2020; Koli & Dalvi 2021; Koli et al. 2021). Coastal regions including the Sindhudurg and Ratnagiri district harbor many wetlands, small seasonal streams and water bodies on rocky plateaus. Exclusive surveys of these habitats may reveal many new observations, therefore more work has to be done to study the diversity of odonates in the entire northern Western Ghats.

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