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First Record of Polypedates Maculatus Common Indian Treefrog (Gray) in Gaya District, India

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Abstract:

During my study on amphibians of Gaya dist. I found Polypedates maculatus, Common indian tree frog from my study sites around Daboor village pond of Gaya dist.first time. Daboor village is located at western part of Gaya Dist. India. It is very rich in amphibian diversity and total 12 species of anuran amphibian was recorded during my out of which some species such as Polypedates maculatus recorded first time from this district of Bihar. However I have recorded this species from another study sites such as Ramsagar pond, Bhurha pond as well as khaira pokhar pond of Gaya district India. Polypedates maculatus the common Indian tree frog is recorded first time from Gaya district .It is an anuran amphibian of the family Rhacophoridae and the genus Polypedates. The species is listed as Least concern (LC) under IUCN red list category.

Keywords **—Amphibia, Anura, Gaya, Daboor village pond, Polypedates maculatus, Rhacophoridae, Least concern**

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I. INTRODUCTION

Amphibians are very pretty creatures that are the important part of biotic community of the earth. They are part of both terrestrial and aquatic ecosystems. They feeds on different species of insects as well as invertebrates and is being eaten by many predators thus make itself the important component of food web (McCormick and polis 1982; Duellman and Trueb, 1986; Martins et al. 1993; Altig et al. 2007).Some of the amphibians are also good bioindicators and help the scientists for the prediction about the ecosystem functioning andecological health (Blaustein and Dobson,2006; Gerlanc and Kaufman, 2005; Taylor et al. 2005) . Amphibians are represented by about 7000 species found all around the world, out of which 447 amphibian species found in India (Frost,2018; Denesh et al. 2020). These amphibian species are facing hardship due to numerous causes and their number is also declining continuously on this earth, more specifically in the tropical part of the world. First of all the documentation of the declining of amphibians was recorded in 1990s (Wake, 1991) . Current extinction rates of amphibian species is about two hundred times more than that of previous extinction rates (roelants et al. 2007). A 2004 global assessment (Baillie et al.2004) of amphibian declining found that nearly one third (32%) of the world amphibians are threatened. Amphibians have existed on earth for over 300 ma ago, but in last two decades the rate of extinctions got increased nearly 168 species had become extinct and at least 2869 species of amphibians are declining continuously i.e. total 43 % amphibian species experiencing decline whereas there is inadequate data available about 22% amphibian species (stuart et al. 2004). This amphibian declining phenomenon has also been dealt by Wake and Vredenburg as the Earth's sixth mass extinction (Wake and Vredenberg, 2008).The

major threat to the amphibian species survival is the loss of habitat and fragmentation of habitat. However, others threat factors like global climate change, the infection caused by deadly fungus Batrachochytrium dendrobatidis, environmental pollutants including immunosuppressive effects of pesticides, anthropogenic eutrophication, invasive alien species etc. could not be ignored all these causes of amphibian decline are of potential value and causes heavy loss of amphibian species (Alford, 1999; Collins, 2003; Green, 2003; Blaustein et al. 2005;Hayes et al. 2010; Lips et al. 2008; Blaustein et al. 1994). Exploration of amphibian in Bihar is not satisfactory only 14 amphibian species recorded from different parts of Bihar except few frequently occurring species (Sarkar, 1991; Sarkar et al. 2014).

The purpose of the study is to present first record of common Indian treefrog, Polypedates maculatus (Gray) from Gaya India. This species of common tree frog Polypedates maculatus (Gray) has been listed as Least concern under IUCN red list category.

2. Material and Methods

On 12th October 2018 morning around 08:00 hours, an uncommon anuran Amphibia was caught From Guava tree grown in the curtyard of author's residence,

Daboor village of Gaya district Bihar (north-western to Daboor village pond) (24°60'36"N, 84°63'09"E), outskirts of Gaya city, Bihar.Later on this species of frog also recorded from another study sites such as Ramsagar pond of Gaya town, Bhurha pond and Jhari-pokhar pond of Amas block of Gaya district Bihar. The frog was caught and put in a plastic jar with some grass and littleamount of water and brought to the Department of Zoology, Magadh University Bodhgaya India for examination. The mouth of the jar was covered with a net to avoid escapingof the frog. Several insects like grasshopper nymph, damsel fly, dragon fly, ants etc. were putin the jar as live food on regular basis. Body weight was measured on a Satorius make digitalbalance (0.1g). Length of whole body and different body parts was measured in cm scale.Photographs were taken in Nikon Coolpix 500. After all these formalities it was released in the University Campus . Identification of frog was made by using the keys available such as Inger (1966), Berry (1975), Inger and Stuebing (2005), Daniels (2005) and Frost et al (2006).

and by comparing types and voucher specimens at Zoological Survey of India, Kolkata (Frost,2018).

3.Results

Durind captivity of frog specimens various morphometric and meric characters were recognizeds noticed and tabulated in Table 1. The frog was identified as Common Indian treefrog, Polypedatesmaculatus (Gray). Polypedates maculatus belongs to the family Rhacophoridae under order Anura. It is a medium sized slim-waisted frog. Snout is obtusely pointed and forwarded a slight beyond the mouth. Nostril is closer to thetip of the snout than the eye. A dark brown line exists between snout and eye on each side. A dark black marking extends from the nostril on both sides of the head, covering the eye, down the flanks right nearly upto the middle of the belly. The limbs are cross-barred with black stripes and the lower side of the thighs patterned with round yellow spots. Tympanum is prominent. When the frog was stationary, sacral vertebrae form a pair of distinct elevations on the back (Fig. 1). Colour change was also observed , when During captivity. When the frog was kept in undisturbed condition, colour of the frog was golden yellow with few black spots/patches on the dorsum and faint cross-barred stripes on the legs (fig 2). However, when the frog was disturbed by stirring the container, prominent black spots and stripes on the dorsum and legs appeared against golden yellow integument of dorsum (Fig. 3).

Pankaj-Fig 01. Stationary treefrog, Polypedates maculatus(Gray) with sacral vertebrae forming a pair of distinct elevations on the back, narrow waist, fingers without web, tips of fingers and toes dilated into spherical adhesive discs.

Pankaj-Fig 02. Undisturbed common Indian treefrog, Polypedates maculatus (Gray) with almost no spots or patches on dorsumand legs, obtusely pointed snout, and nostril closer to the tipof the snout.

Pankaj- Fig 03. Disturbed treefrog Polypedates maculatus(Gray) showing prominent spots and patches.

Pankaj- Table 1:-- Morphometric data ofcommon Indian treefrog, Polypedates maculatus (Gray)

Sl. No.	Morphological characters		Measurement
1.	Weight		25.8 gm
2.	Body Length (Snout-vent length) SVL		6.9 cm
3.	Eye-snout tip distance		1.1cm
4.	Head length		2.2cm
5.	Head width		2.5 cm
6.	Diameter of tympanum		5.2 mm
7.	Eye diameter		6 mm
8.	Eye-nostril distance		8 mm
9.	Nostril diameter		1 mm
10.	Distance between eyes		1 cm
11.	Width at trunk		2.2 cm
12.	Width at abdomen		1.2 cm
13.	Distance between two ends of the jaw		2.5 cm
14.	Diameter of tip of second finger		1 mm
15.	Fore -limb length	Humerus	2 cm
		Radio-ulna	1.5 cm
16.	Hind- limb length	Femur	3.5 cm
		Tibio-fibula	3.7 cm
17.		Astragalus-calcaneum	2 cm

4.Discussion

The Indian tree frog (polypedates maculatus) is found all over most of Bangladesh, Bhutan, India, Nepal, and Sri Lanka. It has been reported from sea level up to at least 1,500m asl (Deuti et al. 2010), However, unlike other widely distributed commonly found anuran species like Duttaphrynusmelanostictus, Hoplobatrachus tigerinus Euphlyctis cyanophlyctis etc. in this area, the Indian treefrog has a patchy distribution and seldom occurs here. The species (Polypedates

maculatus) is listed as **Least Concern** under IUCN Red List (Dutta et al. 2013) considering it as tolerance to a broad range of habitats, wide distribution, supposed large population and because it is unlikely to be declining to qualify for listing in a more threatened category. This species is recorded from Aurangabad, Bhagalpur, Rohtas, Munger district of Bihar state and Singhbhum district of Jharkhand state by Sarkar A.K Das S & Ray S (Sarkar 2014). However, it is reported first time from Gaya District of Bihar state. In tree frogs, dorsal color change is prevalent, functioning to adjust body temperature, minimise water loss, avoid predation by background matching , and/or also play an important role in sexual selection and mating .Such phenomenon is known as metachrosis. Color change is influenced by both ecological as well as intrinsic factors. The ecological factors include temperature, background color, predators, and ecological niche (Nielsen, 1978; Stuart, 2008; Stevens, 2009; Doucet, 2010; Hultgren) . The important intrinsic factors include visual perception, physiological ability for color change, and genetics. The color change is due to the rearrangement of pigment granules in three kinds of dermal dendritic pigment cells, chromatophores like xanthophores, iridophores and melanophores. Dorsal color change of treefrog may occur by changes in one of the three colour variables, brightness, hue, or chroma . However, the validity and capability of the physiological model of Nielsen was not tested using different background colors to justify which colour variable(s) is/are responsible for the colour changes of P. maculatus. King et al.(1994) reported that treefrog Hylacinerea (Schneider) became lighter on brighter backgrounds and at higher temperature. The present species also showed similar type of behaviour when confined in a transparent container having a lighter background (Nielsen,1980; Kats, 1986; Stegen, 2004; Wente, 2003) .

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6. Literature cited

[1] Alford RA. Richards SJ. Global amphibian declines: a problem in applied ecology. Annual Review of Ecology and Systematics 1999; 30:133-165.

[2] Altig, R., M.R. Whiles, and C.L. Taylor. 2007. What do tadpoles really eat? Assessing the trophic status of an understudied and imperiled group of consumers in freshwater habitats. Freshwater Biology 52:386 –395.

[3] Blaustein AR, Wake DB, Sousa WP. Amphibian declines: judging stability, persistence, and susceptibility of populations to local and global extinctions. Conservation Biology 1994; 8:60-71

[4] Blaustein AR, Romansic JM, Scheessele EA, Han BA, Pessier AP, Longcore JE. Interspecific variation in susceptibility of frog tadpoles to the pathogenic fungus Batrachochytrium dendrobatidis. Conservation Biology 2005; 19:1460-1468.

[5] Blaustein AR, Dobson AP. Extinctions: A message from the frogs. Nature 2006; 439:143-144.

[6] Gerlanc NM, Kaufman GA. Habitat origin and changes in water chemistry influence development of western chorus frogs. Journal of Herpetology. 2005; 39:254-265.

[7] Chanda SK. Handbook - Indian Amphibians. Zoological Survey of India, Kolkata. 2002, 1-335.[8] Collins JP, Storfer A. Global amphibian declines: sorting the hypotheses. Diversity and Distributions 2003; 9:89-98.

.[9] Daniels RJR (2005). Amphibians of Peninsular India. Universities Press (India) Private Limited, Hyderabad, 2005, 1-296.

[10] Deuti K, Raha S. Amphibians of Karlapat and Konarak- Balukhand Wildlife Sanctuaries, Orissa. (edited by Director, Zoological Survey of India, Kolkata). Records of Zoological Survey of India 2010; 110(2):7-26.

[11] Dinesh, K.P., Radhakrishnan C., Channakeshavamurthy B.H., Deepak P. & Kulkarni N.U. (2020). Checklist of Amphibia of India, updated till April 2020

[12] Doucet SM, Mennill DJ. Dynamic sexual dichromatism in an explosively breeding neotropical toad. Biology Letters 2010; 6:63-66..

[13] Dutta SK. Amphibians of India and Sri Lanka (Checklist and Bibliography).Odyssey Publishing House,Bhubaneswar, 1997, 1-342

[14] Dutta S, Manamendra-Arachchi K, Vasudevan K, Srinivasulu C, Vijayakumar SP, Roy D et al. Polypedates maculatus. In: IUCN 2013. Duellman

[15] WE, Trueb L. Biology of Amphibians. Johns Hopkins University Press, Baltimore, MD, USA, 1986; 1-670.

[16] Frost D.R, Grant T, Faivovich J, et al. (2006). The amphibian tree of life. Bulletin of the American Museum.

[17] Frost DR. (2018). Amphibian Species of the World:an Online Reference. Version 6(12.10.2018) Electronic Database. American Museum of Natural History,New York, USA.

[18] Green DM. The ecology of extinction: population fluctuation and decline in amphibians. Biological Conservation 2003; 111:331-343.

[19] Hayes TB, Falso P, Gallipeau S, Stice M, The cause of global amphibian declines: a developmental endocrinologist's perspective. The Journal of Experimental Biology. 2010; 213:921-933.

[20] Hultgren KM, Stachowicz JJ. Alternative camouflage strategies mediate predation risk among closely related.co-occurring kelp crabs. Oecologia 2008; 155:519-528.

[21] IUCN Red Listof Threatened Species. Version 2013.2. 2004. <www.iucnredlist.org>. Downloaded on 25 May 2016.

[22] Kats LB, Dragt RGV. Background color-matching in the spring peeper, Hyla crucifer. Copeia 1986, 109-115.

[23] King RB, Hauff S, Phillips JB. Physiological Color Change in the Green Treefrog: Responses to Background Brightness and Temperature. Copeia 1994; 2:422432.

[24] Lips K.R, Diffendorfar J, Mendelson J.R, Sears M.W (2008). Riding the wave: Reconcilling the roles of disease and climate change in amphibian decline. PLoS Biol 6:e72.

[25] Martins MI, Sazima S, Egler G. Predators of the nest building gladiator frog, Hyla faber, in southeastern Brazil. Amphibia-Reptilia 1993; 14:307-309.

[26] McCormick S, Polis GA. Arthropods that prey on vertebrates. Biological Review 1982; 57:29 58.[27] Nielsen HI, Dyck J. Adaptation of the tree frog, Hyla cinerea, to colored backgrounds, and the role of thethree chromatophore types. Journal of Experimental
Zoology. 1978; 205:79-94.

[28] Nielsen HI. Color and color adaptation of the European tree frog, Hyla arborea. Journal of Experimental Zoology. 1980; 211(2):143-151.

[29] Sarkar A.K (1991) .The Amphibians of Chhotanagpur (Bihar) India Rec.zool.Surv.India 89 1-4):209-217

[30] Sarkar A.K, Das S & Ray S (2014). State fauna series 11: Fauna of Bihar (including Jharkhand) 181-193

[31] Stevens, Merilaita. Stevens M, Merilaita S. Animal camouflage: current issues and new perspectives. Philosophical transactions of the Royal Society of London 2009; 364:423-427.Stuart

[32] S, Chanson J, Cox N, Young B, Rodrigues A, Fischman D, Waller R. Status and trends of amphibian declines and extinctions worldwide. Science 2004; 306:1783-1786.

[33] Stuart-Fox D, Moussalli A, Whiting MJ. Predatorspecific camouflage in chameleons. Biology Letters 2008; 4:326-329

[34] Taylor B, Skelly D, Demarchis LK, Slade MD, Galusha D, Rabinowitz PM. Proximity to pollution

sources and risk of amphibian limb formation. Environmental Health Perspectives 2005; 113:1497-1501.
[35] Wake DB. Declining amphibian populations. Science 1991; 253:860.
[36] Wake DB, Vredenburg VT. Are we in the midst of the sixth mass extinction? A view from the world of amphibians. Proceedings of the National Academy of Sciences of the United States of America 2008; 105:11466-11473.
[37] Wente WH, Phillips JB. Fixed green and brown color morphs and a novel color-changing morph of the Pacific tree frog Hyla regilla. American Naturalist 2003;
162:461-473.

