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Corrections on recent herpetofaunal species records from Gujarat State, western India

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Abstract

We re-address the findings of recent publications on herpetofaunal diversity of certain urban areas of Gujarat, India, in which, authors have claimed to report nine frogs and two lizard species for the first time from the State, without any morphological data and/or voucher specimens. We present our critique and comments, with the known distributional ranges of these species and on these erroneous records. We also advocate removal of such species from the faunal list of Gujarat until confirmed reports, based on correctly identified vouchers, are presented. We recommend here that identification of a species should be done following standard protocols and by facilitating the deposition of voucher specimen/s in responsible public repositories for studies involving taxonomy, morphology and range extension.

Key words: Amphibians, Anura, reptiles, species distribution, species identification, Squamata, taxonomy

Main Text

Taxonomy, or the science of identification and classification of organisms, has existed since the beginning of mankind and it may well be the oldest of all sciences. Although it is surely one of the most needed of the sciences, it is arguably the least rated of them all (Rapini, 2004). Although taxonomy in the present day is often considered as an outdated subject (see Daniels, 1999; Hołyński, 2017), it remains fundamental to all ecological studies (Dubois, 2003). In fact, taxonomy has always been a poorly-understood science. Many people do not see it as a first-class science, since they assume that the task of naming living beings is quite easy (Hołyński, 2017). This is indeed a dreadful mistake. Identification is not always a simple process. On the contrary, it is a complex summing up of knowledge (Rapini, 2004). The consequences of bad taxonomy in ecological research have cascading negative effects which are rarely quantified or scrutinized (Dubois, 2003; Bortolus, 2008; Raposo et al., 2017).

In this communication, we address the findings of a few recent publications regarding the herpetofaunal diversity of certain areas within Gujarat, India, that have yielded putative new distributional records of certain amphibians and reptiles for the State.

A team of researchers from Division of Animal Taxonomy and Ecology, Department of Biosciences, Saurashtra University (Gujarat, India) recently made an extensive survey of reptiles and amphibians of two urban centers of Gujarat State. A total of 18 species of amphibians and 19 species of reptiles were listed from Rajkot city (Parmar and Trivedi, 2017; 2018), while 17 species of amphibians and 22 species of reptiles were reported from Jamnagar City (Khandla and Trivedi, 2018; Khandla et al., 2019). In these studies, the authors claim to report nine frogs and two lizard species for the first time from the state of Gujarat (Table 1).

However, these studies with new reports for Gujarat are plagued with a basic problem of identification of species. Apart from one image for each species, the authors have not provided any morphometric or meristic information for the material examined by them. Also, the authors have not mentioned whether they have collected vouchers to support their claims. In taxonomy, voucher specimens are needed to provide a repeatable

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basis for evaluating new range extensions, through the correct identification of species, especially in groups with high cryptic diversity. The results of photography-based taxonomy have been questioned recently (Ceríaco et al., 2016), thus such practice/s should be avoided. The recent remarkable new records of the frogs and lizards need to be further confirmed from the urban environs of the cities of Gujarat State.

Here we present our criticisms of questionable recent herpetofaunal records including comments on the current, up-to-date, known distribution ranges for these respective species. We also advocate removal of such species from the faunal list of Gujarat until reliable records based on correctly identified vouchers are presented in the future.

Erroneous records

Frogs and toads (Amphibia: Anura)

***Minervarya brevipalmata* (Peters, 1871)**

Khandla et al. (2019) recorded the Short-webbed frog, *Minervarya brevipalmata* from the urban areas of Jamnagar city. These authors have claimed that this species is common in the above region. However, according to Frost (2020), *Minervarya brevipalmata* inhabits montane forests of the Western Ghats, in the states of Maharashtra, Tamil Nadu, and Kerala. Earlier this species was erroneously reported from the Shoolpaneswar Wildlife Sanctuary (Sabnis and Amin, 1992), but was also later corrected by Vyas (2012).

***Minervarya chilapata* Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed, and Dutta, 2009**

The Chilapata rain-pool frog, *Minervarya chilapata*, was recorded from the environs of both Rajkot, and Jamnagar (Parmar and Trivedi, 2018; Khandla et al., 2019). This small-sized dicroglossid is known as a point endemic species and restricted to the Chilipata Forest Reserve in the Jalpaiguri District of West Bengal (Ohler et al., 2009). The recent records from the Gujarat State are situated nearly 2,500 km west of its type locality. There are no other authenticated records for *Minervarya chilapata*.

***Minervarya manoharani* (Garg and Biju, 2017)**

The record of Manoharan's burrowing frog, *Minervarya manoharani* from Rajkot city by Parmar and Trivedi (2018) is also considered as a misidentification. *Minervarya manoharani*, a small burrowing frog, was recently described in the *Minervarya rufesens* complex by Garg and Biju (2017). The species is endemic to southern Kerala, India, and known only from its type locality at Agasthyamala Hills in the south of both the Palghat Gap and the Shencottah Gap (Garg and Biju, 2017), both which are about 1,700 km from Rajkot.

***Minervarya nilagirica* (Jerdon, 1853)**

Parmar and Trivedi (2018) and Khandla et al. (2019) recorded the Nilgiri frog, *Minervarya nilagirica* from the environs of two cities in Gujarat State, Rajkot and Jamnagar. However, this species is distributed only in the high hilly forests of the southern Western Ghats. According to Frost (2020), it is found at 800–1600 m elevation and within the forest of Wynaad (Kerala) and the Nilgiri Hills (Tamil Nadu).

***Minervarya rufescens* (Jerdon, 1853)**

The Rufescent burrowing frog, *Minervarya rufescens*, has been recorded from urban areas of Rajkot and Jamnagar, Gujarat (Parmar and Trivedi, 2018; Khandla et al., 2019). However, recent distribution of the species shows it is restricted to Karnataka State and adjoining regions in Kerala State, north of the Palghat gap in the Western Ghats of southern India (Frost, 2020). These localities are in areas of the hot and humid climatic conditions, but the records of Parmar and Trivedi (2018) and Khandla et al. (2019) were from the xeric environs of Rajkot and Jamnagar.

Table 1: The list of recent dubious new records of frogs and lizards from Gujarat, India.

Taxa	Common and scientific name	City	Reference
Amphibians	Short-webbed frog *Minervarya brevipalmata*	Jamnagar	Khandla and Trivedi, 2018; Khandla et al., 2019
	Chilapata rainpool frog *Minervarya chilapata*	Jamnagar and Rajkot	Parmar and Trivedi, 2018 Khandla et al., 2019
	Manoharan's burrowing frog *Minervarya manoharani*	Rajkot	Parmar and Trivedi, 2018
	Nilagiri frog *Minervarya nilagirica*	Jamnagar	Khandla and Trivedi, 2018; Khandla et al., 2019
	Rufescent burrowing frog *Minervarya rufescens*	Jamnagar and Rajkot	Parmar and Trivedi, 2018; Khandla et al., 2019
	Indian burrowing frog *Sphaerotheca breviceps*	Jamnagar and Rajkot	Khandla and Trivedi, 2018; Parmar and Trivedi, 2018; Khandla et al., 2019
	Dobson's burrowing frog *Sphaerotheca dobsonii*	Jamnagar and Rajkot	Khandla and Trivedi, 2018; Parmar and Trivedi, 2018; Khandla et al., 2019
	Jerdon's burrowing frog *Sphaerotheca pluvialis*	Rajkot	Parmar and Trivedi, 2018
	Southern burrowing frog *Sphaerotheca rolandae*	Jamnagar	Khandla and Trivedi, 2018; Khandla et al., 2019
Reptiles	Sikkim ground skink *Asymblepharus sikimmensis*	Rajkot	Parmar and Trivedi, 2018
	Leschenault's snake-eye lizard *Ophisops leschenaultii*	Rajkot	Parmar and Trivedi, 2018

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Minervarya rufescens has also been reported from Manipal and Mookambika Wildlife Sanctuary (Udupi District), and Guddekere, Agumbe reserve forest (Shimoga District) in Karnataka; and Peruvannamuzhi and Pozhuthana (Wayanad District) in Kerala (Gerg and Biju, 2017).

Congeners of *Sphaerotheca*

Parmar and Trivedi (2018) noted four species of *Sphaerotheca* Günther, 1859 from urban gardens of Rajkot city, including the Indian burrowing frog *Sphaerotheca breviceps* (Schneider, 1799), Dobson's burrowing frog *Sphaerotheca dobsonii* (Boulenger, 1882), Western burrowing frog *Sphaerotheca pashchima* Padhye, Dahanukar, Sulakhe, Dandekar, Limaye, and Jamdade, 2017 and Jerdon's burrowing frog *Sphaerotheca pluvialis* (Jerdon, 1853). Three burrowing frogs were listed from Jamnagar city by Khandla et al. (2019): *S. breviceps*, *S. dobsonii* and the Southern burrowing frog *Sphaerotheca rolandae* (Dubois, 1983). However, *S. breviceps* was reported from Gujarat and is considered as a wide ranging species, but a recent systematic study (Dahanukar et al., 2017) has restricted its distribution to the south-eastern coast of India and the population from Gujarat is assigned to *S. pashchima* (Padhye et al., 2017; Patel et al., 2018; Patel et al., 2019). The remaining species of *Sphaerotheca* listed for Rajkot and Jamnagar cities need to be verified.

Lizards (Reptilia: Sauria)

***Asymblepharus sikimmensis* (Blyth, 1854)**

The Sikkim Ground Skink, *Asymblepharus sikimmensis* is uncommon within the urban habitats of Rajkot City, Gujarat (Parmar and Trivedi, 2018). This is a small ground dwelling skink and widely distributed in China, Bangladesh, Bhutan, India (Sikkim, northern West Bengal and Bihar) and Nepal (Smith, 1935; Schleich and Kästle, 2002; Uetz et al., 2020). The species occurs in the eastern part of the country and the image provided by Parmar and Trivedi (2018) appears to be of a *Eutropis* sp., most likely *Eutropis macularia* (Blyth, 1853).

***Ophisops leschenaultii* (Milne-Edwards, 1829)**

Leschenault's snake-eye lizard, *Ophisops leschenaultii* was reported from Rajkot city (Parmar and Trivedi, 2017; 2018) in Gujarat State. This species is widely distributed in rocky habitats of many Indian states, including Bihar, Chhattisgarh, Odisha, Madhya Pradesh, Maharashtra, Tamil Nadu, Telangana and Kerala, as well as in Sri Lanka (Kumar et al., 2017). Previous records were from the southern and eastern parts of India and the represented image of Parmar and Trivedi (2018) for this species appears to be of a juvenile of the *Ophisops microlepis* complex, most likely *O. kutchensis* (see Agarwal et al., 2018).
Moreover, the authors failed to mention and/or record the previously reported reptiles such as the Indian rock python, *Python molurus* (Linnaeus, 1758), Oriental Rat Snake, *Ptyas mucosa* (Linnaeus, 1758), Streaked kukri snake, *Oligodon taeniolatus* (Jerdon, 1853), Saw-scaled viper, *Echis carinatus* (Schneider, 1801), Duméril's black-headed snake, *Sibynophis subpunctatus* (Duméril, Bibron and Duméril, 1854) and Lined supple skink, *Riopa lineata* (Gray, 1839) from Rajkot city (Ardesana et al., 2017; 2018; Vyas, 1986; 2009), and Mugger *Crocodylus palustris* Lesson, 1831 and Hardwicke's Bloodsucker, *Calotes minor* (Hardwicke and Gray, 1827) from Jamnagar city (Vijaykumar, 1997; Jani, 2002). It is advised to study the habitat-specificity and biogeography of reported amphibians and reptiles, especially when a species has been found from a quite different locality in which it has not been reported before and which differs significantly climatically and physiographically from the original locality (e.g. occurring in hilly forests of the southern Western Ghats and Himalayan region vs. occurrence in the drier urban low-elevation localities like Rajkot and Jamnagar).

Another erroneous record is of the Pondicherry Fan-throated lizard, *Sitana ponticeriana* Cuvier, 1829 from Rajkot city, in sympatry with the recently described species, the Spiny-headed fan-throated lizard, *Sitana spinaecephalus* Deepak, Vyas and Giri, 2016 (Parmar and Trivedi, 2018). Not only some reptiles, but also some amphibians reported by these authors, appear to be misidentifications: three out of four species of *Sphaerotheca* and the Ferguson's Toad, *Duttaphrynus scaber* (Schneider, 1799) inhabiting Rajkot and Jamnagar. Unfortunately, Khandla et al.'s (2019) image of Jerdon's bull frog, *Hoplobatrachus crassus* (Jerdon, 1853) from the same city area is, in fact, a member of the genus *Minervarya* Dubois, Ohler, and Biju, 2001.

These erroneous species records from Gujarat need to be reassessed in the future, and appear to be the result of a lack of proper taxonomic knowledge and knowledge of recent taxonomic changes and ignorance of the biogeography and distribution of these species. However, if these claims are truly correct then the authors should have provided substantiating information on morphometric or meristic data for the newly recorded species together with voucher specimens in an accessible public repository rather than relying only on images of new species records (some of which were wrongly identified). Thus, we strongly suggest that the above-mentioned records are incorrect and advocate removal of these misidentified species from the herpetofaunal assemblage of the Gujarat State until the future provisioning of reliable and correctly identified reports.

Such dubious records may influence species conservation and management plans, as taxonomy and conservation go hand-in-hand. We cannot expect to conserve organisms that we cannot identify; and our attempts to understand the consequences of environmental change and degradation are fatally compromised if we cannot recognize and describe the

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interacting components of natural ecosystems (Mace, 2004). As per Das et al. (1996): "*Distribution is also an important component of the biology of the species: if we fail to note its precise distributional range, we may fail to understand its ecological requirements*". While on the subject, it is worth reiterating the plea of Brown (1992): "*Accurate information on existence and distributions of species requires expert knowledge of the animals, geography, and literature*".

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Conflict of interest

The authors declare that there are no conflicting issues related to this research article.

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