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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

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26 August 2020 | Vol. 12 | No. 11 | Pages: 16622–16627

DOI: 10.11609/jott.4995.12.11.16622-16627



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An account of snake specimens in St. Joseph's College Museum Kozhikode, India, with data on species diversity

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Kerala State, southwestern India harbors rich and diverse snake fauna yet it is one that has been little studied (Beddome 1863; Theobald 1876; Ferguson 1895; Wall 1905, 1919; Constable 1949; Gans 1966; Inger et al. 1984; Murthy 1981, 1990; Das & Whitaker 1990; Das 1991; Zacharias 1997; Kumar et al. 2012; Palot 2015; Aengals et al. 2018; Jayakumar & Nameer 2018). A few studies conducted on snakes in Kerala were mostly in the Western Ghats. Little information is available from the low elevation areas of the state especially northern Kerala (Malabar). There are records and specimens from Kannur (Wall 1905) but not much from Kozhikode. Recent studies on the herpetofauna in Malabar coastal plains reveal a good deal of endemics and even new species. Examples: Dussumier's Smooth Water Snake *Dieurostus dussumierii*, (Chandramouli et al. 2012), Striped Coral Snake, *Calliophis nigrescens* (Kumar et al. 2010) Beypore Skink *Chalcides pentadactyla* (Aengals et al. 2018) and the recently described Fanthroated Lizard *Sitana attenborough* (Sadasivan et al. 2018).

The national repositories of reference collections in ZSI (Das et al. 1998; Chanda et al. 2000) and in BNHS (Das & Chaturvedi 1998) are well known. But the holdings of the herpetofauna collections in many local zoological museums are poorly known. Ganesh & Asokan (2010) have documented the collections in the Madras museum. The occurrence of the enigmatic frog *Nasikabatrachus* sp. was revealed from the holdings of three college museums in Kerala and Tamil Nadu (Dutta et al. 2004). Museum of Jahangir Nagar University in Bangladesh is also an example of smaller collections providing important biodiversity information (Mahony et al. 2009). A cursorial glance through St. Josephs College (Kozhikode) museum in Kerala, revealed a small holding of snakes and other biological diversity. These specimens collected by students, faculty members or local people have been overlooked or not properly catalogued and hence remain unstudied. A study on such collections is hence undertaken to fill this lacuna.

This study is based on the snakes in the collections in

Editor: S.R. Ganesh, Chennai Snake Park, Chennai, India.

Date of publication: 26 August 2020 (online & print)

Citation: Zacharias, V.J. & B. Jose (2020). An account of snake specimens in St. Joseph's College Museum Kozhikode, India, with data on species diversity. *Journal of Threatened Taxa* 12(11): 16622–16627. <https://doi.org/10.11609/jott.4995.12.11.16622-16627>

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Funding: None.

Competing interests: The authors declare no competing interests.

Acknowledgements: We thank George Zug of the National Museum of Natural History, Washington, D.C., for commenting on an early draft of the MS and kindly sending copies of relevant publications and the Principal and Head of the Dept of Zoology St Joseph's College, Devagiri for support. Mr. Cyril Edwards (the late) the taxidermist in the dept collected most of the specimens in the museum. Our thanks are due to Jafer Palot for sending his papers and confirming identification of one species. The first author is grateful to George Zug and Ron Crombie for their help and hospitality in the US National Museum, the Smithsonian Institution. We thank Alan Resetar, Field Museum of Natural History, Coleman Sheehy, University of Florida, Museum of Natural History, Lauren Scheinberg, California Academy of Sciences, Jose Rosado, Museum of Comparative Zoology, University of Harvard, Stevie Kennedy Gold of Carnegie Museum of Natural History and Patric Campbell of the Natural History Museum London for providing information on specimens in their collection. We acknowledge and thank curators and collection managers, Cornell University, Museum of Vertebrates and Louisiana State University, Museum of Zoology, for using specimen data that they serve through Vert Net. We thank Polly Lasker of the Natural History Library, the Smithsonian Institution for her help in the library and the anonymous reviewers for their valuable comments on an early draft of the manuscript.

the Zoology Department of St. Josephs College; Devagiri, Kozhikode. The collection focuses on the period between 1957 and 1970 and derives mostly from the effort of late Mr. Cyril Edwards, a taxidermist and snake enthusiast in the Zoology Department. All specimens except two species were collected within a 10km radius of Devagiri at 11.26°N & 75.83°E. No scientific studies have been carried out on this collection other than Adiyodi (1960, 1961, 1963). This paper is aimed at presenting a check list of snakes in the college museum, collected from Devagiri and the surrounding areas in Kozhikode, between 1957 and 1970 with special attention on rare and restricted range species. We compared this data with the collections from Kerala in the North American museums and the British Museum which hold the largest holdings of Indian species outside India, to obtain information on the status and distribution of these species in Kerala. Though the snakes were not collected systematically to study their abundance, the frequency of different snake species in the collection can offer an approximate estimate of their relative abundance in the area, while also considering the inherent complexities such as detection probability and seasonal dynamics, to name a few. (Miller & Zug 2016)

AREA OF COLLECTION

Most areas around Devagiri, (8km from Kozhikode city towards east) from where the specimens were collected, consisted of open secondary scrub jungle and stretches of laterite, sparsely covered with grass intermixed with a few groves of cashew on hilltops and hillsides, with valleys in between, mostly under paddy cultivation. Coconut is grown on many slopes. Menon (1962) has given a detailed description of the area. Secondary vegetation including scrubby trees and bushes also occur in some areas, between the hilltop and the low lying paddy fields. The terrain is undulating with an average elevation of 60m. Weather is hot and humid, with summer season from March to May followed by the southwest monsoon from June to September. Rains may continue till December. The area is an ideal habitat for snakes such as the Sawscaled Viper *Echis carinatus* and Sand Boa *Eryx conicus*. There has been an increase in human settlements over the last 60 years though there are several Sacred Groves/ snake groves in the area supporting wildlife including snakes. (Menon 1962)

The following list mentions the snake species of Kozhikode vouchered in the St. Josephs College collection. The specimens were reexamined recently (August 2017) by the authors to confirm their species identity.

SYSTEMATIC LIST

Family Typhlopidae

1. *Gryptotyphlops acutus* (Dum & Bibr.): One specimen (SJC 011). It was collected in 1969 at Kozhikode. A species found in peninsular India (Whitaker & Captain 2004). There is a specimen from Kannur in the Museum of Comparative Zoology (MCZ) Cambridge (Constable 1949).

Family Pythonidae

2. *Python molurus* (Linnaeus): One specimen (SJC 012) It was collected in 1967 at Kozhikode. It is a southern Asian species common in lowlands, close to densely populated areas of the city and regularly prey on poultry in the country side.

Family Erycidae

3. *Eryx conicus* (Schneider): One specimen (SJC 013): It was collected in 1972 at Devagiri. It occurs in drier parts of India. There is a specimen from Kottayam in the United States National Museum, (USNM) Washington, D.C. (USNM 193291 date of collection and name of collector not known) and in the Cornell University Museum of Vertebrates, (CUMV) Ithaca, collected from Kottayam (CUMV 0009191) on 3 August 1970 by S Ranganathan and from Kollam (CUMV 0009303) collected on 21 August 1970 by Ram S. Singh. Its occurrence at Kottayam, a heavy rainfall area is noteworthy.

Family Colubridae

4. *Dryocalamus nympha* (Daudin): One specimen (SJC 014): It was collected in 1969 at Devagiri. The species occurs in Indian peninsula and Sri Lanka.

5. *Ptyas mucosa* (Linne): Two specimens (SJC 015,16): It was collected in 1956 at Devagiri. Once widespread across South and Southeast Asia today declining in numbers. There is a specimen in USNM from Nelliampathy, Palakkad District (USNM 42468 date of collection and name of collector not known) and one from Ponmudi, Trivandrum District in Carnegie Museum, Pittsburgh (CM 115060) collected on 30 June 1984 by Carl, Gans.

6. *Oligodon arnensis* (Shaw): One specimen (SJC 017): It was collected in 1969 at Devagiri. It is a south Asian species. CM has two specimens from Kottayam. (CM 69181, 69183) collected on 26 May 1970 by F.H. Rahmani.

7. *Oligodon taeniolatus* (Jerdon): One specimen (SJC 018) It was collected in 1969 at Devgiri and is a South Asian species. There are specimens in MCZ collected from Taliparamba, Kannur District by Wall (1905).

California Academy of Sciences (CAS) San Francisco, has three specimens collected from Malabar (CAS Herp 17240, 171241, 17242) by R.H. Beddome, date of collection is not known.

8. *Dendrelaphis tristis* (Daudin): One specimen (SJC 019): It was collected in 1960 at Devagiri. It is a widespread species in South Asia. There are specimens in CM from Sholiar, Thrissur District. (CM 122116) collected on 27 July 1986 by Carl Gans and in CAS from Trivandrum (CAS 14921) collected on January 1941 by A.W.C.T. Herre. A live specimen was kept in the Zoology Department for a year.

9. *Lycodon aulicus* (Linnaeus): One specimen (SJC 020): It is collected in 1959 at Devagiri and found in South Asia. One specimen in CAS from Kozhikode (CAS 15946) was collected on 13 January 1941 by A.W.C.T. Herre, one from Ponmudi in CM (CM115061) collected on 30 June 1984 by Carl Gans and one from Taliparamba in MCZ. (Constable 1949).

10. *Lycodon travancoricus* (Beddome): One specimen (SJC 021): It was collected in 1995 at Kozhikode and occurs in southern India, Madhya Pradesh and Odisha. It is reported from Laccadives (Adiyodi 1963) where it was probably introduced. There are specimens from Ernakulum in CAS, (CAS 15967) collected on 17 January 1941 by A.W.C.T. Herre, from Kottayam in Louisiana State University Museum of Zoology, Baton Rouge (LSUMZ 24708) collected on 26 April 1970 by F. H. Rahmani, in USNM from Travancore (USNM 129726 date of collection and name of collector not known) and from Ponmudi in Field Museum of Natural History, Chicago (FMNH 217705) collected on 23 May 1982 by R. F. Inger and H. B. Shaffer.

11. *Lycodon flavomaculatus* (Wall): One specimen (SJC 022): It was collected in 1960 at Devagiri and is also found in the Western Ghats of Maharashtra, Karnataka and Kerala at an altitude range of 550–650 m (Wallach et al. 2014).

12. *Amphiesma stolatum* (Linne.): One specimen (SJC 023): It was collected in 1959 at Kozhikode and occurs in South and Southeast Asia. There is one specimen in FMNH from Travancore (FMNH 171766) collected on 20 September 1969 by S.R. Ranganathan

13. *Boiga cf. thackerayi* Giri, Deepak, Captain, Pawar & Tillack, 2019: One specimen (SJC 024). It was collected in May 1961 from Kozhikode. It also occurs in southwestern India (Ganesh et al. 2020). There is a specimen from Nelliampathy, Palakkad District, in USNM (USNM 42469 date of collection and name of collector not known) two from Periyar Tiger Reserve in the Wildlife division, Thekkady (Zacharias 1997) and two

from Ponmudi in (FMNH 217701, 217702) collected on 4 June 1982 and 2 June 1982 respectively by R.F. Inger and H.B. Shaffer.

14. *Boiga trigonata* (Schneider): One specimen (SJC 025) It was collected in 1959 at Devagiri. It also occurs in South Asia. Wall (1905) collected it from Taliparamba. There are two specimens in CAS from Malabar (CAS 17245, 17246) collected by R.H. Beddome date of collection not known) three from Kottayam; two in LSUMZ (LSUMZ 24702 and 45546) collected on 21 April 1970 by S.R. Ranganathan and on 5 July 1978 B. Sinha) and one in CM (CM 68862) collected on 21 April 1968 by S.R. Ranganathan.

15. *Ahaetulla nasuta* (Lacepede): One specimen (SJC 026): It was collected in 1959 at Devagiri and is fairly common in South and Southeast Asia. There are five specimens in FMNH from Ponmudi, Trivandrum District (FMNH 217689-217693) collected on May/June 1982 by R.F. Inger and H.B. Shaffer) and one in CM from Peppara Dam, in Trivandrum District (CM 114960) collected on 29 June 1984 by Carl Gans.

Family Elapidae

16. *Bungarus caeruleus* (Schneider): One specimen (SJC 027): It was collected in 1959 at Kozhikode. It is fairly common in the Indian subcontinent.

17. *Calliophis melanurus* (Shaw): One specimen (SJC 028). It was collected in 1960 at Kozhikode. It is found in western and southern India, Uttar Pradesh, Sri Lanka. It is common in the plains of Kozhikode (Kumar et al. 2010)

18. *Calliophis nigrescens* (Gunther): One specimen (SJC 029): It was collected in 1959 at Nilambur. It is a Western Ghats endemic (McDiarmid et al. 1999). There is a specimen in USNM from Nelliampathy (USNM 42467) name of collector and date of collection not known) and Travancore in CAS (CAS 17265 collected by R.H. Beddome date of collection not known). Recently collected from Periyar Tiger Reserve (Radhakrishnan 1999) and Kozhikode near sea coast (Kumar et al. 2010).

19. *Naja naja* (Linn.): Four specimens (SJC 030,31,32,33): It was collected in 1958 at Devagiri. It is a widespread species and is fairly common in the Indian subcontinent.

20. *Hydrophis schistosus* (Daudin): One specimen (SJC 034): It was a common sea snake and was caught from the Kozhikode Coast.

Family Viperidae

21. *Daboia russellii* (Shaw & Nodder): Three specimens (SJC 035,36,37): It was collected in 1957 at Devagiri. It is a widespread species in the area and occurs in South

Asia. There are three specimens from Kottayam, one in CM (CM 69425) collected on 27 July 1962 by S. Perveen; two in LSUMZ (LSUMZ 79887, 79888) collected on 18 April 1969 by B. Sinha and S.R. Ranganathan. There are two specimens in FMNH; one each from Travancore and Kerala (FMNH 171564, 171769) collected on 26 August 1965 and 5 August 1966 by Ranganathan).

22. *Echis carinatus* (Schneider): Two specimens (SJC 038,39): It was collected in 1959 at Devagiri. It occurs throughout India in semidesert and arid tracts and is found in Malabar region but not in southern Kerala (Adiyodi 1961, Daniel 2002). There are two specimens collected from Kozhikode in the college museum. The first author has observed several in 1970's in the Calicut University Campus where two persons died of the bite of this species. Vidal (1890) mentions the influence of *Echis carinatus* in the death rate in Northern Kanara during the last century. Museum of Natural History, University of Florida (UF), Gainesville has specimens from Kottayam (UF 766745) collected by Mahajan on 3 November 1977, Kollam (UF 74270, 74271, 74272) collected by S. Shantaraman on 4 August 1971, and Trivandrum (UF 74269) by Raman Venket on 28 May 1971. LSUMZ has two specimens from Trivandrum (LSUMZ 24719, 24720) collected by Raman Venkat on 28 May 1971 and CAS has a specimen from Malabar (CAS 17277 collected by R.H. Beddome date of collection not known). Its occurrence at Kottayam a heavy rainfall area needs further investigation. The species appears to have a wide distribution in northern and southern Kerala; mostly in the south.

23. *Hypnale hypnale* (Merrem): One specimen (SJC 040): It was collected in 1969 at Kozhikode. It occurs in the Western Ghats as far north as Lat. 16° and Sri Lanka. (Murthy 1990, McDiarmid et al. 1999). In India it is found in the Western Ghats (Smith 1943, McDiarmid et al. 1999). The species occurs at an elevation ranges of 300–600 m in India but from sea level to 1,524m in Sri Lanka (Whitaker & Captain 2004). It has been recorded from Annamalai's, Palani Hills and New Amarambalam, Nilambur (Murthy 1990). Recently two specimens were collected from Idukki Wildlife Sanctuary (Radhakrishnan 1999) and two from Periyar (Zacharias 1997). One was caught from decaying litter an agricultural landscape at Mevada, Kottayam District, Kerala at about 50m, in May 2001. The specimen was, about 20cm in length unfortunately was killed by a farm worker, while clearing weeds at the base of a pepper vine.

There are four specimens of the Humpnosed Pit viper in the MCZ, collected from Taliparamba at 55m, (Constable 1949) a low elevation area not that far from

the sea coast. CM has one specimen from Vazhachal near Thrissur (CM 151746) collected by Gans et al. on 15 June 1990, FMNH has six specimens from Ponmudi (FMNH 217683-217688) collected by R.F. Inger and H.B. Schaffer in May/June 1982 and CAS has one specimen each from Malabar and Travancore (CAS 12269,12270). There is a specimen from Nelliampathy, Palakkad District in the Natural History Museum London (NHMUK ZOO 1911.5.4.5). Seems to have a wide distribution in Kerala in the low lands and hills. The Humpnosed Pit Viper is very common in Kannur, northern Kerala as evidenced by the number of humans bitten by this species (Roshnath et al.2018)

24. *Trimeresurus malabaricus* (Jerdon): One specimen (SJC 041): It was collected from Pulloorampara, about 300m, Kozhikode District, on 30.iii. 1960. Smith (1943) and McDiarmid et al. (1999) reported the species to occur at a range of 600–2,000 m elevations in southern and western India. It is not widespread but reasonably common in its range (Whitaker & Captain 2004). USNM and Natural History Museum, London, UK (NHMUK) have specimens from Nelliampathy (USNM 42470 and NHMUK 1936.9.10.3). CAS has two from Ponmudi (CAS 125400, 124089) collected by J.C. Daniel on 9 May 1965 and May 1969 respectively and one from Travancore (CAS 17274 name collector and date of collection not known) CM has two specimens from Sholiyar collected at 450m (CM122112, 122113) by Gans et al. on 27 July 1986. There are 25 specimens from Ponmudi; 20 in FMNH (FMNH 217663 217682) collected at altitudinal range of 110–920 m by R.F. Inger and B.S. Shaffer in May/June 1982 and five in CM (CM 114910,115037,115132, 115133, 115195) collected by Gans et al. in July 1983 and June 1984. MCZ has a specimen from Kannur at an elevation of 900m (MCZ 119447) collected by W.L. Brown, Wildlife Division, Thekkady has one from Periyar (Zacharias 1997) and Natural History Museum London has two from Wayanad (NHMUK 1874.4.29.1 and 1955.1.3.6971). *T. trimeresurus* seems to be the most abundant species in the hills of Kerala. Wall (1919) collected 163 specimens from Wayanad in 1917.

RELATIVE ABUNDANCE

With twentytwo species, (excluding the sea snake and the two species collected from Nilambur and Pulloorampara) the suburb of Kozhikode once harbored a diverse snake fauna. The study was not conducted to obtain abundance data but the frequency of vouchering different snake species in the collection of the Zoology Department, offers an approximate estimation of potential relative abundance (Miller & Zug 2016). The

number of individuals of each species in the zoology museum collection might potentially provide an approximate measure of snake abundance at Kozhikode during that time period. Obviously, a species' size and ease of sighting and collecting will influence the preponderance of any individual species' presence in the collection, but nevertheless it might also imply what is rare and common (Zug pers comm, vide email dated 28.ix.2016). For example, the Common Worm Snake *Indotyphlus braminus* a very common and widespread species (Whitaker & Captain 2004) is not present in this collection, but would be present in Kozhikode area. There are two specimens of this species from Malabar in MCZ. The well collected species in the collection was the Common Cobra *Naja naja* (4) which is followed by the Russell's Viper *Daboia russellii* (3). The relative abundance of the Common Cobra nearly doubles that of the third and fourth most abundant species; *Ptyas mucosa* (2) and *Echis carinata* (2), two species that have completely contrasting ecological and natural history traits. All the other species were represented by one specimen each. Random field observation during the years 1997–2000 supported this finding though people live in the area believed the Russell's Viper, is the most abundant species in the area.

CONCLUSION

This study highlights the often hidden resources housed in museum collections in colleges and other unassuming and modest natural history holdings that can be leveraged for studies on poorly known species (e.g. *Nasikabatrachus* sp. and *Dieurostus dussumierii*). Our paper suggests that the distribution of several species of snakes as already known and their habitats may not be accurate. Records show that the criteria of collection are generally biased towards representation of a few species or sites leaving majority without any representation in a biodiversity document. College museums are important in this context. We hope our study may stimulate others to collect information on snake species in more college museums in the state. The habitats from where the specimens were collected have undergone drastic changes during the last 50 years. Koshy et al. (1987) found that the number of amphibian and reptiles caught in a southern Indian riparian habitat, were higher than expected and very few were caught under rock and logs. It would be interesting to conduct a survey on the current status and distribution of snakes from various habitats in the Devagiri and surrounding areas in the Kozhikode District. Most reptiles show strong seasonal occurrence (Wall 1905; Zug et al. 1998;

Akani et al. 2013; Rahman et al. 2013; Roshnath et al. 2018) though Hofer & Bersier (2001) believed that high annual rainfall and the lack of a pronounced dry season should minimize potential effects of climatic properties. A yearround survey in the area, may yield comprehensive information on the current status and ecology of this fascinating group of animals.

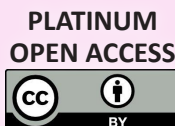
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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

August 2020 | Vol. 12 | No. 11 | Pages: 16407–16646

Date of Publication: 26 August 2020 (Online & Print)

DOI: 10.11609/jott.2020.12.11.16407-16646

www.threatenedtaxa.org

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