International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
NAAS Rating: 4.61
VET 2025; 10(6): 173-175

www.veterinarypaper.com
Received: 12-05-2025
Accepted: 09-06-2025

SM Kolangath
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

Shruti Patwa
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

Priyanka Mulmule
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

VM Dhoot
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

SV Upadhye
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

Corresponding Author:
SV Upadhye
Wildlife Research & Training Centre, Gorewada, MAFSU, Fetri, Nagpur, Maharashtra, India

Hatha Jodi: A commodity of importance under Indian wildlife trade

SM Kolangath, Shruti Patwa, Priyanka Mulmule, VM Dhoot and SV Upadhye

DOI: https://www.doi.org/10.22271/veterinary.2025.v10.i6c.2325

Abstract
India is home to four species of monitor lizards (*Varanus* spp.), which play a vital ecological role in their habitats. However, illegal wildlife trade, particularly the exploitation of their hemipenes (marketed as *Hatha Jodi*), has led to increased poaching despite their legal protection under Schedule I of the Wildlife Protection Act, 1972. This study aimed to identify biological samples seized from Maharashtra using molecular forensic techniques. DNA extraction was performed using the Qiagen DNA Blood and Tissue Kit, followed by PCR amplification of the cytochrome b (*Cyt b*) gene. The purified amplicons were sequenced using the ABI 3500 Sanger Sequencer, and species identification was conducted via nBLAST analysis. Results confirmed the samples belonged to the Bengal monitor lizard (*Varanus bengalensis*), reinforcing the role of forensic genetics in wildlife crime investigations. This study underscores the significance of forensic science in species identification and its role in combating wildlife crime.

Keywords: DNA, Monitor lizard, *Varanus bengalensis*, *Hatha Jodi*, wildlife forensics, barcoding, illegal wildlife trade, conservation, cytochrome b

Introduction
India is one of the world's most biodiverse countries, with ecosystems ranging from the Himalayas to the Western Ghats, Sundarbans, and arid deserts. It is home to approximately 7.5% of the world's recorded species, including over 400 species of amphibians, 600 species of reptiles, 1,200 species of birds, 400 species of mammals, and a diverse array of molluscs and invertebrates. The reptilian fauna of India includes crocodiles, turtles, snakes, and lizards, with several species endemic to the country. Among the reptilian species, monitor lizards (*Varanus spp.*) are of particular ecological significance. India hosts four species, *viz* the Bengal monitor (*Varanus bengalensis*), yellow monitor (*Varanus flavescens*), desert monitor (*Varanus griseus*), and water monitor (*Varanus salvator*). These lizards exhibit sexual dimorphism, with males typically larger and displaying more robust head structures compared to females (Auffenberg, 1994) [1].

The term *Hatha Jodi* refers to the bifurcated reproductive organ (hemipenes) of the monitor lizard, which has been falsely marketed as a mystical root believed to bring luck and prosperity. This misrepresentation has fuelled an illegal trade where the hemipenes are collected, dried, and sold as rare artifacts, often through online platforms (Ramesh *et al*., 2018) [4]. The demand for *Hatha Jodi* has significantly contributed to the hunting of monitor lizards, despite their protection under Schedule I of the Wildlife Protection Act, 1972. Illegal poaching of monitor lizards occurs across India, driven by superstitious beliefs and the demand for exotic animal parts in traditional medicine and black markets. The rise of e-commerce has exacerbated this trade, with platforms unwittingly facilitating the sale of *Hatha Jodi* under misleading labels (Choudhury *et al*., 2020) [2]. Confiscations of large quantities of *Hatha Jodi* have highlighted the scale of this issue, pointing to organized wildlife crime networks. The unchecked hunting of monitor lizards threatens their population stability and disrupts ecological balance. As apex predators in their microhabitats, these lizards control insect and small vertebrate populations, contributing to healthy ecosystems.

Overexploitation may lead to local extinctions, reducing genetic diversity and altering food web dynamics (Whitaker & Captain, 2004) [6]. Conservation measures, including strict law enforcement and public awareness campaigns, are crucial to mitigating the decline of monitor lizard populations in India. The current report details the identification of the *hatha jodi* using molecular tools from seized specimens.

Materials and Methods

Ten biological samples (*Hatha jodis*) seized from different locations in Maharashtra were submitted to the Wildlife Research & Training Centre, Nagpur, for species identification (Figure 1). DNA was extracted using the Qiagen DNA Blood and Tissue Kit, following the manufacturer's protocol to ensure high-purity DNA. The DNA was quantified using Qubit technology (Mfg. Thermofischer Scientific). Species identification was conducted through PCR amplification, targeting the cytochrome b (*Cyt b*) gene, as described in the reference (Verma and Singh 2003) [5]. The Agarose Gel Electrophoresis revealed an amplification of approximately 450 bp (Figure 2). The PCR amplicons were purified using the Qiagen PCR Purification Kit to remove any contaminants and ensure high-quality DNA for sequencing. The purified DNA was sequenced using the ABI 3500 Sanger Sequencer, employing both forward and reverse primers to generate accurate sequence data. A consensus sequence was constructed from the obtained forward and reverse reads to improve reliability. The generated sequences were analysed using Nucleotide Basic Local Alignment Search Tool (nBLAST) from the NCBI database, revealing a high similarity to the Bengal monitor lizard (*Varanus bengalensis*), (Figure 3). The findings confirmed that the seized samples belonged to *Varanus bengalensis*, contributing to evidence in wildlife forensic investigations.

Fig 1: Siezed *Hatha jodis* presented to Wildlife Research & Training Centre, Gorewada, Nagpur for species identification

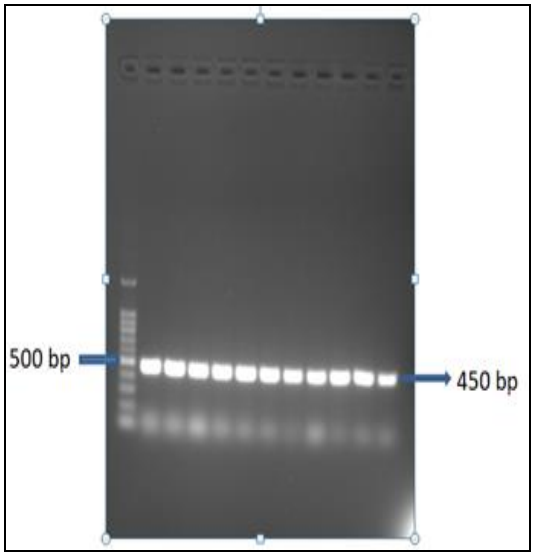
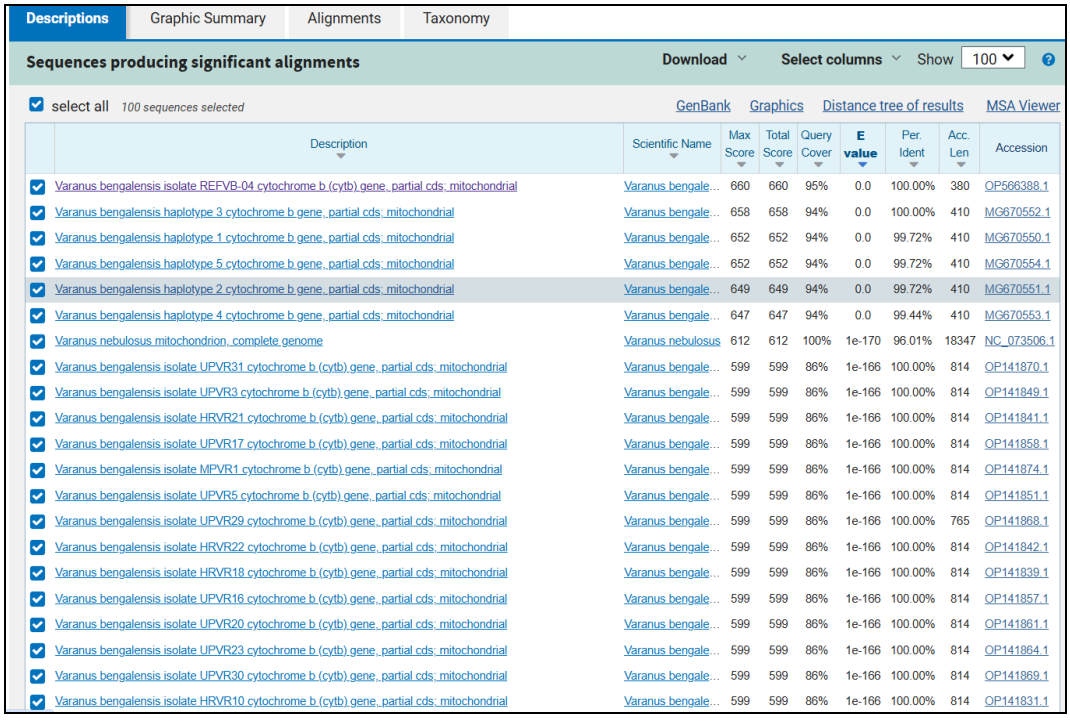


Fig 2: Agarose Gel Electrophoresis indicating an amplification of approximately 450 bp using PCR primers recommended by Singh & Verma, 2003 [5]



Descriptions | Graphic Summary | Alignments | Taxonomy

Sequences producing significant alignments — Download — Select columns — Show 100

select all 100 sequences selected — GenBank | Graphics | Distance tree of results | MSA Viewer

Description	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
Varanus bengalensis isolate REFVB-04 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	660	660	95%	0.0	100.00%	380	OP566388.1
Varanus bengalensis haplotype 3 cytochrome b gene, partial cds; mitochondrial	Varanus bengale...	658	658	94%	0.0	100.00%	410	MG670552.1
Varanus bengalensis haplotype 1 cytochrome b gene, partial cds; mitochondrial	Varanus bengale...	652	652	94%	0.0	99.72%	410	MG670550.1
Varanus bengalensis haplotype 5 cytochrome b gene, partial cds; mitochondrial	Varanus bengale...	652	652	94%	0.0	99.72%	410	MG670554.1
Varanus bengalensis haplotype 2 cytochrome b gene, partial cds; mitochondrial	Varanus bengale...	649	649	94%	0.0	99.72%	410	MG670551.1
Varanus bengalensis haplotype 4 cytochrome b gene, partial cds; mitochondrial	Varanus bengale...	647	647	94%	0.0	99.44%	410	MG670553.1
Varanus nebulosus mitochondrion, complete genome	Varanus nebulosus	612	612	100%	1e-170	96.01%	18347	NC_073506.1
Varanus bengalensis isolate UPVR31 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141870.1
Varanus bengalensis isolate UPVR3 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141849.1
Varanus bengalensis isolate HRVR21 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141841.1
Varanus bengalensis isolate UPVR17 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141858.1
Varanus bengalensis isolate MPVR1 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141874.1
Varanus bengalensis isolate UPVR5 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141851.1
Varanus bengalensis isolate UPVR29 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	765	OP141868.1
Varanus bengalensis isolate HRVR22 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141842.1
Varanus bengalensis isolate HRVR18 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141839.1
Varanus bengalensis isolate UPVR16 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141857.1
Varanus bengalensis isolate UPVR20 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141861.1
Varanus bengalensis isolate UPVR23 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141864.1
Varanus bengalensis isolate UPVR30 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141869.1
Varanus bengalensis isolate HRVR10 cytochrome b (cytb) gene, partial cds; mitochondrial	Varanus bengale...	599	599	86%	1e-166	100.00%	814	OP141831.1

Fig 3: nBLAST analysis revealinga 100 % match with *Varanus bengalensis*

Discussion

The identification of the seized biological samples as Bengal monitor lizard (*Varanus bengalensis*) provides critical forensic evidence supporting wildlife law enforcement in India. This study underscores the utility of molecular techniques, particularly DNA barcoding using the cytochrome b (*Cyt b*) gene, in species identification. The successful amplification and sequencing of the *Cyt b* gene, followed by nBLAST analysis, confirm that forensic genetics is a reliable approach for species authentication in cases of illegal wildlife trade (Verma & Singh, 2003) [5]. The illegal poaching and trade of monitor lizards, particularly for Hatha Jodi, pose severe threats to their populations. Despite their protected status under Schedule I of the Wildlife Protection Act, 1972, these reptiles are continuously exploited due to the superstitions surrounding their hemipenes. The increasing use of e-commerce platforms to sell *hatha jodi* highlights the evolving nature of wildlife crime, making enforcement more challenging (Choudhury *et al*., 2020) [2]. Seizures of large quantities of these artifacts indicate the involvement of organized wildlife crime networks that operate across multiple states and even internationally (Ramesh *et al*., 2018) [4].

The ecological significance of monitor lizards as mesopredators in their respective habitats further exacerbates the consequences of their exploitation. As regulators of insect and small vertebrate populations, they help maintain ecological stability. The loss of these lizards from the environment can disrupt trophic dynamics, potentially leading to an increase in prey populations and subsequent imbalances in local ecosystems (Whitaker & Captain, 2004) [6]. The depletion of genetic diversity due to rampant poaching may also reduce the adaptability of monitor lizard populations, making them more vulnerable to environmental changes and diseases. To mitigate the illegal trade of monitor lizards, a multi-faceted approach is required. Strengthening wildlife law enforcement, increasing surveillance of online markets, and conducting awareness campaigns are essential. Additionally, collaborations between forensic scientists, law enforcement agencies, and conservationists can enhance the efficiency of tracking and dismantling illegal wildlife trade networks. Public awareness initiatives that debunk the myths surrounding *hatha jodi* can help reduce demand, ultimately contributing to the conservation of these ecologically important reptiles.

Overall, this study highlights the critical role of forensic science in wildlife crime investigations. The application of molecular techniques in identifying seized wildlife products not only aids in legal proceedings but also serves as a deterrent against future offenses. Continued advancements in wildlife forensics, coupled with robust conservation strategies, are imperative to ensuring the survival of India's monitor lizards in the face of ongoing threats.

Competing Interests

The authors declare no competing interests.

Funding

This research was entirely self-funded by the authors. The corresponding author did not receive any financial support from national or international research funding agencies.

Acknowledgements

The authors express their sincere gratitude to the Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Maharashtra State, for granting permission to conduct the research. We also acknowledge the Forest Development Corporation of Maharashtra Ltd., Nagpur, and the Office of the Divisional Manager, Gorewada Project, Nagpur, for providing necessary facilities. Special thanks are extended to the Director, Wildlife Research & Training Centre (WRTC), Gorewada, Nagpur, for facilitating the research work.

Conclusion

The illegal trade of monitor lizards, particularly for the mystic Hatha Jodi, poses a significant threat to their populations and ecological balance in India. The application of molecular techniques, such as DNA barcoding, has proven vital in accurately identifying seized specimens, strengthening wildlife law enforcement efforts. Addressing this issue requires a multifaceted approach, including stricter enforcement, online market surveillance, and public awareness campaigns to dispel superstitions and reduce demand. Protecting monitor lizards is crucial not only for conserving biodiversity but also for maintaining healthy ecosystems where they serve as key mesopredators. Continued integration of forensic science and conservation strategies is essential to curb illegal trade and ensure the survival of these vital reptiles in India.

Conflict of Interest

Not available

Financial Support

Not available

Reference

1. Auffenberg W. The Bengal Monitor. University Press of Florida, 1994.
2. Choudhury BC, Deuti K, Mandal M. Status and conservation of Indian monitor lizards. J Herpetol Conserv. 2020; 8(1):45-58.
3. Daniel JC. The Book of Indian Reptiles and Amphibians. Oxford University Press, 2002.
4. Ramesh M, Sharma S, Joshi A. Illegal trade of Hatha Jodi and its impact on *Varanus* populations in India. TRAFFIC Bull. 2018; 30(2):55-62.
5. Verma SK, Singh L. Novel universal primers establish identity of an enormous number of animal species for forensic application. Molecular Ecology Notes. 2003 Mar;3(1):28-31.
6. Whitaker R, Captain A. Snakes and Other Reptiles of India. Draco Books, 2004.

How to Cite This Article
Kolangath SM, Patwa S, Mulmule P, Dhoot VM, Upadhye SV. Hatha Jodi: A commodity of importance under Indian wildlife trade. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(6):173-175.