SACON Report # PR-217

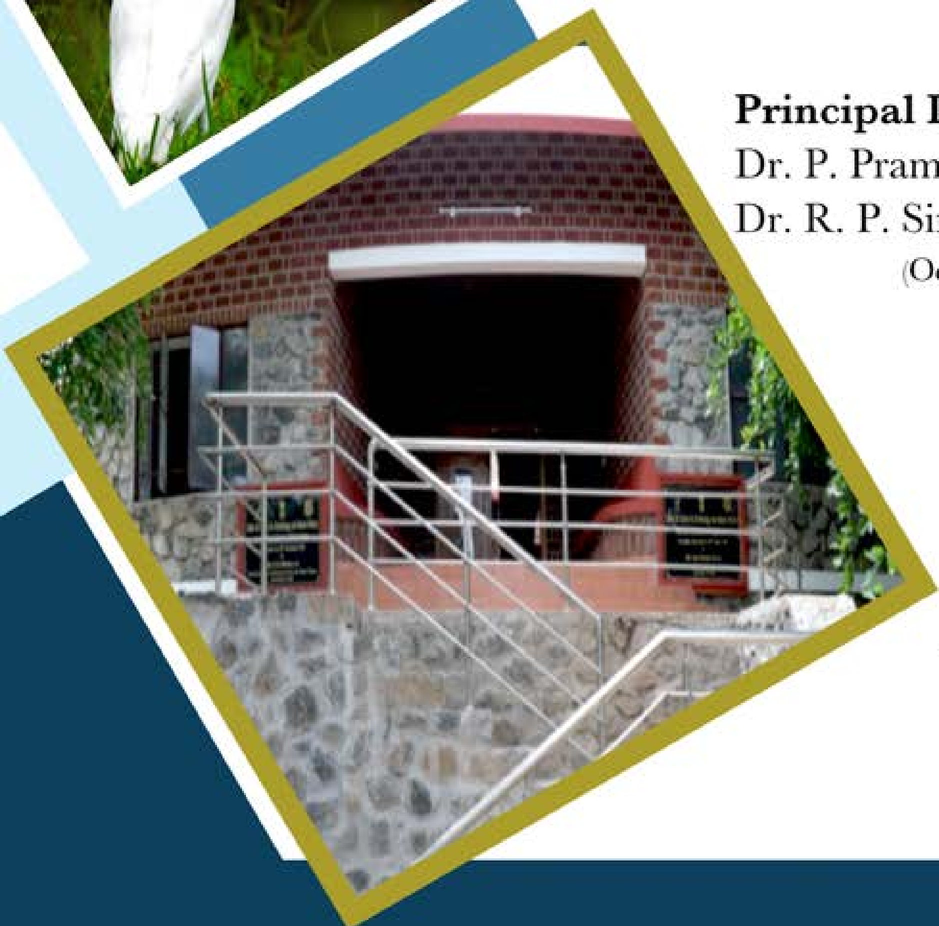
Final Report

Establishment of National Avian Forensic Laboratory at SACON for National Certification to Prevent Illegal Trafficking of Birds

January 2022

Project Period
(October 2017 - March 2021)

Principal Investigator
Dr. P. Pramod, Senior Principal Scientist
Dr. R. P. Singh, Senior Scientist
(October 2017 - June 2021)



Sálim Ali Centre for Ornithology and Natural History

(A Research Centre of the Ministry of Environment, Forest and Climate Change, Government of India)
Anaikatty P.O., Coimbatore - 641108, Tamil Nadu

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Principal Investigator : P. Pramod

R. P. Singh (October 2017 – June 2020)

Research Personnel : Sanjeev K. Sharma (Project Scientist)

Swapna D. Ray (Junior Research Biologist)

Prateek Dey (Junior Research Biologist)

Funding agency:

Ministry of Environment, Forests and Climate Change, Govt. of India.

Duration of the Project: 3 years and 5 months

SACON

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ACKNOWLEDGEMENTS

The National Avian Forensic Laboratory (NAFL) Team wishes to thank the Ministry of Environment Forest and Climate Change (MoEFCC) to provide the fund to establish this laboratory; especially to Shri C.K. Mishra, IAS, Secretary to the Govt. of India, Ministry of Environment, Forest and Climate Change, New Delhi (Chairman – Governing Council, SACON) for their support and inauguration of the laboratory. NAFL team is extremely grateful to the Governing Council and Research, monitoring, and advisory committee for providing us the opportunity to run this project. NAFL team duly acknowledges all state forest departments, Zoological Survey of India, central zoo authority of India, and different zoos, with thanks for granting permission to take up research work and for allowing us to survey and sample collection. Likewise, the Team also appreciates the help from officials of Transit Treatment Center Nagpur and Jivdaya Charitable Trust for helping in sample collection to undergo the present study. NAFL team would also like to express their heartiest thanks to DFO, Coimbatore for providing permission to mist-netting the birds on the SACON campus. It is indeed a great pleasure in expressing our deep sense of gratitude and indebtedness to Dr. K. Sankar, former Director SACON for his help in various aspects. We are indebted to Dr. S. Muralidharan Director – Incharge SACON for his support towards the project. NAFL team is indebted to all Faculty members, Administration section, Finance section, SACON staff members, researchers, and students for suggesting and encouraging to undergo this study. The NAFL Team is very grateful to all those who have stayed in the background but also contributed much to establish this laboratory.

Dated:

Dr. P. Pramod
Senior Principal Scientist &
Principal Investigator

EXECUTIVE SUMMARY

- The objective of the project was to develop a state-of-the-art avian forensic laboratory with infrastructure for bird body part analysis; having a repository of tissue/blood and feather reference materials, to help identify avian species from their remains. This was intended to facilitate the Wildlife Crime Control Bureau and other law enforcement agencies in controlling illegal trafficking.
- A fully furnished State-of-the-Art Avian Forensic Laboratory (NAFL) has been established at SACON and dedicated to the nation on 28th December 2018 by Shri. C. K. Mishra, IAS, Secretary, MoEF&CC in the presence of Dr. T. Chandni, Advisor, MoEF&CC, and other Governing Council members of SACON.
- The NAFL has procured sophisticated as well as common laboratory equipment viz. Next Generation DNA Sequencer, Sanger DNA Sequencer, Covaris Fragment Analyzer, Homogenizer, Horizontal and Vertical gel electrophoresis, Centrifuge, Gel-Documentation system, Deep Freezer (-80ºC), Cryocans, Biosafety Cabinet, Thermal Cyclers,, etc. NAFL has engaged one project scientist and three research fellows to carry out the establishment work. Besides, two MSc dissertation students and five interns were also engaged in the lab for the work.
- Initial research works demonstrated the potential of the laboratory in doing service to the nation. For forensic analysis of bird remains for species identification, sex determination, and analysis of the microstructure of bird feathers.
- Sample collection for reference sample repository employed opportunistic as well as systematic sampling. Under opportunistic sampling, the team carried out road surveys in Tamil Nadu, Maharashtra, Assam and collected road-kill of birds. However, considering the very low probability of getting a random road-kill bird, the team focused on systematic biological sample collection from various Zoos, rescue centers, museum specimens, and targeting mist-netting of birds at the SACON campus.
- Collected about 1300 biological samples (blood/tissue/feather/DNA) of 150 bird species and preserved them in our Avian Biobank. Of these, species-specific barcodes have been

generated for about 113 species using CoI and ND2 genes by means of Sanger sequencing.

- Sequenced whole genomes of eight select species of Indian birds, - a first attempt in the country.
- Developed feather catalog for 17 species of birds with 15 microstructure paramenters.
- Bird feather cataloging lead to the discovery of a new type of feather barb termed as 'sub-plumulaceous' from the dorsal body contour feathers of Indian Pitta (*Pitta brachyura*).
- Developed a novel method for molecular sexing in birds using CHD and CHW gene-specific primers.
- Extended species identification and molecular sexing services to various government agencies such as Wildlife Institute of India, Arignar Anna Zoological Park, Chennai, and Indian Air Force, and successfully solved 6 cases (9 Samples) of bird species identification and 2 cases (8 Samples) of molecular sexing for these institutes /agencies.
- One of the intriguing cases that NAFL has solved Mig-21 crash in Bikaner, Rajasthan on 9th March 2019. NAFL identified the bird species that hit the fighter jet from the wreckage of the plane.
- Identified illegal trade markets and areas in Tamil Nadu, Maharashtra, and Assam, and attempts were made to obtain biological samples of illegally traded bird species. Also conducted systematic surveys of local markets and pet shops in Chennai and Bengaluru.
- Conducted systematic surveys of local markets and pet shops in Chennai and Bengaluru and observed that a few restricted birds such as Rose-ringed Parakeet and Java Sparrow are being traded through back door selling in the garb of pet bird trade.
- Provided hands-on biological sample collection/preservation training to over 120 forest guards/rangers at Tamil Nadu Forest Academy (TNFA) and Sathyamangalam Tiger Reserve, Erode, Tamil Nadu.
- Published four research articles in reputed peer-reviewed journals and over ten research manuscripts are under preparation.