

## DNA Barcoding of Sharks and Rays

by SEAFDEC MFRDMD

The Southeast Asian region has a rich fauna of sharks and rays. At least 174 species of sharks and 148 species of rays and skates are inhabiting this region from freshwater to deep ocean. Indonesia recorded the highest number of sharks and rays with 111 and 106 species, respectively.

Sharks and rays are exploited directly or indirectly in commercial fisheries; however, detailed data on landings and by-catch are often lacking. Global reviews of sharks and rays fisheries indicate that in most cases there are large gaps in the basic biological information required to implement strategic management plans. The primary threat is overfishing where increasing global demand for meat, fins, liver oil, gill plates and other parts and products driving towards extinction.

An accurate identification of sharks and rays species is one of the most difficult tasks especially for look-alike species. DNA barcoding potentially offers scientists who are not expert taxonomists, a powerful tool to support the efficiency and accuracy of field studies involving the challenging identification of diverse taxa. Taxonomic misidentification and the presence of cryptic species can seriously compromise the veracity of ecological, fisheries and conservation-related research and management. These problems are further compounded by the 'greying' of the taxonomic workforce and the decline in the teaching of taxonomy and training of field biologists at universities, both issues identified as major impediments to the conduct of biodiversity science and conservation biology.

The challenges for ecologists seeking verification of their field-based identifications are not trivial. Even when adequate taxonomic keys and field guides are available, it is often difficult to identify organisms in the field with confidence. A 650-base fragment of the cytochrome c oxidase I (COI, *cox1*) also call as DNA barcoding is proposed by Paul D. N. Hebert as a 'global' standard to identify species because the variation in COI within species is lower relative to that among species.

DNA information for species of elasmobranch (cartilaginous fish in the class Chondrichthyes, including sharks (Selachii) and the rays, skates and sawfish (Batoidea)) is accumulating. Total number 14,284 specimens with barcodes of elasmobranch

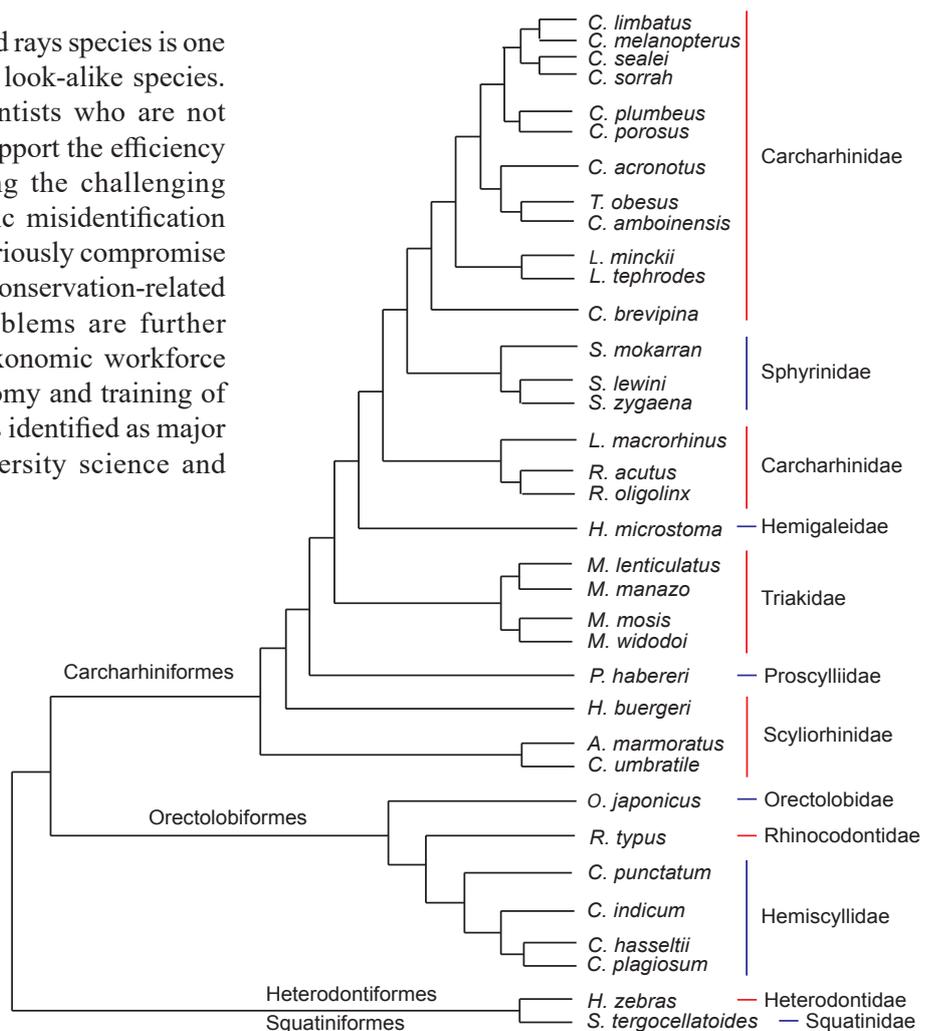


Figure 1. Phylogenetic relationship of among 35 species of sharks

COI sequences were lodged on BOLD (Barcode of Life Data System) to date involves of 899 species collected from 47 countries worldwide. This suggests that there is now a sufficient DNA database available to support a DNA barcoding approach for taxonomic identification of sharks and rays.

MFRDMD is also implementing a research on “Identification of sharks and rays species by DNA barcoding” under the project on “Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region,” with support from the Japanese Trust Fund IV. Through this project, data on DNA barcoding of sharks and rays in Southeast Asian region are being compiled.

MFRDMD and SEAFDEC Member Countries have been collecting genetic samples of sharks and rays to conduct barcoding research, which is progressing in the world. MFRDMD visited and collected specimens from Malaysia (Pahang, Terengganu, Perak, Sabah and Sarawak) and Vung Tau, Viet Nam. A total of 35 species of sharks (131 specimens) and 41 species of rays (134 specimens) has been identified so far. **Figure 1** shows the phylogenetic relationships among 35 shark species. The tree showed that DNA relationships follow the taxonomy classification.



(Top) Shark specimens collected (*Sphyrna lewini*); and  
(Below) Ray specimens collected (*Pastinachus gracilicaudus*)

## REGIONAL PROGRAMS

### EAFM Writeshop on Material Finalization for LEAD



Participants of the EAFM writeshop

TD through the REBYC II-CTI Project organized the Ecosystem Approach to Fisheries Management (EAFM) Leader Writeshop on Material Finalization for Leaders, Executives and Decision Makers (LEAD) from 10 to 14 October 2016 in Bangkok, Thailand.

Attended by 13 participants from IMA International, NOAA, and SEAFDEC, the Writeshop came up with complete materials on EAFM that make LEAD more understandable and the importance of EAFM. The materials include brochure, conversational handouts, animated leaflets, video clips, posters, PowerPoint presentations, etc.

To continue promoting the EAFM concept, TD organized the Ecosystem Approach to Fisheries Management (EAFM) High-Level Consultation for Leaders, Executives and Decision Makers (LEAD) in Viet Nam and the Philippines on 17-18 October 2016 and 25-26 October 2016, respectively. The

EAFM and LEAD EAFM toolkit was presented and imparted to participants who are leaders, executives and decision-makers in fisheries and other sectors. Understanding and supporting the EAFM to achieve sustainable fisheries management through improved planning and implementation are the expected outputs of the Consultations.



Activities during the writeshop