Marine Research

Marine Research (MR) is a peer-reviewed open-access journal published by the National Academy of Marine Research (NAMR). Volume 5 Issue 1 is honored to feature **Dr. Hong-Young Yan** (Research Fellow (Emeritus) of Institute of Cellular and Organismic Biology, Academia Sinica) as a guest editor, overseeing a special issue dedicated to the theme of **"The Taxonomic Study of Fishes in Taiwan: A Historical Review and Its Current Status."**

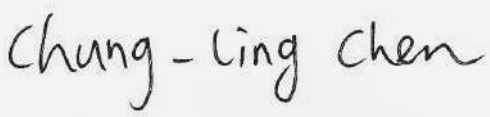
This special issue provides a historical and scientific perspective on the development of fish taxonomy in Taiwan, highlighting the achievements of several generations of ichthyologists and their enduring contributions to marine biodiversity research. The featured articles span a range of topics, including species rediscoveries, new distribution records, DNA barcoding applications, and taxonomic revisions based on integrative approaches. Collectively, these studies illustrate how traditional taxonomy and modern molecular techniques can work in synergy to enhance our understanding of fish diversity in Taiwan and the broader Indo-West Pacific region.

In addition to the research papers, the issue includes a book review on **"Eggs and Larvae of 500 Taiwan Fishes"** and a heartfelt obituary commemorating the life and legacy of **Prof. Shih-Chieh Shen**, one of Taiwan's most influential fish taxonomists.

By showcasing both scientific advancements and historical reflections, this issue affirms the importance of taxonomic scholarship in Taiwan's marine science history. It also aims to inspire future generations to continue exploring and documenting the rich ichthyofauna of this island nation.

MR is published in June and December. The articles are also available for Open Access through MR official website (https://marres.namr.gov.tw/). Given your eminence and contribution to the field of marine research, we warmly invite you to submit your research for publication at MR. We look forward to receiving your manuscripts.

Best regards,
Chung-Ling Chen, Ph.D.
Editor-in-Chief, President of National Academy of Marine Research



The Taxonomic Study of Fishes in Taiwan: A Historical Review and Its Current Status

During my senior year at the Zoology Department of National Taiwan University, under the guidance of Professor Shih-Chieh Shen, I authored an undergraduate thesis titled "The Taxonomy of Labrids of Taiwan." This experience ignited me a profound and enduring interest in fish taxonomy. Although my subsequent academic career has been centered on the sensory electrophysiology of fish, my enthusiasm for taxonomy remained. For the past two decades, I've closely followed the advancement of fish taxonomy in Taiwan. I've seen the field evolve, incorporating not only the traditional methods like meristic counts and morphological characterization, but also infuses molecular approaches such as DNA barcoding for the identification of eggs, larvae, juveniles, and adults. Moreover, the current generation of ichthyologists are actively investigating the phylogenetic relationships among diverse fish groups.

During the Marine Research journal's editorial board meeting on July 10, 2024, I presented a proposal for a special issue dedicated to "The Taxonomic Study of Fishes in Taiwan: A Historical Review and Its Current Status." Following the board's approval, I initiated the process of soliciting articles from Taiwanese scholars for publication consideration in Marine Research.

A comprehensive review on the history of taxonomic study of Taiwan's fish, penned by Professor Kwang-Tsao Shao and his former student, Dr. Hsuan-Ching Ho, reveals a rich research legacy. The review documents that beginning in 1858, scholars from Europe, the United States, the United Kingdom, and Japan undertook extensive studies on the taxonomy of fish in Formosa, the former name of Taiwan. Following World War II in 1945, five generations of domestically trained scientists have progressively expanded these research efforts. By 2024, a total of 3,480 fish species had been recorded in Taiwan, representing approximately one-tenth of the world's known species. This extraordinary biodiversity, concentrated within a relatively small island of 36,000 square kilometers, highlights Taiwan's significant ecotonal position in the global context of fish fauna.

During his research on fish taxonomy in Taiwan, Professor Kwang-Tsao Shao realized the necessity to digitize and make the expanding dataset accessible online to domestic and international collaborators. Consequently, the Taiwanese iteration of FishBase was developed. A paper by his team chronicles the development and sustained maintenance of this digital database over the past 35 years.

Utilizing a combination of traditional meristic counts, morphological characteristics, and DNA barcoding, Dr. Shih-Pin Huang identified a previously unknown ricefish in western Taiwan and the offshore island of Leiyu. This discovery represents a new freshwater fish record for both Taiwan and Kinmen.

While ten species of Ariidae sea catfish were once thought to inhabit Taiwan, Dr. Chien-Hsiang Lin's team utilized comparative osteology, morphology, and DNA barcoding approaches to revise this understanding. Their findings confirm that in fact only three species are residing in Taiwanese waters.

Croaker fish with unusual golden coloration found in Thailand and Borneo waters by Professor Hin-Kiu Mok's team were initially thought to represent a new species. However, further investigation through morphometric analysis and DNA barcoding revealed them to be the already known Spine Bahaba (*Bahaba polykladiskos*).

Flatfish taxonomy in Taiwan was previously understudied. Professor Wei-Jen Chen's team challenged this by re-examining the flatfish genus *Laeops*, leading to the discovery that only three species, rather than a greater number, are present in Taiwanese waters.

Conventional fish classification criteria primarily utilizes meristic counts and morphological characteristics for identification. However, these methods prove inadequate for the identification of eggs, larvae, and juvenile fish. Professor Kwang-Tsao Shao's team addressed this challenge by employing DNA barcoding, comparing it with data from adult specimens, and successfully identifying a total of 505 species. The results, supported by the National Academy of Marine Research, have been published in a two-volume illustrated work. I wrote a book review to emphasize the significance of this publication to the field of fish taxonomy research.

Little did I know, when proposing the Marine Research special issue in July 2024, that Professor Shih-Chieh Shen, a second-generation ichthyologist, would pass away on February 21, 2025, at 99. As one of his former students, having learned Ichthyology and Fish Taxonomy from him, I honored his legacy with an obituary and publication bibliography. Remarkably, every author in this special issue is academically linked to this influential scholar either directly or indirectly. He is dearly missed.

Owing to page space constraints, the subsequent three articles will be featured in Volume 5, Number 2 of the special issue.

For the implementation of fish species conservation, a comprehensive checklist of particular fish groups is indispensable. The first fish checklist for Kinmen Island was compiled in 1960. Kinmen, an offshore island of Fujian Province, China, has been under the jurisdiction of Taiwan since 1949. Dr. Shih-Pin Huang has provided an updated checklist of the island's fish fauna.

Milkfish (Chanos chanos) farming in Taiwan has a history of more than 350 years. Traditionally, it was a sideline job for people living along the coast, who used triangular nets to catch milkfish fry in coastal waters during the fry season. Taiwan's milkfish farming area is about 15,000 hectares, with an annual stocking of about 200~300 millions fry. According to the estimation by Hong-Young Yan (1979. The Biological Characteristics of Milkfish Larvae Along Taiwan Coastal Waters. Institute of Oceanography, National Taiwan University Master Thesis), for every milkfish fry caught, about 150 other fish fry of different species were discarded as bycatches on the beach. Therefore, catching milkfish fry annually results in the death of about 30~45 billions other fish fry, which was very damaging to Taiwan's marine fishery recruitment processes. However, since 1983, Mr. Leit-Tang Lin began to produce milkfish fry through artificial breeding. Not only could it supply domestic demand, but from 1992 to 2002, it also exported annually 300 to 400 million milkfish fry to Southeast Asian countries such as Thailand, the Philippines, and Indonesia. Subsequently, he developed artificial breeding techniques for the following eight important aquaculture fish species: Malabar grouper (*Epinephelus malabaricus*), Mangrove red snapper (*Lutjanus argentimaculatus*), Golden pompano (*Trachinotus blochii*), White star snapper

(*Lutjanus stellatus*), Giant trevally (*Caranx ignobilis*), Javelin grunter (*Pomadasys kaakan*), Fourfinger threadfin (*Eleutheronema tetradactylum*), and The barramundi (*Lates calcarifer*). Mr. Leih-Tang Lin, received only junior high education, not only achieved success in artificial breeding of more than ten species of marine fish fry but also saved hundreds of billions of fish fry from being caught by humans, thus indirectly protecting marine resources of waters around Taiwan. Ms. Hsueh-Hsing Lin meticulously chronicles the contributions made by Mr. Leih-Tang Lin.

The discovery of the landlocked Taiwanese salmon (*Oncorhynchus masou formosanus*) in high mountain streams in 1919, representing the southernmost distribution of salmon species, generated considerable excitement among ichthyologists at the time. It was later revealed that the fish's discovery occurred prior to its formal scientific publication. Dr. Lin-Yan Liao provided a concise account of the historical context and detailed his team's efforts over the past two decades to conserve the wild population through captive breeding and reintroduction to their native streams. By the end of 2022, the total population of the salmon reached 15,374 individuals, exceeding 60 times the original population size.

Professor Hin-Kiu Mok provided valuable assistance in reviewing the numerous manuscripts submitted for this special issue. His contributions are deeply appreciated.

Best regards,

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