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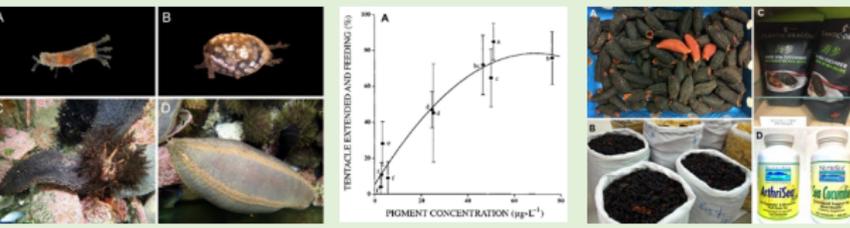
Current Knowledge on the Biology, Ecology, and Commercial Exploitation of the Sea Cucumber *Cucumaria frondosa*

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ABSTRACT
The demand and high market price for sea cucumber has led to the collapse of wild stocks for many traditional species in Asia and the Indo-Pacific. New species have therefore been introduced to the markets over recent decades, including *Cucumaria frondosa*. A fishery for *C. frondosa* emerged in the USA in the 1980s and quickly developed in Iceland, Canada and Russia. Commercial products include frozen and dry body wall (*beche-de-mer*), frozen muscle bands, dry aquapharyngeal bulb (flower), along with various pharmaceutical and nutraceutical extracts. This species is also a candidate for aquaculture due to its high marketability for food and bioactive products. Despite its naturally high abundance, *C. frondosa* is a temperate-polar slow-growing species with annual spawning; therefore, a precautionary approach must be taken to develop best practices for management of this resource. The present contribution reviews the biology, ecology, biochemical properties, harvesting and trade, and the potential aquaculture of *C. frondosa*. This comprehensive synthesis, including 10 theses, 197 scientific papers and 47 reports, aims to provide a framework for future research by highlighting areas of concern for academic studies, fishery management, and aquaculture of cold-water sea cucumber species.

KEYWORDS
Holothurid; holothurian; echinoderm; fishery; aquaculture; life cycle



Coming in June 2022 – A full issue of *Advances in Marine Biology* dedicated to *Holothuria scabra*

Advances in MARINE BIOLOGY
GLOBAL KNOWLEDGE ON THE COMMERCIAL SEA CUCUMBER HOLOTHURIA SCABRA
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Global knowledge on the commercial sea cucumber *Holothuria scabra*
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Abstract
Holothuria scabra is one of the most intensively studied holothurids, or sea cucumbers (Echinodermata: Holothuroidea), having been discussed in the literature since the early 19th century. The species is important for several reasons: (1) it is widely distributed and historically abundant in several shallow soft-bottom habitats throughout the Indo-Pacific, (2) it has a high commercial value on the Asian markets, where it is mainly sold as a dried product (*beche-de-mer*) and (3) it is the only tropical holothurid species that can currently be mass-produced in hatcheries. Over 20 years have elapsed since the last comprehensive review on *H. scabra* published in 2001. Research on *H. scabra* has continued to accumulate, fuelled by intense commercial exploitation, and further declines in wild stocks over the entire distribution range. This review compiles data from nearly 950 publications pertaining to the biology, ecology, physiology, biochemical composition, aquaculture, fishery, processing and trade of *H. scabra*, presenting the most complete synthesis to date, including scientific papers and material published by local institutions and/or in foreign languages. The main goal of this project was to summarize and critically discuss the abundant literature on this species, making it more readily accessible to all stakeholders aiming to conduct fundamental and applied research on *H. scabra*, or wishing to develop aquaculture, stock enhancement and management programs across its geographic range.

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- Systematics
- Morphology and Anatomy
- Geographic Range
- Habitat
- Spatial Distribution and Population Dynamics
- Asexual Propagation (Fission)
- Sexual Reproduction
- Development
- Settlement
- Growth
- Evisceration and Regeneration
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- Digestion and Metabolic Activity
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- Ecosystem Services
- Predators in Nature
- Symbiotic Community
- Fisheries
- Aquaculture
- Conclusion

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The World of Sea Cucumbers – Challenges, Advances and Innovations

Editors: Annie Mercier, Jean-François Hamel, Chris Pearce, Andy Suhrbier



This book provides a broad coverage of sea cucumber biology, ecology, fisheries, aquaculture and trade, while also bringing forward novel cultural, socioeconomic and scientific topics related to commercial and non-commercial species worldwide.

Written by international experts in their respective fields, the book offers a unique outlook into the fascinating world of sea cucumbers, while providing valuable information to various stakeholders and researchers. Commercial fisheries and aquaculture programs are addressed, especially as they relate to emerging species, but the book also covers novel, understudied or lesser-known biological, ecological, and commercial aspects that will be of interest to academic and non-academic readers. The involvement of Indigenous peoples and minorities in various community-level initiatives and on the cultural significance/impact of sea cucumbers in many regions are also examined. Finally, breakthroughs and emerging biotechnologies centered on sea cucumbers are presented.

The World of Sea Cucumbers – Challenges, Advances and Innovations is an important resource for students, academic researchers, entrepreneurs, managers, ecologists, conservationists, and curious thalassophiles who want to understand the biological, ecological, cultural and commercial relevance of sea cucumbers in a global context