

Preface

In this book, you will find the proceedings of a ground-breaking international symposium on the science and conservation of a remarkable group of living species, the horseshoe crab. Earth has only four extant horseshoe crabs: *Limulus polyphemus* in North America; *Tachypleus tridentatus*; *T. gigas*; and *Carcinoscorpius rotundicauda* in southeast Asia. In past decades, these animals were viewed as a natural history curiosity at best or reviled as enemies of shellfish. Today, we know them as flagship species and invaluable to human health. Their blood provides a chemical known as *Limulus* amebocyte lysate or LAL that clots in the presence of minute quantities of bacterial endotoxin and is used to ensure that pharmaceuticals and surgical implants are free of bacterial contamination. Current research points to the promise of horseshoe crab blood in the discovery of new treatments for human disease. Horseshoe crabs are integral to the food web of coastal marine ecosystems and to the economies of coastal communities.

Horseshoe crabs are well known as “living fossils” with a geological history covering hundreds of millions of years and an ancestry reaching back 455 million years to the doorstep of the Cambrian. In spite of this longevity, each species now faces common and growing threats to their survival. Loss of essential spawning habitat due to erosion and shoreline development, coastal pollution, and overfishing all threaten horseshoe crab populations. Biologists and conservationists working in coastal areas throughout North America and Southeast Asia have become increasingly concerned by declines observed in all species of horseshoe crab. A consensus emerged that a structured forum was needed where those working on horseshoe crab conservation could meet, exchange ideas, and plan future research and conservation strategies. In the fall of 2005, a planning committee was formed and selected Dowling College to host the first International Symposium on the Science and Conservation of Horseshoe Crabs (ISSCHC 07).

The symposium, which was held during June 11–14, 2007, brought together a diverse group of researchers, ecologists, managers, and educators who took full advantage of the rare opportunity to interact. Participants included biologists who discover processes underlying behavior and population dynamics, medical researchers who mine deep into the pharmaceutical applications, resource

managers who work to ensure healthy and viable populations, and educators who creatively share fascinating details about horseshoe crabs with the broader public and future generations. Those at the symposium were enlightened by the display of children's art work from around world organized by ERDG, a non-profit organization. The display reminded the attendees of their own youthful excitement as they first encountered and explored these alien-looking creatures.

In addition to its many ecological roles, the horseshoe crab is an international ambassador. The global distribution of the four horseshoe crab species links the eastern and western hemispheres. The symposium logo designed by Dr. Carl N. Shuster Jr. reflects this interconnectedness by showing the two hemispheres and the four species side-by-side facing the same future. And so it was at the symposium, where participants from around the world gathered to share knowledge, present research results, and identify conservation challenges facing horseshoe crabs. Over 150 scientists, researchers, and students from 10 countries presented over 45 papers and 40 posters. And it is in the pages of this book where that shared international knowledge and experience is presented as a beginning in our collective efforts to conserve the world's horseshoe crab species.

Science helping to advance conservation; Conservation helping to prioritize science was chosen as the symposium theme to emphasize that effective conservation depends on science-based resource management. Using biological knowledge as a foundation, populations can be effectively conserved through management of habitat and human use. This theme of bridging biological science and conservation served to guide the symposium program and the organization in this book.

This book is organized, as the title implies, into two main sections: Biology and Conservation. The Biology section is divided into two subsections: (1) Populations and Habitats and (2) Physiology, Reproduction, and Development. The Conservation section is divided into three subsections: (1) Commercial Use and Management of Populations and Habitat, (2) Culture and Captive Breeding, and (3) Public Awareness and Community-based Conservation. Throughout the book, the reader will find results of new studies, and authoritative reviews on the science and conservation of all four of the world's horseshoe crab species. The chapters in this book were drawn from the invited oral presentations at the symposium, with a number of additional chapters chosen from among the contributed poster presentations to achieve greater balance among topics or geographic regions.

During the symposium, a petition with over 200 signatures was prepared to be given to the Director of UNESCO asking that the very first officially designated "World Heritage Species," an invertebrate, be assigned to "Horseshoe Crabs" to afford them added protection and awareness, under the World Heritage Program of the United Nations.

The Editors gratefully acknowledge the work and contributions of our fellow members of the ISSCHC 07 Planning Committee: Jim Berkson, Jane Brockmann, Ruth Carmichael, Anil Chatterji, Chang-Po Chen, Annie Christianus, Glenn Gauvry, Tomio Itow, Jack Levin, Mike Millard, Mike Oates, Martin Schreiber,

Carl Shuster, and Jaime Zaldivar-Rae. Glenn Gauvry and Mariko Sai helped to encourage the participation of many of the attendees from southeast Asia, and they were extremely helpful in coordinating the submission and review of their manuscripts. Dowling College with the Great South Bay in its backyard provided a welcoming facility for the first, of what we hope will be many, International Symposia on the Science and Conservation of Horseshoe Crabs. Communication among symposium attendees was greatly facilitated by the expert translation services provided by Andrew Meehan-Migita and associate. Valerie Royall graphically designed the symposium logo based on Carl Shuster's conceptual drawing. We also thank Drs. Gregory Lewbart, Cheryl Morrison, Meredith Bartron, and Bob Loveland for their helpful manuscript reviews. MLB is grateful to Fordham University for providing him with a Faculty Fellowship during the fall 2007 semester, when much of the preparation of this book took place. DRS is grateful to USGS Leetown Science Center for administrative support during the planning of the symposium.

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