

## BOOK REVIEW

Global Invader: The European Green Crab. Sylvia Behrens Yamada. 2001. Oregon Sea Grant, Oregon State University. i–xiii + 123 pages. ISBN 1-881826-24-4. \$15, plus \$3 shipping, available from the Oregon Sea Grant Program on the Web at <http://seagrant.orst.edu/sgpubs/newpubs.html>.

*"The green crab's reputation as an invader is well deserved. . . . Carcinus maenas was introduced from Europe to the Atlantic coast of the U.S. nearly 200 years ago and has since slowly spread to occupy habitat from as far south as New Jersey to the Maritime provinces of Canada. Sometime before 1900, green crabs were introduced into Australian coastal waters, and more recently they have somehow made their way to Tasmania, South Africa, and Japan."* (from the preface by R. E. Malouf)

One of the many problems in dealing with invasive species is finding out basic information about them. Because by definition an invasive species comes from somewhere else, the primary literature is often difficult to locate or of little relevance to the new habitat. This lack of access to information certainly has posed a problem for biologists interested in the European green crab and its relatively recent invasion into the Pacific Northwest. The green crab is a serious biological threat. It is an extremely hardy species, able to tolerate a wide range of conditions, and it is a voracious predator.

This slim book by Sylvia Yamada is primarily the result of a February 1998 workshop hosted by the Sea Grant programs of Oregon State University and the University of Washington to address the growing need for information on the European green crab, *Carcinus maenas*. Shortly after the workshop, a partnership of the two programs named MIST (for Marine Invasive Species Team) was formed and began to hold additional workshops and training programs as well as to publish informational pamphlets, brochures, web sites, and more. This book is another product of that partnership.

In the preface, Oregon Sea Grant director Robert E. Malouf points out that the intended audience includes university and agency-based

researchers, resource managers, and shellfish growers who are unfamiliar with *Carcinus* and in need of basic information. He also points out that "by design [the book] has a decidedly Pacific Northwest orientation." Thus, the book, like many Sea Grant products, is intended to be a basic source of information but something short of a definitive scientific treatise on the topic and mostly regional in focus. Although the book includes information from invasions around the world, most of the information and cited studies concern the presence of this species in the Pacific Northwest. Given this intended audience and emphasis, the book is a success.

The book is divided into two chapters. The first deals with the basic biology and natural history of *Carcinus maenas* and includes short sections on taxonomy, life cycle, distribution and abundance, feeding and predation, natural enemies, and the impact of the species on ecosystems. Yamada has done an admirable job of compiling the existing information on this species and presenting it in a clear and straightforward manner. It is a bit simplistic at times, and I found the figures wanting. As a systematist (my own bias) I was disappointed that there was not a more detailed treatment of the history of the genus and in particular of this species and related species. We are told, for example, that the Mediterranean congener *C. aestuarii* was formerly known as *C. mediterraneus*, but we are not given any information to let us know when and why the change occurred; indeed, authorities and dates are not included with most taxonomic names in the volume. This is a minor shortcoming but not one that detracts from the stated goals of the book. There are also a few obvious errors. For example, the megalopal stage of *C. maenas* bears a strong, recurved hook on the basis of the cheliped, as do the megalopal stages of many crab species in several families. Yet we are told on page 15 that "the megalopae of *Carcinus maenas* can be distinguished from other crab species by the prominent hook on the base of the claw." Because the chelipedal hook occurs in many tropical xanthoids, this unfortunate error could result in misidentifications of larval stages as *C. maenas* in parts of the world where it does not occur. I was also slightly surprised to see that although the book is targeting the Pacific Northwest,

much of the basic information relies on 30-year-old information from the North Atlantic (e.g., the description of larval stages by Rice and Ingle, 1975—has nobody reared the larvae from ovigerous females in the Pacific Northwest?). This lack of updated information is not the fault of the author, of course, and indeed such compilations provide a valuable service in pointing out what we need to do to better understand this and other invasive species.

The second chapter examines five case studies of invasions of this species around the world (east coast of North America, Australia and Tasmania, South Africa, Japan, and western North America), with a strong emphasis on North America. The chapter also includes observations on the ecological and economic impacts of these invasions (when known), previous and predicted patterns of occurrence, and possible methods for avoidance or control of the species. Perhaps because I know less about these topics, I found this section enlightening and a wonderful source of information, although some of the material seems to repeat what is found in another recent publication on the effects of *C. maenas* in the Pacific Northwest (G. S. Jamieson *et al.*, 1998, *Journal of Natural History* 32: 1587–1598). The section on controlling the species once it is introduced includes examples of trapping, poisoning, offering bounties, and intentionally introducing biological control agents; I found this short section fascinating (though it may not be new to

scientists more in tune than I am with the eradication of undesirable species). The literature cited is up to date and thorough, and Yamada has done a great service to people interested in locating information about this species.

Following the two chapters are a pair of short appendices included to help separate *Carcinus maenas* from other crabs in the Pacific Northwest. Appendix A includes line drawings and brief descriptions of distinguishing features and natural history, whereas Appendix B has color plates, some good and some that could be better. Unfortunately, only 12 species are included in these appendices, giving the reader the impression that the diversity of crabs in the Pacific Northwest is quite low. On the other hand, these are perhaps the species most likely to be encountered by the nonspecialist and/or confused with *Carcinus maenas*, so despite my desire to see a more inclusive treatment, these sections hold true to the aim of the volume. The appendices are followed by a short (70-term) glossary and a very nice list of references, including some unpublished information in the form of theses and dissertations.

All told, this is a valuable compilation, and it will be seen as a very helpful resource for workers in the Pacific Northwest and for workers in other parts of the world where the introduction of *C. maenas* seems likely.—Joel W. Martin, Natural History Museum of Los Angeles County.