SHRIMP

THE ENDLESS QUEST FOR PINK GOLD

JACK RUDLOE
ANNE RUDLOE

Shrimp

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The Endless Quest for Pink Gold

Jack Rudloe and Anne Rudloe

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We dedicate this book to Edward Keith, Glen Buffkin, Geno Litcheldello, Nick Mosconis, Joe Morgan Cruse, Fuzzy Lively, and all the other shrimpers who died at sea or passed away after a lifetime of providing everyone with delicious shrimp.

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Foreword

I became acquainted with the shrimping industry four or five years ago when I was asked to do a TV commercial for the Alabama Shrimpers' Association. It was under a severe strain because of foreign pond-raised shrimp being dumped into the market. The object of the campaign was to get people to eat—and stores and restaurants to sell—Alabama, or at least Southern, wild-caught shrimp. I thought it was a worthy cause. A large seafood wholesale house I am familiar with once had nearly a hundred shrimp boats. Now what it has is big 18-wheelers at the dock unloading box after box of frozen pond-raised shrimp from Asia, which the wholesaler repackages in its own boxes with its logo on them.

I guess I was a logical choice to do the TV ad, since so many people associated the character in my book *Forrest Gump* with shrimping. In fact, I am reliably informed that in a *New York Times* survey that sought to find out why the *per capita* consumption of shrimp had skyrocketed from 1.4 pounds per person per year in the 1980s to 4.1 pounds in 2007, a significant number of people responded that it was because of the *Forrest Gump* movie. Whether this is true I don't know, but it has certainly left me with a sense of connection to shrimp and shrimpers.

And now along come the Rudloes, who, in *Shrimp*, bring an entirely new dimension to the subject, much as William Warner brought to the Chesapeake Bay blue crab in his unforgettable book *Beautiful Swimmers*.

Rich in stories of seamen and the sea, *Shrimp* tells a fascinating story not only of the little creature itself, but of all the

trials and tribulations the intrepid shrimper goes through to harvest it up. As scientists and marine biologists, the Rudloes know whereof they speak, and as writers, they have the talent and grace to make it interesting.

This is one of those rare books that will do honor to any bookshelf.

Winston Groom
Author, *Forrest Gump*

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About Shrimp

Shrimp are abundant, easy to catch, and delicious. Whether they're fried, steamed, boiled in beer, or served with sauces and dips, people love the sweet succulent flavor of shrimp. This is a book about shrimp, people who love to eat shrimp, fishermen who roam the seas catching them, and farmers who grow them in ponds. And it's a book about a conflict that is as old as humanity itself, hunter-gatherers versus agriculture—or, in this case, "aquaculture." Farmers have provided such a huge global supply of pond-grown cheap shrimp that low prices have nearly destroyed the fishermen.

All of this human behavior and activity swirl around small but enormously abundant crustaceans with long whiskers, bulbous eyeballs on stalks, ten legs, and a delicious tail. They can flip themselves off the seafloor and then dive into the mud to escape predators. Shrimp are laterally compressed crustaceans (flattened from side to side) with a streamlined shape

for swimming. They have slender delicate legs for perching briefly on the bottom rather than the stronger walking legs of crabs and lobsters. They swim forward with paddle-like appendages called pleopods on the underside of the abdomen. Backward swimming is accomplished by tail flipping of their uropods, the flat plates on the tail that enable propulsion (see Figure 2.1). Depending on which expert is asked, there are approximately four thousand species of shrimp. Different species occur from the tropics to the arctic, from the edge of the sea to the ocean depths and in freshwater lakes and streams. All shrimp are essential links in marine food chains. Several shrimp species support multibillion-dollar commercial and recreational fisheries.

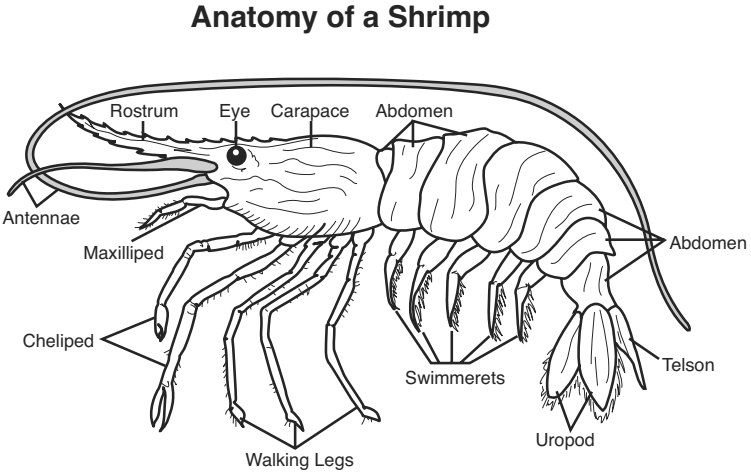


Figure 2.1 Anatomy of a shrimp

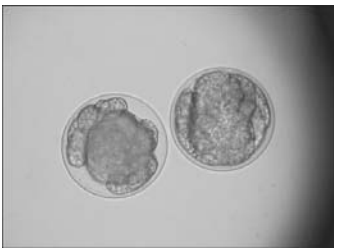
Courtesy of the Louisiana Sea Grant College Program

Approximately four hundred of those species, collectively called the penaeids, release their eggs into the ocean. These

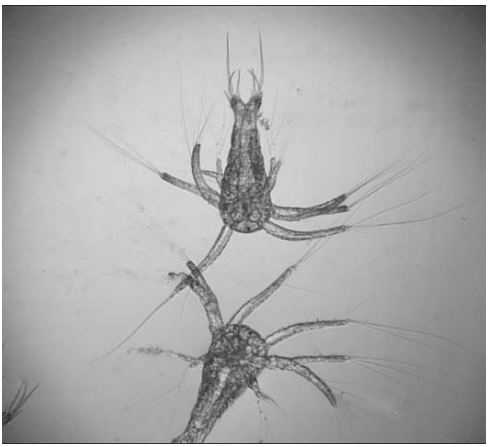
hatch as very undeveloped nauplius larvae, the first and simplest developmental stage of all crustacean species. A nauplius-stage shrimp is little more than a swimming head with the thorax or middle parts of the body and abdomen still absent. Among the twenty-eight hundred species of mostly tiny caridean shrimp, females carry their eggs on their abdomens until they pass through the nonfeeding nauplius stage. Then the eggs hatch as a more developed larval stage, which has more segments and appendages. Most carideans are tiny, inconspicuous, and known only to marine biologists, but a few species are large enough to eat and support fisheries.

In both the penaeids and carideans, the newly hatched baby shrimp are barely visible to the eye, look nothing like the adult shrimp they will become. They live independently in the plankton as they grow, molt, and develop through a long series of larval stages. When they become fully formed juvenile shrimp, they leave the plankton and take up life on the seafloor. Figure 2.2 shows the life cycle of the shrimp.

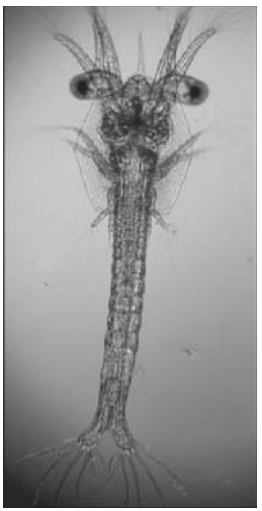
The approximately eleven hundred species of opossum shrimp or mysids are small shrimp like crustaceans, only distantly related to the penaeid and caridean shrimp. The females have brood pouches in which the developing young complete all the larval stages prior to hatching as small but fully developed mysids. Another group, the stenopodids, include only about twenty species of shrimp, but many of them, such as the banded coral shrimp, are beautifully colored and are popular in home aquariums. They have large claws and are more closely related to crabs and lobsters than to the penaeid or caridean shrimp.



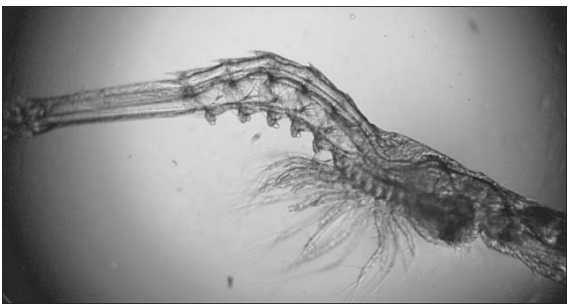
1. Fertilized Egg



2. Nauplius Larvae



3. Protozoea Larvae



4. Mysis Stage

Figure 2.2 Life cycle of the shrimp

Courtesy of American Shrimp, LLC

And it gets even more complicated!

"So many things are called shrimp that it's confusing," chuckled Greg Jensen, an expert on crustaceans at the University of Washington, when we asked him to define the word *shrimp*. "Seed shrimp are ostracods; fairy shrimp, clam shrimp, brine shrimp, and tadpole shrimp are brachiopods; and skeleton shrimp are amphipods. Then there are mud and ghost shrimp, which are yet another group, and mantis shrimp or stomatopods. As I see it, 'shrimp' seems to be almost any crustacean that isn't a lobster, barnacle, or crab."

The word *shrimpe* originated in Britain. It means something very small, although there is nothing small about the impact of shrimp on the world. The idea of smallness no doubt came from people catching the little gray shrimp, *Crangon crangon*, in European waters. "Prawn," on the other hand, is a term usually reserved for the largest species, like *Pandalus eos* and *P. playceros*, the holy grail of shrimp.

Of all species of shrimp known to science, only a few are eaten by man. Most of those are large penaeids of several different species that occur in huge numbers. They may be sun-dried, canned, iced, or frozen, or even freeze-dried for astronauts and backpackers. Everywhere in the world, when edible shrimp show up, the human feeding frenzy begins. Outbreaks of shrimp fever occur aboard trawlers working at sea, among people in Africa dragging them ashore with beach seines, and in recreational fishermen from South Carolina to British Columbia.

In the Pacific Northwest, the six-inch-long cold-water pinks, *Pandalus jordani*, and spot prawn, *Pandalus playceros*, are commercially trapped or trawled from Oregon to Alaska, as are the closely related *Pandalus borealis*, caught off the coast of Maine. In Europe there is a food market for the little gray caridean, *Crangon crangon*, and in Asian waters fishermen set nets to catch tons of thumbnail-sized grass shrimp, *Palemonetes*.

All of those are minor fisheries compared with penaeid shrimp. Wild and farmed, penaeid shrimp are a fifty-billion-dollar-a-year industry, which makes them the most valuable creature in the sea. The vast majority of wild-caught shrimp in the United States are three closely related species known in the U.S. as pink *Farfantepenaeus (=Penaeus) duorarum*, brown *Farfantepenaeus (=Penaeus) aztecus*, and white *Litopenaeus (=Penaeus) setiferus* shrimp, from the estuaries, bays, and sounds of the South Atlantic and Gulf of Mexico. These shrimp are so similar that only a specialist can tell the difference. The commercial pinks and browns are "grooved shrimp" with a slit along the back of their last segment, in front of their tail fins. If you can insert your fingernail into the groove, most likely it's a pink. If the slit is too narrow, it's a brown, and if it has no groove at all, it's a white shrimp, which usually has a beautiful green tail fin.

There is a shrimp for every habitat. Some species seek out sea grass meadows; some dwell in soft mud, coarse sand, and shells. Shrimp are harvested wherever rivers flow to the sea, sinuously winding their way down to the bay, and slowly blending fresh water with salt within bays, estuaries, and

barrier islands. Sea bobs in the genus *Xiphopenaeus,* sugar shrimp *Trachypenaeus constrictus,* rock shrimp *Sicyonia brevirostis,* and royal reds *Pleoticus (=Hymenopenaeus) robustus* are also landed in small numbers. Royal reds are found between one and three hundred fathoms by a few large commercial vessels with big winches. Miles of cable drag them up from the frigid deep waters at the edge of the continental shelf in an area that snapper fishermen call "the end of the Earth."

The scientific names of shrimp not only confuse, but they also put anyone who isn't an ardent invertebrate zoologist to sleep. Yet scientists rely on these Latin names to eliminate confusion since common names for the same species often vary from region to region and language to language. Scientific names change only because zoologists working in different places may decide that the original classification didn't accurately reflect who is related to whom biologically. Two different biologists might independently describe the same species, resulting in two different names for what later proves to be the same animal. Or the same name might be used for animals that are later discovered to actually be two different species. Then a decision has to be made as to what the beast will be called, using an elaborate set of rules based on when the species were first discovered and by whom.

Carl Linnaeus, the father of the system for classifying living species, first named the white shrimp from North America *Cancer setiferus* in 1767. When Harvard naturalist Louis Agassiz examined the white shrimp in 1849, he reclassified it as *Penaeus setiferus* (*Linnaeus*). Scholars in those early days of

biology were schooled in the classics. Penaeus was the Greek river god who turned his daughter, Daphne, into a tree because Apollo was after her with dishonorable intentions. The magical transformation didn't stop the great sun god from trying to make love to the laurel, but that's another story.

In due course the closely related pink and brown shrimp of the southeastern U.S. became *Penaeus duorarum* and *Penaeus aztecus*. Other species of *Penaeus* were later described from other parts of the world. All was well until 1997, when Perez Farfante and Brian Kensley published a monograph of the prawns and shrimps of the world. After examining morphological differences in different species of the genus *Penaeus*, they decided that the most commercially important invertebrates in the world were misclassified, and they instituted sweeping changes. The genus of all the warm-water pink, brown, and white shrimp should no longer bear the name *Penaeus*, but instead should be *Litopenaeus* for white shrimp and *Farfantepenaeus* for brown and pink shrimp. Other species became *Marsupenaeus* and *Fenneropenaeus* The delicious deep-water royal red shrimp that was once called *Hymenopenaus* got a new name, *Pleoticus*. With that monograph, twenty-seven well-established scientific names for twenty-seven species of penaeid shrimp bit the dust, to the annoyance of many in the aquaculture industries. Only the giant tiger prawn, *Penaeus monodon*, was allowed to keep its original name.

Since then many scientific research papers have been published, dutifully using the new names. The change is now in dispute, however. A shrimp expert in Thailand, where the

world's biggest shrimp growers live, insisted that no DNA evidence justifies the renaming of all those species. Also, a loophole in the rules for bestowing scientific names allows the retention of older, well-established names. The scholarly battle rages on as different scientific authors choose to use either the new or old names in their technical publications. In the most recently published research papers, the new names are winning by a margin of 2 to 1, so we've grudgingly adapted the new names in this book. This practice may yet be reversed in the future as more taxonomic research is done.

By whatever name they are called, shrimp have been cooked and eaten for thousands of years. "There have always been customers for shrimp ready to fall upon them whenever and where they could be discovered," wrote M. Gavius Apicius, a Roman author of cookbooks in the first century A.D. One of the first recorded foodies, he cooked at his own banquets. It's said that when he heard that there were large delicious shrimp to be had in Libya, he traveled to Africa to eat them on the spot, but he was so disappointed by the size of what he saw that he sailed home without ever going ashore.

Whether they are the tiny caridean grass shrimp of the genus *Palemonetes* or the gray *Crangon* shrimp of the North Sea and China, the cold-water pinks of the North Pacific and North Atlantic, the warm-water penaeid shrimp, or the farmed tiger prawns and big freshwater *Macrobrachium* shrimp of the tropics, they're all good to eat. There are no poisonous shrimp, although some unfortunate people are highly allergic to them. Although we've never tasted the blind cave shrimp, nor have we feasted on the bizarre eyeless shrimps

that live in the hydrothermal vents at the bottoms of the deepest oceans, we're sure they are delicious. We know of no one who has eaten the semi-terrestrial mangrove burrowing shrimp of New Guinea, but a shrimp is a shrimp, and it might be worth a try.

Today, farmed shrimp outnumber wild-caught shrimp in the marketplace. Before the 1990s, approximately 70 percent of shrimp consumed worldwide were caught at sea. By 2000, 50% were farmed. By 2009, 70 percent had never seen the ocean but grew up in ponds in China, Thailand, Vietnam, India, Taiwan, Ecuador, Mexico, and other Asian and Latin American countries, as well as Australia. Black-and-white tiger prawns from Pacific mangroves, *Penaeus monodon*, are farmed in Asia. Giant freshwater caridean shrimp *Macrobrachium rosenbergii* and South American white shrimp *Litopenaeus (=Penaeus) vannamei* are being raised in greenhouses in Colorado, Kansas, Alabama, and Maryland, as well as ponds and impoundments across Central and South America.

Gourmets, epicureans, and seafood purists insist that wild-caught shrimp fresh from the ocean are superior to shrimp that are raised in ponds and fed artificial feed. We prefer a wild shrimp that has spent its life roaming the oceans, eating a wide variety of foods, but we have eaten farm-reared *vannamei* that were excellent. In one shrimp taste test in Seattle a few years ago, tasters preferred wild-caught *vannamei* over wild whites and browns; farmed *vannamei* came in well down the list. Nevertheless, farmers claim their product is more uniform and has a better quality and consistency than

wild shrimp that may have been sitting on ice in the hold of a shrimp boat for a week before coming to the dock. Farmed shrimp are seined out of the ponds and go immediately into the freezer, often still kicking.

The fresher the shrimp, the less flavor they have. Slightly aged shrimp taste "shrimpy," just as hunters hang game for a few days to improve the taste. Processors produce peeled, gutless, beheaded, and breaded popcorn shrimp by letting them age until the meat separates from the shells so that they can pass easily through the shelling machines. Peeling fresh shrimp by hand is a tedious process. Some people practice shrimp peeling meditation by simply switching off their brains, putting down all their opinions, and just doing it. Or it is possible to boil them whole and let everybody peel their own at the dinner table.

The habitat where wild shrimp are caught affects their taste. White shrimp from the Atlantic are sweeter and firmer than whites from the Gulf of Mexico. The little hard-shelled rock shrimp that are trawled offshore from the east coast of Florida at a depth of eighty feet taste like bites of lobster. Royal reds, which live on the bottom at the edge of the continental shelf in depths of twelve hundred feet, are so sweet and tender that they taste more like scallops than shrimp. Brown shrimp feed on iodine-rich algae that gives them a hearty iodine flavor, while brownies from the West Coast of Mexico have a milder flavor. When pink shrimp from the Tortugas are cooked, their shells turn a deeper shade of pink than other species, and their meat turns from translucent to pink skin tones. Their flavor is excellent—almost as good as the

succulent white shrimp from the Carolinas and Georgia, which, except for the northern spot prawn, are the sweetest of all. But it's all subjective and a matter of taste. If you eat them breaded and covered with cocktail sauce, you'll never notice the difference.

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