

in store for her tale. Western thought had long known Prometheus, Faust, the Golem. Shelley's story, and her expansion of it into a three-volume novel in 1818, warned of poisonous fruits in the garden of new scientific knowledge.

Just as the book *Frankenstein* marked a transition from gothic to science fiction genres, so its protagonist was an intermediate figure, an occultist turned science student putting new concepts in the service of ancient fantasies. As a dropout from the University of Ingolstadt, Victor Frankenstein was not a scientist in the later 19th-century sense but a wealthy gentleman-amateur who apparently had no intention of joint-stock monsterfarming. The historian of science James Secord has noted the period's flourishing country-house hobby of attempting to create living things with electricity. Only a decade after the novel appeared, Justus Liebig's laboratory at the University of Giessen began to show the industrial and agricultural potential of professionalized, organized science.

Shelley's creation might have receded to a paragraph or two in Romantic literature survey texts, like other paleo-thrillers. The daunting original strikes many 20th-century readers as a stretched-out short story adorned with implausibly eloquent declamations by the monster. Yet the same fictional monster, minus soliloquies, has astonished the world. To adapt biologist Richard Dawkins's much later concept, it has become a "memester," one of those cultural constructs spread so widely by word and picture that it has taken on a life of its own. While the story soon became a favorite of the London stage, it was, appropriately, new technology that gave the monster new life: James Whale's 1931 film (based on a modern London theatrical revival), in which Boris Karloff created one of the century's most persistent visual icons. The film also showed the money in monsters, earning the studio \$12 million on an investment of \$250,000.

Turney, who teaches in the University of London science studies program, fears that the pervasive image of the demented scientist or promoter who produces grotesque results (H. G. Wells and his Dr. Moreau, Michael Crichton and his sinister entrepreneur John Hammond) is far from benign alarmism. Turney traces the Frankenstein metaphor through generations of scientific research and imaginative literature on the future of genetics, including Karel Capek's *R.U.R.* 1921 drama (which introduced the word *robot* into non-Slavic dictionaries), and Aldous Huxley's

Brave New World (1932).

Turney argues convincingly that the monster metaphor impedes clear thinking and debate on issues of biotechnology. And he cites a study by Michael Mulkay suggesting that science's critics may no longer be the chief culprits. In the finest traditions of unintended consequences, scientists themselves now invoke the monster metaphor to chill discussion of risks by imputing vulgar fears to opponents and critics. The flesh-and-blood Creature is turning into a straw man.

Monsters are notoriously resilient, as viewers of horror film sequels will attest. Putting Mary Shelley and H. G. Wells out of mind is like the famous psychological experiment of not thinking about a white bear for 10 minutes. Only other vivid images can displace the unwanted one. Until they do, Turney's impressively researched, well-argued book will be essential reading.

—Edward Tenner

**ALIEN INVASION:
*America's Battle with Non-Native
Animals and Plants.***

By Robert Devine. National Geographic Books. 288 pp. \$24

The nation's least-known environmental problem is becoming one of the more menacing ones. Exotic species are running amok, driving native species to extinction, degrading natural ecosystems, threatening the public health with diseases that even Hollywood hasn't discovered. In a cross-country tour to survey the damage, Devine, a journalist, found plenty of evidence of this ecological crisis. He met embattled farmers, botanists, zoologists, scientists, and gardeners, as well as a Sonoma County vintner whose harvest was eaten by herds of wild pigs.



Zebra mussels, which came to America in ships' holds, clog filtration systems and kill clams, but they are also a favored food source of some species, including blue crabs.

Most non-native species—wheat, soybeans, oranges, tomatoes, rice, apples, and irises, for instance—cause no trouble. The danger comes from plants that are “invasive,” a term that is difficult to define because so many imponderables can turn nice plants nasty. For nearly 50 years, Floridians put Asian fig plants in their gardens without incident. A few years ago, the figs suddenly began spreading. It turned out that the plant’s natural pollinator, an Asian wasp, had followed its host to the United States.

Invasive non-native species in the United States date back to the 19th century and before. Ben Franklin brought in Chinese tallow for the production of candle wax; it now overruns bottomland forests and wet prairies in the South. In the 1880s the federal government imported carp; the so-called “wonder fish of Europe” turned out to be a worthless predator here. Ornithologists returned with European house sparrows that rapidly fattened on agricultural crops. Belatedly, restaurant owners put sparrows on the menu, a New York newspaper claimed they made excellent pot pie, and the state of Michigan offered a penny per dead bird. Still the sparrows flourished.

The prize for introducing the greatest number of non-native species goes to the U.S. Department of Agriculture. By 1923 it had introduced more than 50,000 exotic plants, among them crabgrass. Today, an agency within the Department of Agriculture is responsible for checking the millions of ships, plants, and packages that may be transporting larvae, bugs the size of a comma, seeds, even microscopic pathogens. Naturally, aliens sometimes slip through. Serrated tussock, a noxious weed, arrived in packages of seeds from Argentina via Wal-Mart. The Asian tiger mosquito, a carrier of several deadly diseases,

came in a shipment of used tires.

After decades of ignoring or underestimating the invasion by non-native species, citizens have begun to take action. The Nature Conservancy, the Audubon Society, and even the Garden Club of America (a longtime holdout) now support the crusade, and many gardeners are switching to native plants. Still, powerful forces stand in the way of change. Congress remains largely unaware of the problem. Animal activists protest whenever a creature, however harmful, is killed. For fun or profit, people still smuggle in dangerous species as pets: tarantulas, geckos, hissing cockroaches. Nurseries resist changing their inventory of invasive plants—such as purple loosestrife, now among the nation’s most destructive—because they’re easy to grow and thus easy to sell.

Devine believes that the menace can be contained. But how? “Biocontrol,” the deliberate introduction of the predators and parasites a species leaves at home, has not worked well so far, mostly because the agents end up attacking species other than their targets. Pesticides do the same; companies like Monsanto produce wide-spectrum chemicals to maximize profits. And global warming may exacerbate the problem, the author observes: species now confined to southern climes, such as fire ants and “killer” bees, will likely travel north as the temperature rises.

Calm but not blasé, amused by the attendant ironies but never flippant, Devine observes closely and writes with dramatic intensity. He makes such a compelling case for the problem that only his optimism about its solution seems unwarranted.

—A. J. Hewat

Arts & Letters

STEPHEN SONDHEIM: *A Life*.

By Meryle Secrest. Knopf. 480 pp. \$30

Sondheim is the pre-eminent musical dramatist of our time, and not merely because there are no competitors for the title; he would wear the crown even in a stadium of rivals. Now in his late sixties, he merits the tribute Secrest has paid him, a full-scale life in print.

Sondheim was born in 1930 in New York City, grew up on the West Side of Manhattan in upper-middle-class privilege, and went to private schools and Williams College. He

was the product of a troubled marriage—an ineffectual father who one day simply walked out on his difficult wife to live with another woman—and his childhood would send him into permanent analysis as an adult. He found encouragement for his musical talent from the lyricist Oscar Hammerstein II, a mentor and a second father.

By the time he was 25, Sondheim was working with Leonard Bernstein on the lyrics for *West Side Story*. He wrote the lyrics for other shows (*Gypsy*, to the music of Jule