



From the cover of "Man and Microbes"

## Tracing illnesses to their genetic roots

If there were a Forrest Gump of biologists, he might say: "Life is like a hiccup. You don't know why it started, and you don't know when it will end."

For the time in between, scientists have a better grasp. Life, in the evolutionary scheme of things, is about change and opportunism. Those organisms that are better able to adapt to changing surroundings are long-term winners in the only sense that matters biologically: They pass themselves on, through their genes, to the next generation. The principle of natural selection applies equally well to societies of viruses or humans.

As well as this works to explain many things, it also raises nettlesome questions. If nature, through natural selection, can carry on a sort of perpetual purging and pursuit of self-perfection, why hasn't it found a way to prevent nearsightedness and weed out genetic disorders such as Alzheimer's? Why do we suffer so when we catch a cold or flu? Why do we get depressed? Why do we still have an appendix?

In **Why We Get Sick: The New Science of Darwinian Medicine** (Times Books, \$24, 291 pages), Randolph Nesse and George Williams trace the cause of many human disorders to our genetic origins. A study of pregnant women, for instance, shows an almost exact match between the course of pregnancy sickness and the time when the fetus is most vulnerable to toxins. Thus, the heightened sensitivity of women to strong odors and flavors during the early stages of pregnancy may have evolved long ago as a means of preventing the mother from eating, say, a piece of putrid meat and harming the fetus.

In a similar way, the authors, laying the groundwork for what they call Darwinian medicine, argue that depression, fever and gout are the consequence of a cost-benefit decision made at the level of the gene, with the longer-term gains outweighing short-term pains. Does life design itself this way? With many keenly made connections, the authors make a convincing case that it does.

With the discovery this summer of a deadly new disease, human granulocytic ehrlichiosis (HGE), as well as continuing signs that many strains of disease-causing bacteria are becoming increasingly immune to some antibiotics, the timeliness of Arno Karlen's **Man and Microbes: Diseases and Plagues in History and Modern Times** (Tarcher/Putnam, \$24.95, 266 pages) could not be greater.

Mr. Karlen, a veteran science writer, chronicles the appearance of virulent new infections such as AIDS and Brazilian purpuric fever, as well as new outbreaks of old infections such as cholera and tuberculosis previously brought under control by modern drugs.

Mr. Karlen scrupulously details the larger story by charting the ebb and flow of disease throughout history. What is happening today, we learn, is what has always happened, albeit perhaps at a slightly accelerated pace; namely, the appearance of novel infections in response to new contacts, changes in the ways people live, and human-induced modifications in the environment.

The numbers talk. The medieval bubonic plague, carried by the flea of a migrating rat, killed 40 million to 50 million people. The 1918 epidemic of Spanish flu, a strain of the generic infec-

tion whose ultimate origin is farm animals, took 30 million lives in six months. With proficient research, Mr. Karlen has assembled a testament to the precarious vulnerability of humans to the condition of being alive.

Sex, as we all know, can be costly. For biologists, however, the problem is how to reckon these costs with the return of some tangible advantages.

As Richard Michod notes in **Eros and Evolution: A Natural Philosophy of Sex** (Addison-Wesley, \$25, 241 pages), the costs of sex — time, energy, chance of infection — actually hasten the journey to the grave for many organisms.

How does a sexual organism differ from an asexual one? How is it that each parent of a sexually produced organism supplies exactly half of its offspring's chromosomes? Getting the reader up to speed means that Mr. Michod must provide a short course in genetics and touch upon such concepts as meiotic recombination and heterozygosity.

The result is a book whose audience is somewhere between Mr. Michod's peers and the general public. Perhaps a better editorial hand would have brought out Mr. Michod's interesting ideas about how the costs of sex are biologically justified in the right way to the right audience.

Scientists, to carry the evolutionary analogy a step further, have been under a bit of selective pressure of late. First there is the competition for a piece of the ever-shrinking funding pie. Then there are public doubts about the value of certain basic research projects and ventures, such as the canceled supercollider and the space program. Last, and most alarming, is the extremist view that science itself is bad and the entire system of Western rationality passed down from the Greeks a false and dangerous god.

As a result, a new breed of scientist — whose spirit is exemplified in C.P. Snow's phrase "third culture" — is finding that communicating with the public is as important and necessary as publishing in the peer-reviewed journals. John Brockman's **The Third Culture: Beyond the Scientific Revolution** (Simon & Schuster, \$27.50, 413 pages) borrows Mr. Snow's term as the title for a collection of essays by scientists whose names, as if to prove the point, should sound familiar to regular readers of science books.

"Essays," here, may be a misnomer, as Mr. Brockman has distilled the pieces from tape-recorded conversations. Also misleadingly, perhaps, the book never really takes up the theme of science in culture, other than in a few introductory comments.

If the reader is able to forgive these things, the book does have something to offer: scientists writing (talking?) clearly and with zeal on a host of topics, ranging from the nature of consciousness to atomic physics. As some of the scientists trace the course of their careers, we see the ambition for ideas, the intolerance of rivals, the conjecture falling short of proof and the careful reasoning to a position of tentative certainty. This is the curious, dogged, soiled, human face of science. And also its best-devised defense.

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