

Doctoring à la Darwin

BY KATHLEEN MCAULIFFE

Medicine is dedicated to treating symptoms as well as disease. Fever and diarrhea are commonly seen as signs of ill health in need of palliatives. A runny nose is a nuisance that should be suppressed until a cold or allergy has passed. A low iron count is a "deficiency" that requires correction. In general, the medical community regards unpleasant physical reactions to disease and other bodily disruptions as harmful.

But a few rebel researchers challenge that view. They argue that doctors need to consider the significance of symptoms before deciding on how—or whether—to treat them. Their rationale rests on the belief that many symptoms evolved as part of the body's natural defense system and may actually be beneficial. Treatments that act to suppress these uncomfortable reactions, they caution, may in fact delay recovery.

This evolutionary approach to treatment goes by the name of "Darwinian medicine," a term coined by George C. Williams, Ph.D., an evolutionary biologist at the State University of New York at Stony Brook, and Dr. Randolph M. Nesse, M.D., a psychiatrist at the University of Michigan Medical School in Ann Arbor. In a 1991 paper, Williams and Nesse maintained that doctors should pay more attention to

the evolutionary origins of the mechanisms human beings have evolved to protect the body from microbes and toxins. "This sort of analysis can

provide exciting insights into treatment that are counterintuitive," says Williams.

At the first signs of fever from a cold, for example, doctors have often recommended temperature-lowering drugs such as aspirin or acetaminophen. By exploring the evolutionary role of fever in illness, however, disciples of Darwinian medicine have come to question that strategy. It turns out that increased body temperature is a common response to infection throughout the animal kingdom—from humans and rabbits to turtles, frogs, and even lowly insects. That means it evolved a long time ago, says Matthew Kluger, Ph.D., a phys-

iologist at the University of Michigan Medical School in Ann Arbor. And the fact that the response was preserved through the ages means it probably gives organisms a major survival advantage.

To find out just what that advantage might be, Kluger's team injected pathogenic microbes into lizards. Being cold blooded, a lizard can't have a fever but will usually respond to infection by basking in the sun. As part of the experiment, his team kept some lizards in the shade. "In the cooler environment they suffered a much higher death rate" as a result of the infection, says Kluger.

Test-tube studies of infected

OUTER LIMITS

Can man's evolutionary past offer clues to a better way to treat disease? Some bold theorists think so



human tissues shed more light on how fever works as a defense mechanism. Higher temperatures tend to slow the growth of many strains of bacteria while stimulating the movement of immune cells to the site of the infection.

Does that mean it's bad to take aspirin when you have a fever? Kluger warns that any temperature above 104° may itself be life threatening and should therefore be lowered by the most effective means possible. But when it comes to milder fevers, patients should be aware that aspirin has its trade-offs. "It's great for relieving the aches and pains associated with an infection," he says. "But by lowering body temperature, aspirin may prolong recovery, too."

Runny noses—another bane of cold sufferers—may

also be a part of the body's strategy for combating infection. Researchers at the National Institute for Allergy and Infectious Diseases (NIAID) have found that the nasal secretions produced during a cold are loaded with antibodies and other proteins that can attack viruses in the outer layers of the mucous membranes. "The proteins probably help clear the cold—that's probably part of the reason they're there," says Michael Kaliner, M.D., chief of the allergic diseases section of NIAID's Laboratory of Clinical Investigation.



"We'd guess that taking away all the good stuff in a runny nose by drying it up may not be good for a person who has a cold," says Kaliner. "But we don't have proof." Based on his findings, though, Kaliner doesn't advocate aggressive therapy for the sniffles.

Advocates of Darwinian medicine are equally wary of correcting the low iron counts that accompany an ongoing infection. Their caution stems from the discovery that a temporary drop in the body's iron level can serve as a defense as well. "Many microbes need

iron to multiply," explains Kluger. "And during infections, the amount of iron in the blood plasma falls to roughly half its normal level."

As evidence of the benefits of this tactic, Kluger points to a pioneering study of Somali nomads—a people who are chronically depleted of iron because of highly restrictive diets. In a trial conducted by M. John Murray, M.D., professor of medicine at the University of Minnesota, 71 nomads were given supplements to restore their iron levels to normal. Within a month, more than

one third came down with malaria, brucellosis, salmonella, or other infections. By contrast, most of the group who didn't take supplements remained healthy. "It turns out that the iron was making people with latent infections get worse," says Murray.

Another common affliction that is being reassessed in the light of evolutionary adaptations is morning sickness. Both women and their doctors tend to view morning sickness as an undesirable side effect of pregnancy. Yet studies by Margie Profet, an evolutionary physiologist at the Uni-

versity of California at Berkeley, suggest that nausea and vomiting may be nature's way of encouraging pregnant women to avoid dietary toxins that could harm the embryo. Profet claims that morning sickness is triggered by certain foods; coffee, for one, could be responsible for nausea in the A.M.

"And the foods that typically cause it—such as garlic, onions, broccoli, and spices, as well as coffee—contain high levels of natural toxins," she says.

While most of the toxins pose no threat to adults, the embryo may be sensitive to these agents, particularly during the development of its major organ systems two to eight weeks after conception. "It's no coincidence that morning sickness usually begins to subside when that period comes to an end," says Profet. Mainstream physicians point out that some women virtually never suffer from morning sickness, and others have it for much longer than eight weeks. Morning sickness, they believe, is most likely a reaction to hormones produced during pregnancy, not toxins in foods. But Profet claims those observations don't necessarily contradict hers. Increased sensitivity to the cues that indicate natural toxicity—such as pungent odors and bitter tastes—could be mediated by hormones and could very well vary from one woman to the next, she says.

Why hasn't Darwinian medicine attracted a broader following among mainstream practitioners? Part of the problem is that the fledgling science is still struggling for recogni-

Fever and iron-poor blood may have evolved to counter bacterial infections.

tion. "A lot of doctors are uninformed about the field," says Williams. "They don't yet fully grasp the relevance of these concepts to specific treatments."

To be fair, that relevance isn't always easy to grasp. Evolutionary survival mechanisms vary from disease to disease, and there are few rules for treatment that apply across the

board. The medical community already recognizes this principle in the case of diarrhea. Diarrhea may be a beneficial response to some bacterial infections, since it helps to flush the offending microbes out of the body. Indeed, Paul Ewald, Ph.D., a biologist at Amherst College in Massachusetts, notes that some antidiarrheal drugs have been shown to delay recovery from dysentery. Yet in cholera, diarrhea hurts more than it helps. The bacterium that causes cholera releases a substance that makes the cells lining the intestines secrete voluminous amounts of fluid, up to 20 or more quarts a day. "Diarrhea is not part of a person's defense system in this instance—it's part of the bacteria's strategy for survival," says Ewald. The microbe loosens the bowels so it can be borne out of the body more easily. "People with cholera can actually die from diarrhea."

Further research on host-parasite interactions might bring greater acceptance of Darwinian medicine. In the meantime, its chief proponents aren't too worried by the field's less than enthusiastic reception among doctors. They point out that challenging ideas seldom meet with instant approval—as Darwin himself could attest. ■