If mice and guppies can live dramatically longer on a drastically reduced diet, what about you? And would you call it living?

AIMEE LEE BALL has a very light lunch with the Calorie Restriction Society.

The Case for Eating Less (and less...)

WITHIN A FEW SQUARE BLOCKS OF THE BEST Western Hotel in Madison, Wisconsin, there are dozens of places to indulge in deep-dish pizza, blueberry pancakes, and the mega-butterfat ice cream for which the dairy state is known. None of these culinary delights has made its way to the hotel's second-floor meeting room, where the annual conference of the Calorie Restriction Society (CR Society) is taking place. Perhaps 50 people are sitting at tables set up with pitchers of water and bottles of a saw palmetto and nettle root supplement (a kind of party favor for the men, touted to "support the prostate"). The members of this congregation are, without exception, extremely thin, some ›

Some people think the secret of longevity is eating like a mouse.

ILLUSTRATIONS BY ROBERT GIUSTI

with the enviably and fashionably buff looks of Hollywood, but some evincing the emaciated bodies usually associated with anorexia, end-stage AIDS, or holocaust. Cheeks are sunken; limbs look as if they would break like dry twigs. One man is eating greedily from an enormous bowl of salad greens—apparently his breakfast, since it's just 9 A.M. A reedy woman is using a plastic knife to stir and scrape into her mouth a few ounces of a soft orangy paste that she says is mainly whey—a protein derived from milk that's very big with the CR folk. I am not compelled to ask for a taste.

Welcome to the world of the perpetually hungry. What these people and their fellow 900 members of the CR Society have in common is a vigorous, unshakable belief that dramatically reducing caloric intake—by as much as 40 percent below what would make the body naturally feel full and satisfied—is the only way to retard the aging process. Until recently, it's been easy to dismiss these dietary evangelists as a lunatic fringe. The organization's Web site warns newcomers that the conspicuous change in appearance likely while following the CR regimen may invoke alarm among friends or strangers, and Brian Manning Delaney, the founder and president, has referred to the practice of eating less for the purpose of living longer as "anorexia longaeva."

Delaney is not a doctor, nutritionist, or health care professional. He majored in music at Brown University and now lives in Sweden, where he is finishing up a PhD dissertation on 19th-century German literature and philosophy. When asked if his lack of scientific credentials doesn't obviate the likelihood of people taking him seriously, he answers, with a calm assurance that somehow manages to avoid hubris, "Not after they talk to me for a while." Delaney's impressive self-education about caloric austerity began when he was hospitalized with a severe case of food poisoning. After spending some concentrated time reading up on diet, health, and longevity, he started an Internet-based discussion group about calorie restriction. "It became a little hobby for me," he says, "and I tried to introduce a more scientifically rigorous discussion into the popular, simplistic explanations for slowing the aging process."

Researchers put lab rats on low-calorie diets and extended their life spans by 33 percent.

Antiaging strategies are at least as old as Ponce de León's search for the fountain of youth. (There's a rather poetic symmetry in the fact that Ponce's 16th-century search led him to Florida, which would become a 21st-century geriatric mecca.) More than 60 years ago, researchers at Cornell University put lab rats on low-calorie diets and extended their life spans by 33 percent; the skinny rodents also had fewer age-related diseases. Caloric restriction has shown similar effects on roundworms, guppies, spiders, and fruit flies. The man who did the most to popularize the theory that pushing away from the dinner table could be the "fountain" for humans was Roy L. Walford, MD, whose books include titles like *The Anti-Aging Plan* and *Maximum Life Span*. A professor of pathology at UCLA's School of Medicine, Walford was a memorable figure (with his shaved head and intense eyes) as the physician for the self-contained ecosystem known as Biosphere 2, a controversial experiment during the early 1990s designed to discover whether humans could sustain themselves in a closed environment. Since the eight men and women of the original crew in the Arizona desert couldn't grow enough food to eat a normal diet, they practiced unintentional CR for about two years. Among the results, according to Walford's measurements, were lower blood sugar, blood pressure, and cholesterol—all so-called biomarkers of aging. Delaney had followed Walford's work with avid interest, and when the two got together with like-minded others in 1994, the CR Society was born—at a meeting in Las Vegas. (It's interesting to contemplate one last blowout at the Caesars Palace all-you-can-eat buffet.) The 79-year-old Walford now has ALS—Lou Gehrig's disease—but Delaney argues that making any association between this terminal neuromuscular disorder and the CR diet is as wrongheaded as it was to blame the fatal heart attack of running advocate Jim Fixx on his 26-mile marathons.

ADVOCATES OF CR INSIST THAT the point of the diet isn't to be thin, it's to eat less—and to eat less in a specific way that doesn't sacrifice vitamins or minerals. To get started, they figure out a "set point" (roughly, the weight their body tended toward as a healthy young adult) and then cut calories to drop at least a pound or two per month until they reach a CR "target weight"—15 to 25 percent below set point. Some people practice a milder form of CR with a target weight of only 5 percent or so below set point—"not that different from a health-conscious person eating a controlled diet," says Delaney, although he cautions that this may achieve fewer benefits than the more radical version. The CR diet is not vegetarian, but since followers consume so little, everything they put in their mouths must be nutrient rich. (In the recipe index on the society's Web site, even the "bingeing brownies" contain rice bran, brewer's yeast, and psyllium husk—that last ingredient being the active stuff in Metamucil.) "It's a pain in the ass at first," Delaney admits. His own typical diet is whole grain cereal with soy milk and raisins for breakfast, no lunch, and a dinner of vegetables with beans and a grain such as rice. Sometimes he adds a piece of fruit, with an indulgent dollop of fat-free yogurt if he's worked out that day. The results: age 40, 5'11", 135 pounds.

The regimen is sometimes known as Calorie Restriction with Optimal Nutrition, and members, who may refer to one another as CONTINUED ON PAGE 162

CONTINUED FROM PAGE 158 CRONies, share stories about bearing up under various negative side effects: certainly hunger, but also chronic cold feet, lightheadedness, irritability, loss of libido. Some people chat about lack of "cushioning"—discomfort sitting on hard surfaces because of reduced body fat. There are e-mail exchanges about the sleeplessness that often accompanies bedtime hunger along with helpful hints: room-darkening with a plastic tablecloth Velcro-ed to the window frame, or tuning a radio to the end of the dial to create white noise (you might also overhear a few pilots on the same frequency). One of the CRONies spent $1,000 to build a mini-kitchen in his basement, adjacent to a garden where he grows more than a dozen kinds of sprouts. His wife told him that the preparation of his giant salads was making too much of a mess.

SHANNON VYFF EATS ONLY once a day and is contemplating cutting that back to a meal every other day. Vyff, now 28, was a high school student in Kansas at the time of the Biosphere experiment when she became interested in Walford's antiaging prescription. After marrying her high school sweetheart, moving to Oregon, and having three children, she ballooned up to 210 pounds. So when her husband joined the National Guard to support his medical school education and left for basic training, Vyff embraced CR, dropping from plus size to 120 pounds on a 5'10" frame. "One friend says she noticed me out of the corner of her eye when I was in my workout clothes," says Vyff, "and she thought, *Oh, the poor girl has cancer,* before realizing it was me." (Exercise is a complicated subject for CRONies. According to some research, sedentary rats on CR lived even longer than rats that exercised along with caloric restriction. Plausible explanation? Exercise wears things out.)

Not even the most ardent CR enthusiasts advise it for children, but Vyff is already imparting some of its nutritional dogma to her family. Two years ago, her daughter, now a precocious age 7, read the list of ingredients on a juice box handed out by her kindergarten teacher and announced, "I can't drink this. It's not juice. Corn syrup is the first ingredient." When the family is away from home, instead of going to McDonald's they bring along CR "megamuffins" made with barley, mung beans, flaxseed, beet powder, algae, and gelatin. Vyff's husband calls them human lab chow. He's on the diet, too, although his recent tour of duty in the Middle East put a crimp in his CR style.

"I have to do a lot of explaining about why we eat differently," says Vyff, "and when I first started, I had more of a problem with cravings, feeling sorry for myself. Now dried apricots and walnuts have become my comfort food." If she's invited to the home of non-CR family or friends, she eats sparingly of whatever is served, while trying to stick to the less caloric options—there's generally a carrot stick or broccoli spear available. She insists that her vital signs are excellent, her hair and skin in admirable condition, the only problem being acne if she eats too much sugar—and by that she means organic plums or frozen bananas, not Krispy Kremes or Häagen-Dazs. "Other people say they deserve a treat," she says. "I deserve a healthy, long life, and the hunger feels good to me. When hunger hits, I analyze its effects on my body, bemusedly, and see it as an indicator that I'm on track, making friends with it, I guess."

> Okinawans, who live into their 100s, follow a life strategy that loosely translates as "eat until you are eight parts full."

One of the leading researchers of CR, though a nonpractitioner, is Richard H. Weindruch, who was a graduate student at UCLA en route to a PhD in experimental pathology when Walford was running a lab there. "Walford offered me a list of six topics that I could study, one of which was caloric restriction," says Weindruch, now 53 and a professor of medicine at the University of Wisconsin. "I immediately became fascinated and attracted to this little area of gerontology." By 1990 he was heading a study with rhesus monkeys, which share about 95 percent of their genes with humans, and today the animals on CR are showing fewer signs of aging, especially the oldest of them: less diabetes, less arthritis, less damage to their muscles, reduced risk of cardiovascular disease. "The average life span of monkeys is somewhere around 27 to 30 years," says Weindruch. "Our oldest are now in their mid-20s. It's showtime for caloric restriction."

There are myriad credible theories about why CR seems to work in animals. One is that it slows the rate of cell division in many tissues. (Uncontrolled cell division is a hallmark of cancer.) Another is that CR limits injury to mitochondria, the tiny structures that provide the energy for most cellular processes. A third theory suggests that CR triggers a kind of survival mode in which all unnecessary functions are shut down, conserving energy (of which the body has a finite allotment) to be spent later in life. Weindruch believes that CR may slow aging and prevent age-linked maladies by altering the pattern of gene activity in organs such as the heart and brain. It used to be that scientists had to wait an animal's entire life span to study the effects of antiaging interventions. Now there is a futuristic technology that uses DNA-laced chips about the size of a credit card to measure quickly the activity of thousands of genes and determine the biological age of tissues. "It's part of the revolution in genomics," says Weindruch. "It allows us to get a bird's-eye view of which genes are more active with regard to aging, and it may be very informative in telling us how calorie restriction is able to oppose the aging process."

The only culture that seems to put the philosophy of calorie restriction into practice naturally is on Okinawa, the largest of the islands between mainland Japan and Taiwan. People there tend to eat something similar to the CR diet—although not as strict—following a life strategy called *hara hachi bu,* which loosely translates as "eat until you are eight parts full," and they live longer, healthier lives than inhabitants of other Japanese islands. In the 1970s, the Japanese Ministry of Health, Labor, and Welfare sponsored a study ›

that showed an unusually high number of Okinawans 100 years or older, many of them still vital and living independently—a marked contrast with the number and health of American centenarians.

In this country, the ultimate legitimacy for CR might come from the hallowed hallways of our National Institutes of Health (NIH), where there are ongoing antiaging studies. "In lab animals—rats and mice—we can reliably increase life span by reducing their calorie intake," says Mark P. Mattson, PhD, who heads the Laboratory of Neurosciences at NIH's National Institute on Aging (NIA). "The nerve cells in their brains are more resistant to degenerating, and they're more able to retain their motor function and learning and memory skills." The regimen seems good for the heart, too: Lab rats on the diet were subjected to stress—either tiny little straitjackets or cold-water swimming tests—and when they were released, their blood pressure and heart rate returned to normal more quickly. "We think the diet stimulates cells throughout the body in beneficial ways," says Mattson. "Specifically, we're finding that meal skipping puts a mild stress on cells that helps them cope with more severe stress, the way vigorous exercise is a mild stress on your muscles and cardiovascular system. It's almost like whatever doesn't kill you makes you stronger."

The next set of lab rats is likely to need larger straitjackets: Mattson has submitted a proposal for a human study about meal skipping. The control group would eat three meals a day. The experimental group would eat the same number of calories and the same types of food but would consume all their food for the day within a four-hour time period, so the only difference between the two groups would be meal frequency. Humans can make for less cooperative research subjects than rodents, but the study will exact compliance in several ways: Probes placed under the skin will monitor body temperature (any time you eat, your temp goes up about a degree). And all the subjects, who will be limited to ages 40 to 50, must be living with a spouse or roommate, ensuring what Mattson calls feedback (read: tattletales).

The NIA is already recruiting participants for another exploratory human trial, a serious study with an apt name: CALERIE (Comprehensive Assessment of Long-term Effects of Reducing Intake of Energy). At three university research centers (Tufts, Washington, and Louisiana State), men and women between the ages of 25 and 60 will be monitored to see whether their risk of such age-related chronic diseases as hypertension and diabetes is affected by a calorie-restricted diet that's sufficient in vitamins and minerals. CALERIE is not the Draconian ›

regimen of CR extremists: The entirely reasonable proposed meal plans include English muffins or bagels and cream cheese for breakfast, sandwiches or salads for lunch, pork chops or spaghetti and meatballs for dinner (in limited quantities, of course), at a 20 to 30 percent reduction in calories. "We want people to live a good life," says Charles G. Hollingsworth, DPH, chief of clinical trials at the NIA's Geriatrics and Clinical Gerontology Program. "As you age, if you don't take care of what you take in, it will take care of you. We're not offering the fountain of youth; what we're offering is hope that with caloric restriction at about 20 percent, these people will show changes in the markers of aging."

Results of these studies are not expected for several years, and the CRONies are not waiting. As the scientific community tries to prove them right or wrong, they are collecting their own informal human data, although their organization is not old enough—and neither are its members—to reveal just how life prolonging CR is. "There's never been a group of people crazy or committed enough—pick your adjective—to test CR," says Delaney. "We can watch the rate at which people in our group start to die, but do we want to wait for that level of certainty?"

As Weindruch points out, even with proof positive that caloric restriction could make us all Methuselahs, it is unlikely to become mainstream, unless pharmaceutical companies find a way to make it easy. We already know that we'll live longer and healthier without cigarettes and suntans, but that knowledge hasn't completely eliminated smoking or tanning beds, and ours is a culture of rampant obesity. But it is possible that a 21st-century drug could mimic the cellular and molecular effects of CR on the body's tissues so people could reap the benefits and turn back the biological clock without resorting to semistarvation.

Then again, it might turn out that a life without raisin pumpernickel and cheesecake isn't necessarily longer—it just seems that way. ●

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