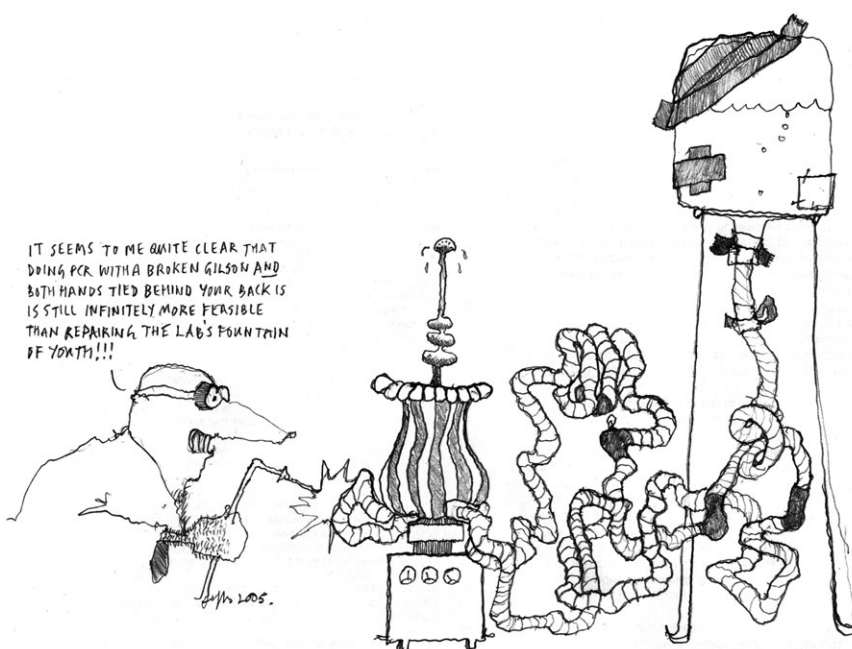


An occasional column, in which Mole, Caveman and other troglodytes involved in cell science emerge to share their views on various aspects of life-science research. Messages for Mole and other contributors can be left at mole@biologists.com.

Any correspondence may be published in forthcoming issues.



How much future?

For millennia, humans opened their eyes on the new day and thought, “Huh, I guess I wasn’t eaten during the night.” As anti-getting-eaten technology slowly improved, this thought was eventually replaced by “Huh, I guess I didn’t die of some horrible disease during the night.” It is only in the past few decades that we’ve come to expect to wake every day and think, “Hey, I want to do this waking up thing for a long, long time.” Sure, people have felt like this in the past, but only recently has the thought been answered. Science has begun to say, “You want it? You got it. No problem.” Not now, not soon, but eventually (the story goes), we’ll live as long as we like, and even longer.

The last century saw a dramatic rise in average life expectancy worldwide, as did the century before and the century before that, from about 40 in primitive societies to, well, a lot more. This will continue to increase dramatically as long as we manage to bring hygiene to places that don’t have it, which is a really superb way to increase average life expectancy. And the pharmaceutical industry can point to these dramatically increasing numbers and say, “See? We’re doing a bang-up job giving people more of the waking up thing.”

Of course, I’m not being fair to the

pharmaceutical industry or, indeed, to biomedical science, which does get a huge thumbs up for increases in average life expectancy in developed nations (where improved hygiene is not the predominant factor any more). By the way, 40 continues to be the average life expectancy of individuals in those few stone-age societies scattered in the far-flung regions of the earth, living in harmony with their environment, eating no processed foods, and never using a cell phone, microwave oven, or GM cows. Not that these things help us live longer, of course, but they come with the package.

Biomedical science is doing, and hopefully will continue to do, a great job of extending our average life expectancies. Detection and management of diabetes, cardiovascular disease, and cancer (to name some biggies), successful repair of traumatic injuries, vaccination against childhood and adult infection, and treatments when we get such infections, have all had major effects on our societies. Indeed, we are promised more. Personalized designer drugs, gene replacement therapies and, maybe some day, nano-doctors working on site to treat micro-problems: all of these suggest that we haven’t yet reached the asymptote on the life-extension curve. (Bend with me here, it isn’t often that I get to use “asymptote” in a sentence.)

Flushed with this excitement, we sometimes even hear wild words like “immortality” occasionally slipping through the ever-loosening lips of the prognosticators (how one qualifies as a prognosticator is not often obvious; unlike most so-called futurists, I have a *degree* in prognostication.) And this can lead to dire predictions (or they *would* be dire, if they weren’t so funny) of what will happen to society when we can all live forever – a problem we supposedly have to start thinking about now. I’m not making this up. In the US (literally, “United against Sentience”), there is a serious argument that the socialized retirement plan of Social Security will fail because in a few years everyone will be living well past 120 – okay, it’s only a serious argument for people who already want to scrap the program – and by “serious” I mean “made up.”

But is this what we should be telling people, that we want to make everyone live forever? Before we spend too much time on this, it might be worth taking a moment to decide what we really want here.

I’ll use two parables to make my case, neither of which I made up (if I *had*, they’d be funnier). The first goes like this. Once there was a brave youth who did a favor for a god, and the god offered him a wish in return. The youth asked to live forever, but unfortunately forgot to ask that he not age in the process. As a result, with the passing years, he became more shriveled, shrunken, and crippled (apparently plastic surgery, botox, and a good fitness program were not options) until eventually he turned into a grasshopper. This last bit may seem a little far-fetched, but evolutionary relationships often fail to figure in parables (yet another reason to teach evolution in grade schools). The second parable goes like this. Once, a master carriage builder (for those confused by “carriage”, think “engineless automobile”) built a vehicle that was so perfectly constructed, so perfectly balanced, of such perfect materials, that it operated without problem or difficulty for many years until one day, still running with precision, it simply fell to pieces.

Both are silly, of course. The first seems to urge us either to happily die before we get wrinkly, or perhaps to be careful about what we wish for, lest we become

orynchthopteran. But in a sense, isn’t this more or less what we’re getting from biomedical science? As we fix the lethal symptoms and consequences of aging, we seem to be replacing them with more (and sometimes worse, albeit slower) symptoms and consequences. Infectious disease, statistically speaking, was replaced by cardiovascular disease, which in turn was recently replaced by cancer as the leading cause of death in the aging cohort. (If you happen to be 25 and unfortunately happened to die, you most likely banged your head, but then again, its unlikely you’d be reading this). As cancer, in all its many guises, eventually succumbs to our efforts and intellects (heartily desired) what will come to replace it? Will we eventually need treatments against metamorphosis into grasshoppers?

I know what you’re thinking – stem cells – the latest in the struggle between science and society on so many levels. If we can only replace our worn out stem cells with young, happy ones, then aging will be a thing of the past. Provided we can do this research at all, of course, given all the ‘ethical dilemmas’. Some of you, reading this, may live in far away, forward-thinking countries, like California, where stem cell research is encouraged and promoted, because it holds the promise of making people fabulously wealthy – *and* solving the problems of aging. Others know that the research on stem cells is ethically problematic, because human blastocysts are apparently precious life forms that should be allowed to enjoy their existence in tanks of liquid nitrogen. But that isn’t what we’re talking about here. The most likely outcome of stem cell research is that we may well find ways to treat important diseases, but we’re not going to make people live forever. The more we hype it, the more disappointed the public will be when we *only* cure diabetes or degenerative neurological disease – of course, if we cure wobbly neck skin, everyone will be ecstatic. Meanwhile, aging research is making amazing strides in other arenas. Manipulation of genes with cool names like Methuselah (named after Methuselah Jones), and less cool names like p66SHC (named after p66SHC Jones) gives us flies and mice that live to extraordinarily old age, or at least get fewer wrinkles. And they don’t become grasshoppers, either. We can’t

manipulate these genes in you and me, however, but we can eat fish oil. And, by the way, if you think that stem cells are fraught with discussions of ethical dilemmas, wait until someone proposes to make kids who don’t get old!

The second parable, by contrast, gives us an alternative perspective. The carriage was constructed so perfectly that no one part wore out before any other part. From an engineering perspective this might be considered challenging. But we can at least imagine a well-built car that is maintained by a team of expert mechanics (I’m having some trouble imagining expert carriage mechanics in my neighborhood – actually, I’m having trouble imagining expert *car* mechanics in my neighborhood, but that’s my problem) well into what would be its old age, and humming along just fine until one day it breaks down and just can’t be fixed any more, long after any other car would be off the road.

Perhaps this marvelous carriage is what we might best hope for, not only for our cars (yes, please!) but also for *ourselves*. Quality of life, good health, a full range of activity both physical and intellectual, until the hour of our demise. A consummation, devoutly to be wished (to coin a phrase) indeed. And this *is* something we can offer the public. Not a *cure* for aging, but a long, productive life free of degenerative disease. Some day.

I’ll admit it, I’d prefer a sort of immortality: I imagine a distant future where we park our identities and our consciousness until a set time (as we do each night, but longer), when we wake up decades or centuries later, look around a bit, and then set the clock for the next wake-up time before going back to sleep. I’d love to find out what happens down the road, what new things we’ll learn, where we’ll go. And if there are still reality television shows (in which case I’ll just go back to sleep). But barring that fantasy, the goal of living as marvelous carriages seems like a pretty good deal. There is mostly likely a limit on how many tomorrows we can attain, but making them good ones is something we might be able to pull off.

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