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August's newsletter brings together a new essay on facing the challenges of evolutionary success, and a preview of the script of a forthcoming short animation - to be released in the fall.

Our Cooperative Darwinian Moment

Evolution can be ruthless at eliminating the unfit. "Red in tooth and claw," as Tennyson memorably described it, Nature routinely sacrifices billions of individual organisms and sometimes entire species in the course of its adaptive progression.

We humans have been able to blunt Nature's fangs. We take care of individuals who would not be able to survive on their own—the elderly, the sick, the wounded—and we've been doing so for a long time, perhaps tens of thousands of years. In recent decades more and more of us have leapt aboard the raft of societally ensured survival—though in ways that often have little to do with compassion: today even most hale and hearty individuals would be hard pressed to stay alive for more than a few days or weeks if cut adrift from supermarkets, ATMs, and the rest of the infrastructure of modern industrialism.

This strategy of expanding our collective fitness has (at least temporarily) paid off: the consequent reduction in our death rate has resulted in a 700 percent expansion of human population in just the past two centuries, and a current population growth rate of about 80 million per year (births in excess of deaths). Humans are everywhere taking carrying capacity away from most other organisms, except ones that directly serve us such as maize and cattle. We have become expert at cooperatively avoiding nature's culling, and thus at partially (and, again, temporarily) defeating natural selection—at least, in the way it applies to other species.

Some argue that "natural selection" is at work within human society whenever clever and hard-working folks get ahead while lazy dullards lag behind. The philosophy of Social Darwinism holds that this kind of competitive selection improves the species. But critics point out that individual success within society can be maladaptive for society as a whole because if wealth becomes too unequally distributed, social stability is threatened. Such concerns have led most nations to artificially limit competitive selection at the societal level: in the United States, these limits take the forms of the progressive income tax, Social Security, food stamps, disability payments, Medicaid, and

Aid for Dependent Children, among others. Even most self-described "conservatives" who think that government shouldn't prevent society's winners from taking all still think it's good for churches to give to the needy.

While the last few decades of rapid economic growth and material abundance—enabled by cheap fossil energy—led to a dramatic expansion of social safety nets in industrialized countries, they also featured the emergence of an ostensibly benign global imperial system led by the United States, whose fearsome military machine kept a lid on international conflict and whose universally accepted currency helped maintain relative international economic stability (in ways that served U.S. interests, of course). Globally, deaths from war have declined, as has mortality linked to dire poverty.

So far, so good (more or less).

Unfortunately, however, many key components of our successful collective efforts to beat The Reaper are essentially unsustainable. We have reduced mortality not just with antibiotics (to which microbes eventually develop immunity), but also with an economic strategy of drawing down renewable resources at rates exceeding those of natural replenishment, and of liquidating non-renewable resources as quickly as possible. By borrowing simultaneously from the past (when fossil fuels were produced) and the future (when our grandchildren will have to clean up our mess, pay our debt, and do without the resources we squander), we are effectively engaging in population *overshoot*. Every population ecologist knows that when a species temporarily overshoots its environment's long-term carrying capacity, a die-off will follow.

And so, as the world economy stops growing and starts contracting during the next few years, the results will likely include a global increase in human mortality.

Resilience theorists would say we're entering the "release" phase of the adaptive cycle that characterizes all systemic development, a phase described as "a rapid, chaotic period during which capitals (natural, human, social, built, and financial) tend to be lost and novelty can succeed." This is a notion to which we'll return repeatedly throughout this essay, and it's a useful way of conceptualizing an experience that, for those undergoing it, will probably feel a lot less like "release" than "pure hell." Among the possible outcomes: Government-funded safety nets become unaffordable and are abandoned. Public infrastructure decays. Economic systems, transport systems, political systems, health care systems, and food systems become inoperable to varying degrees and in a variety of ways. Global military hegemony becomes more difficult to maintain for a range of reasons (including political dysfunction and economic decline at the imperial core, scarcity of transport fuel, and the proliferation of cheap but highly destabilizing new weapons) and international conflict becomes more likely. Any of those outcomes increases our individual vulnerability. Everyone on the raft is imperiled, especially those who are poor, old, sick, or disabled.

We could redesign our economic, political, transport, health care, and food systems to be less brittle. But suggestions along those lines

have been on the table for years and have been largely rejected because they don't serve the interests of powerful groups that benefit from the status quo. Meanwhile the American populace seems incapable of raising an alarm or responding to it, consisting as it does of a large under-class that is over-fed but under-nourished, over-entertained but misinformed, over-indebted and under-skilled; and a much smaller over-class that lives primarily by financial predation and is happy to tune out any evidence of the dire impacts of its activities.

A thoroughly unsentimental reader of the portents might regard an increase in the human death rate as an inevitable and potentially beneficial culling of the species. The unfit will be pruned away, the fit will survive, and humanity will be the better for it. Eventually. In theory.

Or maybe the rich and ruthless will survive and everyone else will either perish or submit to slavery.

The greatest danger is that, if social support systems utterly fail, "overshoot" could turn to "undershoot": that is, population levels could overcorrect to the point that there are fewer survivors than *could have been* maintained if adaptation had been undertaken proactively—perhaps far fewer than the population just prior to the Industrial Revolution. And for those who did manage to struggle on, levels of culture and technology might plummet to a depth far below what could have been preserved had action been taken.

We have a population bottleneck, as William Catton calls it, ahead of us no matter what we do at this point. Even if a spectacular new energy source were to appear tomorrow, it would do little more than buy us a bit of time. However, we still get to choose *how* to pass through that bottleneck. We can exert some influence on factors that will determine how many of us get through, and in what condition.

Cooperative or Competitive Adaptation
A worst-case scenario is likely to be averted only by an effective, cooperative effort to adapt to scarcity and to recover from crises.

Fortunately there are perfectly good reasons for assuming that collaborative action along these lines will in fact emerge. We are a supremely cooperative species, and even our earliest ancestors were dedicated communitarians. Other species, though often squabbling over food and potential mates, likewise engage in sharing and cooperative behavior. Members of one species sometimes even cooperate with or offer help to members of different species. Indeed, as evolutionary theorist Peter Kropotkin pointed out in his landmark 1902 book *Mutual Aid*, evolution is driven by cooperation as well as by competition.

More directly to the point: hard times can bring out the worst in people, but also the best. Rebecca Solnit argues in *A Paradise Built in Hell* (see this review in the *New York Times*) that people tend to cooperate, share, and help out at least as much during periods of crisis as during times of plenty. A critic might suggest that Solnit stretches this argument too far, and that collapsing societies often feature soaring rates of crime and violence (see, for example, Argentina circa 2000); nevertheless, she supports her thesis with

compelling examples.

Assuming we fail to *prevent* crisis but merely *respond* to it, we might nevertheless anticipate a range of possible futures, depending on whether we set ourselves up to compete or cooperate. At one end of the competitive-cooperative scenarios spectrum, the rich few become feudal lords while everybody else languishes in direst poverty. At the other end of that spectrum, communities of free individuals cohere to produce necessities and maximize their chances for collective prosperity. Back at the "competitive" end of the scale, there is hoarding of food and widespread famine, while at the "cooperative" extreme community permaculture gardens spring up everywhere. With more competition, people perish for lack of basic survival skills; with more collaboration, people share skills and care for those with disabilities of one kind or another. Competitive efforts by investors to maintain their advantages could lead to a general collapse of trust in financial institutions, culminating in the cessation of trade at almost every level; but with enough cooperation, people could create a non-growth-based monetary system that acts as a public utility, leading to a new communitarian economics.

It's a Set-Up
In the real world, humans are both competitive and cooperative—always have been, always will be. But circumstances, conditioning, and brain chemistry can tend to make us more competitive or more collaborative. As we pass through the population-resource-economy bottleneck in the decades ahead, competitive and cooperative behaviors will in turn come to the fore in various times and places. My initial point in all of this is that, even in the absence of effective action to *avert* economic and environmental crises, we still have the capacity to set ourselves up to be either more competitive or more cooperative in times of scarcity and crisis. With the right social structures and the right conditioning, whole societies can become either more cutthroat or more amiable. By building community organizations now, we are improving our survival prospects later.

But I'd go further. Here's a preliminary hypothesis for which I'm starting to collect both confirming and dis-confirming evidence: We're likely to see the worst of ruthless competition in the early stage of the release phase, when power holders try to keep together what wants to fall apart and reorganize. The effort to hang on to what we have in the face of uncertainty and fear may bring out the competitive nature in many of us, but once we're in the midst of actual crisis we may be more likely to band together.

Among elites—who have enormous amounts of wealth, power, and privilege at stake—the former tendency has carried the day. And since elites largely shape the rules, regulations, and information flows within society as a whole, this means we're all caught up in a hyper-competitive and fearful moment as we wait for the penny to drop. Elites can deliberately nurture an "us-versus-them" mentality (via jingoistic patriotism, wedge issues, and racial resentments) to keep ordinary people from cooperating more to further their common interests. Revolution, after all, is in many respects a cooperative undertaking, and in order to forestall it rulers sometimes harness the cooperative spirit of the masses in going to war against a common foreign enemy.

The over-competitiveness of this pre-release-phase is playing out most prominently and fatefully in debates over "austerity," as nations bail out investment banks while leaving most citizens to languish under lay-offs, pension cuts, and wage cuts. It seems that no measure aimed to prevent defaults and losses to investors is too draconian. But in many historic instances (Russia, Iceland, Argentina) it was only *after* a massive financial default occurred—that is, once release ran its course—that nations could fundamentally revamp their monetary and banking systems, making recovery possible. That makes "release" sound a bit like a long-overdue vacation. It's important to emphasize, however, that what we face now is not just a collapse and reorganization of a national financial sector, but a crucial turning from the overall expansionary trajectory of civilization itself.

Our collective passage through and reorganization after the release phase of this pivotal adaptive cycle can be thought of as an evolutionary event. And, as noted above, evolution is driven by cooperation as much as by competition. Indeed, cooperation is the source of most of our species' extraordinary accomplishments so far. Language—which gives us the ability to coordinate our behavior across space and time—has made us by far the most successful large animal species on the planet. Our societal evolution from hunting-and-gathering bands to agrarian civilizations to industrial globalism required ever-higher levels of cooperative behavior: as one small example, think for a moment about the stunningly rich collaborative action required to build and inhabit a skyscraper. As we adapt and evolve further in the decades and centuries ahead, we will do so by finding even more effective ways to cooperate.

Ironically, however, during the past few millennia, and especially during the most recent century, social complexity has permitted greater concentrations of wealth, thus more economic inequality, and hence (at least potentially) more competition for control over heaps of agglomerated wealth. As Ivan Illich pointed out in his 1974 classic *Energy and Equity*, there has been a general correlation between the amount of energy flowing through a society and the degree of inequality within that society. And so, as we have tapped fossil fuels to permit by far the highest energy flow rates ever sustained by any human civilization, a few individuals have accumulated the biggest pots of wealth the world has ever seen. Perhaps it should come as no surprise that it is precisely during this recent, aberrant, high-energy historic interval that Social Darwinism and neoliberal economics have arisen, with the latter coming to dominate economic and social policy worldwide.

The Leap

With release will come the opportunity for a collaborative evolutionary surge. Recall that in the release phase of the adaptive cycle there is expanded opportunity for novelty to succeed. Most people these days tend to think of novelty in purely technological terms, and it's true that email and Twitter can speed social change—for example, by helping organize an instant political rally. But spending hours each day alone in front of a screen does not necessarily lead to collaborative behavior, and it's just possible that we may not be able to count on our hand-held devices continuing to function in the

context of global economic crisis, trade disruptions, and resource shortages. Therefore perhaps it will be in our interactions within flesh-and-blood communities that our most decisive further innovations will arise.

The details are impossible to predict, but the general outline of our needed cooperative evolutionary leap is clear: we must develop a heightened collective ability to conserve natural resources while minimizing our human impacts on environmental systems. In some respects this might turn out to be little more than an updating of traditional societies' methods of managing common grazing or hunting lands. But today the stakes are far higher: the commons must extend to include to all renewable and non-renewable resources, and "management" must bring extraction and harvest levels within the long-term ability of natural systems to recover and regenerate.

At the same time, with energy flows declining due to the depletion of fossil fuels, current levels of economic inequality will become unsupportable. Adaptation will require us to find ways of leveling the playing field peaceably.

Laying the groundwork for reorganization (following the release phase) will require building resilience into all our social structures and infrastructures. In the decades ahead, we must develop low-resource, low-energy ways of meeting human needs while nurturing an internalized imperative to keep population levels within ecosystems' long-term carrying capacity.

There are those who say that we humans are too selfish and individualistic to make this kind of evolutionary leap, and that even if it were possible there's simply too little time. If they're right, then this may be the end of the line: we might soon wind up in the "unfit" bin of evolutionary history. But given our spectacular history of cooperative achievement so far, and given our ability to transform our collective behavior rapidly via language (aided, for the time being, with instantaneous communications technology), it stands to reason that our species has at least a fair chance of making the cut.

To be sure, evolution will be driven by crisis. We will adapt by necessity. In this release phase there will be vast potential for violence. Remember, release is the phase of the cycle in which capital is destroyed—and currently there are towering piles of human, built, and financial capital waiting to topple. We have been set up to compete for shards and scraps. It's no wonder that so many who sense the precariousness of our current situation have opted to become preppers and survivalists. But things will go a lot better for us if, rather than stocking up on guns and canned goods, we spend our time getting to know our neighbors, learning how to facilitate effective meetings, or helping design resilient local food systems. Survival will depend on finding cooperative paths in which sacrifice is shared, the best of our collective achievements are preserved, and compassion is nurtured.

Darwin tells us we must evolve or die, and current circumstances bring that choice into stark relief. A lot of people evidently think that fitness and selfishness are the same. But we've gotten ourselves into

our current fix *not* because we're too good at cooperating to achieve collective fitness, but rather because, in our success, we failed to take account of the finite and fragile nature of the natural systems that support us. It's true that individual initiative is important and that group-think can be stultifying. Yet it is our abilities to innovate socially and to cooperate in order to increase our collective fitness that have gotten us this far, and that will determine whether we survive, and under what conditions, as we adapt to scarcity and re-integrate ourselves within ecosystems in the decades ahead.

The Peak Oil War (a video script)

It's a war of words. But what's at stake is nothing less than the fate of contemporary industrial society.

The controversy is about a finite resource that makes our civilization go. It's energy-dense, cheap, and portable. We had nothing like it before the oil age, and in the past 150 years we haven't found anything better, from a purely economic point of view. Nature took *tens of millions* of years to make petroleum, but we will have used the best of it in the space of *two hundred* years. The controversy is between those who say affordable oil is going to last a few decades longer; and others who say, not so much.

Here's the back-story. About 15 years ago some eminent retired petroleum geologists calculated that we're depleting the world's giant oil reservoirs so quickly that global oil production would fairly soon reach a maximum rate and begin to decline. We'd still have a lot of oil left after "peak oil," but supplies would no longer be able to grow to meet the ever-rising demands of the global economy. This would mean higher fuel prices, geopolitical conflict, and economic turmoil. The only logical response to "peak oil" would be to strategically reduce our dependence on oil as quickly as possible.

At the time, officials at the International Energy Agency and the US Department of Energy, and oil industry spokesmen like Daniel Yergin, were forecasting that world oil supplies would encounter no problems at all in the foreseeable future, and that oil prices would remain at about $20 a barrel until at least 2020. Their message: don't worry, drive on!

What actually happened? World crude oil production flat-lined in 2005 and hasn't budged since, even with every oil-producing country pumping flat-out, with oil companies drilling in deep water, and injecting water and gas into older fields. Oil prices went crazy. Wars erupted in the oil-rich parts of the world, and the global economy went into a tailspin. Granted, there were other reasons for war and financial crisis—a terrorist attack and a real estate bubble—but oil prices were bubbling away in the background, making matters much worse than they would otherwise have been.

Altogether, it looked as though the "peak oil" crowd had been right.

Now the oil industry is staging a PR counter-offensive. New technologies like hydrofracturing, horizontal drilling, and tar sands

mining are making increasing quantities of lower-quality, unconventional hydrocarbons available. Indeed, US oil production has gone up by nearly a million barrels a day as a result of fracking the low-porosity shales in North Dakota and Texas. That's more than five percent of the oil we use in America. Imports are down. The industry argues we just need to drill more to produce more. Problem solved!

But wait—what's actually new here? Not the technology; it's mostly been around since the 1980s, with a few recent refinements. Not the unconventional resources; those have been known to geologists for decades. What's new is *high oil prices*. So is technology going to solve that problem?

Not by a long shot. Remember, it's high oil prices that make unconventional oil worth producing in the first place. It takes money and energy (and water!) to frack low-porosity rocks, much more than it takes to drill a conventional onshore oil well. So how does the economy handle high oil prices, and can we count on prices staying high enough to make the unconventionals workable for a long time? Well, as it turns out, the economy *hates* high oil prices and responds by going into recession. Which makes energy prices volatile. Which makes the unconventional oil industry subject to booms and busts.

Of course, unconventional hydrocarbons also have higher environmental costs, leading to worse oil spills, water pollution, and higher greenhouse gas emissions giving us worse droughts and floods.

So what's the bottom line? In broad terms, the "peak oil" analysts were right. But the fossil fuel industry, with its deep pockets and friends in mainstream media, is winning the PR battle.

This is not a sporting event. What really matters is not who wins the debate. What matters is how we prepare for the inevitable. One way or another, oil is a dead end. It's driving us over the cliff, killing both our economy and the global climate. The same is true for the other fossil fuels—coal and natural gas. But ditching oil won't be easy. We spent the last century building a massive global economy to run on cheap liquid *oil*, not on solar or wind. We need to wean ourselves off our high-energy lifestyle. We've got to transition to a way of life that's slower, more local, less plastic, more renewable, more . . . organic. Fortunately, our satisfaction and well-being do not depend upon maintaining unsustainable levels of consumption. If, as a society, we focus more on the quality of our communities and the integrity of our relationships, we'll be far happier, even as we burn less petroleum.

We'd be foolish to wait for events to settle the debate once and for all. Let's say goodbye to oil; it's saying goodbye to us.