Parasite Rex

Well, it's funny that people, when they say that this is evidence of the Almighty, always quote beautiful things. They always quote orchids and hummingbirds and butterflies and roses. But I always have to think, too, of a little boy sitting on the banks of a river in West Africa who has a worm boring through his eyeball, turning him blind before he's five years old. And I reply and say, "Well, presumably the God you speak about created the worm as well," and now, I find that baffling to credit a merciful God with that action. And therefore it seems to me safer to show things that I know to be truth, truthful and factual, and allow people to make up their own minds about the moralities of this thing, or indeed the theology of this thing.

– David Attenborough

Ash: You still don't understand what you're dealing with, do you? Perfect organism. Its structural perfection is matched only by its hostility.
Lambert: You admire it.
Ash: I admire its purity. A survivor... unclouded by conscience, remorse, or delusions of morality.
Parker: Look, I am... I've heard enough of this, and I'm asking you to pull the plug.
[Ripley goes to disconnect Ash, who interrupts]
Ash: Last word.
Ripley: What?
Ash: I can't lie to you about your chances, but... you have my sympathies.

– Alien (1979)

From an evolutionary perspective, the parasite is a beautiful creature. Instead of possessing a set of adaptations that make it suitable for thriving within a "natural" habitat – an ocean, a forest, a tundra, a jungle, etc. – the parasite typically finds its habitat within an organism itself. Parasites twist the core evolutionary process of adaptive radiation in a new direction, finding opportunities for new niches and species differentiation within host species that emerge over time in new geographies, not the new geographies themselves. To a parasite, the world IS an oyster. Given the amazing diversity of life on Earth, using life-forms as habitats presents a phenomenal opportunity for parasitic adaptive

radiation and thus, evolutionary success. Almost every multi-cellular life-form on the planet serves as a host for one or more parasites, and as a result parasites account for more biodiversity and sheer numbers than non-parasitic life. In many respects, the parasite is an evolutionary apex.

Why do parasites get such bad press? Most of them are not what zookeepers would call "charismatic vertebrates", but instead tend to be viruses or squishy worms with nasty looking (from a human perspective) and voraciously-presented mouths. That's a problem for any public relations campaign. More importantly, parasites do not behave according to what game theorists call a "nice" or cooperative strategy. These are not win-win relationships, where there's some sort of symbiotic benefit shared between the two organisms, some sort of reciprocal value provided by the tapeworm to whatever warm-blooded intestinal tract it happens to inhabit. No, the very definition of a parasite is that it is harmful to its host, with a one-way transfer of resources. Parasites are squatters, not tenants. They are thieves, not buyers.

But they don't steal a lot. Not usually, anyway, as examples of *Alien*-esque life-forms that kill their hosts in some burst of gore are few and far between. Almost all parasites are better off keeping their hosts alive for as long as possible, so it would seem natural for any individual parasite to take just enough from its individual host to live well without killing off the host. And this is, in fact, the case – few parasites kill their hosts – but it's the *why* behind this fact, the evolutionary dynamic behind this fact, that I want to examine.

An individually successful hookworm is not thinking "Gee, I better slow down a little bit here. Wouldn't want to damage my host too much." That hookworm acts exactly as it is programmed to act … to eat and reproduce as much as it is hookworm-ly possible to eat and reproduce. **An evolutionary perspective requires us to look at the *population* of hookworms in relationship to its habitat – the *population* of host animals – to figure out the evolutionarily stable strategy (or ESS as it's known) for hookworms**. We will never figure out the ESS by looking at an individual hookworm and an individual host, because you can't just extrapolate from what's good or bad for that individual relationship, no matter how much of a long-term view you take for that individual hookworm and its descendants.

From a population perspective, a parasite species is trying to balance growth with robustness in the context of its life-form habitat in exactly the same way that a non-parasite species is trying to balance growth and robustness in the context of its geographical habitat. Both grow by consuming resources.

If growth outstrips resource supply, that's a problem, because the offspring population is going to starve and die off. This is the population dynamic that is most closely associated with the work of Thomas Malthus, who despaired of any animal (including the human animal) escaping this deterministic pattern of population growth outpacing resource availability, punctuated by enormous population die-offs in order to restore the balance between resource supply and demand. In the human context, innovation in our tools and our mental constructs has allowed us to increase our species population essentially unchecked by Malthusian logic since the 14th century and the Black Death, with only a small hiccup from pandemic and global war in the early 20th century. In the non-human context, any respite from resource-depletion die-offs must come from the glacially slow process of natural selection and the evolution of adaptations that push a species into a more robust, less volatile relationship with its environment. This is an ESS.

What's interesting (to me, anyway) is that a parasite species tends to have more options in the development of its ESS than a non-parasite species. A parasite is not geographically "grounded" like a non-parasite. Because its habitat is another population of life-forms, the population of parasites can more easily "choose" how to allocate its resource consumption. Maybe the parasite species is better off if it concentrates on a few individuals within the host population and really loads up on those unlucky targets, depleting all of their resources and killing them in the process, but leaving a critical mass of healthy hosts unharmed so that they can reproduce and provide juicy targets in the future. Maybe the parasite species is better off by getting smaller and less noticeable or impactful on the host species. Maybe the parasite species is better off if it moves from host species to host species within its lifecycle, so that no single host species is damaged too severely even if the individual parasites run rampant during their stay. These are strategic options at the population level that are much more difficult to develop or evolve within species that have a specific geography for a habitat. Not impossible … maybe you can rotate from one resource-rich patch of your geography to another and then back again (migration) … but more difficult. A resource habitat created by life-form *populations* is just more fungible than a resource habitat created by a singular geography, and that's a really big deal for an ESS.

This flexibility (and hence evolutionary *speed*) in creating an ESS is a big reason why parasites dominate the world. Like humans, they're pretty good at getting around the gloomy future that Malthus predicted. Not by inventing the printing press, fossil fuel energy sources, and liberal ideas of social organization, but by quickly evolving a wide range of behavioral adaptations that are extremely

effective at balancing resources and growth. **Here's what these parasite ESS's have in common: they make the parasite *population* invisible to the host *population*.** The relationship between individual parasite and individual host may also be invisible, but it also might be a violent struggle to the death or somewhere in between … evolution doesn't care about individuals. Evolution has to be understood at the group level, and the evolutionary beauty of the parasite is its amazing suitability and fitness – at the group level – for using life itself as a habitat.

Now why do I care so much about parasites and their evolutionarily stable strategies? **Because the most effective alpha-generating investment strategies are parasites.** An alpha-generating strategy of the type I'm describing uses the market itself as its habitat. It's not an investment strategy based on the fundamentals of this company or that company – the equivalent of a geographic habitat – but on the behaviors of market participants who are living their investment lives in that fundamentally-derived habitat. A parasitic strategy isn't the only way to generate alpha – you can also be better suited for a particular investment environment (think warm-blooded animal versus cold-blooded animal as you go into an Ice Age) and generate alpha that way – but I believe that the investment strategies with the largest and most consistent "edge" are, in a very real sense, parasites.

What do these parasitic strategies look like? Their number is legion. They exist in every nook and cranny of every public market in the world, and they feed off the behaviors of non-economic or differently-economic market participants. A giant pension fund isn't engaged in commodity markets because it has an opinion on the contango curve of oil futures; it's trying to find a diversifying asset class for a massive portfolio that needs inflation protection. If you're an experienced trader in that market and you see signs of the giant pension fund lumbering through the brush … well, you're in the wrong business if you can't skin a few dimes here. This is what good traders DO, and the really good ones have devised effective processes and strategies that comprise a strategy, so that it's not just a one-off trade but an expression of a consistent informational edge. These strategies are inherently niche-oriented, and they do not scale very well, any more than any single parasite species can scale beyond the size of its host species. But the informational edge is real, which means that the alpha generation is real, and that's a beautiful thing even if the outward form is as ugly as a hookworm.

Why does a parasitic strategy have a bigger informational edge than a non-parasitic strategy? Because market participant behaviors are far more consistent over time than the economic fundamentals of companies or countries. I can predict with 100x more confidence what a giant

pension fund is trying to achieve with its market activities than what S&P 500 earnings will actually be next year. World events and market outcomes are utterly unpredictable, especially in a global environment of economic deleveraging, massive monetary policy experimentation, and political fissures the size of the Grand Canyon within and between countries. Human nature, though, is as constant as the northern star.

How does a parasitic strategy with an informational edge persist? Why isn't it arbitraged (or regulated) away? First, remember that we're talking about the group level, not the individual. Certainly it's possible to have competition between individual parasitic strategies that split the economic resources taken from the host. But at the group level, just like their biological cousins, effective parasitic investment strategies are largely invisible to their hosts. As Baudelaire said way before Kevin Spacey did in *The Usual Suspects*, the greatest trick the devil ever pulled was convincing the world he didn't exist.

What's the pay-off for thinking about alpha-generation investment strategies through this evolutionary perspective? Two big pay-offs, I think.

First, one of the trickiest puzzles of effective allocation and risk management for anyone who invests in actively managed funds is trying to figure out the capacity limits of those strategies. This typically isn't something you worry about with a strategy that is focused on capturing broad market returns or one that uses big liquid securities like S&P e-mini's to express its portfolio, but it's a significant concern with funds that claim to have some sort of informational or process edge (alpha generation potential) and express that edge with single-name securities or any sort of liquidity-challenged instrument. **There are very powerful formulas in the evolutionary biology toolkit for figuring out both the optimal population size of a parasite species relative to its host as well as the optimal amount of resources that the parasite population should take from the host.** This is at the heart of figuring out what behaviors, including size, are evolutionarily *stable* for the parasite, and it is directly applicable to alpha-oriented investment strategies with parasitic qualities. Instead of taking a manager's word on investment capacity or making some rough guess based on the AUM of other managers (which is basically the state of the art today), these ESS tools should allow us to project investment capacity directly for many alpha-generation strategies.

Second, it shows how one might create an advanced multi-strat investment platform, one that uses the Adaptive Investing perspective to identify the alpha-generation strategies with the most effective

ESS's, as well as the optimal capacity and allocation characteristics for the market "habitat" in which these strategies operate. Unlike the individual strategies, which inherently scale poorly, a multi-strat structure scales easily, limited only by the number of individual strategies brought under the operational umbrella. Would this sort of investment platform have something of an image problem, intentionally seeking out and unafraid to characterize certain investment strategies as *parasites*? Maybe. But somehow I think there are plenty of others out there who, like me, can see the evolutionary beauty of these strategies and are not afraid to call them by their proper name. I hope you'll join me in this exploration.

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