Review: The Altruism Equation

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A review of a book on evolutionary theory and altruism which discusses Kropotkin. Unfortunately, as shown, the account of Kropotkin's ideas is flawed and so both "mutual aid" and his contribution to science are obscured.

Lee Alan Dugatkin, *The Altruism Equation: Seven Scientists Search for the Origins of Goodness* (Princeton: Princeton University Press, 2006)

Since Charles Darwin's *On the Origin of Species* (1859) the explanation of various aspects of animal and human life have been discussed, namely co-operation, altruism and ethics. The predominant image from Darwin's masterpiece was one of individual competition and this made all these apparently difficult to explain. Darwin himself discussed the issue in *Descent of Man* (1871) but to little apparent effect.

Darwin's principle British advocate, Thomas Henry Huxley, expounded the notion that evolution and ethics were unrelated (indeed, in opposition) in 1888 based on the individualistic perspective of *Origin* with nature portrayed as "red in tooth and claw". This essay, as any well-read anarchist will know, inspired Kropotkin to write the articles which later became *Mutual Aid: A Factor of Evolution* (1902) which effectively refuted Huxley's assertions. Since then, Kropotkin's name sometimes appears in books and articles on animal co-operation yet given how pioneering his work on mutual aid and ethics was, this lack of acknowledgement is disappointing but, given the caricature all-too-often presented of *Mutual Aid* and his anarchism in general, perhaps unsurprising.

Lee Alan Dugatkin's *The Altruism Equation* is an example of this kind of work. The book discusses the life and work of seven scientists who wrote on "altruism" including Kropotkin, Warder Clyde Allee and William David Hamiliton (who produced the "altruism equation" of the book's title) before expanding upon the subsequent developments in science this work has produced, ably summarising recent research on altruism and cooperation. Dugatkin, an evolutionary biologist and animal behaviourist, is well-placed to give a good account of Kropotkin's ideas and how they have faired but sadly does not. Although the book is well written and engaging, it is fundamentally flawed.

The flaws are three-fold. First, it makes some dubious assumptions on cooperation (the best that can be said is that it reflects some, but not all, scientific perspectives). Second, it is non-political in the worse sense of the word insofar as it does not question the assumptions of the

society Dugatkin lives in. Third, it misunderstands Kropotkin's arguments. All three are related, as would be expected.

The third flaw is the most serious for the major problem with Dugatkin's argument is that mutual aid (co-operation) is equated to altruism, something Kropotkin never did but which the reader is not informed of. Indeed, Kropotkin rarely used the term "altruism" in his writings and *Mutual Aid* was no exception. He does talk of "love" (which could be considered as similar) but only to dismiss the notion that mutual aid has anything to do with it. Mutual aid, as he repeatedly stressed, was a product of the struggle for existence. He also – from the book's sub-title onwards – stressed it was a "a factor of evolution" and never denied the existence of "selfish" behaviour nor mutual struggle. Indeed, his account of human history is marked by a conflict between co-operative and competitive tendencies as reflected in class struggle.

The picture that Dugatkin paints, whether intentionally or not, is very much at odds with Kropotkin's own position and arguments. We are informed that Kropotkin "sees altruism at every turn in nature" (13) and although he rightly notes Kropotkin's place in "the Russian school" and its recognition of "mutual aid" within animal life, he conflates "altruism and cooperation". (23) This can be seen when he asserts that "Kropotkin's 'mutual aid' was a catch-all phrase for what we would now call altruism". (41) This becomes caricature when he claims that for Kropotkin "kindness and altruism prevailed in the animal world". (32)

In reality, Kropotkin was well aware that the animal world (including humanity) was one of struggle and he explicitly rejected the notion attributed to him by Dugatkin:

> "But it may be remarked at once that Huxley's view of nature had as little claim to be taken as a scientific deduction as the opposite view of Rousseau, who saw in nature but love, peace, and harmony destroyed by the accession of man. In fact … the first observation upon any animal society … cannot but set the naturalist thinking about the part taken by social life in the life of animals, and prevent him from seeing in Nature nothing but a field of slaughter, just as this would prevent him from seeing in Nature nothing but harmony and peace. Rousseau had committed the error of excluding the beak-and-claw fight from his thoughts; and Huxley committed the opposite error; but neither Rousseau's optimism nor Huxley's pessimism can be accepted as an impartial interpretation of nature."

Mutual aid – cooperation – was selected for because of the benefits it accrues to those who practice it:

> "It is not love, and not even sympathy (understood in its proper sense) which induces a herd of ruminants or of horses to form a ring in order to resist an attack of wolves; not love which induces wolves to form a pack for hunting … It is a feeling infinitely wider than love or personal sympathy — an instinct that has been slowly developed among animals and men in the course of an extremely long evolution, and which has taught animals and men alike the force they can borrow from the practice of mutual aid and support, and the joys they can find in social life."

He was always very careful to distinguish cooperation from morality. They were related for mutual aid was the basis upon which morality developed but they were not the same:

> "life in societies is the most powerful weapon in the struggle for life … Sociability thus puts a limit to physical struggle, and leaves room for the development of better moral feelings … Compassion is a necessary outcome of social life. But compassion also means a considerable advance in general intelligence and sensibility. It is the first step towards the development of higher moral sentiments. It is, in its turn, a powerful factor of further evolution."

In terms of morality, he explicitly excluded a discussion of this in *Mutual Aid*:

> "But it is not love and not even sympathy upon which Society is based in mankind. It is the conscience — be it only at the stage of an instinct — of human solidarity. It is the unconscious recognition of the force that is borrowed by each man from the practice of mutual aid; of the close dependency of every one's happiness upon the happiness of all; and of the sense of justice, or equity, which brings the individual to consider the rights of every other individual as equal to his own. Upon this broad and necessary foundation the still higher moral feelings are developed. But this subject lies outside the scope of the present work"

Mutual aid was practiced by most animals and the social living it produced created a sense of fairness or justice (to whatever degree).[1] By mixing together cooperation and altruism, goodness and altruism, Dugatkin obscures Kropotkin's actual position. This is, to say the least, unfortunate.

This may reflect current debates between scientists for it is suggested that scientists today would not agree with Kropotkin because cooperative and altruistic acts "are typically defined in modern-day evolutionary biology as behaviours that benefits others but entail a cost to the individual performing them." (28) Yet, in an endnote, Dugatkin admits that there is "certainly still debate over the exact definition of altruism" and while game theory defines "both cooperation and altruism" as "behaviors that entail a cost to the actor and a benefit to others", other contexts define cooperation "strictly in terms of benefiting all parties involved, and this entails a benefit, not a cost, assigned to the payoff of the cooperator." (156–7)

Kropotkin makes no such false assumptions and instead notes that co-operation (mutual aid) benefits both the species and the individual – species, after all, being made up of individual creatures. In *Mutual Aid*, he clearly assumes – and rightly – the second definition:

> "mutual aid is as much a law of animal life as mutual struggle, but that, as a factor of evolution, it most probably has a far greater importance, inasmuch as it favours the development of such habits and characters as insure the maintenance and further development of the species, together with the greatest amount of welfare and enjoyment of life for the individual, with the least waste of energy."

Why Dugatkin takes the first definition is not explained nor does he bother to explain the difference between his and Kropotkin's nor its ramifications. Undoubtedly, this decision was a political one insofar as it reflective of the cultural and class perspectives of Dugatkin even if he was undoubtedly not conscious of it. This can also be seen when he talks of how, "[i]n Siberia,

[1] For Kropotkin's views on morality see: "Anarchist Morality", *Black Flag Anarchist Review* Vol. 4 No. 1 (Spring 2024); *Ethics: Origin and Development* (Montreal: Black Rose, 1992).

Kropotkin observed what appeared to be altruism and cooperation among both animals and peasants of the region at every turn. Animals unite to protect themselves". (26) Why "appeared to be"? A wolf pack hunting together and sharing the kill *is* cooperation. Likewise with herd animals working together to protect themselves. It seems somewhat ideological to portray working together to survive (indeed, prosper) as a "cost". And what would the "cost" to a wolf be in working as a pack? To share the food that they would never have caught if they hunted alone? That this is a "cost" to individual animals surely reflects cultural assumptions developed within a capitalist society?

So it is simply not the case of Kropotkin producing an "adamant defense of nature as a bastion of altruism, where blood kinship plays almost no role". (13) He produced a well-documented account of how nature was a bastion of cooperation and social living. Moreover, Kropotkin was at pains to link his work with that of Darwin, arguing that co-operation helped ensure the survival of individuals and their offspring and so would be favoured by natural selection. Dugatkin skims over the awkward fact that Kropotkin was echoing the views that Darwin had laid out in his *Descent of Man* (1871), making it clear that as a consequence he thought himself a better Darwinian than Huxley. Given that this was noted in *Mutual Aid* – indeed, Darwin was quoted ("'Those communities,' [Darwin] wrote, 'which included the greatest number of the most sympathetic members would flourish best, and rear the greatest number of offspring'") – there really is no excuse for this.

This is ignored in the chapter "Darwin's Bulldog versus the Prince of Evolution" which discusses Huxley and Kropotkin. He recounts how Kropotkin was dismayed by Huxley proclaiming that from "the point of view of the moralist, the animal world is on about the same level as a gladiator's show" and "was a continual free fight, and beyond the limited and temporary relations of the family, the Hobbesian war of each against all was the normal state of existence." (12) Kropotkin considered this an "atrocious article" (13) and wrote the articles that became *Mutual Aid* to refute it.

Dugatkin clearly sympathises with Huxley's position but admits that he "presented the reader with no such evidence to judge" his claims and "seems to have reached his conclusions … based on how national selection *had* to operate, and equally, if not more importantly, on both his life experiences and on the work of his favorite philosophers, Thomas Malthus." (18) Later in the book Dugatkin also admits "the fact that animal fights so rarely involved lethal tactics … animals [do] not fight to the death – as gladiators do – when they contest resources that will increase their reproductive success". (112) He does not link this admission to his note that the "gladiator reference in [Huxley's] 1888 essay was not a metaphor for Huxley; he meant it literally". (17)

Why we should bother with an article based on mere assertion rather than evidence and whose main metaphor is admitted as being baseless is not explained. However, Dugatkin gives the impression that it is Huxley who was right rather than Kropotkin. So while Huxley's lack of evidence is noted in passing, Kropotkin's extensive evidence is dismissively described as a "laundry-list" where he "would often roll off a long series of examples of what he saw as mutual aid in a seemingly endless, rambling paragraph." (28) It is also admitted that "Kropotkin was an excellent naturalist, and many of his Siberian observations have been confirmed repeatedly" (28) but this seems to be of little consequence for Kropotkin's "observations [were] colored by passionate political opinions of what society ought to look like" (35)

This reflects a pattern – those scientists whose ideas question the current system get this noted but if their comments reflect its assumptions then that goes unmentioned. While Kropotkin's and

Allee's (a Quaker and pacifist) politics are discussed in some detail and the impression given that they influenced their scientific work, this is not done for others with more conventional ideas. Huxley's evidence-free speculations are given a free pass, as noted, while Hamilton is recorded (147) as feeling that "political correctness … had run amok", having sexist views on women's mathematical skills (Dugatkin's apologetics on this are depressing) as well as holding "some controversial views on eugenics, on occasion seriously raising the issue of the use of infanticide for severely handicapped babies" (94) yet these opinions are not considered political for some reason nor considered as skewing his science. Yet a moment's reflection would show that, as with Huxley, this would shape what he considered as important, how he interpreted the evidence he gathered (and what evidence to gather) and so on.

It is worth recalling Stephen Jay Gould's comments that it is right to "criticise the myth that science is itself an objective enterprise, done properly only when scientists can shuck the constraints of their culture and view the world as it really is … Scientists needn't become explicit apologists for their class or culture in order to reflect these pervasive aspects of life." Recognising this obvious fact suggests that science "must be understood as a social phenomenon, a gutsy, human enterprise, not the work of robots programmed to collect pure information" and so science, "since people must do it, is a socially embedded activity." Even facts are "not pure and unsullied bits of information" as "culture also influences what we see and how we see it. Theories, moreover, are not inexorable inductions from facts. The most creative theories are often imaginative visions imposed upon facts; the source of imagination is also strongly cultural." Science "cannot escape its curious dialectic. Embedded in surrounding culture, it can, nonetheless, be a powerful agent for questioning and even overturning assumptions that nurture it … Scientists can struggle to identify the cultural assumptions of their trade and to ask how answers might be formulated under different assertions. Scientists can propose creative theories that force startled colleagues to confront unquestioned procedures."[2]

This applies to the history Dugatkin recounts in his book. He, rightly, draws upon Daniel P. Todes' book *Darwin Without Malthus* in his chapter on Kropotkin but he fails to note sufficiently how Todes shows how Darwin's ideas on natural selection found a welcome home in Russian intellectual and scientific circles but his Malthusian assumptions were seen for what they were, a product of his society and "the unsurprising fact that he shared the ideological outlook of his class, circle, and family. This outlook was not universal, and a reader … who did not share it … might easily identify the author's ideological preconceptions as bourgeois, Malthusian, or, perhaps, typically British."[3] Dugatkin, in contrast, does not ponder why "Malthusian doctrine quickly became widely accepted in England" (20) nor mentions that this was so within the ruling classes, working class perspectives being both different and apparently of no consequence.

This does not, of course, mean that Hamiliton's work is flawed but it does mean that its apparent "apolitical" nature is no-such thing while Kropotkin's politics would have allowed him greater insight precisely because he questioned more and had a wider perspective. As such, to inflict the all-too-common "rose-tinted glasses" trope on his readers as regards Kropotkin is unfortunate but also a missed opportunity.

[2] *The Mismeasure of Man* (Penguin, 1981), 21–3.

[3] Daniel P. Todes, *Darwin Without Malthus: The Struggle for Existence in Russian Evolutionary Thought* (Oxford University Press, 1989), 13.

For example, he recounts how Huxley invoked the Malthusian notion of humanity "multiplying more quickly than its resources" (18) and his "conviction on the validity of this process [that "rapid multiplication led to a Hobbesian war of all against all when resources were scarce"] turned him away from evolution for any guidance on morality." (21) Huxley himself is quoted on how Malthus' "conclusions … have never been disproved and never will be" (21) Likewise, the influence of Malthus on Darwin's ideas is noted. However, the awkward fact that the subsequent years have refuted these arguments goes unmentioned. Dugatkin can hardly be unaware of this for the facts are all around him and Kropotkin indicated the situation in an article referenced (31) in the book:

> "for human beings who are in possession of scientific knowledge, and co-operate for the artificial production of the means of subsistence and comfort, the law is quite the reverse to that of Malthus. The accumulation of means of subsistence and comfort is going on at a much speedier rate than the increase of population."[4]

This remains as true now as then – not least because there were 800 million humans when Malthus penned his infamous work, there are nearly 8 billion now. Yes, famines do occur, but these are not driven by a lack of production (quite the reverse) but rather the perversities of distribution within a capitalist economy. It would have been nice for Dugatkin to admit this rather than simply quote Huxley as if his assertions were based on something other than (class) prejudice. Kropotkin's politics, in other words, allowed him to see the obvious, what the "apolitical" take for granted and do not question.

Yet while Kropotkin's scientific credentials are doubted because of his politics, those politics are not well understood. As an Anarchist, we are told, Kropotkin "believed that the state stands in the way of what people do best: namely, live in small groups and help each other independent of blood ties." (31) Yet Kropotkin envisioned a society based on federations of appropriately sized groups and had no fixation on smallness. Yes, some of these may be small but not all – size would be based on objective needs rather than being pre-determined. Likewise, the claim that it "was only the modern state, with governments that incorporate too much power, that Kropotkin believed was a danger to humans" (32) is, at best, incomplete. Kropotkin – being a socialist – also recognised that private property and its resulting inequalities were a danger to humans. Kropotkin stressed that the modern state and capitalism were interwoven, and he was against both. Getting rid of political power (in the hands of the few) while retaining economic power (in the hands of a few) was both undesirable and impossible. But, then, Dugatkin writes of "presocialist anarchism" (13), whatever that is.

What of the "altruism equation" itself. Hamiliton's rule is that "natural selection favors the gene for altruism whenever r x $b > c$ (95) where the cost (c) of altruism is balanced by benefits (b) accrued by blood relatives who have only some probability (r) of carrying the gene in question. Dugatkin notes that "the impact of the b and c terms in terms of Hamilton's rule have been overlooked, despite the fact that they may be critically important". (148) Yet this is not too surprising for the benefits and costs will be impacted by environmental factors and, as such, amenable to human action. This can be seen from the discussion of "gene-level" analysis of humanity (127–9)

[4] "The Scientific Basis of Anarchy". *The Nineteenth Century* (February 1887), 246. This article along with its companion piece, "The Coming Anarchy" (*The Nineteenth Century,* August 1887) were later revised and published as the pamphlet *Anarchist Communism: Its Basis and Principles* (1891).

which inadvertently demonstrates it weakness as the influence of socio-economic factors clearly outweighs any genetic determinism which may or may not be at work. Again, it is hard not to be struck by how consistently allegedly scientific choices reflect wider social factors. It should also be noted that while *r* may be calculated with a degree of objective accuracy, assigning a numeric value for costs and benefits would be inherently subjective.

While Dugatkin is keen to root "altruism" in kinship, he does discuss the prisoner's dilemma and how it led to the notion of "tit-for-tat" as the means of explaining the evolution of cooperative behaviour in non-related animals. (143–5) However, he suggests that "from the point of view of the gene(s)" the individuals share the "tit-for-tat" gene and so "in a sense" they are its "brothers and sisters". The gene(s) "can help copies of themselves that reside in other … individuals" and so "are, in fact, relatives of a sort". (146) In order to save his thesis, he undermines it for, lest we forget, humans share over 90 percent of their genes with cats and dogs, with chimpanzees it is 98 to 99 percent. Any two human beings are 99.9 percent genetically similar. In terms of off-spring, even though it would get 50% of its mother's DNA and 50% of its father's, those two sets of genes are almost exactly the same – and nearly the same as unrelated people. If "tit-for-tat" works because "selfish" genes for cooperation (or altruism) seek to replicate, then kinship does not matter because they exist in any human. It also means altruism is not a puzzle for the relevant genes would be replicated regardless of the cost of the altruistic individual. Which means, ironically, a gene-level view comes to similar conclusions as the "group selection" it arose to combat – namely that an individual animal could sacrifice itself for the benefit of others.[5]

In terms of "tit-for-tat" (or "reciprocal altruism", to use Robert Trivers' term), this is premised on individuals co-operating but punishing those who take advantage of others. Kropotkin was well aware of the need for mutual aid to remain mutual. He notes that non-cooperative animals "will be treated as an enemy, or even worse" and so while "anti-social instincts continue to exist … natural selection continually must eliminate them, because in the long run the practice of solidarity proves much more advantageous to the species than the development of individuals endowed with predatory inclinations. The cunningest and the shrewdest are eliminated in favour of those who understand the advantages of sociable life and mutual support." This would overtime generate social instincts and the evolution of a sense of fairness:

"Moreover, it is evident that life in societies would be utterly impossible without a corresponding development of social feelings, and, especially, of a certain collective sense of justice growing to become a habit. If every individual were constantly abusing its personal advantages without the others interfering in favour of the wronged, no society — life would be possible. And feelings of justice develop, more or less, with all gregarious animals."

So much for Kropotkin thinking "almost every sort of action involving members of the same species … constituted altruism". (28) He was well aware of the need to enforce cooperation against those who would seek to exploit others. This hardly fits in with Dugatkin's picture of Kropotkin's ideas but it does predate and predict core aspects of "tit-for-tat", namely that co-operative behaviour is rewarded, selfish behaviour punished. Over time (iterative interactions), social living would see co-operation spread – not least because groups which *were* internally Hobbesian would quickly go extinct if they could exist in the first place.

[5] Kropotkin may be considered by some as a group selectionist ("good for the species") but that is not the case for he recognised that cooperation benefited the individual animals involved. In other words, he had a "bottom-up" perspective which recognised that groups are made up of individuals and that association benefited them in many ways. Hence *mutual* aid, not "aiding others".

It should also be noted that, just like Huxley, Dugatkin does *not* explain how humanity managed to raise above its nature and practice cooperation within non-related groups as well as develop ethics. As Kropotkin mocked, Huxley's arguments implied a divine spark and an inability of natural selection to explain substantial aspects of animal and human life.[6] Mutual aid need not be "nice" – the cooperation of wolves in hunting benefits them but not their prey (likewise the mutual aid of herd animals benefits them, but the hunter goes hungry). It is not altruism (as the word is usually used) which causes this cooperation, rather it is to survive in a hostile world. That this cooperation produces a sense of fairness and justice and, in turn, empathy and altruism does not stop it being driven by the need for survival. In this, Kropotkin – again – is the pioneer, not Huxley, as there is flourishing research in the evolution of ethics.

Dugatkin – unlike Huxley – suggests that "altruism between family members" is "one of the very foundations of morality in humans" (117) when a moments reflection would see that helping your family members can and does conflict with morality. Nepotism is considered a bad thing for a reason. This does not mean discounting the influence of kinship but cooperation (even altruism) is practiced far beyond kinship even considered at its most extended. To limit it to kinship may explain aspects of it, but more will inevitably be lost as Dugatkin's book shows.

The example of jumping into a river to save an infant is given (73) which is often summarised in this perspective as someone being willing to save two of their children, eight cousins, etc. In the companion article to "The Scientific Basis of Anarchy", Kropotkin utilises "the child in the river" thought experiment to contrast anarchist views on ethics – which he suggests "the plain man of the people" holds – to those of "the religious moralist" and "the utilitarian". The "plain man of the people" acts as follows:

> "He does not much calculate. But he has grown in the habit of always feeling the joys of those who surround him, and to feel happy when others are happy; of suffering, deeply suffering when others suffer. To act accordingly is his second nature."[7]

We can only imagine the amusement he would have had adding the "geneticist" who would only jump in once he had calculated the percentage of genes they shared with the child and determined that it were sufficient for them to bother. Of course, it will be hastened to suggest that this is known and that genetic relatedness calculations are obviously not done (how could they be?) but the fact is that this example is used and the impression given. Dugatkin does so in his book, stressing repeatedly the importance of kinship in producing altruism and even simply co-operation. That this fits in so-well with cultural assumptions produced by a hierarchical and capitalist system is rarely questioned – or even noted.

Dugatkin seems to misunderstand Kropotkin's comments on "Hobbesian speculations" and the nature of family and tribe. (30) That modern anthropology concludes that "hunter-gatherer societies, groups and villages are often composed of extended family members" (30) does not contradict the point Kropotkin was making. As he indicated, "Zoology and palaeo-ethnology are thus agreed in considering that the band, not the family, was the earliest form of social life." This may, indeed, have been an extended family but definitely not the family of the post-Medieval epoch which Hobbes and Huxley projected backwards to the dawn of humanity (if not beyond). As Kropotkin noted in passing, he was not discussing the family "in the modern sense of the

[6] Peter Kropotkin, "Justice and Morality", *Black Flag Anarchist Review* Vol. 3 No. 3 (Autumn 2023).

[7] "The Coming Anarchy". *The Nineteenth Century* (August 1887), 163.

word". Dugatkin does not note that even a tribe considered as an extended family is very much at odds with Hobbes' fiction on the "state of nature".

Likewise, seeking a genetic explanation for animal or human behaviour often produces little more than "just-so" stories. This can be seen from the most bizarre example he gives, when he explains a scientist's speculation on how larvae could evolve horrible taste. (79–80) This is somehow related to "altruism" (based on kinship) because a larva being eaten "receives a genetic benefit because it is related to its sibling." Given that altruism was usually defined as an act which benefits others at the expense of the altruist, this really is stretching things to a ridiculous level. After all, the larvae are not leaping into the mouths of the predators, they are being consumed by chance. There is no act here, no sacrifice in any meaningful sense – simply luck. To equate this with "altruism" or suggest it is somehow driven by kinship shows the problems with far too much of mainstream science (particularly noticeable when seeking to justify some unpleasant aspect of modern society).

Finally, Dugatkin laments that "not one of the characters of this drama [of Huxley and Kropotkin] did a single experiment examining altruism, cooperation and kinship". (35) While experiments have, for example, helped to identify that various animals (primarily primates) have a sense of fairness – which, incidentally, confirm Kropotkin's arguments – and so have some usefulness, Kropotkin would undoubtedly have recognised their limitations:

> "As soon as we study animals — not in laboratories and museums only, but in the forest and the prairie, in the steppe and the mountains — we at once perceive that though there is an immense amount of warfare and extermination going on amidst various species, and especially amidst various classes of animals, there is, at the same time, as much, or perhaps even more, of mutual support, mutual aid, and mutual defence amidst animals belonging to the same species or, at least, to the same society."

The myth of the "alpha wolf" is a classic example of scientists being misled by studying animal behaviour in captivity. That this particular myth chimed with the patriarchal views of the dominant culture goes without saying. Kropotkin would not have been surprised and rooted his arguments in observations from natural, eschewing the assertions and assumptions that Huxley's ruminations on humanity were based.

It is not hard to conclude that a genuinely objective science will not be possible until we live in a free, classless society and until then what steps we do make in terms of our understanding of the world will be further in those least related to society. This is not to say that progress will not be made –Darwin's contributions being a case in point – but it will not be easy and will involve combating their misuse (whether malicious or unthinking) to justify or rationalise social injustices. In this socially aware scientists have an important role to play, as shown by the likes of Kropotkin and Gould. Dugatkin's book would have undoubtedly benefited if he queried his culturally defined assumptions more rather than suggesting Kropotkin's politics made him less scientific.

Ultimately, it is good to see Kropotkin so prominently placed in a book on a subject he made such an important and ground-breaking contribution to. Sadly, the account of his ideas leaves much to be desired and, as with its fixation on kinship, it undermines what is a well written work on a worthy subject. Dugatkin, it should be noted, returned to Kropotkin in his short book *The Prince of Evolution: Peter Kropotkin's Adventures in Science and Politics* (2011) which expands upon

his chapter in this work as well as in articles in various journals. He also had webpage which had a Kropotkin section with various useful links (sadly it is no more but can be found via the *Internet Archive*). As such, his interest is genuine and has exposed many to Kropotkin who would otherwise have not come across him. It is unfortunate that this book's account of Kropotkin's ideas is so flawed.

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