# Meat, Medicine, and Materialism: A Dialectical Analysis of Human Relationships to Nonhuman Animals and Nature

**Stefano B. Longo**
**Department of Sociology**
**University of Oregon**
**Eugene, OR 97403-1291[1]**

**Nicholas Malone**
**Department of Anthropology**
**University of Oregon**
**Eugene, OR 97403-1291[2]**

## *Abstract*

*The idea that humans are innately competitive and cruel is a dominant theme throughout Western thought. These notions that legitimate human cruelty to each other and other animals have their origins in biological sciences and have greatly influenced the social sciences. Sociologists, particularly Marxist sociologists, however, have often contested this view of human nature. This notion has also come under fire by evolutionary biologists. In line with these critical analyses, this paper will continue to challenge this theory of human nature principally through examination of human relations to nonhuman animals, and secondarily in reference to nature as a whole. Approaching this from a dialectical materialist perspective, we employ an interdisciplinary approach and reject reductionist, idealist and teleological explanations. We attempt to uncover the underlying structures that promote the competitive and cruel (exploitative) nature of humanity, illustrating this in terms of agribusiness and biomedical research.*

***Keywords:*** *dialectical materialism, animal cruelty, human nature, agribusiness, biomedical research*

## Introduction

The idea that humans are innately competitive and cruel is a dominant theme throughout Western thought. Hobbesian notions of intrinsic human brutality have been used to justify cruel, exploitative and competitive behavior in relation to each other, as well as human relations to nature. The naturalization of human cruelty toward each other, and other animals, is rooted in a biological pretense that has been carried over to the social sciences. While economists find this view to be well suited towards developing theories of economic rationality, and while socio-biologists (and evolutionary psychologists) have determined these characteristics to be defining, even essential, aspects of the human character, sociologists have often questioned this description of human nature. In addition, evolutionary biologists are increasingly challenging this notion.

This paper will seek to call into question this theory of human nature by examining human relations to nonhuman animals, and to a broader extent, nature in general. By examining this relationship critically, from a dialectical materialist perspective[3], we integrate social and biological analyses to reveal the underlying structures that promote the competitive and cruel nature of humanity. These structures, it will be argued, give primacy to an economic (in the orthodox, neoclassical sense) understanding of humankind's place in nature, and in the process, veil fundamental biological and ecological relationships between human and nonhuman animals. Using a critical interdisciplinary approach allows us to lift the veil of reification and expose the social structures that drive the unprecedented human exploitation of animate nature.

Non-dialectical approaches toward nature have serious implications. These views are commonly held throughout academic research communities, business communities, and the public at large. As a result, the exploitation of nature, notably the mistreatment of nonhuman animals, has become a widespread and acceptable means toward reaching profitable ends that are understood as interchangeable with the public good. The increasing mistreatment of nonhuman animals in agribusiness and biomedical research, we will show, are clear examples of the conditions that are brought about by reductionist and idealist logic.

## Human Nature, Science and Dialectics

The varying levels of emphases given to conflict and cooperation, individuals and groups, as well as other dichotomies, are subjects of debate in both the social and biological sciences. Darwin and others have delineated the importance of relative reproductive success (fitness, in a biological sense) arising from the competitive interactions of organisms in relation to their environment (Darwin 1985; Fisher 1958; Wilson 1975). Neo-Darwinian theory privileging competition as the initial driver of evolutionary change has dominated theories of human evolution (Cronk et al. 2000; Fuentes 2004; Sussman 2002; Wrangham and Peterson 1996). This approach has been influential in the social sciences. The persistence of social Darwinist concepts in the social sciences are evidenced in socio-economic theories based on rational individual choice that treat the maximization of utility as the guiding principle of social relations. Further, racist conceptions of "naturally" superior levels of social fitness for Europeans and their ancestors have been historically prevalent. The intellectual histories of the biological and social sciences interact on a "two-way street of influence" as behavioral ecologists develop models (human and nonhuman alike) and generate predictions based on cost-benefit analyses of energy expenditure in relation to fitness returns (Krebs and Davies 1997; Maynard-Smith 1982; Sommer 2000).

These theoretical approaches, however, have been developed in a reductionist manner. Understanding human nature and the roles of competition and cooperation in social and biological processes is a complex endeavor. At minimum, these relationships need to be studied and understood from an interdisciplinary perspective. For example, humans engage in complex patterns of niche construction whereby cultural and social interactions result in important ecological alterations (Laland et al. 2001). Moreover, a reductionist approach, while sometimes useful for understanding the workings of parts of a system, limits the scope of the analysis by developing dualisms or dichotomies, as opposed to understanding whole processes, missing the interaction and interdependence of parts that are crucial to the processes (Gould and Lewontin 2000). The dichotomies that develop (e.g. human versus nature, human versus animal, cooperation versus competition, exploitative versus altruistic, etc.) are counter-productive and are often more reflective of social relations than biological realities. Therefore, looking for some underlying single human nature is, in a dialectical view, fundamentally flawed.

Sociologists have often entertained the idea that human nature is not fixed, but historical. Essentialist notions of innate human nature have been critiqued throughout the Marxist tradition, beginning with Marx's sixth thesis on Feuerbach (Tucker 1978). In addition, biologists and anthropologists are considering the role of multiple human natures (Ehrlich 2001; Fuentes 2004; Fuentes 2006). Recently, evolutionary theorists have begun to contest the primacy of competition in human societies. This approach has led to emphasizing the central role of adaptability and flexibility in human (and nonhuman) evolution. Indeed, increased awareness of intraspecific variability, behavioral plasticity, and a rejection of the "myth of the typical primate" are central to emergent evolutionary models of nonhuman primate social systems (Fuentes 1999; Strier 1994). Nevertheless, it is still quite common within the social and physical sciences (and to a greater extent in the popular press) to characterize inter-individual relationships among humans as *either* competitive *or* peaceful. This approach has been employed to seek explanations of human behavioral "universals" across cultures, including violent inter-group conflict (Wrangham and Peterson 1996), infanticide by males (van Schaik and Janson 2000) and sexual coercion (Thornhill and Palmer 2001).

The debate over whether primacy is given to cooperation or conflict, cruelty or compassion, group or individual emerges from an interaction between empirical data sets and the structure of scientific inquiry. Indeed, scientific research is a social and political process. "The denial of the interpenetration of the scientific and the social is itself a political act, giving support to social structures that hide behind scientific objectivity to perpetuate dependency, exploitation, racism, elitism, [and] colonialism" (Levins and Lewontin 1985, 4). Science does not occur in a vacuum. Socio-political processes affect science in ways that are not always apparent to the scientist. Under the existing capitalist social relations, competition and exploitation are strongly regarded as necessary components of social life. Along with this, the detailed division of labor promotes increasing specialization, which can be characterized as extreme. Humans (scientists) become alienated from the larger processes by this fragmentation into individual units and do not see their relations to these processes. As a result, scientific theory and ideology can sometimes become confounded[4].

Using the dialectical method to flesh out the interplay between social and ecological processes will provide a more fruitful analysis for understanding these relationships. We cannot understand the role of competition without understanding the role of cooperation, or cruelty without compassion, in the same way that you cannot understand "up" without "down." One does not exist without the other, one acquires its properties from the relation to the other, and those properties develop as a result of their interaction (Levins and Lewontin 1985). This is also true of the other dichotomies discussed above. Dualistic and idealist accounts of human nature emphasize features that distinguish humans

from other animals. A holistic approach, or what Benton (1993) calls a naturalistic view, begins with the common predicament for all natural beings.

When scientific endeavors atomize and reduce natural phenomena in order to fit them into a conception of the world where parts have ontological superiority to the whole, a distorted view develops that can be described as alienated from the larger ecological process. As Levins and Lewontin (1985) explain, this alienated view is both ideological and real. The claim that the social order is the natural result of competing interest groups is an ideological formation intended to make the structure seem inevitable, but it also reflects the reality that has been constructed. Social groups that are *created* by the system are said to be the *basis* of the system (Levins and Lewontin 1985). In the same way, scientific theories are developed that are said to explain natural phenomena, but can be based in reflections of social relations.

In this manner scientific theories are reified, hiding behind the veil of a system of generalized commodity production. Under a capitalist system of production, commodities are fetishized. That is, exchange of commodities becomes central to social life and social relations are understood as relations between things rather than people. In this reified view, social relations and social phenomena are understood as and based on commodity relations. As Lukács (1968, 91) states, "Reification requires that a society should learn to satisfy all its need in terms of commodity exchange."

As a result, reification creates 'laws' that veil the real relations between objects, and social constructs become natural and inevitable facts. The knowledge that is constructed from this process does not offer a clearer understanding of the social and biological environment, but simply reproduces the ideology of the ruling class. It functions to make the phenomena of capitalist society appear as "supra-historical essences," concealing reality (Lukács 1968). Henceforth, non-scientific institutions can easily adopt the dominant paradigms of the scientific community and thus reify dualistic notions of human nature.

Despite a broad consensus among social scientists that human social relations are extraordinarily complex, "Much of the focus on the evolution of human patterns remains on inter-individual or inter-group competition for access to resources" (Fuentes 2004, 712). This approach to evolutionary biology is steeped in Enlightenment ideology and the political economy of capitalism. A system that is based on the accumulation of capital resources in order to continually reproduce the processes of generalized commodity production requires domination of the major means of production. This domination includes converting communal resources into privatized parcels for the sole purpose of creating surplus value. Within these social relations, a socially constructed system of intensified competition and exploitation develops pitting humans against humans, as well as nature, which today have escalated to unparalleled intensity.

The liberal economic paradigm based in the pursuit of self-interest as the driver of social progress is highly influential in developing this individualist notion of increased fitness[5]. What is lost in this approach is the fundamental conception of Darwinian evolution as a population level process which examines changes in gene frequency in populations over time. That is to say, it is not an individual process per se. Population level processes have much more complexity as they are interacting with a host of factors including environmental conditions, historical changes, density dependent effects, and stochastic processes. A dialectical approach does not ignore these influential factors. In fact, a dialectical analysis addresses such issues taking into account the variety of factors that concomitantly interpenetrate each other to better understand social and biological processes. Giving ontological superiority to the individual over the social, what Marx referred to as "Robinsonades" (Marx 1973, 81), is an inherently non-dialectical approach.

Human relations to nonhuman animals are often characterized as higher beings dominating lower life forms in order to meet human needs. Teleological notions of life have frequently considered nonhuman life forms as serving human needs, while economistic conceptions present humans in a proprietary relation to nonhuman animals and, to a greater extent, nature. Notions of domination and mastery of nature have undermined holistic conceptions of nature. These notions developed into a mechanistic view of the natural world where nature is viewed as dead or outside the realm of human life (Merchant 1989). Within this view of nature, the exploitation of the natural world is acceptable.

A dialectical approach to the natural world sees humanity as enveloped in natural processes, not outside of them. Nature is a dialectical process and "opposing forces lie at the base of the evolving physical and biological world" (Levins and Lewontin 1985, 280). Organisms are both subjects and objects, causes and effects of their environment. There is an interactive effect occurring that influences all aspects of the environment including, of course, humans. A materialist, dialectical, and co-evolutionary perspective is necessary for understanding the human society/nature relationship (Foster 2000). As Engels stated in *Dialectics of Nature* (Engels 1966, 180):

> *Let us not, however, flatter ourselves overmuch on account of our human conquest over nature. For each such conquest takes its revenge on us. Each victory, it is true, has in the first place the consequences on which we counted, but in the second and*

> *third places it has quite different, unforeseen effects which only too often cancel out the first... Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature — but that we, with flesh, blood, and brain, belong to nature, and exist in its midst...*

Within an egocentric and reductionist conception of the natural world, the treatment of nonhuman animals is rooted in utility. Their existence is seen only in relation to humans and their lives have no consequence outside of the realm of human needs. These utilitarian and dominating relations to the rest of the animal universe are exemplified in modern agribusiness, which has created an industrialized animal production process, and by the biomedical research industry that siphons animal life into a quest for profits, competition for research dollars, and reproduction of the scientific status-quo. Each of these provides important insight into the unprecedented exploitation of nonhuman animals that is occurring under modern capitalism. Within these realms, human relations to nonhuman animals have been infused with a scientific understanding of the world that is based in bourgeois liberal ideology and grounds this understanding in the social structural processes of advanced capitalist relations. These views promote a conception of the world where humans, as the final link in the "great chain of being," naturally dominate other life forms.

## Agribusiness

The production of large-scale animal food products is often referred to as factory farming. In agricultural circles it is commonly called "confinement" or "intensive" farming. Factory farming is the ultimate example of the extreme exploitation and cruelty towards nonhuman animals in agribusiness. In this realm animals are simply commodities and the goal is capital accumulation[6]. This intensive process focuses on lowering costs and increasing revenue, which results in pushing animals to greater and greater "productivity." While successful in reaching these aims, this practice has deleterious impacts on the welfare of nonhuman animals and human society alike.

Animals are kept in highly crowded conditions in which they are often unable to move more than a few inches or feet. Egg-laying chickens are confined to small cages that are filed into tight proximity, piled one above the other extending for what appears like a never-ending warehouse of white fluff with bright red/orange highlights. Female egg laying chickens are de-beaked so that when they are crowded into cages they do not injure each other through pecking in response to the overcrowding. Males are simply discarded. Pigs are confined to cages under similar conditions and often become distressed and engage in self-mutilation. Cows live in such crowded conditions that they are often covered with feces (Mason 1990). These types of conditions exist for all species of industrial "livestock."

Under this system, food must be produced on a mass scale for processing in a manner that is required by capital interests, i.e. most profitable to the shareholders. For capitalist agriculture, nature is regarded in a mechanized way while ethical and ecological considerations are, at best, secondary. High output and consistency are demanded, which entails large-scale production processes that have little regard for the well-being of the animals that are being raised. "The superimposition of maximizing economic returns upon animal husbandry exerts pressure on it towards cost reduction; yield maximization, and overall process-control" (Benton 1993, 153). As the process becomes increasingly industrialized, animals are treated much like protein producing bio-machines, pumping out product for profit.

Treatment of animals in this manner causes them to feel unnaturally high levels of stress that often results in various illnesses. Moreover, highly crowded conditions breed diseases and allow them to spread easily. In order to combat this and other health problems, agribusinesses have taken to using antibiotics on a massive scale to keep animals "healthy." Along with the daily doses of medication, many domesticated farm animals[7] are given hormones in order to increase their size or milk producing capacity.

These "efficient" production processes are said to be beneficial to the consumer in that they produce low cost meat and dairy products for human consumption[8]. But the benefits that are reaped as a result of industrialized animal production can be more accurately defined as the accumulation of profits for big agribusiness. The practice of injecting hormones and medicating farm animals is promoted by companies like Monsanto, not because it helps produce low cost, healthy food for consumers, and least of all for any considerations for the well-being of animals. Rather, the goal is maximum profits. For example, Monsanto promotes Posilac (its patented bovine growth hormone) in order to produce profits, plain and simple (Midkiff 2004). It is widely recognized that there are surpluses of cow's milk in the U.S. and that there is no real need to increase milk production. In addition, the widespread use of antibiotics has created a windfall for the pharmaceutical industry, as about 70% of the antibiotics in the U.S. are produced for animal feed (Cook 2004). The use of growth hormones and antibiotics only further the exploitation of nonhuman animals and currently the human health consequences are not completely understood (Begley and Brant 1994).

There is no doubt that humans have consumed animals as a source of calories and protein for millennia. Evidence supports a pattern of increasing meat consumption in the earliest members of our genus, from *Homo habilis* (2.5 mya) through *Homo erectus* (1.9 mya), and eventually to a transitional process of intensifying animal and plant domestication by our own species beginning 12,000-10,000 years ago (Lewin and Foley 2004). It is important to note, however, that humans, as anthropoid primates, have a long evolutionary history that has shaped our digestive physiology and nutrient requirements. Features of the human digestive system are both genetically conservative and un-specialized (i.e., able to utilize a wide range of plant and animal foods) (Milton 2000).

Humans, therefore, are adaptable (rather than adapted) and are able to exist on extreme diets such as those that include high levels of animal matter despite a strongly herbivorous ancestry. Further, Cartmill (1993) explores the role of hunting in human history. A full-appreciation for both the scientific evidence (and biases) and the historical context of hunting calls into question any essentialist notions of humans as exploitative killers of non-human animals[9].

Obviously, human-nonhuman relationships, in the context of diet, have had social ramifications that existed well before the emergence of capitalism. Nevertheless, the scope and scale of exploitation and cruelty under capitalism, and particularly the monopoly stage of capitalism, where industrialized agribusiness is the norm in food production, is unparalleled. Under capitalism, the human alienation from nature has allowed for the treatment of animals as commodities, not sentient beings. This commodification drives a wedge between human and nonhuman animals and, further, justifies the mass exploitation of all living beings. What's more, in agribusiness, as well as in other sectors of the economy, these harmful practices become essential for the preservation and perpetuation of the system as the accumulation of capital is a driving force. As such, in this historical process a critical contradiction exists: some of the most abominable and destructive features of the system become foundational (Baran 1957).

Explaining these developments in terms of natural processes where humans are the highest form of life that developed through a process of "survival of the fittest" is not only biologically and socially inaccurate, it is dangerous. These explanations have played an important role in legitimating ideologies that allow for the extreme exploitation of life under a capitalist system of production. As a result of this exploitation, we have reached a critical stage in history where ecological degradation threatens all forms of life.

In the reductionist view of nature, nonhuman animals are viewed as individual units of production and are stripped of their place in the ecological web of life that includes humans. This approach has led to the development of scientific research that has as its aims increasing production and profits, focusing solely on the economic outcomes while ignoring the ecological interactions. These processes have widespread deleterious effects as the build up of waste causes pollution of land and water resources, the growth of factory farms dislocates rural communities, and the methods of production have short- and long-term health consequences for human and nonhuman animals alike (Mason 1990). In addition, animal feed production is highly energy and water intensive resulting in a number of environmentally significant consequences.

## Biomedical Research: The Use of Nonhuman Primates

From the first scientific description of an anthropoid ape by the Dutch physician Nicolaas Tulp (1593-1674) to the published findings of the examination and dissection of a chimpanzee by Edward Tyson (1699), the closest relatives to the human species, under the guise of science, have become subjects of knowledge and have been subjected to a separate standard of valuation (Corbey 1995; Nash 1995; Thijssen 1995). Such early delineation between human and "other" animal life forms confined the recognition of higher moral status neatly within our own species boundary.

With the 2004 discovery of a recently lived (~18,000 ya) species of small-brained hominin (*Homo floresiensis*) on the Indonesian island of Flores, our place in nature is further contextualized (Brown et al. 2004; Gibbons 2004). The discovery has two important implications for this discussion. First, that the evolutionary process is not equivalent to a march of progressive forms reflective of an inevitable natural order, but rather an often stochastic filtering of existing phenotypic variation (Gould 1989). Secondly, due to the temporal proximity of *Homo floresiensis* and lack of gene flow with anatomically modern humans, the discovery supports the view that living humans are derived from a recent ancestral African population (~ 250 kya) that has undergone a dramatic expansion process dominated by replacement of regional lineages.

York (2005) correctly identifies an important implication of the *H. floresiensis* findings: that the degree of genetic similarity among all living human populations supports the *absence* of distinct biological human races. York continues on to argue that our species has narrowly avoided "genuine moral dilemmas" due to the recent extinction of these closely related, yet different beings. We *are indeed* faced with similar ethical questions when interacting with our close nonhuman primate relatives, specifically the fellow members of

the Family Hominidae (the monophyletic taxonomic group that includes chimpanzees, bonobos, humans, and gorillas).

Humans (*Homo sapiens*) are one of approximately 635 taxa (species and subspecies) classified as members of the Order Primates. Nearly a third of these taxa are categorized as "endangered" or "critically endangered" by the World Conservation Union (IUCN). Threats to nonhuman primate species are synonymous with threats to tropical ecosystems in general, including habitat loss and degradation, depletion of species for human consumption, and the removal of species for medicinal use. The welfare of these ecosystems is inextricably linked to the activities of human populations, both within the developed and developing world (Malone 2003). In addition to these geographical and economic interconnections, nonhuman primates share in many aspects of our behavioral, physiological, and developmental systems. Our shared evolutionary history with the nonhuman primates is evidenced by such commonalities as encephalization (increasing ratio of brain size to body size), reliance on visual cues as opposed to olfactory or chemical signals, extended life history intervals (e.g., infant dependency, inter-birth intervals, etc.), and complex social systems.

These primate-wide trends arguably underlie a special relationship between human and nonhuman primates, to the exclusion of all other biological organisms, in regard to the utilitarian use-value of nonhuman primates to Western societies (see Fuentes and Wolfe 2002; Malone et al. 2004 for detailed descriptions of human and nonhuman primate interconnections in primate-habitat countries and the impacts of the illegal pet-trade, respectively). While rarely engaging in traditional forms of functional domestication (e.g., the derivation of food products), nonhuman primates are frequently the subjects of comparative research in both field and captive settings, objects of attraction in zoological gardens, trained for use in the entertainment industry, and employed, along with mice, rats, rabbits, dogs and other animals, as subjects within the biomedical testing industry. The use of nonhuman primates in biomedical research, exemplifies how biological relationships can be simultaneously emphasized and de-emphasized (i.e., proponents of the animal model of biomedical testing emphasize the predictive value of physiological similarities between humans and the nonhuman test subjects, whereas the "nonhuman" status of the subject permits their use on moral grounds). It is through the exploitation of this contradiction, that the role of underlying profit-based systems can be seen as "tipping the balance" toward cruel practices and a veiling of our relationship to the natural world.

Nonhuman primates comprise a small percentage of the overall number of animals used in biomedical testing (estimated at over 100 million — with a vast majority being rodents). The National Institute of Health reports approximately 25,000 nonhuman primates in U.S. governmental research holdings for 2001-2002, with a continuous effort to replace subjects by maintaining large-scale captive breeding colonies. The use of primates, especially chimpanzees (*Pan troglodytes*), in invasive biomedical research is a highly contentious practice. It is estimated that between one and two thousand chimpanzees are currently being used, or are readily available for biomedical research within the U.S. The array of arguments against their use range from the moral and ethical, to a questioning of scientific efficacy and the very ability for animal models to accurately predict biological results in human clinical trials (Cavalieri and Singer 1993; Fouts et al. 2002; Greek and Greek 2000). Our goal here is not to restate the varied ideological positions of opponents (and proponents) of the use of nonhuman primates in biomedical research (for a thorough discussion see Cohen and Regan 2001), but rather to describe institutional structures that perpetuate their widespread exploitation, irrespective of scientific value. Our view of the animal-testing model, as evidenced below, is that the dominating influence of economic constructions contaminates the evidence in support of scientific (biological) and ethical (ideological) arguments. This overriding influence is both deleterious and potentially dangerous to the long-term sustainability and health of our own species.

This system is perpetuated in part by public fear from historical medical failures such as the widespread birth abnormalities associated with Thalidomide use in the 1960s, and a public relations campaign driven by the Foundation for Biomedical Research. Public and governmental support for consumer safeguards therefore lies behind legislation mandating the use of the animal model in drug development. A merger in 1985 of two powerful lobbying groups produced the National Association of Biomedical Research (NABR). The NABR wields enormous strength and resources in the arena of political lobbying with the support of over 500 corporations and organizations directly profiting from the use of laboratory animals. The data, however, dispute the efficacy of the animal model, and the number of doctors that question its predictive value for human clinical trials is increasing.

Despite the inherent lack of predictive capability of animal models, a multi-billion dollar industry supports this "scientific" status quo and the exploitation of millions of nonhuman animals each year. How can this irrational practice be explained? The answer rests in liability protection protocols and eventually, congressional mandates. As early as 1964, Dr. James G. Gallagher, the Director of Medical Research for Lederle Laboratories, recognized the impact of legal regulations and stated, the

> *result of the regulations and the things that prompted them is an unscientific preoccupation with animal studies. Animal studies are done for legal reasons and not for scientific reasons. The predictive value of such studies for man [sic] is often meaningless — which means our research may be meaningless* (in Greek and Greek 2000, 78).

Despite these admitted shortcomings, the use of nonhuman animals as biomedical subjects continues on the basis of the aforementioned legislated mandates and system of legal protection for the pharmaceutical industry. In fact, as Dr. Robert Sharpe states in *The Cruel Deception* (1988, 30), "If animal experiments are misleading, they are at least flexible: they can be deemed inapplicable when necessary, ignored when convenient and used to imply important advantages over competing products."

Other drivers of the biomedical research industry are built into the structures of the academy ("successful careers" determined by publications and the accumulation of research dollars), the U.S. military, and the lucrative businesses that supply the biomedical research complex with laboratory equipment and lineages of test subjects. Collectively, these businesses, such as Charles River Laboratories, Primate Products, Inc., and Lomir Biomedical, constitute billions of dollars in corporate profits (and millions of lobbying dollars) to maintain the status quo. This environment presents challenges to the widespread implementation of alternatives to the animal model, including: *in vitro* research, autopsies, epidemiology, mathematical modeling, and the extensive clinical research of patients (Greek and Greek 2002).

The behavior of humans (individuals and societies) under such institutionalized "niche construction" becomes overwhelmingly alienated from both biological and ecological relationships to nonhuman animals. Positive interactions between species that alter the environment and selective pressures in favor of shared ecologies (facilitation, as described by Bruno et al. 2003), potentially a historical driver of evolutionary change, are replaced by a limited and static conceptualization of interspecific interactions. Through these processes, nonhuman primate species become functionally integrated into human economic systems. A striking example is the farming of our genetically closest relatives (chimpanzees) in breeding colonies for biomedical research that, as discussed above, continues to be driven by profits rather than medical advancement. As Marx wrote in *Grundrisse* in regard to the reduction of human relations to nature to a set of market-based utilities: "nature becomes purely an object for human kind, purely a matter of utility; ceases to be recognized as a power for itself; and the theoretical discovery of its autonomous laws appears merely as a ruse so as to subject it under human needs, whether as an object of consumption or as a means of production" (as cited in Foster 2002, 31).

The material reliance on nonhuman animals in biomedical models is based on an "uncontested underlying commonality in the anatomy and physiology of humans and other animals" (Pavelka 2002, 27). The use of nonhuman animals, however, occurs in ways that hide commonality and suppress notions of compassion for other forms of life. Henry S. Salt (1851-1939), a socialist animal rights activist, challenged an illogical dichotomy between nature and society as well as between humans and nonhuman animals. Salt identified "the hypocrisy of scientists who 'in theory renounced the old-fashioned idea of a universe created for mankind,' yet used a position of moral right, ignoring the close relationship that exists between humans and nonhuman animals, to justify the torture of animals" (Clark and Foster 2000, 469).

The use of nonhuman primates in biomedical research is a relationship based on human domination over other forms of life. While this is often couched in the belief that this work is done for the interests of all, clearly some have more interest in perpetuating this relationship than others. Corporate entities that reap large profits from the status quo have a vested interest in maintaining this utilitarian conception of nonhuman primates and, as discussed in the previous sections, other species and nature in general.

Finally, this analysis has purposely focused on the use of nonhuman primates in biomedical research. Our intent is to emphasize specific physiological and ecological characteristics, shared in common with humans, which magnify the contradictions of their relegation to biomedical testing subjects. In doing so, we have identified underlying social and institutional structures that support and sustain their continued use in spite of biological limitations, results, and realities. If testing is not efficacious in respect to nonhuman primates where proponents argue that the high degree of similarities to humans make them most effective, then it is probably not efficacious in most cases, and — while beyond the scope of this paper — the use of all nonhuman animals in biomedical testing should be re-considered and re-evaluated.

A dialectical approach does not reduce the relationship to nonhuman primates to a purely utilitarian one. As stated above, interactions between species is a crucial element determining the health of ecosystems for all species. With the increasingly real danger of losing more primates to extinction, their reduction to mere test animals offering liability protection for corporations along with enhanced profit for pharmaceutical companies, can only serve to worsen the current disturbing trends.

## Conclusion

The exploitative relationship between human and nonhuman animals results from a reductionist and mechanistic view of nature that ignores the interpenetration of species and their environments. Nonhuman animals become means of accumulation — mere body parts akin to machine parts in the juggernaut of capital. Scientific research is not only anthropocentric and needlessly cruel in manipulating nonhuman animals for its own ends, but it has as its chief aim increasing production and ultimately profits, focusing solely on the economic outcomes while ignoring the ecological interactions.

Many have approached the treatment and use of nonhuman animals by addressing these issues in terms of "animal rights" and "animal liberation." Such discussions are based primarily on moral and philosophical considerations, however, while this paper, although not averse to the ethical implications, addresses these issues first and foremost on materialist grounds — i.e., in terms of the material consequences of these practices and the break with principles of ecological sustainability. The two moral philosophical camps that are best known in the area of animal rights are the liberal individualist view of rights, advocated for by Tom Regan (1983, 2004) and the utilitarian view of animal liberation which is associated with Peter Singer (1977). These views focus on the moral duty of individuals, while underemphasizing institutional (structural) criticism. It would be inaccurate to say that they do not address institutions at all. Yet, a materialist and dialectical perspective centers on such aspects and develops a holistic co-evolutionary approach toward creating a favorable community and environment as opposed to focusing on the individual (Benton 1993)[10].

In this sense, while doing a great deal to bring this issue to the fore, these "animal rights" discussions are insufficient in addressing the problems associated with nonhuman animal welfare. A dialectical and materialist approach is an ecological approach in that it is holistic and appreciates the interdependency between all life forms and their environments. Furthermore, this approach rejects idealist and teleological explanations, such as spiritual, religious or social Darwinist views, that have the tendency to move away from the scientific into the super-natural — ultimately leading back to an anthropocentric outlook. If we rely solely on the philosophical and moral debate, we are relying on nuances and logical opinions that are developed within a social context that can often reflect the dominant ideology. It is crucial to examine the material world for historical and empirical realities, such as those found in the realm of agribusiness and biomedical research, in order to make a scientific argument that has lasting credibility.

Such an approach is essential to lift the veil of reification, and achieve what Rose (2002, 218) describes as "biosynergy," or "the collaborative and mutually beneficial interaction of all living elements within regional ecosystems, which leads to individual, social, and ecological stability, longevity, and enrichment." Using a dialectical approach will allow a better understanding of the interrelations that exist between human and nonhuman animals, and nature more generally. This can move us toward "mutually beneficial interactions" that will appreciate ecological concerns.

As knowledge is socially constructed, dominant ideologies shape our interpretations of the social and natural world. Our analysis has permitted us to point to the inherent contradictions and reveal the reified conceptions that are prevalent throughout our current social institutions. This approach takes nothing about the current social relations for granted and allows for new insights into long-standing practices that have been reified.

Doing so facilitates a new comprehension of relations between humans and their environment where co-evolution and interdependence are at the forefront of our understanding. For example, it is important to understand that humans are flexible and adaptable (multiple human natures). Behavioral plasticity is very much a part of our evolutionary history and both intra- and inter-group primate social behavior is viewed as highly variable (Fuentes 1999; Treves and Chapman 1996). The degree to which primates are able to adapt to environmental alterations and/or socio-cultural constructions will be a function of the degree of plasticity at the individual, and subsequently the group level (Fuentes 1999).

In terms of human relations to nonhuman animals, we ultimately see the potential for a more humane, compassionate and cooperative interaction between humans and other animals while fostering environmental sustainability. The co-evolutionary nature of these relations becomes apparent once a dialectical analysis is employed. For example, if we begin to look at issues such as illness and disease or environmental degradation as social concerns instead of — or as well as — purely biological or physical concerns, we can develop different solutions. Addressing the health problems of domesticated farm animals on factory farms could be remedied by solutions that focus on a major restructuring of the food production and distribution systems rather than loading animals with medication. Furthermore, eliminating factory farms would be an effective measure for reducing water pollution and other environmental problems and discontinuing the use of pesticides for plant production (much of it used to feed animals on factory farms) could be more effective than searching for new drugs (and more "animal trials" within the current paradigm) for reducing instances of cancer. Understanding causes and effects in a dialectical manner could sig-

nificantly change the dependence on nonhuman animals as test subjects as well as for food production.

Conveniently, avoiding such a perspective has enormous material benefits for those who are at the center of such decision-making. More often than not, research dollars follow the capital intensive, profitable, and reductionist solutions. Therefore, little time and money is spent focusing on solutions that are made vivid by the dialectical analysis. In avoiding the universal interconnectedness and interpenetration of opposites, causes and effects are delimited to fit into commonly held constructions of the physical world and solutions are based on neatly predetermined causes.

The dialectical approach highlights the holistic nature of our relations to the rest of nature by examining, for example, whole ecosystems in their heterogeneity and complexity. It is interdisciplinary in that it integrates a diversity of knowledge recognizing that the natural and the social are inseparable (Levins and Lewontin 1985). This analysis allows us to understand that our relations to nonhuman animals are multidimensional and that while the current practices and methods of production are able to furnish low cost food for some or medicine for others, they also bring a variety of economic, environmental and social problems (Altieri 2000). These considerations offer direction for future analysis into the relations between human and nonhuman animals as well as to the rest of nature so as to move toward a better understanding of the metabolic relations between society and nature (Foster 2000).

There is nothing inevitable or natural about the exceedingly cruel relations between human and nonhuman animals that are common at present. In a social environment that is based on individualism and exploitation, humans develop and intensify these traits. The primacy of competition and the widespread practice of exploitation became common under capitalism where the economic relations are reified as "natural" social relations. Ill-conceived, reductionist, non-dialectical conceptions of human nature that serve to justify the alienation of humans to each other and their estrangement from all other living beings are used to legitimate the ruthless and cruel practices that underlie current agribusiness and biomedical research. We contend that these structures give primacy to an economistic understanding of humankind's place in nature and, in the process, veil fundamental biological and ecological relationships between humans, nonhumans and nature.

## Endnotes

1. Author to whom correspondence should be directed: E-mail: slongo@uoregon.edu
2. E-mail: nmalone@uoregon.edu
3. We use the term "dialectical materialism" to refer to an approach that opposes reductionist and mechanistic materialism or an idealist or vitalist dialectic and should not be confused with the vulgarized use of this term during Stalinist era Soviet-style Marxism. See Clark and York 2005 for a further explanation.
4. It is important to note that in this paper we are not critiquing science per se, but science that is entrenched in the capital accumulation process and develops in a non-dialectical manner.
5. What we call the liberal economic approach can also be associated with what is often referred to as liberal individualism or possessive individualism.
6. The focus on factory farms is to highlight the practice of large-scale capitalist food production that is exclusively geared toward producing commodities for market exchange.
7. We use the term "farm animals" throughout this paper, but this is not used to legitimize the exploitation of nonhuman animals in the farm context, but to describe the material and historical circumstance that some species of nonhuman animals have been domesticated for farm labor and food production. This descriptor allows us to distinguish this group of animals that are commonly found in this environment from others. Further, we want to make clear that we are not advocating that this is a natural condition.
8. When the claim is made that this process produces low cost food for human consumption, the social and environmental costs (what economists like to call "externalities") are not considered as part of the equation.
9. We are hoping to avoid the essentialist argument that humans are, or are not, by nature meat eaters. A materialist approach recognizes that humans have historically eaten meat, but this does not mean that humans are innately meat eaters. Humans are biologically and socially adaptable.
10. This is not to say that individuals do not play a role in shaping history, but that these social structures constrain and shape their choices and that emphasizing the individual seriously diminishes the analytical power of the discussion.

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