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THE MYTH OF PROGRESS IN SCIENCE: DIALECTICS, DISTORTION AND LYSENKOISM IN THE SOVIET UNION

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The scientific controversy surrounding Lysenkoism is both unparalleled and well known amongst historians and philosophers of science (Joravsky 1970, McMullin 1987, Pollock 2009, Wolfe 2010). Yet, while this may be true for scholars and students a generation ago, I argue that the controversy of Lysenkoism is not widely known today. Particularly in political science, this historical period and phenomenon in the Soviet Union remains irrelevant or at least, inconsequential to the scientific study of politics.

What value then, would an examination of an already well discussed, yet largely forgotten scandal in science accomplish? First, the unique socio-political and historical material circumstances surrounding the controversy can offer a re-evaluation of the politics of science and the process by which scientists and the general public understand and conceive the notion of "progress." While easy to dismiss as inconsequential or as a historical "fun-fact," T.D. Lysenko's theories and practices were considered revolutionary within his homeland. They were progress for Soviet science, and although largely discredited today, some would argue that Lysenko's ideas retain value and are indeed contributions to science (Liu 2004, Rolls-Hanson 2005).

Second, Lysenko is also relevant for political science because any examination of politics adds to understanding in general. More specifically, the controversy involves political explanations, in terms of the social phenomenon of Lysenkoism, but also in terms of the structure and processes involved in the creation of political science itself. Lastly, while not arguing the case of Lysenko can or should be enveloped in a larger typology or pattern of controversies in science per se, general knowledge can be gleaned about understanding past or current controversies.

A common myth within and outside of the scientific establishment has been the conception of scientific "progress" towards a grand vision of generalizable, universal "big T truth." What this position presupposes is that the accumulation of scientific knowledge is both teleological and ahistorical. By scientific establishment, I am conflating processes, individual scientists, organizations and distinctions between different spheres of scientific endeavors. A crucial distinction should be made between the natural and social sciences, but while there are certainly important differences and logics at work within these spheres, my argument generalizes these differences to maintain a man-

ageable scope of this research.

Contrary to the conception of science in a vacuum, I argue, scientific practice and the meaning of progress are socially and historically bound. Illustrative of the political and social processes that constitute scientific practice and knowledge is the case of T.D. Lysenko and what became known as the scandal of “Lysenkoism” in the former Soviet Union. Rather than offer a definitive explanation or “cause” of Lysenkoism in the positivistic sense, I employ a Marxist perspective. This Marxist lens can uncover the processes of Lysenko's case but also to help gain insight into science as myth and progress as concretely determinable.

Science, whether in the West or the East, does not stand on its own, but occurs within the context of social processes, political decision-making and social relations. Pursuing how science or scientific theories are constituted, legitimated and discarded reveals how conceptions of an objective measure of “progress” simply do not conform to historical circumstance. It is not that various facts and knowledge have never “accumulated” or that data collection strategies or techniques have not progressed substantially, but rather, that the myth of “progress” has been largely characterized as ahistorical and apolitical.

Scholars like Thomas Kuhn have long since shown that scientific “progress” is political and changes have a revolutionary character. Marxist scholars such as Lewontin and Levins (1985) have challenged the concept of “progress” in the field of biological evolution which has broader implications for science in general; progress, both theoretically and materially, is dialectical, historical and political (27-28). Thus, the history of Lysenkoism is best approached by analyzing both the historical and social context in which Lysenko was born, in addition to the trajectory of theoretical and practical genetics, biology and agronomy in Russia and the subsequent Soviet Union.

Trofim Denisovich Lysenko was born in 1898 in Karlovka in Poltava Province, Ukraine (Young 1983). Born to peasants and humble surroundings, Lysenko would become an influential figure in the USSR and eventually become a “dictator” of an entire academic field (Graham 1993:126). According to Graham, “Lysenko was strikingly different from the majority of biologists and agronomists... he was a vociferous champion of the Soviet regime and its agricultural policies” (127). The force and success of what has become known as “Lysenkoism”, the tacit acceptance and promotion of Lysenko's system throughout the bureaucracy, has many facets and defies singular explanations of “cult of personality” or “corrupted bureaucracy”. To understand Lysenko and his doctrines fully requires a historical and holistic approach.

Lewontin and Levins (1976) contend that, “The Lysenkoist movement of the 1930s-60s in the Soviet Union was an attempt at a scientific revolution” (33). Although the movement would eventually produce failure, they

identify several factors that contributed to its fruition and success. First, Lysenkoism developed during a time in Soviet society receptive to radical proposals due to the pressing needs of Soviet agriculture. Second, there were strands of non-academic agricultural traditions and practices along with discredited Lamarckian conceptions such as the transmission of inheritance through acquired characteristics, from which to draw intellectual content. Third, due to high literacy and the popularization of science, the debates over theory and method was made a public affair. Fourth, a budding cultural revolution put tension between the youth and exacerbated the view of an elitist academy. Finally, there was a widespread belief in the relevance of philosophical and political issues which kept discourse at the most general level. In addition, these circumstances were nested in a larger, international political context of competition with a rival superpower (i.e. Cold War, etc.) and a repressive and dogmatic bureaucratic and administrative apparatus (33)

Methodological Dialectics

Substantiating and defining what employing a "Marxist" perspective consists of, at least in methodological terms, requires two caveats. First, the proliferation and history of Marxist thought has produced a variety of strains, differing camps and persuasions which make it difficult to reduce all Marxian thought into a comprehensive definition or criteria. For example, one may call themselves "Marxist" but would that be orthodox, neo-Marxist, structural, post-structural, young Marx, mature Marx or Leninist-Marxist etc.? Second, because of this, there remains on-going debates, disagreements and continual specifications and reinterpretations which will be eschewed and/or conflated in favor of a general, less technical specification. For elaboration, Resnick and Wolff (2006) offer a selection of essays which address contemporary debates and work in Marxian theory.

In methodological terms, a Marxist perspective involves historical materialism and materialist dialectics. Simply, historical materialism contends that phenomenon are contextual situated in time and space (be that social space as well) and cannot be understood as existing independent of context. This means that objects and ideas which seem natural, eternal or generalizable are dependent upon the time, place and culture in which those objects and ideas are situated. In addition, the driving force (*kinetics* as Lewontin and Levins (1985) conceive) that move history are based in material reality, social relationships and economy. This would be in contrast to idealist conceptions of reality which posits that consciousness, ideas or ideology are the kinetics of history shaping it and bringing material phenomenon into being. Elements of dialectical thinking are not strictly Marxist and can be found in the writings of

ancient Greek thinkers. G.W.F. Hegel is the modern wellspring of dialectics, his being idealist, but Critical Theorists such as the Frankfurt School (Horkheimer, Adorno, Habermas, Marcuse, Siebert etc.) have expanded modern dialectical thinking extensively.

Under positivistic methodologies, phenomenon are reducible to their constituent parts which is necessary for understanding the fundamental essence of a thing. What positivistic methodologies allow is for propositions to be posited which can then be verified as established fact or truth. Steinmetz (2005) makes a distinction between positivism at a philosophical level and a historically situated "methodological positivism" which is closer to the conception that I employ. The main features of methodological positivism include an epistemological commitment to the discovery of universal laws, empiricism as necessary to understand the world and assumptions that methods in the social and natural sciences be identical (3).

Dialectics, in contrast, do not reduce phenomenon into their constituent parts but rather attempt to create knowledge in a holistic fashion. This logic defies singular explanations for phenomenon and attempts to reconcile aspects of things that appear as contradictory. In positive science, objects and phenomenon fall into mutually exclusive categories. Examples of this include distinctions of political versus economic or science versus religion. Whereas, under dialectical logic, politics cannot be fully understood without reference to the economy and mutually exclusive categories dissolve making reduction problematic.

As an example of differentiating the two logics, take the topic of scientific controversies. Under positivism, it would be useful to determine the exact causes of controversies and define the essential and constituent parts that make a controversy a "controversy" in general. The next step could be to reduce all historical examples of scientific controversy into the framework and explain the root causes and effects throughout all cases of controversy reducing them to their essential and constituent parts. This would concretely establish what a controversy would consist of regardless of time or contingent circumstance.

Dialectical logics would instead examine the contradictions and antagonisms involved in a case or cases of controversies. What would be crucial would be to examine the processes which bring the controversy into being or what factors influenced this or that particular controversy in relation to the context. More importantly, dialectically logics would resist isolating the controversy as such since it would be interconnected to the forces producing change and its initial creation. The key questions would not be "what does a controversy ultimately consist of or what are their ultimate causes?", but rather "what processes and factors brought this controversy into being or what forces

and interrelations allow it to persist or be defined as such?"

While the above discussion makes effort to delineate the two logics, in a dialectical fashion, however, these two logics themselves are not mutually exclusive. Both are useful for understanding a complex reality and share overlap in terms of how scholars apply them. Critical Theory and the Frankfurt School for example, draw conclusions and accept knowledge created by both positivist and dialectical methodologies.

The Rise and Characteristics of T.D. Lysenko

Bracketing explanations for a moment, the biography of Lysenko's life is the most well known and straightforward aspect covered by scholars. Graham (1993) states, "Lysenko began his career in Ukraine and in Azerbaidzhan, southern regions of great agricultural importance to the Soviet Union" (124). Educated at the Kiev Agricultural Institute, he applied his mix of formal education and peasant "mentality" to his postings at remote research stations. According to Sheehan, Lysenko "...first came into the limelight in 1927 in connection with an experiment in the winter planting of peas to precede the cotton crop in the Transcaucasus. His results, in his remote station in Azerbaijan, were sensationalised in *Pravda*. The article projected an image of him as a sullen 'barefoot scientist' close to his peasant roots" (MIA Sheehan 1978). His skill in using the news media to publicize his discoveries and his "masterful way with journalist" would be an important feature of his career (Joravsky 1970 59).

What put Lysenko on the map was his discovery of *vernalization*. Although he himself did not "discover" the technique, his use and application was as innovative and original as it was forceful. Vernalization was an agricultural technique which attempted to obtain crops in winter that were planted during summer months but were soaked and chilled for a period of time (MIA Sheehan 1978). With the promise of higher yields in a time of famine, the Ukrainian Commissariat of Agriculture Aleksandr Shlikhter, ordered wide-scale use of the technique (Soyfer 1994 17). A promotion was in order for his discovery and in 1929, "Lysenko was moved to a newly created department for vernalisation at the All-Union Institute of Genetics and Plant Breeding in Odessa. While in Odessa, he began to publish the journal *Yarovizatsiya* (Vernalisation) in which he disseminated his ideas on a wide scale and created a mass movement around vernalisation" (MIA Sheehan 1978). What Lysenko offered was "progress" in the science and techniques of agronomics- for which he was handsomely rewarded.

Lysenko's fame began to grow and he began to be known, not so much for the accuracy or applicability of his theories and techniques, but for his abil-

ity to “get things done.” His success as an agrobiologist and his practical achievements were difficult to assess and nearly impossible to replicate. Echoing sentiments of what Joravsky calls a “peasant mentality,” Sheehan comments:

His methods were seriously lacking in rigour, to put it mildly. His habit was to report only successes. His results were based on extremely small samples, inaccurate records, and the almost total absence of control groups. An early mistake in calculation, which caused comment among other specialists, made him extremely negative toward the use of mathematics in science.

Yet he continued to climb higher in the bureaucracy.

By 1938 he became president of the Lenin Academy of Agricultural Sciences. By 1940 he ascended to his highest position as director of the prestigious Institute of Genetics of the Academy of Sciences. While it is tempting to account for this transition due to personal qualities or “bossism,” the story is more complicated. Structural, historical and political factors all contributed to Lysenko's progression from an agronomist in remote Azerbaidzhan to the most powerful agrobiologist and figurehead of an entire academic field. This ascension was by no means bloodless or apolitical; the path was littered with the bodies of dissenters.

Structure, Science and Politics in the Soviet Union

Born a Ukrainian peasant, Lysenko's rise seems a proletarian triumph and was largely regarded in that way by his supporters. The combination of collectivization and state ideology helped to bring many individuals into positions within the bureaucracy once open only to “bourgeois” specialists or highly vetted professionals. Budgetary constraints also played a distinct role in helping to foster “peasant scientists,” since trained agronomists were not able to be placed at every village (Joravsky 1970:54). Accordingly, by 1929 there were 23,000 participant peasant scientists working in “hut labs” throughout the Soviet Union (54). These factors would lay the foundation of Lysenkoism: the widespread promotion and acceptance of, as authoritative, Lysenko's scientific theories and leadership.

As Joravsky points out, these peasant scientists would specialize in many techniques and aspects of agronomy or agriculture, from “Weed control, proper collection and spreading of manure, introduction of clover, purchase of certified improved varieties of seed, sprouting potatoes before planting...” and other innovative techniques (54). The work of those peasants participating in the “hut lab movement” was met with ridicule and hostility by many villages and other peasants. Advice was often given to peasants by village leaders to

form groups under the guise of civil defense organizations to avoid ridicule (58). Joravsky contends that these conditions produced a “peasant mentality” among the scientists to psychologically manage the anxiety of taking chances, along with, a general hostility to interference; “If he thought his 'experiment' might fail, he would not try it himself, much less urge it on others” (58). Lysenko, according to Joravsky (1970), had just such a mentality.

While peasant ideology certainly would play a role in decision-making, this conception only highlights a singular psychological aspect, which authors such as Lecourt (1977) or Lewontin and Levins (1976) contend as overly simplified and inaccurate. The historical circumstances do not lend themselves to explanations given by scholars such as Joravsky, “The books of Medvedev and Joravsky show clearly the way in which dogmatism, authoritarianism and abuse of state power can help to propagate and sustain an erroneous doctrine and even establish its primacy for a time. But a theory of 'bossism' is not sufficient to explain the rise of a scientific movement with wide support nor to explain its form and context” (Lewontin & Levins 1976 39). What is significant about Joravsky's “peasant mentality” thesis is that it illustrates Lysenko's connection to the social circumstance of other peasants who would enter formal education or continue the expansion of what would eventually constitute agricultural science and practice in the Soviet Union.

Before elaborating upon the events that helped to consolidate Lysenkoism, some explanation of the basic tenets of the doctrine and of traditional genetics are in order. According to Lewontin and Levins (1976) there are six tenets underpinning the theoretical structure of Lysenkoism: First, heredity is conceived as physiological process extending over the lifespan of an organism as it interacts with its environment. Second, assimilation of environmental conditions occurs in relation to the heredity of the organism whose “program” unfolds over the course of the lifetime and aspects of the environment are either selected or excluded which pass on to the next generation. Third, if the environment is normal then the heredity is maintained in the reproductive cells, but if conditions are altered then changes occur in the hereditary processes of the next generation. Fourth, specific factors such vernalization, grafting and hybridization destabilize the hereditary program and allow it to be modified. Fifth, assimilation of nutrients and the external environment are dominated by heredity and during sexual reproduction, there is a mutual assimilation of different heredities which make it a vulnerable stage for modification. Sixth, speciation is not a product of populations but of individual developmental physiology (35-36).

While not exclusively comparably to Lamarckian conceptions of the inheritance of acquired characteristics, many features of Lysenkoist doctrine rely on those concepts. What is so crucial, particularly in regard to the state philosophy, is the possibility for humans to intervene in the material world in a

positive manner. Modification and intervention in the evolution of organisms for human purposes fit well with the normative conceptions of Marxism whose goal was understanding the world in order to change it. Rather than applying dialectical materialism to produce the tenets of Lysenkoism, however, the tenets were born from experience in field and promotion of false results. Lysenkoism was a Marxist science in name only.

Currents and work on genetics had begun and were accepted scientific practice in the Soviet Union for many years. Genetics under Lysenko became associated with the West and became labeled a “bourgeois” science. In the West, genetics were continually advanced throughout the 20th century and in the sense of true progress, by the end of the century, had achieved ultimate status as the mechanism for heredity. Mendelism or Neo-Mendelism was the main theoretical construct guiding investigations into heredity during Lysenko's time. Created from and expanding on the postulates of Abbe Mendel in the early 1900's, it is the general science of particulate heredity (Huxley 1949 3).

According to Huxley, Neo-Mendelism has four main tenets: First, the distribution of inheritance is based upon the behavior of the chromosomes and genes and serve as the heritable differences between individuals. Second, all changes in heredity are due to past mutation with either the addition, substitution or subtraction of genes or strings of genes leading to variation. Third, evolutionary change is based upon natural selection and the differential survival of genes with mutations serving as the quanta of change. Fourth, mutations produce effects which are small and these incremental changes appear as continuous variation at the species level and are important in evolution (121-22). The main difference between Neo-Mendelism and Lysenkoism, Huxley contends is that, Neo-Mendelism is organized around a central concept whose formulation was needed to explain observed facts, whereas, Lysenkoism was a central concept imposed on certain facts while excluding others to offer an alternative explanation (22-23).

With the discovery of DNA in 1953 by Watson and Crick, the geneticists were given a solid, materialist foundation for genetics on which they have never been refuted and is currently accepted fact (Gouyon et al 2002 135). In Lysenko's time, though, many aspects of genetics and the mechanisms and processes remained under-developed. On these “silences” in genetics Lysenkoists built their case to bolster their theories while ignoring both the Eastern and Western contemporary, and current research of the day that supported genetics. To solidify the movement, geneticists and other dissenters in the Soviet Union would pay a high price.

According to Graham (1983), the history of dialectical materialism as a pursuit of scholars can be broken into two phases: (1) “authentic” and (2) “calcified”. During the authentic period of the pre-1930s, natural science

ideology was not an intrusive affair and many scholars were freely interested in Marxist theories and methods (122). The application of dialectical materialism was done “authentically” as opposed to ideologically where Marxism was forced upon scientists as a state doctrine.

This situation intensified during the purges of the 1930s when the political atmosphere in the Soviet Union became even more oppressive and strained. The process of collectivization under Stalin was a traumatic experience involving the dislocation of millions of peasants and repression by police forces to ensure obedience to new rules. During this period universities and the main scientific establishment, the Academy of Sciences were purged and reorganized, “The intellectual tone of the academic discourse changed. The shifts were most dramatic in the social sciences, but they could be seen in the natural sciences as well. The historian who today leafs through Soviet journals of the late twenties can easily perceive a transformation around 1929, the year of ‘the Great Break’” (Graham 1993 122).

Joravsky (1970) argues that political factors played an important role while placing responsibility on biologists that they themselves were unwitting contributors to the switch from genetics and biology to Lysenkoism. First, they endorsed a “Marxist” biology that was juxtaposed to a “bourgeois” science of any kind. Second, they endorsed the end of intellectual autonomy for scientists and scholars. Finally, they agreed with the program of political bosses that biologists duties were to serve the country's immediate practical needs rather than science for science sake (237). Given the context of the 1930s, however, it seems more than “unwittingly” that any scientist would support such radical shifts to an ideological science without coercion. The climate of fear and the reprisals against those individuals who challenged state authority or orthodoxy would be sufficient to induce many scientists to follow the official discourse. A striking comparison can be made of the US during “McCarthyism” when it became practically impossible for scholars sympathetic to Marxism or communism to hold those views in or outside of the classroom (Reisch 2005 19). Defiant scholars often lost their positions or were reprimanded under a climate of fear and repression.

Lecourt (1977) offers a more specified and historical approach which includes three distinct periods in which to examine the continuous political evolution of Lysenkoism. The first period can be considered his “technician phase” which lasted only a few short years from 1927 to 1929 and has already been discussed in some detail. This was the beginning of his career and had he not garnered governmental support, the outcome of his career would certainly have been different (40).

During the second period, roughly 1929-1934, Lysenko moved from technique to theory. What he called the “phasic development of plants” would become a key component of Lysenkoist doctrine (41); it was during this period

that a movement began to grow around the singular scientist. Lysenko also did much to connect his new science to that of Ivan Michurin, a revered Leninist geneticist and agronomist who Lysenko mythologized after his death in 1935 (43-44). Developed contrary to Mendelism, which offered an internal “particulate” mechanism for the transmission of heredity, Lysenko posited, “By regulating external conditions, the conditions of life, of vegetable organisms, we can change strains in a definite direction and create strains with desirable heredity. Heredity is the effect of the concentration of the action of external conditions assimilated by the organism in a series of preceding generations” (Ryan 2002).

In the West, Mendelism had led to the discovery of the gene and chromosomes which were identified as the material “substance” of heredity in organisms, whereas in the East, this path was denied. Ironically, geneticists of the West had more closely satisfied the assumptions of dialectical materialism becoming more “Marxist” than had Lysenkoists in their distortions of Michurin, a founding father of Soviet genetics. Michurin had made important discoveries concerning predominance in genetics and his fruit gardens were recognized by the Council of People’s Commissars under Lenin’s insistence (MIA Michurin). Michurin himself never rejected Mendelism but the theories he formulated towards the end of the 18th and beginning of the 19th century had room for interpretation. These inconsistencies and unanswered avenues were seized upon under Lysenkoist conceptions.

That Michurin had laid foundations for a Soviet science of genetics was no concern for Lysenko who misrepresented his theories for his own political gain. Lysenko established his theories in opposition to genetics and Western “bourgeois” science in general. Sheehan (1978) gives an illustrative summary:

The science of genetics was denounced as reactionary, bourgeois, idealist and formalist. It was held to be contrary to the Marxist philosophy of dialectical materialism. Its stress on the relative stability of the gene was supposedly a denial of dialectical development as well as an assault on materialism. Its emphasis on internality was thought to be a rejection of the interconnectedness of every aspect of nature. Its notion of the randomness and indirectness of mutation was held to undercut both the determinism of natural processes and man’s ability to shape nature in a purposeful way.

The disingenuity of Lysenko’s theories can be attributed to the fact that they were in no way deduced from the principles of dialectical materialism, but had a pragmatic character stemming from the experience of attempted agron-

onomics experiments (Lecourt 1977, 46). According to Soyfer (1994) Lysenko lacked the passions and intellectual curiosity of many of his peers (9). It is doubtful that Lysenko's intellectual accomplishments would lend credibility to the idea that he struggled to reconcile the dialectic and Marx's conceptions prior to or during his practical experiences in the field. Soyfer states, "Yet, having examined pages written in Lysenko's own hand, I can affirm that the inadequacies of his education remained obvious throughout his life... and he was unable to complete either a master's or a doctoral dissertation. Instead, he found a different way to the top..." (9-10).

Only later, after the fact of his success did Lysenko attempt to reconcile his theories into a coherent whole. The last phase extended from 1935 to 1948 and marked the most brutal and repressive consolidation of Lysenko's power and influence. During this time the doctrines, strands and inconsistencies in Lysenko's theories would be reorganized and unified into a theoretical system under the guise of dialectical materialism, the official philosophy of the Soviet state (Lecourt 1977 46).

The "new biology" that Lysenko and his followers established depended upon an ideological framework which made it possible to declare Mendelism as a "false" or "bourgeois" science compared to the "true Proletarian science" of Lysenkoism. This stance contributed to the repression and ultimate banning of genetics by Lysenko in his position as director of the Institute of Genetics of the Academy of Sciences. According to Lecourt, "From here it was only a step to treating geneticists as traitors and agents of imperialism infiltrated into the state apparatus" (47). In 1940, a crucial event in their campaign against the geneticists occurred: the attack on the most prestigious Soviet geneticist, Nikolai Vavilov. Director of the Moscow Institute of Genetics, Vavilov was publicly denounced by Lysenko and was subsequently arrested and died in deportation (49).

As Sheehan states, "Vavilov was not the only one. The growing ascendancy of Lysenko coincided with the purges that reached into virtually every Soviet institution during 1936 to 1939. Already, before Vavilov's arrest, the losses among Soviet biologists had been staggering" (MIA). Many scientists, dissenters and oppositional bureaucrats found themselves in prison or dead. Regardless of these events, Lysenko found favor among Stalin and many other leaders of the Communist Party. Even after Stalin died, Lysenko remained in his position, yet, the apogee of the movement had passed and soon opposition both inside and outside of the Soviet Union would begin crack the edifice of Lysenkoism.

Farewell T.D. Lysenko and the Progress of Marxist Science

For most of the Lysenkoist period in the Soviet Union, the ideas and

practices of T.D. Lysenko were largely unknown to the outside world. Few of the techniques and results received the serious scrutiny that may have undermined the theories. Concerned with emerging American imperialism during the Cold War, the Soviet establishment convened a meeting to unite the widest possible spectrum of individuals into an ideological front to meet this challenge. The World Congress of Intellectuals for Peace was convened in Wroclaw, Poland in 1948, but to the surprise of many, the topic turned to Lysenko, which started an ideological battle, which was to have lasting consequences (Lecourt 1976, 17-18).

The article that began the battle was written by Jean Champenoix under the title, "A Great Scientific Event: Heredity is Not Governed by Mysterious Factors" and presented a report by the Soviet academy which was thoroughly denounced by the international community as based on metaphysics (18). The arguments made by the Lysenkoists in defense were largely based on ideological and political grounds rather than scientific ones. This stance only weakened their position as they claimed, as the rhetoric of Lysenko had consistently maintained, that it was a matter of "bourgeois" versus "proletarian" science (24).

At the conference, many Soviet geneticists spoke out against Lysenko's theories and the experiences they had endured. By the end of the conference, however, Lysenko had drafted a report which effectively ended genetic study in the Soviet Union. Through the guise of "reorganization" of biology, the revisions extended throughout the scientific establishment down to the syllabi of individual professors in order to promote Michurin and Lysenkoist theories of heredity. Lecourt states, "These practical measures signaled no more nor less than the death sentence of genetics in the Soviet Union: all teaching of this discipline and all research were to be prohibited for more than fifteen years" (34). The reaction shocked the international community and set the USSR back for decades on research in genetics- a costly mistake from which was sown the seeds that ultimately led to the demise of Lysenkoism. The scientific "progress" that Lysenkoism had once offered had become a rigid, politically supported doctrine, amounting to a regression and distortion of science.

Lewontin and Levins (1976) point to five factors that contributed to the decline of Lysenkoism: First, it did not fulfill its promises to agriculture which had always remained a critical issue, but now after 30 years of practice it would no longer seem the "fix" that it once was perceived as. Second, administration and economic planning became depoliticized and more business-like; the domain of experts and technicians. Third, the prestige of academic authority was reconsolidated and the "revolutionary" peasant innovators and subsequent cultural revolution was aborted. Fourth, the "two camps" (East vs. West) rhetoric that many politicians had favored lost sway and a more conciliatory approach was adopted; defiance of genetics that was once considered a pride

became an embarrassment. Fifth, the political police power began to weaken along with the need to settle past oppression and the return of many exiled geneticists created new demands for freedom of scientific research (56-57).

Finally in 1962, due to political pressure stemming from Khrushchev's exposure of the Stalinist "cult of personality" within the Soviet Union, Lysenko was dismissed from his position as director of the Institute of Genetics of the Academy of Sciences (Soyfer 1994, 272-73). An ardent Stalinist from the beginning, without the support of powerful leaders and amidst a climate of change in the scientific establishment and broader culture, Lysenko lost most of his positions and status bringing an end to the era of Lysenkoist domination.

Far from the simple tale of the misuse of science by a maniacal bureaucrat or from a genuine attempt to integrate Marxism and dialectical materialism into biology and agronomy, Lysenkoism represents a historical and political struggle in which many actors and factors contributed to a dynamic ascension of a particularly gifted rhetorician with the backing of a repressive, authoritarian state. Ultimately, Lysenkoism is the story of a failed revolution which effected the social and material relationships and conditions in Soviet Russia only to produce its own destruction through contradictions in practice and theory. Even though the case of Lysenkoism is unique to the historical circumstances in which it was situated, there are lessons to be drawn for science and the meaning of progress in the West and globally. It begs the question: as to what types of scientific dogmas and incorrect theories are politically supported in the American or international context? What contemporary theories cast as "progress" will not stand the test of time or be revealed as fraudulent?

Lysenkoism was based upon a vulgarization of Marxism; vulgarization in the sense that Marx's theories were not represented accurately or as an intellectual endeavor, but as ideology. The dangers of such vulgarization are well highlighted by the history of the movement. While the failure of Lysenkoist science helped to discredit a Marxist approach among many scientists globally, the negative example it provided allowed for new avenues in appropriate Marxist science to be considered. "Progress", in that sense, has given the approach value in the West as an alternative paradigm to traditional scientific method (Lewontin & Levins 1976, 63) as practitioners have had to reevaluate the assumptions of scientific theory given the context of recent politics and society. Studying the history of Lysenkoism has the potential to provide insight into the actual application of Marxist thought, especially in consideration of its pitfalls, methodological issues, its failures and possible successes. So long as scholars continue to find value in Marxist thought and dialectical materialism, it will have a critical place in the realms of science and society as a valuable, if not indispensable, innovative means for resolving fundamental

contradictions.

While "progress" as a universal, determinable goal is questionable, conceptions that science can and does change over time is certainly tenable. Particularly within the context of each discipline or scientific specialization, progress is possible; it is defining progress, however, which requires politics and is not a completely objective, empirical "Truth." As Rule (1994) contends, "...the expectation that theoretical work in our discipline should yield conclusions to puzzles or problems that *just anyone* might entertain is misguided and foredoomed. Instead, people may insist, different theoretical projects define their *own* ends-and their own standards for 'progress' in those directions" (254).

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