

The Command of Biotechnology and Merciful Conquest in Military Opposition

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Biotechnology has an increasingly extensive use for military purposes. With the upcoming age of biotechnology, military operations are depending more on biotechnical methods. Judging from the evolving law of the theory of command, the command of biotechnology is feasible and inevitable. The report discusses some basic characteristics of modern theories of command, as well as the mature possibility of the command theory of military biotechnology. The evolution of the command theory is closely associated with the development of military medicine. This theory is expected to achieve successes in wars in an ultramicro, nonlethal, reversible, and merciful way and will play an important role in biotechnological identification and orientation, defense and attack, and the maintenance of fighting powers and biological monitoring. The command of military biotechnology has not become a part of the virtual military power yet, but it is an exigent strategic task to construct and perfect this theory.

INTRODUCTION

Science and technology not only lead to profound changes in military power and form of war, but also greatly enriches the strategic thinking and vision field. The military theory of command plays a more and more important role in controlling new spaces or domains effectively. It guides the development of military theories with more motility and foresight and gives an impetus to the military reform. Science and technology always leave imprints of times on the development of military command theory. In the 21st century, biotechnology is no doubt one of the powers with most developmental potential in the science and technological field. It is a practical and crucial issue that the effect of biotechnology on the military theory of command should be studied and the relevant military strategies should be taken. Moreover, the emergence of war based on command of biotechnology will be the most profound change in the history of military medicine.

Command of the war is a right to control the war and also the freedom to initiate, continue, or cease military operations. In a certain sense, the process of war is a process of competing for command.¹ The modern theory of command is a means to ensure that our own elements of battle be fully exerted in a certain space and, at the same time, prevent the corresponding elements of enemies from exertion. Theories like the command of the sea by Alfred Thayer Mahan² and the command of the air by Giulio Douhet accelerated the development of military technology in both naval and air battles. The theory of command develops with advances in science and technology, which may be an important basis for military strategy of the 21st century. Meanwhile, the pattern of warfare and the mode of military operation may exhibit evolutionary changes.

The development of the theory of command also impacts that of military medicine. For example, the emergence of military opposition that was based on novel command was followed by the birth of military nautical medicine, military aviation (space) medicine, ergonomics, military operational medicine, ionizing irradiation, and operational environmental medicine. The command of biotechnology is of special guiding importance to military medicine.

The command of biotechnology is a superior dominance of military biotechnological application based on the microcosm of life structure within a certain period of time, including the effective defense and attack through modern biological techniques the monitoring, sustaining, and reinforcement of personal competition in battles, the insurance of the living quality of our people (army men and women and civilian), and the protection of the ecological environments in battlefields. It will bring enormous changes to the style of war and the theories of battles. It brings about brand-new criteria for military medicine in terms of demand of military operation, and also causes evolutionary changes in the connotation and essence of military medicine.

The struggle of biotechnological dominance is a competence in modern science and technology, especially in biotechnology and military medicine. The meanings of the command theory of biotechnology consist of: taking a whole or partial lead in the military application of biotechnology; making biotechnology a real power of defense and attack; maintaining a long-lasting advantage in competition of military biotechnology on a large scale. The concept put forward does not aim at modern wars, but at future military reforms. It is to build a foundation of intellectual innovation, system construction, and advance defense with a notion of the command of biotechnology, the research and development of modern biotechnologies, and the effect of military establishment.

FORMATION OF THE COMMAND OF BIOTECHNOLOGY

Apart from great social benefits, modern biotechnology possesses increasing military values. Some biotechnologies related with military affairs show great advantages in rescuing war injuries, strengthening the power to fight, resisting fatigue, sensing and battlefield monitoring, and manufacturing military materials.³⁻⁵ In fact, many modern biotechnologies will gradually take on a characteristic of attack and will be used directly as means of defense and attack. Biotechnologies will have an all-round and profound influence on the future war. Therefore, the one who leads and dominates the military biotechnological field will achieve success in wars. The future war will be the one based on the

command of military biotechnology. From the connotation of the command theory and the relevant practice of war, we see the following characteristics of the military theory of command.

CHANGE IN COGNITIVE ABILITY AT HIGHER LEVEL

The human military confrontation is an integration of damage efficiency and cognitive ability. Their conjunct and interlaced development results in a continuous military reform. The change of cognitive ability originated from the development of science and technology driven by the motive of exploring nature. The origin and growth of the command theory of the sea indicate that the advancement of cognition greatly promoted the sea power. The early navigation landmarks, directional compass, orientable astronomical instruments, and the timing and logging techniques built a solid basis of oceangoing operations. The emergence of other command theory of the sea has close relation with the application of seaplane, hydrophone, and telecommunication, and the development of radars on naval ships, mechanical and electrical directors, and other subaqueous detecting devices.⁶ Other theories of command are also supported by similar obvious cognitive courses.

The establishment and enrichment of biological informatics embodies the rapid development of modern biotechnology, which is concerned with genes and sequences, structures, and functions of proteins that reveal the mysteries of life. The scale of the top three databases of biological informatics is expanding by geometric series. The development of modern biotechnology is also embodied by the innovation and perfection of many biological techniques and methods, including DNA recombination, gene modification, gene cloning, exogenous gene expression synergy, gene targeting, stem cell technology, and tissue engineering, etc. These technical tools have greatly promoted understanding of life and helped to clarify the relationship between life pattern and military struggle for humans. Therefore, they are possibly to be applied to military purposes.

MULTIDIMENSIONAL EXPANSION

Exploration and cognition expanded from the primitive state and space of living to multidimensional space time. Humans' exploration and cognition of a new space is the most prominent symbol of brand-new technological revolution — the formation of new battlefields or main technical domains. With the advancement of military technology, the command theories have gone across the land and stretched to the sea, the air, and space. Today, the normal physical spaces have been completely dug up and the new battlefields will be found in new technical domains. The command theories in battlefields are still undergoing a displacement with the development of science and technology and the special expansion of human activities. The evolution of the theories symbolizes the center of gravity for subduing in war is changing.

Modern biotechnology opens a new space of exploration complicated and diversified—the microcosm of life. The development of modern biotechnology experiences a process of cognition of vital phenomena from macro to micro levels. The invention of the electron microscope makes it possible for us to observe a life structure less than 1 angstrom. What is more, our exploration for the nature of life has reached the molecular level of a protein or a gene. Now that the military the-

ory of command is to conquer a certain space in battles, either the land, sea, air, or outer space, if technical conditions permitted, the cognitive extension of human beings into the ultramicro space is reasonable and inevitable. That will finally alter the center of gravity in military affairs to obtain an upper hand. Once biotechnology is applied to battles, the more that is known about the ultramicro world of life, the more freedom one will have to take actions. This ensures the ability to take the lead and dominate in military operations.

UPGRADE OF THE MEANS AND POWER OF CONQUEST

Rather than annihilation of corporeal destruction, the military theory of command pursues a conquest emphasizing destruction of economic foundation to antagonism and suppression of technology, which is characterized by farther strike, wider injury, more precise attack, and all-round containment. However, “Now war is always the shock of two hostile bodies in collision, not the action of a living power upon an inanimate mass.”⁷ The object of war is always human beings. Therefore, to win a war is to take initiative in attack, resistance, organization, apperception, judgment, and mental endurance so as to suppress enemies. With the upgrade of the means of conquest, the military theory of command is pointing at the biological characteristics of human beings by divesting their exterior ability of attack and defense.

Revolutionary breakthroughs on biotechnology have been made by the progress of science and technology. It has not only brought a more accurate understanding of life itself, but also the power of regulation. Modern biotechnical development has changed the former attributes of biotechnology in military applications. In the past, biotechnology was mainly used in the prevention, diagnosis, and treatment of injuries and diseases. Now, discoveries made in the exploration of human health through biotechnological methods can clarify the law of life at the molecular level, which makes it possible to regulate and control the functions of human bodies by adjusting its ultramicro structures to gain powers of defense and attack. Since war is an act of violence aiming at annihilating enemies or depriving them of resistant abilities, the modern biological techniques used for attack purposes have a more direct and precise target at humans than other methods, which will play a more important role in future military operations.

FOLLOWING THE PRINCIPLES OF TIME-EFFECTIVENESS AND BENEFIT

The military theory of command emphasizes obtaining benefits and other advantages. It not only seeks military balance of powers, but also heads for a destination more efficient, economical, and beneficial. For instance, the basic train of thought in the command of the sea was always entangled with traffic efficiency, trade channels, wealth amassment, and expansion of governance.² The technical domain in which a command theory appears is often synchronized with the economic rise and fall of national or international interest groups and in accordance with the dominant field of the time in the social development.

On one hand, the driving force of the biotechnological advancement comes from the requirement of promoting

human health and standards of living. It bears motivation to pursue social benefits and has a wide developmental prospect. In the last decade, the international productive value of the biotechnological industry increased by five times every 3 years. In developed countries, the increasing speed is approximately 25% to 30%. In the 21st century, the scale of industries related to biological economy will be 10 times that of the information technology industry, which will dominate in international economic growth.⁸ Therefore, an effort made to lead and control in the biotechnological field not only has military significance, but can also cement our comprehensive national strength through the boost of social economy.

On the other hand, as described in *The Art of War* by Sun Zi, “Those skilled in war subdue the enemy’s army without fighting hard. They capture the enemy’s cities without a storming attack and overthrow his state without an excessive and perpetual damage. Their aim must be to take all under heaven intact through strategic superiority.”⁹ With the participation of modern military biotechnology, the military attack will obtain stronger directivity and deterrence, less casualty, and lighter damage of the civilization, which will be a merciful conquest that can increase the benefit of war.

TRENDS OF INTEGRATED DEVELOPMENT

High-technology war is a holistic contest of battle systems, which results in a change of connotation of the command theory. The requirements of different military theories of command mingle with each other and leaves a course that new theories will be built on the basis of the pre-existing ones (either used for reference or extended) and all theories will support each other.

Modern biotechnology itself is an aggregation of the latest technological progresses. For example, the DNA chip is a combined result of research fruits harvested in physics, combinatorial chemistry, mathematics, and informatics.¹⁰ Meanwhile, the invention of biosensor and genetically engineered computers that use DNA to make calculations will be helpful for the command, control, and transference of information. The mutual supplement and penetration of the command of biotechnology and the command of the information, and other theories of command determine a necessity of multidimensional control of the sea, air, outer space, information and biotechnology, etc., to triumph in future military operations.

AGGRESSIVENESS OF BIOTECHNOLOGY

Biotechnology can be used for aggressive purposes, which is the key factor for command of biotechnology. The new categories of injury that may arise are the focus of interest of military medicine.

Modern biotechnology reveals pathologies about factors that do great harm to people and provides effective means of exploring the hazardous factors in human health. Meanwhile, the knowledge can be used to bring damages and injuries to individuals in war in a more accurate and effective fashion. Different military biotechnologies can be chosen in accordance with different pathogenic factors to meet different military goals. The attack, therefore, will wound different levels of specific gene, protein, cell, tissue, and organ. It no doubt will be more effective to cause damages than conven-

tional weapons, yet the nonlethal effect will remain to be civilized in terms of postwar reconstruction and hatred control.

With ultrastructural damage, targets are chosen directly from a nucleotide sequence or a certain protein structure. Affecting the structure and function of a gene or a protein as a damaging effect can cause human physiological dysfunction. Precision injury and ultramicro damage are two wounding methods of modern biotechnologies based on genomics and proteomics. They are completely different from the traditional wars that damage tissues and organs directly since they target the primary structure of gene or protein.¹¹

NONLETHALITY

The injuries are completely different from those caused by traditional weapons, including nuclear and chemical weapons. Traditional weapons aim at killing and demolishing in an extreme way. The goal of precision injury is not necessarily to terminate a life, but to choose a degree of injury depending on the purposes of operations and the types of enemies. By means of gene regulation, certain, or a couple of, key physiological functions in a human body — such as learning, memorizing, balancing, fine manipulation, and even the “bellicose” character — can be injured precisely without a threat of life.¹¹ Although ultrastructural changes also arise in injuries caused by cold or hot weapons, such as gene changes with battle wound or disease, and cancerigenesis, teratogenesis, and mutagenesis, the causativeness, mechanism, and aim of damage are completely different.

REVERSIBILITY

After the goal of military operation is achieved or erroneous attack happens, vaccines, drugs, or information about the damaging factor and damaging target can be provided to increase the likelihood of salvage and saving, exhibiting the greatest mercifulness. Therefore, biotechnology aggressiveness gives rise to relatively merciful conquest as compared to other weapons.

EXCEEDING TRADITIONAL BIOLOGICAL WARFARE WEAPONS

Military biotechnology in this theory is to be used specifically and limitedly with its single purpose of attacking military targets or localized targets. Military goal can be achieved with no need of massive killing, thus avoiding injury to nonmilitary objects (civilians) or destruction of ecological environments and human civilization. This is what is expected by warfare profit theory and weapon ethics in the 21st century.

The main difference between military biotechnology and traditional bioweapons is the dismissal of the antihuman massive destruction. Besides, the differences lie in the historic background, research, and development concepts, techniques, injury mechanism and effects, developmental prospects, and application ranges.¹² The significance of distinguishing the modern military application of biotechnology from the traditional bioweapons is to promote a healthy development of modern biotechnology, abide by the Biological and Toxin Weapons Convention more effectively, and strike a blow on the traditional bioweapons, therefore welcoming new military progresses and reforms, and changing the notions and civilization level of war.

REVOLUTION OF FIGHTING POWER

The military application of biotechnology will make military medicine a fighting power in addition to a tool of maintaining and strengthening the fighting power of the army — that is, forming an aggression system of biotechnology. Meanwhile, this change is of extensive and profound impact.

MAINTAINING HEALTH

Some biotechnology can strengthen the fighting power of the army. Medicine is going to promote health, prevent disease, and strengthen the body in addition to treating disease. And the goal of medicine is transforming from “saving oneself and killing the enemy” to “strengthening oneself and controlling the enemy.” Military medicine should not only prevent and treat disease and injury, but also maintain and promote the health of military personnel. Even under combating conditions, health protection should be stressed. Fighting power criteria for various conditions should be formulated. A system in which the human body can adjust to and be in harmony with the environment should be created. The emphasis of health is unprecedented, thus scientifically increasing the fighting power of the army.

Biotechnology can provide the army with high titer vaccines to prevent and treat contagious diseases following warfare. Moreover, a biological reserve can be set up for military participants to store DNA, stem cells, blood, and bone marrow samples. This helps battlefield rescue and organ repair, or preparing individualized drugs and vaccines, and formulating plans for disease prevention, nutrition, and training for each army man or woman.¹³

BIOINFORMATION PROCESSING, MONITORING, AND COMMAND

The development of modern biotechnology makes it possible to set up new generation command systems by using biocomputing, sensors, or simulated detectors, which greatly elevates the level of the information-based command platform.⁵

A battlefield medical information system based on individual soldiers will monitor and analyze the physical and mental status of soldiers, and transmit relevant information to the commanding and medical personnel in a real-time way. Therefore, the commanding and medical personnel can know the situation of battlefield medical care and assess the fighting power. Meanwhile, the system will help the commander monitor the maneuver of the army, greatly increasing the efficiency of decision making. It will also help the commander and the army to recognize each other.

INNOVATION OF THE ATTACKING MODE

Traditional weapons cause body damage, and the effect should be judged on the battlefield. However, the damage of biotechnology can be predicated before war or even in laboratories. Therefore, the damaging capability, targets, and degree of damage can be determined according to the situation, greatly increasing the controllability of war, and realizing fighting effects-based

VERSATILE MILITARY APPLICATIONS OF BIOTECHNOLOGY

The combination of information technology and biotechnology gives birth to the biological computer, which has greatly increased performance. Moreover, due to its small size, large storage capability, and low cost, a great platform computer network can be applied to each weapon and each soldier.

In addition, substantial breakthroughs may also occur in the following areas: military biomaterials, such as biosteel, bioceramics; military biosimulation, such as simulated motive power, simulated navigation, and structural simulation; military bioenergy, military food and drinking water, and special military garments.¹⁴

CONCLUSION

Military biotechnology renovates health care, fighting power monitoring, command efficacy, and military materials and equipment. Its application tends to be extensive and substantial. In particular, with rapid development of military biotechnology, it transforms from defense to a balance between attack and defense, giving rise to a new concept of warfare, a new balance of military force, and new attacking power. The new attacking power exhibits basic traits such as ultramicro damage, nonlethality, and reversibility. As compared to ordinary war, biotechnology-based warfare can achieve desired goals in a relatively merciful way. As a result, the position of military medicine will be promoted, and the connotation and extensions of military medicine will be widened. Moreover, evolution will occur in the establishment and application tactics of military medical institutions, and the training of military medical personnel.

Biotechnology is completely different from traditional biological warfare weapons in terms of attack, because the latter is based on massive killing and destroying the healthy development of humankind. Nevertheless, in the research and development of military biotechnology, the history of biological warfare weapons should not be repeated. Therefore, the Biological and Toxin Weapons Convention should be consummated and implemented or new restrictive methods should be formulated. The theory of command of biotechnology will regulate the research and development of military biotechnology and stress the biosafety of humankind.

Military biotechnology is not to realize fighting power. In the long run, the theory of command of biotechnology is an extension and addendum to the theory of command. It will combine with various technologies and biotechnology, such as information technology and materials science to become a commanding point in the struggle for the initiative in future military reforms. From the constitution of the command theory of biotechnology, we see changes not only in military technology, but also in the sense of war concept and war civilization. With the advancement of science and technology, in recent unbalanced wars, how to reduce the casualty of the civilian and fighting members of both sides was a key factor restricting the military operations.¹⁵ But this endeavor cannot protect civilization. The command of military biotechnology is hopeful to achieve a maximal reduction of damage to people and the environment, which represents a certain degree of war civilization.

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