

XENOBOTS, BETWEEN TECHNICAL POSSIBILITIES AND NORMATIVE PROHIBITIONS IN MILITARY ACTIONS

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Motto: *As long as there are people, there will be wars.* (Studocu, n.d.)
Albert Einstein

Abstract

The scientific and applied research leads day by day to achievements unbelievable some time ago. The results also mean spectacularity, often bordering on the imagination, but also a fast pace with a high speed of appearance of novelties. An enumeration of the results that "broke the incredible" must include Dolly (the sheep cloned in 1996), Eva (Adevarul, 2002) (Eve) the first cloned human being (USA in 2002, the year of the sheep's death!), the technological steps taken in terms of transhumanism (implants and improvements of trivial level (vaccine, contact lenses, etc.) or conventional (Alexander, 2015) (drugs for mental potentiation, bionic prostheses, more recently implants under the skin (Buhnici, 2017) or dedicated chip brains, etc.... (Neuralink, Neuravista, Second Sight (the bionic eyes).

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Here the terminology of the field also proposes *human enhancement* and refers to the use of technologies to modify / upgrade human capabilities. It is a component of transhumanism, one that Julien Savulescu & Co would probably label at the "conventional" level, and IT specialists would call Human 2.0. *Human enhancement devices* mean implants for sensory upgrade (hearing, sight, smell, etc.) and which in some situations link the human being to the computer & cybernetic/informational derivatives.

Each "achievement" produced specific disturbances among the public, cults of various orientations, but also concerns. Some have also meant normative positions limiting or prohibiting experiments. And this is even if sometimes there was a period of several years between the moment of the public announcement of the realization and that of the normative intervention.

We are considering situations such as the cloning of animals (cows, horses, sheep, pigs, etc.) and the distribution of meat and their preparations for public consumption. This is why discussions in the public space and in that of normative forums have been prolonged, resulting in some limitations or prohibitions after years of debate. In the US, it was found that in 2008 there were "on the table" of Americans at least 4,000 cattle and at least 500 pigs that came out of the paws of cloning breeding (Adevarul, 2009). The European Union has repeatedly discussed the phenomenon (2008 (European Parliament, 2008), 2009 (DW, 2009), 2010 (European Parliament, 2008), 2011 (European Parliament, 2008). Needless to say, United Nations Resolution No. 59-280 on human cloning (March 8, 2005) came three years after Eve's "birth." The appeal to bioethics and other documents of this international forum, such as those of 1997 or Resolution 53/152 of December 9, 1998, in which the *General Declaration on the Human Genome and Human Rights* was approved, failed to stop in the following decade the opening of real factories dedicated to gene therapies (the case of China), but also of laboratories specialized in gene therapies or extended to hybridization. Some of these also showcased gender achievements, showing that they are close to human cloning.

Things got even more complicated when nanotechnology came into focus: "Nanotechnology represents a new practice in the food sector. At small sizes, materials have different properties. Nano-ingredients can be

used as anti-bacterial agents or to change the colour or flavor of foods" (European Parliament, 2008). But nanotechnology is not limited to this area.

It seems that in this place the discussions did not end, all the more so as news and new pros and cons appeared, including at the level of specialists.

However, the "front" of scientific research is much wider and punctuated with outstanding achievements.

If transhumanism proposes a "technological" transformation of the human being and a posthuman path in the cyborg sense, xenobots bring the construction of a new form of life and come with a new challenge that is already considered destabilizing ...

Create these "creatures" in 2019-2020?! (organic robots) amaze the scientific world first as "genesis." *"These are new living machines," explained computer scientist and robotist Joshua Bongard of the University of Vermont at the time. "They are neither traditional robots nor a known animal species. It's a new class of artifacts: a living, programmable organism."* (Mazilu, 2021).

Moreover, xenobots show amazing capabilities. Some of these, such as "self-repair/self-healing," seem to be foreshadowed by Wolverine (Wikipedia, n.d.) (James Howlett/Logan), the mutant and fictional superhero of Marvel Comics, or other such characters. Such a quality to add to the human body is also found in the research of the Defense Advanced Research Projects Agency (DARPA).¹ The Lifelong Learning Machines (L2M) program aims to achieve paradigm-shifting developments in AI (Artificial Intelligence) architectures and ML (Machine Learning) techniques.

This is part of what we call the fourth industrial revolution, including the fusion of digital, technical and biological systems.

Others, such as xenobot reproduction, "occur rarely and under certain circumstances, using a process called kinetic replication, which is known to occur at the molecular level but has never been observed before at the scale of cells or entire organisms," the researchers explain (Tosha, 2021).

The fact that these tiny biological robots can move, carry a task, and self-repair impresses anyone. They are grown from stem cells from

African clawed frog embryos (xenopus laevis), "prepared" (from the blastula stage) into shapes created by a supercomputer. Their size (less than 1 mm) and programmable "capabilities" make them fit to work, "swimming" in the human body to solve a task (of a medical nature, we believe).

Further, however, having to deal with an unprecedented and obvious specificity "life-giving", the performance of "common tasks" (tasks for which small entities "coordinate") consuming energy, we could use for xenobots, the term "Genergy", a suitcase word that compresses knowledge and energy or information and energy into a single topic..." (Marcus, 2011).

Here, in the place where specialists duel with pros and cons over the definition of new entities, we must remember that beyond the "hard" and "software" offered by xenopus laevis (African frog) and supercomputer (AI) "Life is a form of information processing" (Marcus, 2011) as Marcus told us a decade before the advent of xenobots!

If late 2019 and early 2020 offered xenobots that quickly entered the concerns of research institutes such as DARPA, December 2023 shocked us by showing us a category of "creatures" (!?) called antrobots. The name comes from the reunion in a phrase of the words anthro and robots and takes into account the fact that this biological product is the result of a process similar to the case of xenobots, only here human cells from the trachea from donors were used.

It is worth mentioning that there is research and achievements in the field of hybridization, the creation of chimeras and other hard-to-define "creatures"/artifacts.

"Applied ethicists should be involved in the creation and development of these organisms, not just scientists and engineers," said Susan and Michael Anderson of the Universities of Connecticut and Hartford, who specialize in machine ethics, pointing out that there are major concerns about xenobot toxicity, lifespan and the hypothetical ability to reproduce in the future (Hotnews, 2020).

It is hallucinatory to imagine what kind of "beings" would result from combinations like:

- Xenobot&antrobot

- Xenobot&plant
- Antrobot & plant
- Chimera&xenobot
- Chimera & plant

And can things go on?!

A continuation that could also mean specializations for military use of these artifacts/creatures. There seems to be no special ban on hybridization. It was probably considered that the prohibition of any genetic modification resulting from the Recommendation of the Parliamentary Assembly of the Council of Europe no. 934/1982 also covers the possible combinations of human DNA with other forms of DNA, which is also stated in the UNESCO Declaration on Human Rights and Human Genome, 1997. Other gender documents followed.

The experience of humanity so far has shown us that almost all scientific and technological discoveries and inventions that have been suitable for military applications have been used at least partially in armed confrontations. Beyond the technological possibilities under study that indicate the possibility and usefulness of using xenobots in military medicine or in solving “domestic” situations (gathering plastic particles from sea and ocean water, etc.), there are also some that imply a military purpose. Xenobots are no exception, their names being on the study panels of scientific and technological research institutions related to the military field.

In fact, the Irish journalist and writer licensed in genetics in Glasgow, Peter Andrews initiates us with the title of the dedicated article: XENOBOTS already exist! Small bio-robots in your veins to heal you or ... eliminate if you're a bad boy (Andrews, 2020).

This is how we find among the gender concerns: “L2M”: Military funding from DARPA. Acronym “L2M” refers to Lifelong Learning Machines (Darpa, n.d.). A quick look at the public justification for the U.S. taxpayer spending points to others. “Research on the xenobots was funded in part by the Defense Advanced Research Projects Agency, a federal agency that researches technology for military use.” Therefore, it is not a singular presence in the institution's concerns.

If the civilian use was mainly aimed at medical purposes such as intervention by using the network of blood vessels or humors or the use of

small “beings” to perform ecological tasks (collecting plastic particles or other substances dissipated in nature and which must be collected/recirculated, etc.), the military environment may have different concerns.

Institutions with DARPA similar concerns, however, exist on all meridians. A 2011 post by Mikhail Buleev, a former employee of the Ilyushin Aviation Plants, showed that Russia had a correspondent, but in completely different, domain-oriented structures. According to Buleev, it meant “hundreds of DARPAs” (Quora, n.d.).

In 2012, however, Russia brought defense research under the Russian Foundation for Advanced Research Projects in the Defense Industry. The number of employees (240) is relatively close to that of the similar institution in the USA (220).

After President Putin's announcement in the summer of 2012 on the subject of research with military applications, in the coming period, obviously using previous experiences, countries such as China, India, Germany, Great Britain, Japan, South Korea, Ukraine, etc. are creating similar institutions (Trigkas, 2017). Moreover, in order to promote faster technological advance, the UK Army established in 2020 a structure framed with SF authors! (Rusu, 2021).

There are variations and differences between countries regarding entities dedicated to scientific research of this kind, some being subordinated to the Ministry of Defense, others being civil, mixed, linked through collaborations with various other institutions, etc. However, all of them have in mind perspectives with a relatively long-time horizon. Examples would be Japan's specific 2012 projections for 2050. Also mentioned in Japan is the concern for xenotransplants (G4Media, 2024) from pigs to monkeys due to the existence of a shortage of organ donors.

Meanwhile, information has emerged regarding the “technological research achievements” related to hybridization, including through parallel developments of organs taken from aborted fetuses. Even if, by virtue of already existing regulations or fear of the possibility of altering the human genome, experiments have been stopped at “ages” of about a month of “artifacts,” the thoughts of many people turn to centaurs from ancient mythology face to face

with the approaching chimeras (Dobozi, 2023) that current biomedical applications make possible.

Some limitations imposed by norms (UN resolutions, EU, etc.) seem not to be covering. And that's for various reasons. First of all, the fact that the new artifacts have a fast pace of appearance, which goes beyond norming, then that to a large extent the research and incipient uses are confidential, and so on.

However, on a product ostensibly intended for medical purposes, it is difficult to issue any finding capable of prohibiting military use, even in view of the fact that they have a lifespan of a few days. A dual-use classification would presuppose a well-defined purpose, difficult to change and verifiable and, above all, to demonstrate over time in the case of military use. Some may be in a spectrum that is difficult to define, such as the behaviour of xenobots specialised in gathering/concentrating explosive powder in order to remove it from the propagation path of an explosion or its production upon reaching its specific shape or quantity (cumulative funnel) or critical mass (see radioactive substances).

Under what conditions, however, could xenobots be considered precursors within the meaning of paragraphs 3 and 4/Article 2/Convention of January 13, 1993 on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction? We believe that xenobot and/or other artifacts do not fit here. And Article 11 of the same regulation allows the development of research as long as it is done for "purposes not prohibited by the Convention, including the international exchange of scientific and technical information, chemicals and equipment for the manufacture, processing or use of chemicals for purposes not prohibited by the Convention." We seem to be faced with sequential dilemmas. Would they be physicochemical precursors, tactical precursors or precursors as a living entity ready to articulate themselves in a new artifact that can perform tasks that result in military ends?

We are reaching a place where discerning between beneficial and evil use becomes difficult, uncontrollable, and slippery.

It would be enough for tens, hundreds or thousands of such artifacts to fulfill the mission of blocking the operation of a device and thereby causing death, injury, blocking of activity or paralysis of a military-specific system. Such an event (xenobot blocking) could also occur through action on the devices of civilian institutions, even hospitals. And then would it take the form of bioterrorism?

Beyond domain-specific privacy, we might wonder in terms of cataloguing xenobots and other gender artifacts whether it would be subject to prohibition by rules when used for:

- Access and offensive work in biologically, radioactively, chemically contaminated spaces, etc.;
- Access and work to disrupt weapons systems;
- Access and work to disrupt the action of some military after instillation of specific solutions or injection with drugs "additive" with xenobots;
- Access and work to trigger reactions in the body of animals used on the battlefield or for specific missions in peacetime (guarding airports, etc. objectives, detecting drugs and prohibited material, etc.);
- Access and work to trigger delayed reactions post injury, post vaccine, fasting;
- Tracking the traceability of objects, substances or persons (weapons, ammunition, etc.) by wearing xenobot markers;
- Marking the place for aiming or directing/self-directing strokes;
- Sensor carriers for detecting and collecting/collecting explosives particles;
- Operation as an undetectable fire initiation mechanism in the aquatic environment or for metal-free mechanisms;
- Operating as a discrete (undetectable) mechanism for gathering/concentrating small quantities of explosives in order to bring them to the size programmed for explosion at predetermined locations (physical, chemical, geostationary/coordinates, etc.);
- Trajectory indicator/marker to track traceability of substances;
- Penetration of safety systems, cipher enclosures (detecting harsh physical mechanisms), etc.

- Transmission of basic data (temperature, humidity, presence of persons or animals, substances, etc.) from premises that cannot be mechanically penetrated to certain dimensions;
- Penetration and destruction of elements of military devices

So offensive, defensive profile uses, but also ... passive.

The reference rules regarding the prohibition of certain materials/substances/prefabricated materials for military use (duals) have some provisions of principle, but in execution some tables (annexes) containing their official names are submitted. Practice proves that others can occur (besides the forbidden ones). And the biological ones are in addition to the chemical ones (and have the "age" given by the moment of adoption of the tables).

In this place, in Romania, the Ministry of Foreign Affairs, through the Department for Export Control (ANCEX), represents the national authority in the field of the control of exports, imports and other operations with military goods and dual-use items, and is responsible for implementing the Government's policy in this area. There are also dedicated normative acts. Thus, we have in the field EMERGENCY ORDINANCE no. 43 of April 14, 2022 on the control regime for operations with dual-use items.

Regulations of this kind are shared by most states and are based on the need for biological disarmament. The desideratum took into account the consequences of the use of biological and chemical weapons during World War I. The year 1925 also brought the Geneva Protocol (United Nations, n.d.a.) as the first legal instrument that prohibited the use in war of asphyxiating, toxic gases or bacteriological means of combat. Five decades later, the Convention on the Prohibition of Bacteriological (Biological) and Toxin Weapons (BTWC) (United Nations, n.d.b) was adopted. Currently, there are 183 States Parties to the BTWC. Even if biological weapons are banned, research in this field can be carried out according to the same rules (The European Commission, 2022).

It is no accident that jurist Christian Delanghe called bioterrorism "the invisible enemy of human rights" (Lupu, 2017) and saw it "as the Trojan horse" of international terrorism, ... attacking the exclusive inviolability and

untouchability of human rights and fundamental freedoms, such as the right to life, health and security (Lupu, 2017)."

"*Information as form*" (Marcus, 2011) - is brought to our attention by Marcus. In *the tradition of Darwinian (1859) and post-Darwinian (Haeckel 1866) biology, in which form is brought to attention by virtue of the principle of natural selection and functionality (reproductive success), Augustus Weissmann writes towards the end of the nineteenth century: "It seems that the biology of heredity cannot be explained exclusively in terms of matter and energy; We need something extra, which we call information"* (Marcus, 2011).

During the Cold War, Jamie Shea, a former NATO official, said: "There may be war exclusively in space, but whoever controls space also controls what happens on land, sea and air. If you don't control space, you don't control other areas." (Mareş, 2019) But if a military power wants compensation, can it try micro-level application solutions?!

The Gulf War of 1991 is considered to be the military expression of third wave civilization as postulated by Alvin Tofler. It is also the place where Mihai Nadin notices a translation to another kind of confrontation. This takes place under the idea that "It's not their job to know why!" (Nadin, 2016) and envisages an industrial efficiency, a factory to achieve effects and to prove supremacy. Thus, "the civilization of illiteracy has reintegrated the military into the web of significant tasks and functions of the pragmatics of high efficiency." (Nadin, 2016) (Reflecting on the WHY would lead to a decrease in yield, in the case of wars based on ideologies "impregnated" by forces.)

The analyses of those who deal with the categorization of wars tell us that we are already in the stage of fourth-generation warfare (4GW, "a conflict characterized by a blurring of lines between war and politics, combatants and Civilians. The term was first used in 1980 by a team of analysts from United States, including Paleoconservatory William S. Lind, to describe the comeback War in one Decentralised form"). If we accept as valid the theorizations of some authors (James Corbett (Corbett, 2022), Alba Iulia Catrinel Popescu (Popescu, 2021), however, we are witnessing the fifth-generation war.

Moreover, Iulian Chifu pleads to describe the (informational) war of the sixth generation in which we would find ourselves: *“The sixth generation of information warfare is that of “mind breaking.”* (Voinea, 2024) We believe that all generations of war have relied more or less on “soft blows” (dedicated to the mind) meant to destabilize the citizen’s relations with the Army, those related to the political and administrative leadership, those related to the attitude of allies and even of the enemy, but also related permutations. This is in an attempt to “align” confrontations and “untangle” their intertwines related to information and their way of practicing (Chifu, 2017). We believe that it would be “unfair” to contain the “waves” of information warfare only at the hybrid level (fourth generation).

It seems that today xenobots and the possibility of their military use bring us to the face of seventh-generation warfare. It is the place where confrontation brings to use the melange of individual and partly structural level, between digital, technical and biological systems. The pace is also given by the appearance of Xenobots 2.0 (Farland, 2021) in 2021, less than two years after Xenobots 1.0.

The hypothesis of using xenobot-type artifacts could consider “eradicating” attitude, motivation and goal pursuit during confrontation. Instead, it would require pursuing self-improvement of means and, perhaps, increasing the effects beyond expectations. This could also require a redefinition of fourth, fifth generation wars, etc. The work would also consider the possibility of use in actions of a terrorist nature. If the war in Ukraine has imposed the drone as an “artifact” capable of driving out land armor and naval ship as well as it has made soldiers in the ground forces flee or beg the means of battle to spare them, then we are ready for the next step. A step in the seventh-generation war in which the Xenobot etc. artifacts can become the “indoor drone” to use in battle!

DARPA’s specifications show us that the Lifelong Learning Machines (L2M) Program aims to achieve paradigm-shifting developments in AI architectures and ML techniques. The program seeks to develop

systems that can continuously learn during execution and become increasingly expert while performing tasks, be subject to safety limits, and apply previous skills and knowledge in new situations – without forgetting previous learning.

L2M consists of two technical areas. The first aims to develop complete systems and their components; The second brings together the diverse expertise of researchers in order to explore the biological mechanisms underlying learning. These will be translated into a new generation of computing architectures, mechanisms and algorithms (a spiral induced to each specimen of artifact)!

The limiting rules are about effects and not about scientific and technological research.

Beyond the regulations specific to the field adopted by international forums or institutions that regulate the internal functioning framework, some states have also adopted applied measures that take into account developments in the military field. Thus:

- In 2022, the Pentagon published a Strategy on the Responsible Use of Artificial Intelligence and its Path to Implementation (Soare, 2024)
- The DoD (Departement of Defense) pointed to the responsible and ethical use of artificial intelligence and autonomous systems through policies such as DoD Directive 3000.09, the department’s guidance on autonomous systems, or the 2023 strategy for the use of data, analytics and artificial intelligence.

They are also based on:

- The DoD has adopted five general principles for the ethical use of AI: responsible, fair, traceable, reliable, and regulatable.
- In October 2023, President Joe Biden signed a legislation on AI that the administration said was one of the “most significant actions ever taken by a government to move forward in AI safety.”
- “The Pentagon established in July (2022) the Office of All-Domain Anomaly Resolution (AARO), focused on unexplained activities in proximity to military installations, in restricted airspace, and other “areas of interest” (Ciobanu, 2022)
- Decision 349/16 Jan-2024 in support of the Biological and Toxin Weapons Convention (Council of the European Union, 2024)

The source of law is the Protocol on the prohibition of the use in war of asphyxiating, toxic or similar gases and bacteriological methods of warfare, signed in Geneva on June 17, 1925 (subsequent to the document the CONVENTION of April 10, 1972 on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and their destruction). The intention was to completely rule out the possibility of bacteriological (biological) agents and toxins being used as weapons.

Similarly, the European framework includes a number of regulations, including CFSP 545, COARM 25, the User's Guide to Council Common Position 2008/944/CFSP defining common rules governing control of exports of military technology and equipment. Here we can also add Regulation (EU) 2021/821 of the European Parliament and of the Council of 20.05.2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transport of dual-use items (recast).

Within the internal framework we also find:

- Order of the Minister of Foreign Affairs approving the Methodological Norms for the application of Government Emergency Ordinance no. 43/2022 on the control regime of operations with dual-use items (Articles 7 and 10) and Art. 14 (end-use *declaration* and *end-use certificate*/specification of military or civilian use) (Official Gazette of Romania No. 522, 27.05.2022)

- Emergency Ordinance on the control regime for operations with dual-use items (Official Gazette of Romania No. 374, 15.04.2022)

A fear of the use of xenobots as weapons must also be seen through the prism of international humanitarian law (IHL). As a branch of public international law, it stipulates the rules according to which in armed conflicts they are intended to protect people who may or may not participate in hostilities but may be affected by them and to limit the means and methods of war used. An extension into the field of terrorism and actors practicing illegal violence complicates matters.

If regarding the medical use of xenobots the Hippocratic Oath (the form adopted in 1975 by the World Medical Association within the Geneva Declaration or newer versions) seems to be covering and accepted, the idea of healing

the sick including through the "lesser evil," and for civil use of administrative type a formula of administrative nature is accepted. When it comes to the military use, things get complicated. Would their defensive use (actions in a toxic, nuclear-contaminated environment, etc.) be acceptable, would offensive or even "passive" use (including the disappearance of traces!) lead to operational effects through a possible violation of (possibly) norms?

The two branches of IUDs are:

- The Geneva Law (humanitarian proper) - intended to protect military personnel who do not or no longer take part in fighting and the people not actively involved in hostilities (civilians in particular);

- The Hague Law or the Law of War, which determines the rights and obligations of belligerents in the conduct of military operations and imposes limits on the means of striking the enemy.

They do not cover by provisions the categorizations that could be made regarding the use of xenobots and other artifacts of the kind mentioned. However, we must also note a number of difficulties related to:

- distinguishing
- cataloguing
- demonstration
- stability
- interpretation (of the meaning of use)
- the absence of recognized norms
- combinations, self-improvements, "self-healings", etc.

And first of all, it's about the possibility of categorizing the artifact. Here we turn again to Marcus and find out (under "Words - suitcase as an expression of the third party") that: "*Gnergy is, in English, a word - its own suitcase that compresses into a single term knowledge and energy or information and energy; The result is an entity that is neither information nor energy, or it is both*" (Solomon, 2011).

Beyond a classification in a defined normative field. And perhaps the hardest thing would be the possibility of proving the incriminated action, of preserving evidence (the lifespan of artifacts, their superfluous nature), etc.

Of course, some may ask why we perform scenarios as long as they have not got to us with

specific actions. We must bear in mind that many evil actions have been perfected in various ways before we notice it. The time gap is shrinking, and the movements of globalization help with that.

Or maybe we should include them all in *the Continuous War*, according to the phrase proposed by Mihail Orzeată (Orzeată, 2011).

Beyond all this, this game of God is a dangerous one by nature. Homo ludens, which “cannot break away from the magic circle of the game” (Huizinga, 1939) and could cause homo sapiens to disappear and be replaced by something hard to define. It seems that we are also witnessing the violation of other norms, some related to the “alteration of creation” (Semen, 2024) as father and teacher Petre Semen well said on the Biblical Atlas show on Radio Trinitas.

The risk of the phenomenon getting out of control is high.

We need to know and prevent! Let us hope that Marcus’ saying can be true here: “*Man does not create prosthetics to let himself be knocked down by them, but to control them for his own benefit*” (Solomon, 2011).

And “xenophobia” should not include xeno... bots

A forewarned man is worth two!

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