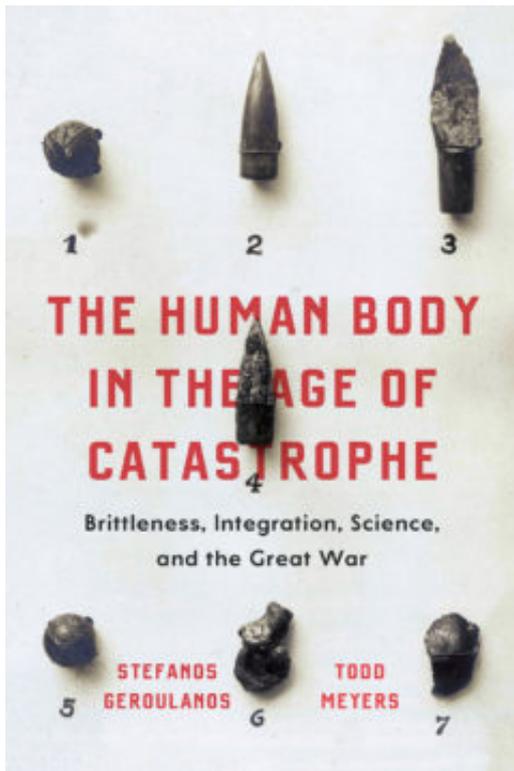


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The Human Body on the Verge of Collapse

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By Eugene Raikhel



[The Human Body in the Age of Catastrophe: Brittleness, Integration, Science, and the Great War](#)

[Stefanos Geroulanos](#) and [Todd Meyers](#)

University of Chicago Press, 2018. 416 pages.

1.

What is the 21st century body if not endlessly open, changeable, and porous? Genes interact with each other and with the environment from the prenatal period through life. The mother's diet and lifestyle affect the gene expression in the fetus. Hunger can alter the gene expression in an entire population, changes which can last through life span and perhaps also be transferred to the next generation. We now know that the body not only consists of human cells, but that our health and proneness to diseases

depend on interactions with microbes who inhabit our bodies. The microbiota, the total microbe population of our bodies, tie the inner and outer surfaces of our bodies together with the milieus of the world. The biosciences continue to provide new understandings of how human biology is entangled with the environment and society.

For a long time, the body was an enclosed entity. When I studied medicine less than fifteen years ago, we learned that around 2020, we would know the genetic basis of all diseases. Gene therapy would enable doctors to cure diseases like Alzheimer's disease or schizophrenia. The discovery of the double helix structure of DNA after the Second World War provided a foundation for understanding the body and its diseases in completely new ways. Increasingly refined molecular studies and interventions in disease combined with epidemiological twin studies provided an understanding of the body as a result of genetic templates inherited through generations. With the completion of the human genome project just after the turn of the 20th century, a new formula for life was proposed: the human genome as a book of life, where DNA via RNA was transcribed into proteins, the building blocks of the body. Life became DNA; human evolution could be traced as a trajectory of the selfish gene.

However, in the last two decades there has been a shift in scientific understandings of the body: If the body at the turn of the 20th century appeared confined, individual, enclosed, and well-arranged, two decades later, it appears much more open, changeable, chaotic and inseparable from its environments.

2.

This is not the first time in the history of medicine that bodily understandings have oscillated between being enclosed and open. These shifts, however, have not only been driven by scientific progress or technological developments, but also by shifting political or societal contexts. That is the point of departure of a wonderful and groundbreaking new book, [*The Human Body in the Age of Catastrophe*](#), by Stefanos Geroulanos and Todd Meyers.

With the First World War, science and medicine, physicians and scientists were confronted with injured and destroyed bodies to an extent not previously seen: shock, blast injuries, bullet strikes, and sepsis. Soldiers returned from the front line with limbs torn off, shell splinters protruding from the brain, and extensive soft tissue wounds. Traumas leading to paralyzing fear, death anxiety, and feelings of powerlessness led to panic reactions, déjà vu, and nightmares. Confronted with this new panorama of somatic and mental illnesses seen in relation to various immediate and slow reparative functions of the body, the available medical and scientific

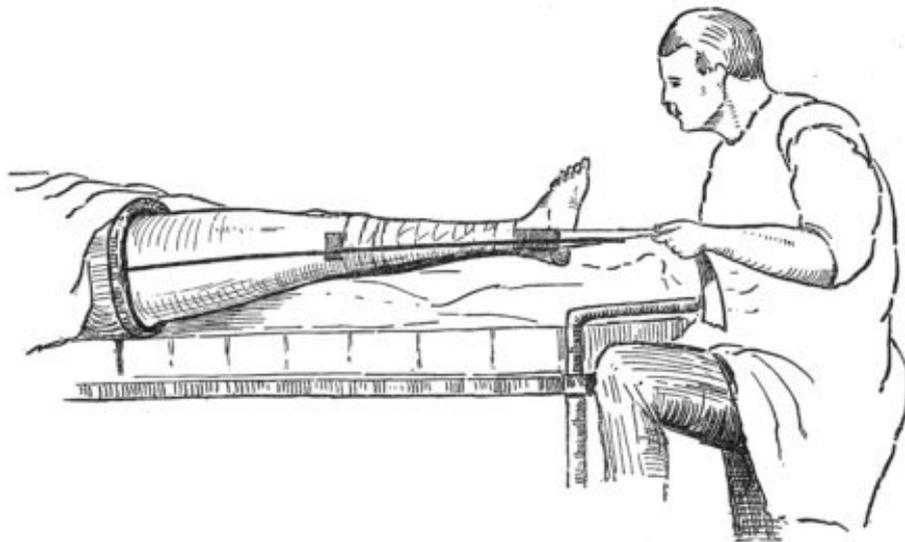
epistemological models seemed unsatisfactory. Among the phenomenon that physiologists and physicians struggled the most to understand, was shock. How could bodies react so differently to traumas? Some patients seemed barely to be affected by major injuries and could be discharged from the hospital after short time. Others died within minutes or hours from wounds that were barely visible. Geroulanos and Meyers demonstrate how wound shock represented the perfect example of disease coming not from the outside as a reaction to the injury itself, but rather as an internal systemic and bodily response.



Circa 1915: Red Cross personnel attending to wounded soldiers on a Russian battlefield during the First World War. (Photo by Hulton Archive/Getty Images)

In medicine shock is defined as a pathophysiologic situation where the flow of blood is insufficient to sustain the functions of the organs. A major cause of death in injured patients is the triad of hypothermia, coagulopathies, and disturbances in the acid-base balance. The triad leads to systemic responses, different homeostatic functions ultimately break down, and the blood pressure drops. Ultimately, blood flow becomes insufficient to provide the organs and tissues with oxygen and nutrients. Therefore, in war medicine and trauma care, an important objective is to break the triad, for instance by wrapping the patient in warm blankets to prevent hypothermia. This therapeutic technique stems from the First World War, and Geroulanos and Meyers show how new understandings of wound shock, which led to a reconceptualizing of the body as an integrated whole, also had therapeutic consequences. The body's individual and systemic responses to external stimuli forced physiologists,

neurologists, psychiatrists, and psychologist to reconceptualize the epistemology of the body: the body was integrated, its parts connected and stood in relation to its environments. The body was vulnerable because of its integration; it was integrated because it was vulnerable. "Why don't we die daily?" the American physiologist Walter Bradford Cannon wrote in 1926, in an attempt to understand the brittleness of the body. Ultimately, the vulnerability of the body threatened life itself.



The Thomas' splint drill for fractures was widely used during the First World War. Image: Wellcome Collection

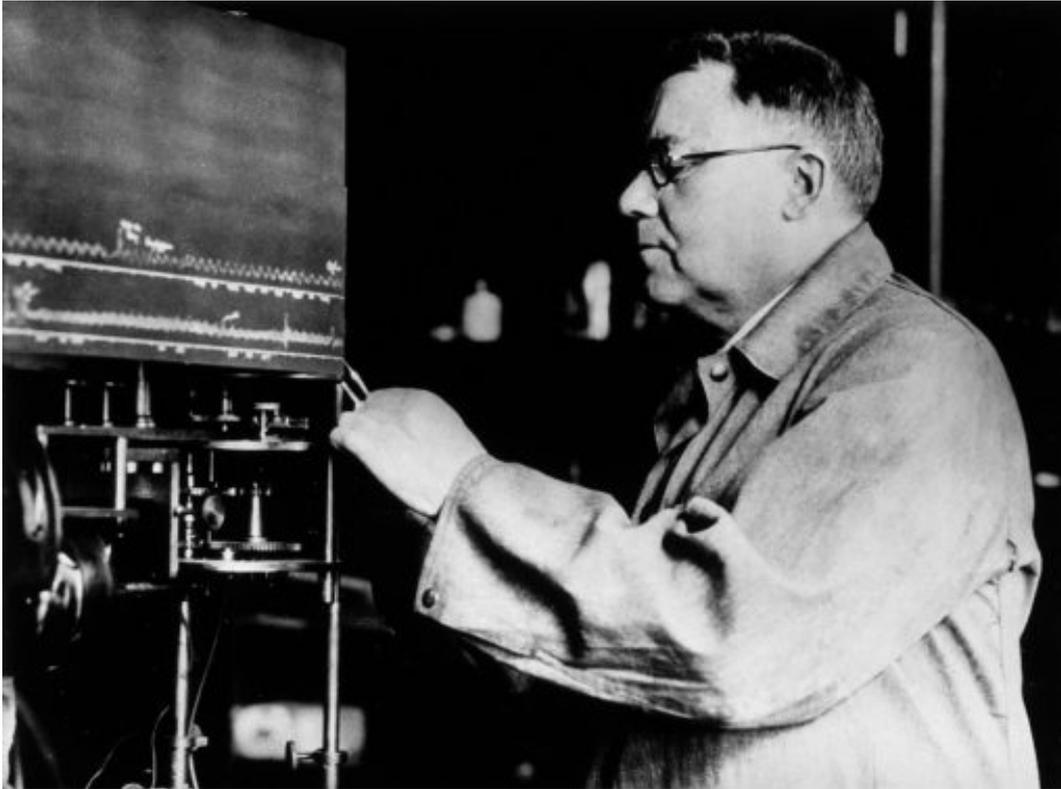
Geroulanos and Meyers trace this new concept of the body back to the discovery of hormones in 1905. Hormones forced physiologists and physicians to rethink medical and scientific understandings of the body. Not confined to one organ, hormones exerted their effects in different organs and tissues. At the same time, Freud developed his drive theory, which can be seen as a radical rethinking of the body's integration. At the end of the 19th century, cell theory and bacteriology dominated German medicine: health and disease were sought in cells or microbes. The first three decades of the new century, however, would become the era of physiology. Where Western history of ideas traditionally has credited Nietzsche, Marx, and Freud for shattering the romantic illusion of individual independence, Geroulanos and Meyers foreground the role of three physiologists and physicians: Walter Bradford Cannon, Henry Dale, and Kurt Goldstein. Individuality was not to be rooted in subjectivity. It was not morality that formed the basis of the individual. If physiology until then had been dominated by a Darwinian evolutionary model, where for instance

emotions were valued for their expressive functions in adapting the organism to the environment, the new discovery of hormones combined with bodily responses to injuries contributed to a shift in physiology: Individuality was the result of bodily and psychic responses from an inner, connected system.

3.

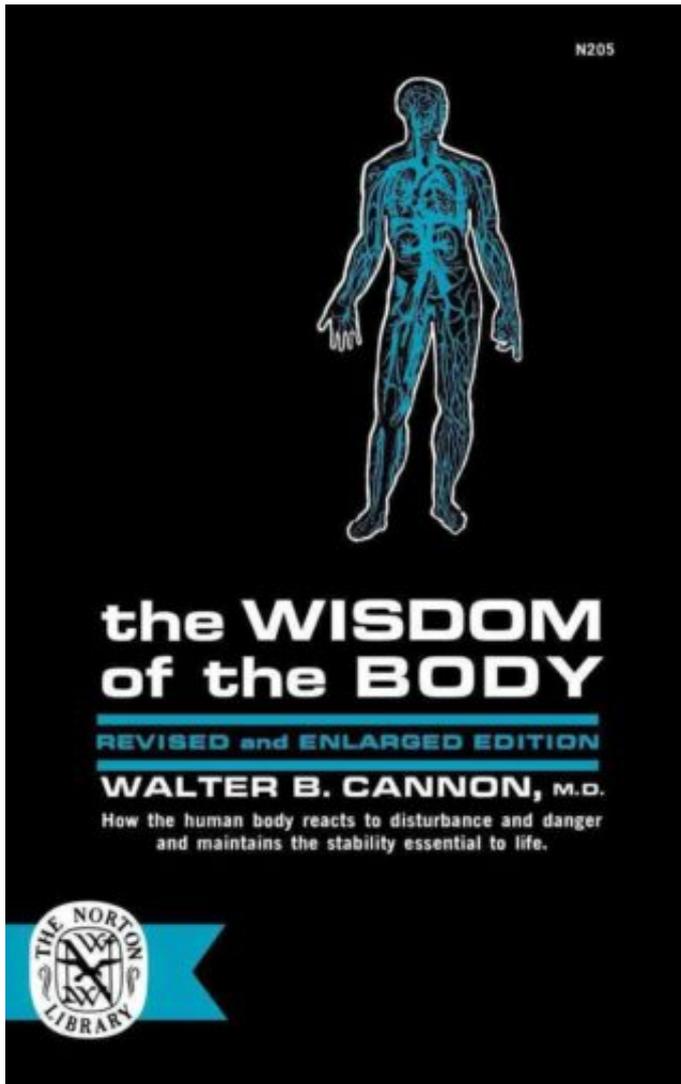
Geroulanos and Meyers provide three examples of how the First World War contributed to a reconceptualization of individuality: brain injuries, the relationship between emotions and physiology, and anaphylaxis. Kurt Goldstein (1878-1965) was a German neurologist and psychiatrist who rejected a clinical approach that detached symptoms from the patient. The doctor rather needed to start with the patient as a whole where functionality played a major role. To Goldstein, experimenting together with the patient represented an integral part of therapy: By making the patient [repeat exercises over and over again](#) he demonstrated how localised brain injuries constrained the ability of the patient to perform complex task in everyday life.

Goldstein reasoned that by performing the exercises with the physician, the patient would exceed the norms that restricted his or her life. The unnatural circumstances of Goldstein's laboratory helped the patient in taking the first steps to compel the new restrictions that the disease had imposed on the patient's life. By doing this, the doctor helped the patient create new norms and realize his or her "self-actualization." Goldstein fiercely opposed a conventional, generalised understanding of normality – it only made sense to talk about the normal and the pathological from the perspective of the individual patient. To Goldstein, this was a fundamental insight: life was individuals' ability to produce and realize themselves in relation to their milieu. This insight would become so fundamental to Canguilhem and his philosophy of life as a normative activity: a healthy life is the ability to constantly revise and constitute norms.



Walter Bradford Cannon, undated. Photo: unknown. Wikimedia Commons.

Walter B. Cannon (1871-1945) is known as the man who introduced the concept of fight-or-flight-response. He was particularly interested in examining how emotions, mental states, and physiological responses were tied together, for instance how the autonomic nervous system regulated the release of stress hormones from the adrenal cortex. This mechanism could be seen as an evolutionary adaptive response to external threats. But to Cannon, such a Darwinian understanding only grasped part of the phenomenon and overlooked how the mind and body were interconnected. Physiology provided different concepts and tools to understand bodily responses: emotions had to be seen as integrated, bodily processes responding to environmental changes. The organs of the body could not be seen as isolated from each other, but were part of a connected unity. This was what Cannon referred to as [homeostasis](#)— an interplay that kept threatening the body, and ultimately made it so vulnerable.



Walter Braford Cannon's book *The Wisdom of the Body*, first published in 1932. Here W. W. Norton & Company's edition from 1963.

A third example highlighted by Geroulanos and Meyers, is anaphylactic reactions. These are acute life-threatening reactions where the body's immune system reacts to various allergens. Crucial to the pathophysiological responses is the release of histamine, which leads to problems breathing, low blood-pressure, and ultimately shock. The realisation that the body contained hidden microscopic substances, which suddenly could be released under certain circumstances, led Henry Dale (1875-1968) to conceptualize the body as a finely regulated unity. An external stimulus that led to the enormous release of an endogen substance, became defining for Dale's concept of individuality: highly varied and individualized responses to external stimuli, and its potential for hurting itself by the means of *autopharmacology*, separated individuals from each other.

In the writings of Goldstein, Cannon, and Dale, the individual came into being by the means of diseases, injuries, and threats from the outside. That, however, did not imply that individuality was reserved for those who were sick or injured. The originality of Geroulanos and Meyers' work lies in pointing out how the unconsciousness, physiological regulation of the body, and the continuous possibility of its collapse, enabled individuality.

4.

In the first decades of the 20th century, different knowledges of the body collided with one another and inspired various political ideologies: evolutionary theory, bacteriology, and cell theory. The evolutionistic body took the development of the species as its foundation, and this body was integrated in social and racial hygiene. The bacteriological body with its focus on contagion, which grew out of late 19th century medicine, fitted well with notions of invasions from outside. The notion of "us" and "them" was mirrored in political measures of regulating populations, not least those who "threatened" society, like prostitutes, immigrants, criminals, Jews. Cell theory did not only provide a model for the fundamental unit of the body and its diseases, it also inspired philosophical theories of society as an organism consisting of differentiated entities. Geroulanos and Meyers demonstrate how the political and the medical became intertwined in the early 20th century.

Nevertheless, Geroulanos and Meyers convincingly show how physiologists at the same time reformulated a new theory of the body *and* society. The individual became an integrated unit, a homeostatically regulated organism threatened by interior and exterior factors constantly defining its own norms in the environment it inhabited. First World War and the stock market crash of 1929 both exemplified the precariousness of society and how the integration of society was constantly challenged by interior and exterior crises. However, as Geroulanos and Meyers point out, in the interwar period, integrated and holistic theories about the body, including idealized approaches to the patient, collided with the realities of society: a growing population, economic depression, and the therapeutic limits of medicine. The hopes of physiologists and physicians were often impossible to put into practice, like efficient therapies, and the emerging healthcare services did not manage to incorporate the physiological theories into patient-centered care. Since then, these theories and approaches have partly been picked up and integrated in complementary and alternative medicine. Ultimately, biotechnology, molecular biology, and genetics laid the foundation for a more atomistic understanding of the body and disease in medicine.

Geroulanos and Meyers have written a monumental book that seems acutely relevant to our time: when the climate crisis and antibiotic

resistance once again demonstrate the fragility of our bodies and societies and point to how our bodies are deeply entangled with nature, we once again move towards the body that physiologists and physicians a century ago struggled so hard to understand and construct.

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