



## The art of medicine

### The Great War's new body

5 years after the end of World War 1, on Oct 18, 1923, the British physiologist Ernest Starling delivered the celebrated Harveian Oration before the Royal College of Physicians. He titled his speech *The Wisdom of the Body*, echoing Job 38:36, "Who hath put wisdom in the inward parts?" Starling thought his own achievements, from his early work on hormones to the law of the heart, led inexorably to the new picture of the body that he offered to his audience. He concluded optimistically that although "the ocean of the unknown still stretches far and wide in front of us", nevertheless "we know the directions in which we would sail, and [...] only labour is required to extend almost without limit our understanding of the human body and our control of its fate".

What an extraordinary claim, and so soon after the millions of casualties in World War 1. Starling had seen first-hand soldiers maimed by shrapnel and shocked as their bodies collapsed from injury. He had seen the misery left in the war's wake, especially on the German population in 1919, about which he wrote a parliamentary report. But he also recognised how profoundly the human body had changed during the war, and how it was now differently available to the physician and the laboratory scientist. Small groups of researchers in the UK, western Europe, and the USA came to focus less on injuries than on the way the body absorbs them

as a whole. The body ceased to be a sum of its organs and became an integrated, extremely fragile, and constantly threatened system of systems. The story of how they rethought the human body against the background of war riveted contemporary medicine, physiology, and neurology and remains illuminating to this day.

This story does not begin on the battlefield or the field hospital but in the laboratory, years before a shot was fired. After Starling and William Bayliss identified secretin in 1902, they began to consider how *The Fluids of the Body*—the title of one of Starling's books—affect organs at a distance, and how hormones compound nervous responses to generate rapid bodily reactions. 3 years later, Charles Sherrington spoke for the first time of "integrative action" carried out by reflex arcs and more complex neural networks, and by 1910 Walter Cannon at Harvard had begun to consider how particular pathologies or encounters generated body-wide emotional and physiological reactions. In the laboratories of Henry Wellcome, the physiologist Henry Dale described the chemical basis of neurotransmission and identified histamine and its contradictory self-protective and self-destructive effects on the organism, which led him to develop an early theory of autoimmunity he called autopharmacology. For all these thinkers, as for aphasia specialists like Henry Head in London, Raoul Mourgue in Paris, and Kurt Goldstein in Germany, the body (or the brain) had to be conceived away from the "bottom up" models that their predecessors and elders had championed: the body was regulating itself, protecting itself, responding to stimuli with overwhelming force.

Much had been learned in the laboratory, but human experimentation remained frustratingly out of reach. The war suddenly, brutally, afforded physiologists and neurologists an experimental situation under the banner of care for the injured. Paradoxically, the promise for medicine was immense: the pioneering surgeon George Washington Crile endeavoured to work at the Ambulance Américaine hospital in Paris on the grounds that "In a peaceful community, there is almost no opportunity for the study of human material", whereas "in Europe such opportunities are now abundant and they may never again be available on such a scale".

But here the new approach to bodily regulation crashed against a serious problem: bodies were fragile, and the equilibrating processes physiologists had been studying did not necessarily help save them, but could make things worse. At times their interventions jeopardised the body as a whole precisely while trying to save it.



Claggett Wilson (1887–1952), *Dance of Death* ca. 1919

Watercolour and pencil on paperboard image: 16 3/4 × 22 1/2 in. (42.5 × 57.1 cm). Gift of Alice H Rossin (1981.163.12).

Pathologies emerged that had to do with the brittleness of integration: brain injuries, which seemed so diverse as to challenge theories of local brain functions and suggested that every patient needed to be studied and treated individually; sepsis, which was treated as a whole-body disease that could not be stopped after its onset; so-called wound shock, in which the body sought to protect itself against an injury by hiding blood in the capillaries, only to find its systems collapsing one after the other from a sharp drop in blood pressure. As wound shock and so-called war neuroses became the exemplary conditions of World War 1, physiologists were confounded: why did one patient survive an injury whereas another succumbed to it?

The conceptual energy put into answering this question would drive medicine in the period immediately after the war. Most famous and influential was Cannon's theory of homeostasis that edged out competing theories by physiologists John S Haldane and Lawrence J Henderson. Cannon cited his studies of wound shock and insisted that bodily integration salvaged and stabilised, however temporarily, the problem that "our bodies are made of extraordinarily unstable material". While bodily integration ruled the self, each person handled the potential to collapse differently.

Head, Goldstein, and Alexander Luria approached the ways that the brain and body regulate behaviour with similar anxieties. Goldstein, extrapolating from his care of patients with devastating brain injuries, proposed that it was necessary to appreciate specific "catastrophic situations" in which individuals found themselves to be able to produce a "total picture of the patient". The French surgeon René Leriche, who wrote an influential book on bone fractures on the battlefield, pushed on towards what he called a "surgery of pain"—surgery intended to specifically alleviate pain felt differently by each patient—which, like Goldstein's "total picture", took seriously the patient's subjective experience of injury and the way it entered and altered his world.

These researchers thus claimed that the body was tightly integrated, but this integration both presumed and constantly fought off its own collapse. Starling's answer to Job's question in *The Wisdom of the Body* was compatible with the broader approach. Neither heart nor brain were hegemon over the body, what Starling called the "inward parts", and internal processes generated a healthy whole; it was the body itself that held this "wisdom" and held it together. So vital and delicate was this balance that Cannon would later ask, while writing up his own thesis on the wisdom of the body, simply, "why don't we die daily?" The physician and physiologist who were charged with alleviating "the pain, mental and physical, associated with sickness and disability, or the cutting off of a man by disease in the

prime of life", Starling wrote, also sought to reintegrate the individual back into a healthy and productive community, which for soldiers fortunate enough to survive was difficult as they were reminders of a war the world would much rather forget.

This concept of the body as an integrated, extremely fragile system of systems, one that was constantly threatened with catastrophe, had an influence beyond medicine. And as in medicine, so in politics: understanding and enforcing international integration better became the key appeal of the League of Nations, precisely because existing systems for cooperation seemed insufficient. This model of the body—its hormones, its regulatory apparatuses—was cited repeatedly by economists, politicians, and social planners. Crises came to be understood as disruptions that were exacerbated by existing, imperfect integrations that would, in turn, need to be improved—whether, for all the differences, in John Maynard Keynes's UK or Herbert Hoover's or Franklin Delano Roosevelt's USA. And new forms of liberalism emerged under medicine's umbrella: if the self was always threatened and had a tendency to implode, it was the purpose of liberal politics to work like a physician and to constantly shore it up.

For all their innovation and invention, these changes to the concept of the human organism did not last. Physiology would eventually find a path back to atomisation and divided systems. Still, these concepts of homeostasis, integration, and equilibrium in the early 20th century would eventually, in contrasting ways, find their way into other domains, such as anthropology, international relations, and cybernetics. How did such a revelatory and productive turn in medical thinking—productive both in reducing the mortality associated with battle-related shock as well as in widening avenues of medical research such as endocrinology and neurophysiology—influence politics yet eventually recede to the background of medical thought? Perhaps most relevant for medical science today, how can hard-earned lessons of a century ago help to provide insights about threats and injuries in ongoing theatres of conflict? Integration and reintegration, whether as the physiological basis of injury and recovery or the means by which soldiers return home and communities heal, remain central problems for medicine.

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#### Further reading

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