ESSAYS ON SCIENCE AND SOCIETY

From Turin to Stockholm via St. Louis and Rio de Janeiro

Rita Levi-Montalcini

CREDIT: ALLAN BURCH

Rita Levi-Montalcini

was born in 1909 in Turin, Italy. A medical doctor and neurobiologist, she was awarded the Nobel Prize for Physiology or Medicine in 1986, together with Stanley Cohen, "for their discoveries of growth factors."

The absence of psychological complexes, tenacity in following the path I reputed to be right, and the habit of underestimating obstacles—a trait I inherited from my father—have helped me enormously in facing life's most tragic occurrences. To my father, and to my mother, I owe also a tendency to look on others with sympathy and without diffidence. This attitude, which was common to all four of my parents' children, showed itself most powerfully in my older brother Gino.

On 16 October 1941, 3 years after the promulgation of anti-Semitic laws in Italy, Gino came home and informed us in a cheerful and proud tone about an honor that had been bestowed upon him: "They've put me in Einstein's company," he told us. On a placard pasted on walls all over Turin, his name had been listed along with Einstein's and those of other persons believed by the authors to belong to the "Jewish race"—such as Franklin D. Roosèvelt, La Passionaria, and Lenin. After the enumeration of the horrible crimes perpetrated by these "Jews," the authors urged that they be exterminated: "Not in concentration camps, but up against the wall and then at them with a flame thrower!"

At this time, I had already been forced to resign from my post at the university because I was Jewish. In December 1939, I set up a small laboratory in my bedroom and resumed my research into how the periphery affected the development of the nervous system in its nascent stages. Six months later, Mussolini declared war on England and France, and Turin was bombed by the Allied powers. My family sought safety at a small house in the Piedmontese hills near Asti, where I set up my laboratory again.

The instruments, glassware, and chemical reagents necessary for my project were the same as my 19th-century predecessors had. Chick embryos were the object of my experiments. I would bicycle to neighboring farms to buy fertilized chicken eggs ("for my babies," I explained to the farmers, because they were "more nutritious"), which I incubated at home using a small thermostat. During that period, I first noticed that the phenomenon of massive cell death occurs even in embryos that are developing normally. Thirty years later, in 1972, other researchers correctly attributed this phenomenon to programmed cell death (apoptosis).

On 25 July 1943, Mussolini handed in his resignation to the king, and by 10 September, after the ignoble flight of the royal family and the Fascist generals at the head of the government and army, German tanks were parked outside of Turin railway station. For all of us who were not Aryan, it was no longer a question of bearing with threats and hostility from the local Fascists, but of going into hiding to save our lives from the barbarian hordes that had invaded the country. My family and I fled to Florence where we remained in hiding until the Allies came in August 1944.

From September 1944 to May 1945, I worked as a physician for the Allies in a refugee camp. Day and night, army trucks would unload old people, women, and children who had been brought to Florence from the nearby battlefield areas. Epidemics of abdominal typhus and cholera spread like wildfire from one barrack to another, favored by the terrible hygienic conditions and the debilitated state of the refugees, and made countless victims.

Northern Italy was finally freed in April 1945. My family and I returned to Turin, and I resumed my position as assistant to Giuseppe Levi, who had been called back to occupy the Chair of Anatomy at the university. In 1946, I received an invitation from Viktor Hamburger, who was chairman of the department at the time, to spend a semester at the department of zoology at Washington University, St. Louis. He had read a paper of mine on the mechanisms governing the effects of peripheral tissues on the nerve fibers that innervate them; my findings contradicted his own hypotheses, and he wished to investigate the question further in collaboration with me. In September 1947, I reached St. Louis, where my own findings and interpretation eventually prevailed. Viktor offered me a position as associate professor, and St. Louis became my home for more than two decades.

In 1950, Viktor brought to my attention an experiment by a former student of his, E. Bueker: Instead of grafting a limb bud onto a developing embryo, he had grafted a malignant mouse tumor and noticed that it had become innervated by the adjacent sensory ganglia of the host. When I repeated the experiment using the silver-staining technique, I found that nerve fibers had emerged not only from the sensory ganglia, but even more from the sympathetic ones, and had extended chaotically so as to completely invade both the neoplastic tissue and practically all of the embryo's organs; even the veins had been perforated and the circulation blocked. I hypothesized that the tumor had released a humoral agent that acted on sensory and sympathetic ganglia and their emerging fibers, a finding that I presented to the New York Academy of Sciences in 1951. At the time, it did not arouse the interest of the scientific community.

To identify the humoral agent, I resorted to the tissue culture technique I had learned while working with Giuseppe Levi in Turin. I traveled to Rio de Janeiro where an old friend, Hertha Meyer, had set up a tissue culture laboratory at the Institute of Biophysics, directed by Carlos Chagas. Thanks to the simplicity and clarity of the bioassay, I was soon able to prove that the tumors released a growth factor in the culture medium.

In December 1986, at a ceremony before the king and queen of Sweden, nerve growth factor (NGF) was officially recognized as the first of a family of endogenous specific growth factors, bringing it to the attention of researchers in other areas of biology and the lay public. But the NGF saga is far from concluded. In recent years, NGF activity in both normal and pathological conditions prospects a much wider role for this molecule than had previously been foreseen.

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