Gerty T. Cori, Biochemist

Gerty T. Cori (*nee* Radnitz), whose early death on 26 October 1957 was a great loss to biochemistry and the scientific world, was born in Prague, Czechoslovakia, then a part of the Austro-Hungarian Empire, in 1896. She attended secondary school in Prague and Teschen and became a medical student at the German University of Prague. She received her M.D. degree in 1920, together with a fellow student, Carl Ferdinand Cori, whom she married the same year. The association thus started was a lasting and happy one from the human point of view and, in terms of what it meant to science, one of the most fruitful and successful on record.

In 1922 Carl and Gerty Cori came to the United States, becoming American citizens in 1928. Until 1931 they worked at the State Institute for the Study of Malignant Diseases in Buffalo, New York, and in that year, following Carl's appointment to the chair of pharmacology at Washington University School of Medicine, they made their home in St. Louis, Missouri, where a son, Carl Thomas, was born to them in 1936. At the same university, Carl took over the chair of biochemistry in 1946, and Gerty became professor of biochemistry in 1947.

Their medical and physiological training gave Carl and Gerty Cori the background to correlate events at the molecular level with the processes in the body as a whole, and they became outstanding exponents of the group of medically trained scientists who, well versed in the physical and chemical sciences and deeply interested in biology, pioneered in the development of what is known today as dynamic biochemistry. Their lives followed more than just parallel courses; they followed a single, lofty, and straight course. This course of life they shared with their students and collaborators in a spirit of friendship and understanding which, with the integrity and excellence of their scientific leadership, resulted in high accomplishment.

It would be impossible to separate the contributions of Gerty from those of Carl Cori, as they always worked in close collaboration ever since their first joint publication in 1923. Their early work dealt with the fate of glucose in the animal body and the effect of hormones, such as insulin and epinephrine, on carbohydrate metabolism, a study which they would take up later with isolated enzymes following the discovery of key enzymes in the breakdown and synthesis of glycogen and utilization of glucose. The discovery of phosphorylase and of glucose-1-phosphate (Cori ester) and that of the branching enzyme (amylo-1, 4→1, 6-transglucosidase) led to our present understanding of the mechanism of biosynthesis of the highly branched glycogen molecule and to the first synthesis of this polysaccharide in the test tube. The discovery by Gerty Cori and her pupils of the enzyme amylo-1, 6-glucosidase, which cooperates with phosphorylase, phosphoglucomutase, and glucose-6-phosphatase in the biological cleavage of glycogen to glucose (glycogenolysis), completely elucidated the mechanism of this process. It further led to an elegant, and now classic, enzymatic analysis of the structure of glycogen by Gerty Cori and her collaborators. In recent years Gerty turned to the study of the "chemical lesion" in the glycogen storage disease of children and recognized two groups of disorders, one with normal and the other with abnormal glycogen, referable to deficiency of glucose-6-phosphatase in the former and to alteration in the branching or debranching enzymes in the latter. Gerty's indomitable, almost superhuman will kept her at work, with undiminished enthusiasm, through the weary years of failing health and dwindling physical strength, to produce some of her most outstanding scientific contributions.

In 1947 Carl and Gerty Cori shared with B. A. Houssay of Argentina the Nobel prize in physiology and medicine. With Marie Curie and Eve Jolliot-Curie, Gerty Cori was the third woman to receive a Nobel prize in science. Many other honors and distinctions, in some cases jointly with her husband, were bestowed upon her. She was not only a scientist of enormous stature but a human being of great spiritual depth, endowed with the most precious gifts that can adorn human nature. She was modest, kind, generous, and affectionate to a superlative degree and a lover of nature and art, living true to her statement: "honesty, which stands mostly for intellectual integrity, courage, and kindness are still the virtues I admire" ["This I Believe," a series of radio broadcasts by Edward R. Murrow (Columbia Records)]. Her attitude toward the riddle of the universe was expressed by her belief in the development of a philosophical system, based on the laws of physics, chemistry, and biology, without recourse to vitalistic ideas, although she warned that this hope should not be confused with the naive belief that human knowledge has no limits ["Some Thoughts on Science and Society," Sigma Xi Conference on Science and Human Responsibility, Oct. 1954, Washington Univ., St. Louis, Mo.]. She had faith in the moral progress of mankind but her youthful belief in rapid progress gradually gave way to a more realistic hope that there will be advance but a belief that it will be slow. In her own words, "Contemplation of the great human achievements through the ages is helpful to me in moments of despair and doubt. Human meanness and folly then seem less important. Humanity has but a short history of civilized life and the hope for greater wisdom must resign itself to a fairly distant future. Gone are the somewhat Utopian hopes of my youth, the belief in rapid, continuous progress. Hope remains, but the time scale has widened" ["This I Believe," a series of radio broadcasts by Edward R. Murrow (Columbia Records)].

Those who knew Gerty Cori admired the rare combination of human attributes which resulted in the harmonious personality that was so engaging, a rich, open personality in which an astonishing drive for action was uniquely blended with an unusually gentle, kind, and charming nature.

SEVERO OCHOA
New York University College of Medicine, New York, New York

Severo Ochoa has been kind enough to encourage me to dwell on some facets of Gerty Cori's many-sided scientific work. In view of the general interest in "molecular biology," with special reference to heritable diseases in man, I have found it fitting to emphasize Gerty Cori's pioneer work in the field of biochemical genetics in man.

There are now several cases in which heritable human diseases and even "allergies," abundant in many races, can be traced back to a particular enzyme defect. Gerty Cori's studies on the glycogen storage diseases represent the first demonstration that a human heritable disease stems from a defect in an enzyme. In the hepatic storage disease a specific phosphatase, glucose-6-phosphatase, is missing. In the more involved disease which affects the muscle system, Gerty Cori's observations were even more remarkable. To my mind the most fundamental aspect of this particular study is the demonstration of the existence of abnormal short-branched, glycogen, "limit-dextrin (phosphorylase)," to use Gerty Cori's terminology, and its correlation with the absence (or defect) of the so-called debrancher enzyme, amylo-1, 6-glycosidase. The latter enzyme was also discovered by Gerty Cori. This outstanding piece of molecular biology was initiated early in 1950, stemming, of course, from Gerty and Carl Cori's earlier discoveries in this field. The demonstration that an aberrant architecture of a polymer is rooted in a well-defined enzyme defect still remains an unmatched scientific accomplishment. The ingenious enzymatic techniques employed here should be used as a teaching topic for students in biology, biochemistry, and medicine.

Gerty Cori was deeply interested in the broad aspects and implications of biological science. At the same time, she insisted on craftsmanship as the healthy basis for scientific work. She did not tolerate mediocrity or facile approaches in science. This is also reflected in the high demands that she made on her own labor. Her illness only served to intenstify these demands on herself. She exercised the same intense and warm enthusiasm in her active concern about the future of free human society. We shall all deeply miss her crusading spirit.

HERMAN M. KALCKAR
National Institutes of Health, Bethesda, Maryland

News of Science

Passport Decision

The U.S. Supreme Court ruled in a five-to-four decision on 16 June that a person cannot be denied a passport because of his beliefs or associations. This ruling invalidates the State Department's regulations denying passports to Communists, to persons who refuse to sign non-Communist affidavits, and to those whom the Secretary of State believes would in some way help the Communist cause and injure the best interests of the United States by leaving this country. The Court decided the three cases before it on grounds of lack of statutory authority and thus avoided constitutional issues.

The cases involved artist Rockwell Kent and two scientists: Walter Briehl, Los Angeles psychiatrist, and Weldon Bruce Dayton, a physicist of Corning, N.Y. Kent and Briehl, whose cases were considered together, refused to answer State Department questions about Communist affiliations. They said they wished to travel abroad for pleasure and for professional reasons.

Dayton, who wanted a passport to take a job at the Tata Institute of Physics in Bombay, India, was accused of association with Communist espionage agents. He denied the charges under oath, but the Secretary of State refused him a passport on the basis of confidential information. There was a possibility that the Dayton case would provide a major test of the Government's constitutional powers to use secret informants. But the Court disposed of it on the statutory basis of the Kent-Briehl case.

Majority opinion. Justice William O. Douglas prepared the majority opinion. Joining him in the decision were Chief Justice Earl Warren and Justices Hugo L. Black, Felix Frankfurter, and William J. Brennan, Jr. Douglas wrote:

"Freedom of movement across frontiers in either direction, and inside frontiers as well, was a part of our heritage. Travel abroad, like travel within the country, may be necessary for a livelihood. It may be as close to the heart of the individual as the choice of what he eats, or wears, or reads. . . .

"Freedom of movement also has large social values. As Chafee put it, 'foreign correspondents and lecturers on public affairs need first-hand information. Scientists and scholars gain greatly from consultations with colleagues in other countries. Students equip themselves for more fruitful careers in the United States by instruction in foreign universities.' . . .

"[*Congressional intent.*] The difficulty is that while the power of the Secretary of State over the issuance of passports is expressed in broad terms, it was apparently long exercised quite narrowly. So far as material here, the cases of refusal of passports generally fell into two categories. First, questions pertinent to the citizenship of the applicant and his allegiance to the United States had to be resolved by the Secretary, for the command of Congress was that 'no passport shall be granted or issued to or verified for any other persons than those owing allegiance, whether citizens or not, to the United States.' . . . Second was the question whether the applicant was . . . engaging in conduct which would violate the laws of the United States. . . .

"The right of exit is a personal right included within the word 'liberty' as used in the Fifth Amendment. If that 'liberty' is to be regulated it must be pursuant to the lawmaking function of the Congress. . . . And if that power is delegated, the standards must be adequate to pass scrutiny by the accepted tests. . . . Where activities or enjoyment, natural and often necessary to the well-being of an American citizen, such as travel, are involved, we will construe narrowly all delegated powers that curtail or dilute them. . . .

"We must remember that we are dealing here with citizens who have neither been accused of crimes nor found guilty. . . . They may or may not be Communists.

"But assuming they are, the only law which Congress has passed expressly curtailing the movement of Communists across our borders has not yet become effective. It would therefore be strange to infer that pending the effectiveness of that law, the Secretary has been silently granted by Congress the larger, the more pervasive power to curtail in his discretion the free movement of citizens. . . .

"To repeat, we deal here with a constitutional right of the citizen, a right which we must assume Congress will be faithful to respect. We would be faced with important constitutional questions were we told that Congress . . . had given the Secretary authority to withhold passports to citizens because of their