

## The Brownstone Tower

Everybody who receives this Journal is aware of the initials DNA and RNA and of the current phrase "cracking the code" carried by both nucleic acids that determines what proteins shall be synthesized in living cells. I was curious to find out whether my unrefreshed, antebellum chemistry would enable me to understand what is going on in this extremely active field of chemical genetics. For enlightenment I went to our own National Institutes of Health to see a young man, Dr. Marshall <sup>w.</sup> Nirenberg, whose name, not yet in American Men of Science or on the rolls of the Washington Academy of Sciences, is becoming known nationally and internationally as a pioneer in "cracking the code."

Organizationally, Dr. Nirenberg is a member of the staff of the Section on Metabolic Enzymes in the Laboratory of Biochemistry and Metabolism, National Institute of Arthritis and Metabolic Diseases. The chain of command begins with DeWitt Stetten, Jr., Associate Director in Charge of Research, over Leon A. Heppel, Chief of the Laboratory, over Gordon Tomkins, Chief of the Section, over Dr. Nirenberg, who has three professional associates (Heinrich J. Matthaei, Oliver W. Jones, and Samuel H. Barondes) and two laboratory assistants.

Physically, Dr. Nirenberg is to be found in the D corridor on the eighth floor, northwest wing of the big Clinical Center. His name appears beside the door of room 13. Arriving ahead of the time of my appointment, I retreated when I found standing room only in 13, and little of that. The hall, too, was lined with a variety of equipment that could not be accommodated in the laboratory rooms. At noon I met Dr. Nirenberg, and we went to lunch with Carl Brewer in the pleasant dining room of the new office building, No. 31,

which houses the Division of General Medical Sciences, the Division of Research Grants, and extramural program staffs of the several Institutes.

At lunch Dr. Nirenberg explained his work to me. As I understand it, he and his associates were the first to report synthesis of a known protein-like substance (polyphenylalanine) in a cell-free medium containing amino acids and a synthetic RNA (polyuridylic acid). This RNA was specific for the polymerization of phenylalanine. Thus it was shown how to go about the business of synthesizing other proteins from other RNAs of known composition and eventually to relate the sequence of amino acids in the resulting protein to the sequence of basic groups in the template RNA; i.e., to decipher the code, which is believed to be universal. Carl Brewer pointed out that the whole story of the development of concepts of the DNA-RNA role in heredity beginning in 1953 was well told in a long article in the New York Times of 2 February 1962 and, of course, many other popular articles have been written about the subject. Dr. Nirenberg, whose work is outlined in the Times story, endorsed it. I recommend it.

Being engaged, as I am, in desk work in biology, it was refreshing to be in the presence of one who is in hot pursuit of knowledge, who has more experiments in mind than he can carry out. He is free to develop his research as he sees fit and is really not under scientific direction of those named in the second paragraph. His work is controlled by his own thinking and by results obtained by others working along similar lines. Communication is very important in such a rapidly developing subject, and there is a grapevine that carries the word among the members of the DNA-RNA fraternity.

At lunch Dr. Nirenberg was wearing his worn white laboratory coat, a

symbol of his absorption in his work. I surmised that he might not count the hours he spends in the laboratory. "True", he said, and added that he lives on the campus in an apartment house built for physicians who must be close to the Clinical Center. Thus if an idea strikes him at home, he can be in the laboratory in a few minutes to try it out. He showed me around his laboratory and nearby instrument rooms. Electronics baffle me, and I could respond only to a very simple device in the hall, a large heavy thermos jug containing liquid nitrogen in which tubes containing enzymes are suspended. At such low temperatures the activity of enzymes is preserved for months.

Dr. Nirenberg was not always destined for biochemistry. He graduated from the University of Florida in 1948 not knowing what he wanted to do. He tried more than one occupation and in 1952 took a Master's degree in entomology, also at the University of Florida. His dissertation was on the Trichoptera of Alachua County, aquatic insects of no economic importance. He had taken a minor in biochemistry and decided to work for a Ph.D in that subject at the University of Michigan under James F. Hogg. He took his Doctor's degree in 1957. Since then he has worked at NIH, first on postdoctoral fellowships, then as a member of the staff. The attention he has received lately must be somewhat distracting and he must be reluctant to give up his valuable time to instruct poorly prepared people like me in the purpose, methodology, and significance of his work. Yet he is doing so patiently and cheerfully. We hope that he may have the satisfaction of solving many of the problems now in his mind and will enjoy both the regard of his colleagues and public recognition of his achievements.