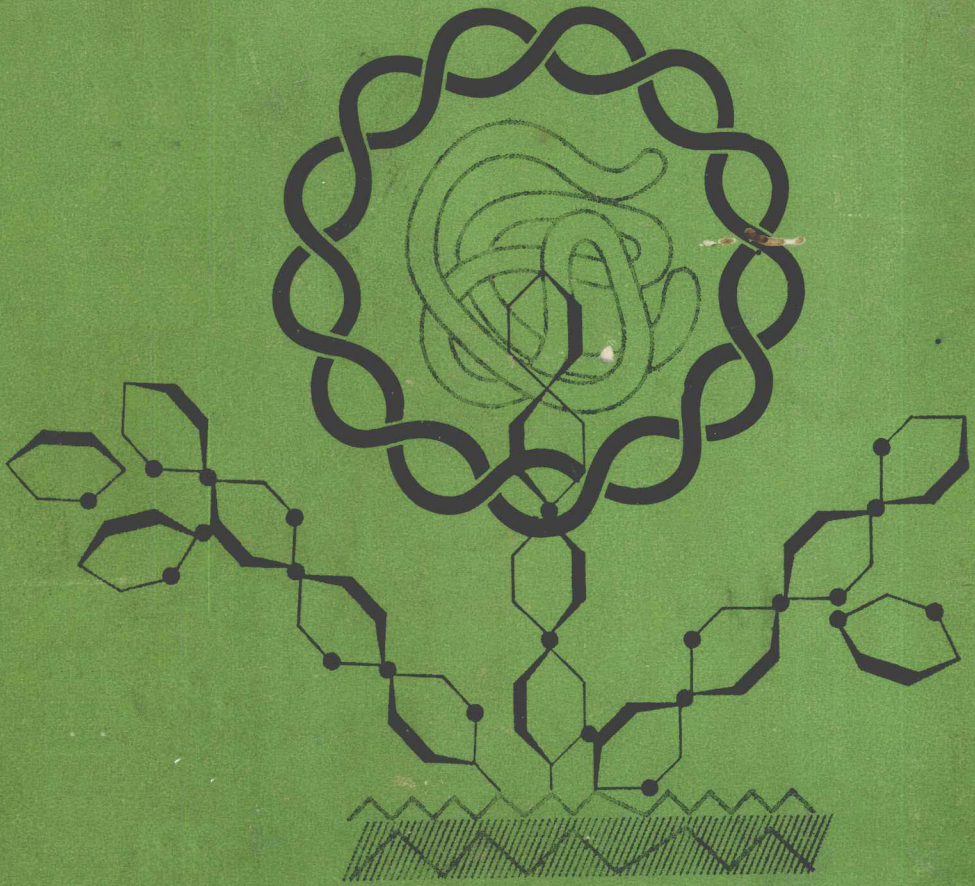

Blood and Tissue Antigens

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DAVID AMINOFF

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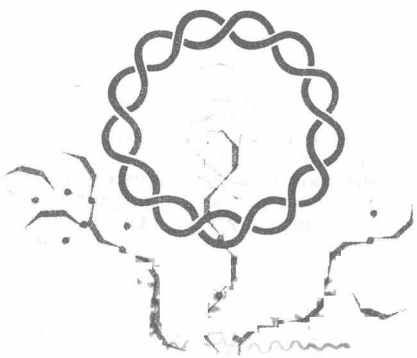
THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN



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On his return to England in 1938 he joined the staff of the Biochemical Department at the Lister Institute under Professor R. Robison, and was appointed a Reader in Biochemistry at the University of London. Morgan extended his work on bacterial antigens, but these investigations largely came to an end with the outbreak of World War II in 1939. By this time, however, he had established certain basic ideas on the composition and, in general terms, the overall macromolecular structure of the O somatic antigens. The ideas brought forward formed the basis of much of the important and exciting

PREFACE

This volume consists of the proceedings of the International Symposium on Blood and Tissue Antigens held in Ann Arbor, Michigan, September 17-19, 1969. The meeting was sponsored by the Simpson Memorial Institute and the Department of Postgraduate Medicine of The University of Michigan in association with the Glycosamino Glycan Glycoprotein Group.

The Symposium was organized to honor Professor Walter T. J. Morgan of the Lister Institute of Preventive Medicine, London, England, who, for thirty years was a dedicated investigator of the blood group substances. His vigor, imagination, and productivity in the field have been symbolic.

All the presentations and relevant discussions are included in this volume. The principal editorial changes pertain to the adaptation of the oral presentation to the published form, the omission of informal remarks and biographical introductions of speakers, and the trimming of the taped discussions to a terse rendition. This aspect of the editing was, of course, carried out by the authors and participants in the discussions.

A program such as this could not have been held without the assistance and help of many individuals and organizations. It is a pleasure to acknowledge the moral support and help rendered by my colleagues on the Executive Committee: Drs. Roger W. Jeanloz, W. Ward Pigman, and Richard J. Winzler. The executive organizing committee gratefully acknowledges the financial support of the following foundations and pharmaceutical companies: Abbott Laboratories, Chicago, Illinois; Academic Press, Inc., New York, New York; Behringwerke Aktiengesellschaft, Marburg (Lahn), West Germany; Dade Reagents, Inc., Miami, Florida; Glenwood Laboratories, Inc., Tenafly, New Jersey; Hoechst Pharmaceutical Co., Cincinnati, Ohio; Hoffmann-La Roche Inc., Nutley, New Jersey; Merck Sharp and Dohme, West Point, Pennsylvania; National Cystic Fibrosis Research Foundation, New York, New York; National Institute of Allergy and Infectious Diseases, Bethesda, Maryland; Ortho Research Foundation, Raritan, New Jersey; Parke, Davis & Company, Detroit Michigan; Pfizer Diagnostics, New York, New York; Sandoz Pharmaceuticals, Hanover, New Jersey; Schering Corporation, Bloomfield, New Jersey; G. D. Searle & Co., Chicago, Illinois; Smith Kline & French Laboratories, Philadelphia, Pennsylvania; Specific Serums, Inc., Hoboken, New Jersey; Spectra Biologicals, East Brunswick, New Jersey; E. R. Squibb & Sons, New

BIOGRAPHICAL SKETCH

Walter Thomas James Morgan was born in London on October 5, 1900. His childhood was happy and his schooling uneventful until the time he reached the fifth form when it became inevitable that under the national emergency of the 1914-1918 war he would be conscripted into the armed forces on reaching the age of eighteen. Since he was already interested in chemistry, he decided to leave school before he was seventeen to work in a recently finished government plant for the production of synthetic phenol, a key chemical in the war effort. He found this experience exciting and useful and remained in this post until some months before his eighteenth birthday when he volunteered for service in the Navy. He was stationed at the Royal Naval Experimental Station where he worked on materials for smoke screens and on chemical warfare agents. He also spent a good deal of time transporting these weapons to naval dockyards and depots. On demobilization at the end of 1919, he entered London University as a student, graduated B.Sc., and worked for a time as a chemist in an industrial laboratory. During this period he continued his studies in evening classes, completed his first research project, and was awarded the M.Sc. degree for a thesis on amino acid esters. As a result of this success, he was recommended by his examiner, Professor Arthur Harden, for the Grocers' Company Research Scholarship tenable at the Lister Institute. He commenced work at the Institute in August 1925. His first investigation was concerned with the development of methods for the isolation of hexose mono- and diphosphates, trehalose non-phosphate, and several other sugar esters which were products of the controlled fermentation of glucose by yeast juice, a subject being studied by Professor Harden at that time. After completing work for his Ph.D. degree in 1927, Morgan was awarded a Beit Medical Research Fellowship and continued to investigate the structure of some of these important intermediates of carbohydrate metabolism until 1929 when he was appointed Biochemist and First Assistant in the Serum and Vaccine Department of the Lister Institute at Elstree, outside London. At the time he assumed this position there was no biochemical laboratory and little suitable scientific equipment. It was this early experience with very limited facilities that taught him how to plan a research project and carry it through with the simplest experimental procedures.

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work by others that was done in the next decade. His contributions up to this time indicate that he was an active and early worker on the structural analysis of biologically important macromolecules, a field considered today as molecular biology.

The crisis in Europe in 1939 required the solution of many urgent problems in the Emergency Blood Transfusion Service, and Morgan and his colleagues soon became involved in the production of high-potency immune sera for blood grouping. It was during this period that he completed his work on bacterial antigens and started investigations to characterize the substances responsible for the ABO blood group specificity of human secretions and tissue extracts. By having the foresight from the beginning to work with blood group active glycoproteins obtained from individual donors rather than from pooled specimens, Morgan and his colleagues obtained, at each stage of their work, valuable information at the molecular level about the variations encountered in the glycoproteins secreted by individuals and of how the products of the action of closely related genes differed from one another. Various aspects of this subject, many of which will be discussed at this Symposium, have occupied his attention since that time.

The sum total of Morgan's work, spanning as it does a period of more than four decades, has added much to our understanding of immunochemistry, in particular, and medical science, in general. In recognition of his contributions he has received many honors, which include his election to the Royal Society and the invitation to give the Society's Croonian Lecture. He has received the degree of M.D. (honoris causa) from Basel University, the Conway Evans Prize from the Royal Society and the Royal College of Physicians, London, and the American Association of Blood Banks' Karl Landsteiner Award, which he shared with his colleague, Professor Winifred Watkins. More recently, he was awarded a Royal Medal by the Royal Society and, together with Professor Otto Westphal, of Freiburg, Germany, received from the Paul Ehrlich Foundation, Frankfurt, the Paul Ehrlich and Ludwig Darmstädter Gold Medal and Prize. Shortly before this Symposium on Blood and Tissue Antigens, The University of Michigan conferred on him the degree of D.Sc. (honoris causa).

Professor Morgan retired from his University Chair in 1968 but continues to take an active interest in immunochemistry and to serve his scientific colleagues as a Member of the Medical Research Council and in other scientific capacities.

During the next six years he worked chiefly in the field of bacteriology and immunity, and because of this experience in the production and titration of antibacterial and antitoxic sera he was led into the field of immunochemistry. He published at this time the results of his first investigations on certain chemical aspects of immunity and described the isolation and properties of serologically specific polysaccharides from a number of gram-negative bacteria. One early achievement was to obtain the complete "O" somatic antigen from *Shigella shigae* and several other gram-negative organisms by extracting them with diffusible, neutral, water-soluble anhydrous polyhydroxy organic solvents, such as diethylene, propylene, and trimethylene glycol. The procedure whereby bacterial cells were differentially extracted with selective organic solvents allowed the relatively small quantity of surface antigen present to be recovered without disintegration of the overall structure of the cell, and for this reason much unspecific material associated with the cell cytoplasm and intracellular structures was eliminated from the antigen preparation. As most proteins are insoluble in these solvents, the antigen extract was largely free of cellular enzymes.

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