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NRC SCIENTISTS HELP FIGHT DISEASE

Before the present century, there was no threat to human life greater than attack by germs – bacteria, viruses and other micro-organisms which cause such diseases as plague, typhoid, smallpox and poliomyelitis. Every day, living creatures are attacked by germs which, fortunately, are repelled by the body's own defenders. One basic mechanism supports all defensive action – the body's ability, developed over millions of years of evolution, to preserve its individual qualities. It automatically recognizes foreign materials, such as disease germs, and calls into action special cells and chemicals to destroy them. The same system that protects the body against harmful micro-organisms is also responsible for the rejection of transplanted organs, for allergies, and "auto-immune" diseases such as rheumatoid arthritis, when, in effect, the body acts against itself.

How antigens and antibodies are structured, how they work, how they can best be exploited in clinical medicine are questions currently being examined by Dr. G.A. Adams, Dr. N.M. Young, Dr. H.J. Jennings and Dr. M.B. Perry of the Immunochemistry Group and by Dr. C.T. Bishop, head of the Biochemistry Laboratory of the National Research Council of Canada.

After a bacterial infection has set in, the body brings into action two chemical defenders called antibody and complement. Antibodies, large proteins varying in molecular weight from 150,000 to one million, are highly specific in their action; an antibody effective against one type of germ will not act against another type. Each antibody is tailored to lock with a specific molecule called an antigen, which is usually found on the surface of the germ. Since there are thousands of germs, each with different characteristic antigens which signal the alien nature of the invader, the body may be called upon to make any one or more of an estimated required million different specific antibodies. When an antibody reacts with its corresponding antigen, the action of complement, a complex of biologically active molecules, is triggered and results finally in the destruction of the foreign material.

NRC's basic research on the body's immune system and its function in combating disease requires a broad interdisciplinary approach. Working in close co-operation on this project are: bacteriologists with facilities to grow pathogenic bacteria; chemists and biochemists with experience in immunology and protein and carbohydrate chemistry; doctors and medical researchers from hospitals in Canada and the United States, and physiologists with extensive animal facilities. Dr. Bishop says that this work represents the interdisciplinary approach to research that is essential for major advances in the life sciences.

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