

In recent years (since 1948), the National Research Council has opened its doors to a limited number of postdoctorate Fellows who have been carefully selected on the basis of merit from the universities of the world. About 100 of these keen young scientists are now working in the laboratories, most of them in chemistry, physics or applied biology. They are appointed for one year only but may be retained for a second year if conditions warrant. This flow of young men through the laboratories has a stimulating effect; it creates a sort of university atmosphere that is both fresh and invigorating and keeps the Council young.

Principal Activities in 1954-55.—The activities of the *Division of Applied Biology* range from applied studies on food storage and transport to more fundamental work on the metabolism and chemical composition of living organisms.

The maintenance of high humidity in cold storage rooms has been studied in an effort to reduce surface drying of foodstuffs. In an experimental room, relative humidities approaching saturation have been obtained by cooling the room indirectly through a jacket of cold air. The design features are being considered commercially.

The gray discoloration of processed pork has been related to a light-induced oxidation of the meat pigments: recent studies have shown that this change occurs much more rapidly in the muscle pigment than in the blood pigment. Because of the growing interest in medical and related fields, frozen storage of living cells and small organisms is under investigation. Studies on blood plasma albumins have shown that the serum albumin molecule consists of at least two sub-units rather than the single chain structure suggested by other workers. Work on the production of citric acid by submerged fermentation of beet-sugar molasses has shown that the laboratory procedure is feasible on a larger scale. The carbohydrate composition of various grains, seaweeds, and marine algæ continues to receive attention. Statistical studies have included standardization of laboratory techniques for detecting slight variations in taste of food products.

In the Maritime Regional Laboratory at Halifax the scientific interests of the staff have broadened considerably during the year. A pilot plant dryer has been designed and constructed to permit studies of optimum conditions for drying such materials as seaweeds. The nutritional value of dried seaweed meals compared favourably with casein; dulce and rockweed meals were superior to gelatin or soybean in rate of regeneration of liver protein. A method has been developed to determine the presence of carrageenin in seaweeds. The cause of pitch formation in pulp and paper mills is under study. Other subjects of investigation are the quality of hard cider, the cause of flakiness of cod filets, quality changes in stored potatoes, and various aspects of metallurgical reactions at high temperatures as encountered in manufacturing iron and steel.

The Prairie Regional Laboratory is continuing work on the utilization of agricultural materials. A method for producing lysine by fermentation is being investigated; if this is successful, it should increase the use of wheat for animal feeding. A toxic factor in rapeseed meal is being studied to determine the cause and to find a method of overcoming this defect.

The current trend toward the production of hardboard, or 'synthetic lumber', as a major building material of the future, has resulted in emphasis being shifted from the field of insulating or fibre board to hardboard. In studies on water resistance in fibre boards it has been found that most pulps can be sized by treatment with metallic salts at the appropriate degree of acidity. The metallic salts react with native constituents in straw or wood pulps. A patent for this process has been applied for.

In a study of elevator dust explosions it was found that the most important factor was the size of the dust particles. Only those fractions that pass through a 150 mesh screen are potentially dangerous for initiation of explosions. Dust separation and removal systems are being designed and installed by commercial equipment engineers.

Other projects include studies on the properties and mechanism of reactions of starches, sugars, proteins, fats and oils, and other plant constituents; on the physiology, biochemistry, and enzymology of living plants and micro-organisms; on the mechanism of fermentation processes; and on the design and operation of fermentation equipment.