

INDUSTRIAL CHEMICAL RESEARCH

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The writer has no thought of entering upon an extended exposition of industrial research, nor upon a description of any special problem, but to give in a few words his impressions of the work done at the Mellon Institute of the University of Pittsburgh, in the hope that these impressions may be, to some of those present, of at least a passing interest.

The Mellon Institute represents, in cement and stone, the ideas and ideals of Dr. Robert Kennedy Duncan. Dr. Duncan, as most of you know, was a pioneer in the popularizing of science, especially chemical science, with the industrialists of America. He was a man of wonderful imagination and of magnetic personality; when he entered a room, he became at once its center; when he spoke, the captains of industry listened. His voice is still heard in the Institute he founded. It was Dr. Duncan's idea that the manufacturer was entitled to the service of men of approved ability, and that the investigator, on the other hand, was entitled to the stimulus and aid which come from companionship with other investigators and the oversight and direction of trained scientific administrators. These advantages the Institute affords.

At the Mellon Institute an industrialist, a company, or an association of manufacturers may become the donor of a fellowship. The conditions are essentially the signing of an agreement stating the relation of the donor, the Institute, and the Fellow, and the contribution of a foundation sum for a period of not less than one year. This sum must be large enough to permit of the purchase of all necessary special equipment and to pay the salary of the Fellow. The Institute gives the Fellow the room for his work, the use of permanent equipment and library, and the direction of the administrative officers. All results obtained during the course of such a fellowship belong exclusively to the donor. One can get some idea of the scope of the Institute's work when he learns that during the year 1920-1921, the foundation sums of

the Industrial Fellowships totaled \$320,848, and that there were 48 fellowships and 83 Fellows. During the ten years ending March 1st, 1921, the total contributed amounted to upwards of \$1,500,000; while the overhead expenses of the Institute were approximately \$470,000.

To come now to the individual fellowships. The writer recalls very vividly the case of a prospective donor who was being conducted through the building, and who exclaimed, upon entering the room of the Laundry Fellowship: "What on earth has a laundry to do with Chemistry?" Of such stuff are many donors, before they are converted. It happened that the Laundry Fellowship was working upon matters that involved a great deal of Chemistry; not only the routine analyses of soaps, water softeners, water samples, blues, sour, bleaches, and the like, and in the investigation of claims for damage, but also the greater problem of interesting the public in the idea of "sending it all to the laundry", a problem involving not only the renewing of soiled fabrics, but a study of all the complex operations concerned with the weaving, dyeing, and composition of fabrics. The new problem of the laundry is something more than the washing of the collars and "biled" shirt of the bachelor until he gets a wife. The Laundry Fellowship is an association fellowship, with about 1800 members behind it.

Other fellowships bear the names of Synthetic Resins, Bread, Zirconium, Fish Products, Fuel, Plastics, Soap, Enameling, Synthetic Acids, Food Container, Protected Metals, Stove, Sulphur, Oil Shale, Nickel, Flotation, Glass, Oil, Quartz, Gas, Tar Products, Emulsion Flavors, Inks, Cements, Fiber, Yeast, Silicate, Magnesia Insulation, Coke, Organic Syntheses, Insecticides, Glue, Fertilizer, Dental Products, Cleaning, Refractories, Asbestos, Fruit Beverages, and Magnesia Products.

The Bread Fellowship is the oldest, probably, at the Institute, and one of the most successful. It would be hard to overstate the importance of the work of this fellowship, and of similar work done elsewhere, upon the quality and cost of commercial bread. The processes developed save, probably, half the yeast and half the sugar used in bread-making. One has only to compare

the commercial bread of today with that of a few years ago to realize the enormous importance of scientific methods applied to this ancient art of the home.

The Fellowship labeled "Fiber" looks ordinary and uninteresting; but when one understands its ramifications and import, it has a different significance. One of the problems of this fellowship is the testing and development of fiber shipping containers. If one goes through a freight warehouse these days, he is struck with the lack of wooden boxes and the way in which fiber boxes and cartons have taken their place. The development of containers includes not only the study of the fiber boards, multiple and corrugated, but of the adhesive, which must be cheap and at the same time proof against storage in damp warehouses and exposure to weather.

One of the tools of this fellowship is a miniature Ferris wheel, operated by a motor and containing a series of baffles, so that a loaded container may, in a few minutes, be subjected to all the drops and bumps of a thousand, two thousand, or three thousand miles. Other tools give the actual strength of the fiber and tape employed.

The Sulphur Fellowship has a number of most interesting problems.

You will realize how enormously the production of this element was stimulated by the war, as the starting point in the manufacture of sulphuric acid, which in its turn lay at the foundation of the manufacture of explosives. Now, the war over, the companies producing sulphur in the Texas fields have an enormous excess of this element over what the markets can possibly absorb. The question is, how to use the vast sulphur deposits. Perhaps some of these present will have some ideas on the subject. A large scale use which seems possible is as a material for large acid proof containers.

Curiously enough, while the sulphur obtained from the deposits by the Frasch process is very pure (often 99.9%), the presence of a trace of oil in the sulphur makes its continued combustion in a sulphur burner difficult, because the oil forms a film which extinguishes the flame. A special burner had to be devised for the purpose.

The Yeast Fellowship, the Flotation Fellowship, and the Coke Fellowship have problems of most far reaching character and are almost research institutes in themselves. Such fellowships are of the type called Multiple Fellowships, in which the Senior Fellow is a man of unusually high research ability, in charge of a group of investigators for the solving of a group of problems.

Fellowships like those on Synthetic Resins, Synthetic Acids, Organic Synthesis, and the Pratt Memorial Fellowship are doing work of a pure-science research character, but often on a scale of which the organic chemist rarely dreams.

The stipend carried by the fellowships at Mellon Institute is far beyond that allowed in the usual college or university. Since it is paid by manufacturers, accustomed to a business man's scale of compensation for service performed, instead of by Boards of Trustees doling out very limited funds to needy students, there is a possibility of attracting and holding men of University research character to the work of investigation. The advantage of these fellowships is further increased by the fact that by special arrangement with the donor, the Fellow may spend a limited amount of his time in graduate study or in teaching at the University of Pittsburgh. A number of Fellows have received higher degrees in this way.

The writer will close this paper with the inscription he often pondered upon during his year in Pittsburgh. It is: "This building is dedicated to the service of American Industry and to young men who destine their life work to the industries; the goal being ideal industry, which will give to all broader opportunities for purposeful lives."