

tests" which Professor Dewey has noted as the valid aim of public education.

We thus approach a second restrictive influence on the teaching of life-science to our people. There is wide-spread failure of educators and public-school administrators to recognize and to utilize the great intellectual achievements of this scientific age. Even the most favored type of training for leadership in public education seems in recent decades to have slipped away from substantial backgrounds of knowledge into protracted tests and dissertations on methods of teaching. Educators with an outlook thus narrowed and distorted must be held largely responsible for a growing number of state laws and regulations which now often practically limit teaching licenses in high-school subjects to those who are surfeited with drill and doctrine on *how* to teach, but who are largely bankrupt in the subject-matter which must be taught.

During the past eighteen months I have been a member of a committee which is actively investigating the many things which affect the teaching of biology in our schools. From this source and from others there is no lack of evidence that laws and state board requirements of the type just indicated adversely affect the teaching of all science subjects in our high schools. It could be said with fair safety and certainty that in some states the promotion of such laws and regulations by our educational leadership is now preventing most of their prospective teachers of biology from obtaining an acceptable training in biological science. Here, then, is a second aspect of harmful restraint in public education upon which an aroused interest of thinking citizens is greatly needed.

IV

In conclusion, let us recall that in these and coming days the principle of democracy is itself under destructive pressure. Shall the public that decides the fate of our democracy conceive nature and man as research discloses them, or as uninformed and essentially ignorant masses can variously imagine them? In some laboratories of the world—chiefly in Europe and America—the researches of much less than a century have shown that such things as mosquitoes, flies and lice may and do carry pain, disease and death—and poverty—to human beings. Enlightened thought and practice in some parts of the world now strive to exterminate such carriers of pain, poverty and death, and thus to advance civilization on a basis of reality; but only two years ago last June Mahatma Gandhi—who alone largely controls the destiny of one eighth of mankind—seems to have said: "We have no right to take the lives of mosquitoes, flies, lice, rats or fleas. They have as much right to live as we." The Gandhis are everywhere—they are your neighbors and mine—and they thrive and propagate in a dim educational twilight from which the thought-transforming light of new knowledge is essentially excluded. To-day nations and peoples have a choice: on the one hand, between the host of unrealities, poverties and diseases rooted in meditations, crystal-gazing and traditional ignorance; on the other hand, through full and earnest public education their destiny can accord with the realities already disclosed by much and luminous research.

RESEARCH AT MELLON INSTITUTE DURING 1937-38

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THE scientific work of Mellon Institute during the fiscal year, March 1, 1937, to March 1, 1938, is described in the annual report of the director, Dr. E. R. Weidlein, to the board of trustees, which has just been published. During this period the institute's investigations in pure science were expanded, especially in the fields of biology and medicine, and the research programs of the industrial fellowships were also widened. Throughout the year \$1,062,830 was expended by the institution in conducting pure and applied science research.

Hydroxyethylapocupreine, a contribution of the institute's department of research in pure chemistry, has aroused great interest as a possibly useful drug in the treatment of pneumonia, and hence has been given broad collaborative study by the chemical, pharmaco-

logical and medical staffs connected with the problem of pneumonia therapy. Drs. C. L. Butler and B. L. Souther and Misses Mary Hostler and Mary Clapp were active in the preparation work; and in order to facilitate further the production of the drug for more extensive clinical trial, semi-plant scale operations were undertaken by E. R. Mease. Medical work on hydroxyethylapocupreine also advanced during the year through the study of additional clinical pneumonia and pneumococcic empyema cases and through the testing of new experimental drugs prepared in the institute (Drs. W. W. G. MacLachlan, J. M. Johnston, H. H. Permar, M. M. Bracken and G. E. Crum; Professor W. T. Dawson). Supplemental clinical studies on children are being carried on by Drs. Maud Menten and R. R. Macdonald. Research on alkyl, hydroxy-

alkyl and other derivatives of apocupreine, with the aim of finding more efficient antipneumococcal drugs, is being pursued productively by Dr. Alice G. Renfrew and assistants, working under the direction of Dr. L. H. Cretcher, the departmental head.

Studies on the revision of texts for the U. S. Pharmacopoeia have been continued in this department by Dr. M. W. Green, under the guidance of Dr. G. D. Beal. Also of concern to pharmaceutical and medical specialists has been the research of the demulcent fellowship (1934-36) on the employment of certain bassorin gums in the treatment of intestinal complaints of bacterial origin. At present clinical studies are being made thereon at a prominent medical school under a grant by the institute. The basic medical researches sustained since 1928 by the institute at the Western Pennsylvania Hospital in Pittsburgh have in general pertained to bacteriological and serological problems. These investigations, inspired by Dr. C. B. Schildecker, are being carried on by Dr. R. R. Mellon, aided by five scientists and five assistants. In 1937 this group continued studies of the treatment of streptococcal and pneumococcal infections. The research pertaining to the variability of the tubercle bacillus has reached the point where it appears to be of some importance in diagnosing anomalous aspects of lung tuberculosis while they are still in their benign stages. This advance may make it possible to resort to preventive and hygienic measures that should stop these stages from passing into the classical and more fatal forms of the disease. A number of medical schools have been supplied with samples of the special diagnostic tuberculin for experimental purposes.

The institute's nutrition fellowship, a pure science investigation headed by Dr. G. J. Cox, assisted by Misses Sara F. Dixon and Margaret C. Matuschak and by Edgar Walker, is supported by The Buhl Foundation of Pittsburgh to study broadly the causes of dental caries. Three phases of the nutritional influences in caries etiology are receiving research, namely: (1) nutrition during the period of formation of the teeth, (2) foods which initiate caries, and (3) factors which affect the rate of progress of decay. In a study of the first of these phases, it has been shown that modification of the diet of female rats during pregnancy and lactation affects the caries susceptibility of the young. The best improvement obtained so far has been the elimination of three out of four cavities of the type studied by the fellowship, indicating that nutrition plays a part in the formation of caries-resistant teeth. Studies of the formative phase of teeth and their ultimate resistance to caries are concerned with (1) protein, (2) the influence of the ratio of calcium and phosphorus in the diet of the mother, and (3) the effects of fluorides added to a diet con-

taining a minimum of fluorine. Tests of the concept that certain properties of foods initiate caries, as distinct from their action in promoting the carious process following the inception of decay, are under way. One of these studies is of the effect of thermal shock in inducing caries in rats. Another investigation has to do with the comparison of the number of cavities produced in rats by thoroughly dried corn meal and meal softened by exposure to 100 per cent. humidity. Proof that foods promoting decay do not necessarily initiate cavitation is provided by the demonstration that fermentable carbohydrates will not start dental caries in rats but will accelerate decay in existing cavities. A current study of a metabolic influence on rate of decay of teeth has to do with experimental acidosis produced by ammonium chloride incorporated in the diets of rats with existing caries.

Seventy-two applied science research programs or industrial fellowships—34 multiple and 38 individual fellowships—were in operation during 1937-38. These investigations required the services of 142 fellows and 76 fellowship assistants during all or part of the year. Through their accomplishments many fellowships have assured their continuity. Thirty-seven fellowships have been at work for 5 years or more, and of this number 18 have been active for 10 years, 11 have concluded 15 years or more of research, and 8 fellowships are 20 years of age or older. Seven fellowships began operation during 1937-38: amine, Anthracite Industries, chemical hygiene, Cotton Foundation, dielectrics, protein, and tar properties. The can investigation, a multiple fellowship, resumed work with new personnel after a pause in operation. The institute has accepted five new fellowships whose research will be started soon. The following fellowships concluded their investigations in 1937-38: air pollution research, a special survey that was a part of the Air Hygiene Foundation work; anthracite, which was succeeded by the Anthracite Industries fellowship; bone products, which was consolidated with the bone black fellowship; and detergent.

The achievements of the fellows during the year have demonstrated the value of the facilities in the institute's new building, occupied early in 1937 and dedicated last May. The new home has not only supplied adequate space, equipment and special research quarters, but has also given rise to a new enthusiasm and a greater desire on the part of the fellows to be successful in their work. The year 1937-38 was in fact characterized by unprecedented advances through industrial fellowship researches, principally a number of new products of promise. Releasable facts regarding this investigational progress will now be summarized.

Air Hygiene Foundation of America, Inc., a coop-

erative organization with headquarters and a multiple fellowship at the institute, made valuable additions to the improvement of industrial health by attention to the medical, engineering and legal phases of the problems involved. H. B. Meller, the senior fellow, is managing director of the foundation, which is supported by 200 industrial concerns. Scientific investigations were begun by the foundation at the Saranac Laboratory and at the Moore School X-Ray Laboratory of the University of Pennsylvania. These researches seek the development of practical procedures now needed to aid industries in the prevention of occupational diseases. Engineering studies have been arranged for at the Harvard School of Public Health. The foundation's legal committee has studied and reported on compensation legislation. The foundation reviews and abstracts current literature relating to industrial hygiene, conducts short-time studies for members, and acts as a central clearing-house for information in this rapidly developing field. The institute's chemical hygiene fellowship, of which Dr. H. F. Smyth, Jr., is the incumbent, with two assistants, is studying the toxicology of some of the newer synthetic organic compounds.

Dr. H. J. Rose and his associates on the Anthracite Industries fellowship are designing basements and utility room layouts for residences in relation to modern automatic anthracite heating installations. Engineering data relating to the performance of anthracite fuel beds and to the design of heating equipment are being systematically gathered and studied. The fellowship is also devoting attention to possible uses for anthracite ashes.

Within the past two years Dr. F. J. Williams on the lead fellowship has evolved a new process for manufacturing barium oxide from barium sulfate. The multiple fellowship on calgonizing, guided by Dr. B. H. Gilmore, has pursued its investigations of the sanitary value of sodium metaphosphate in machine dishwashing and of the uses of sodium metaphosphate products containing soap. The ceramic chemicals fellowship, held by W. J. Baldwin, has had successful results in researches on wet-process enamels.

The multiple fellowship on commodity standards, headed by Dr. Jules Labarthe, Jr., has a basic program placing particular emphasis on the establishment of standards for nearly 300 items of staple merchandise for the purpose of providing known values for consumers. The fellowship staff is also active in consumer education. The multiple fellowship of the Cotton Research Foundation, whose incumbents are Drs. D. M. Musser, R. F. Nickerson and H. S. Olcott, is investigating in general the chemical and physical properties and uses of the whole cotton plant. The Cotton Research Foundation is a group of private

individuals who have perceived the needs of the industry in its entirety and are cooperating in an effort to improve its status. Through the fellowship this group has turned to scientific investigation as a means of finding new uses and new markets for cotton and cotton products and of safeguarding present markets in which cotton has encountered serious competition. The activities of the multiple fellowship on garments (Dr. T. H. Swan, senior fellow) is concentrating on problems related to the production and wear of men's shirts, neckties and undergarments.

Dr. R. N. Wenzel on the dielectrics fellowship has for his objective the development of improved insulating materials and processes for application to electrical equipment. The multiple fellowship on heat insulation, supervised by R. H. Heilman, has continued conductivity determinations, especially in the low-temperature or building insulation field. A broad research has been conducted on rock-wool products. The fellowship has also aided materially in the development of technical information on a new all-asbestos insulating air duct, a product of importance in air-conditioning. On the safety fuse fellowship D. E. Pearsall developed, as a result of continued investigation on the improvement of safety fuse blasting, a series of new slow-burning fuse powders. This fellowship has also worked out a new non-smouldering type of safety fuse that has an almost fireproof structure.

L. C. Hewitt on the silicate fellowship has created a new block for glass tanks. The multiple fellowship on mineral products, headed by Dr. G. J. Bair, has devised a process of preparing an exceedingly fine silica with unique properties. The multiple fellowship on technical glass (Dr. R. R. McGregor, senior fellow) has centered research attention on problems of cementing and caulking of glass tile and glass block. Recent developments of the multiple fellowship on refractories (S. M. Phelps, senior fellow) have to do with learning about the properties of insulating fire brick, plastic refractories, cold-set cements and the spalling of silica brick. During the year Dr. E. E. Marbaker on another fellowship has continued studies of special ceramic constructional materials for laboratories.

On the paper fellowship, Dr. P. B. Davidson carried out research that resulted in a new blueprint paper. Dr. G. H. Young and his aids on the multiple fellowship on protective coatings added usefully to the knowledge of the fundamental structure and properties of organic resin films on metals. A new resin ("Raolin") is under development by J. W. Reynolds and his coworkers on another multiple fellowship. Sulfur cements are being applied in new ways found by Dr. P. V. McKinney and the other incumbents of the multiple fellowship on sulfur.

The multiple fellowship on organic synthesis, whose senior fellow is H. F. Robertson, carried forward studies on the preparation, properties and uses of amines, solvents, intermediates and resins. In the field of amines, various derivatives of alkylene, alkylol and heterocyclic amines were made and their characteristics and some of their applications investigated. Work on solvents consisted partly of the preparation of new propylene glycol and ethylene-propylene glycol derivatives that have not heretofore been available for research. An investigation was made of the solubility of all the commonly available natural gums and resins in over 40 solvents, and a study was carried out on the corrosive effect of commercial chlorinated solvents on metals. Work on brake fluids was continued, as were experiments on water-soluble textile lubricants. Several new products were synthesized, among them the silicon and titanium esters of some higher alcohols as well as their phosphoric and boric acid esters. Advances were recorded in research on problems incidental to the refining of lubricating oils by solvent extrac-

tion methods. A number of newer compounds of interest to the dyestuff and pharmaceutical industries were synthesized. Investigation was continued on the properties of the sodium sulfates of some higher alcohols, three of which are now on the market under the name of "Tergitol" penetrants. In the domain of resins experimental work was carried out on the improvement of vinyl resins in hot-melts for those adhesive applications where the use of solvents is undesirable. Facilities were provided for adapting some of the commercially available vinyl resins to the specific needs of the protective coatings industry.

During the calendar year 1937, one book, 14 bulletins, 32 research reports and 65 other papers were published. Twenty-two United States patents and 70 foreign patents on fellowship discoveries proceeded to issue. The total contributions to the literature for the 27 years ended December 31, 1937, have been 20 books, 157 bulletins, 776 research papers and 1,182 miscellaneous papers; 690 United States patents were granted during the same period.

SCIENTIFIC EVENTS

BUREAU FOR STREET TRAFFIC RESEARCH AT YALE UNIVERSITY

YALE UNIVERSITY has announced the establishment, beginning on July 1, of a Bureau for Street Traffic Research to be devoted to the joint purpose of the scientific study of the problem of street and highway traffic accidents and congestion and to the training of graduate students for professional work in the field of traffic engineering.

President Charles Seymour, in making the announcement said:

This action on the part of Yale University is in line with its long interest in the entire field of efficient transportation. Through the Transportation Committee now composed of Professor Charles Tilden, Robbins Stoeckel and Dean S. W. Dudley, Yale University has for many years, with the aid of funds bequeathed by Lord Strathcona, conducted broad studies of the problems of transportation.

The function of transportation has always been a factor of great social and economic importance. In the present generation it has assumed new importance and has accumulated additional problems in the almost universal use of the automobile.

With 29,000,000 motor vehicles in operation by 40,000,000 drivers over a 3,000,000-mile highway system, the automobile has become the dominant transportation mechanism in America. Despite the many obvious services which it has rendered to society, it has, nevertheless, brought with it some exceedingly serious and complicated problems. These problems fall into two natural categories: those of accidents and those of congestion. Amer-

ica can not calmly accept a situation where 40,000 lives are taken annually through accidents, many of which are obviously preventable, nor can the country accept without serious question a situation where congestion deprives a valuable transportation service of its maximum efficiency.

There is a further need at this time to make a searching examination of the possibilities of achieving a better coordination as between the various means of transportation available to the American people. In line with its traditional policy of attempting to render full service to society through the development of techniques to solve current social problems, Yale University has taken the step of establishing a formal activity devoted to the development of engineering and administrative principles for the relief of the joint problem of traffic accidents and traffic congestion.

Provision will be made for continuous research on problems in this field and, in addition, for the training of qualified graduate students for professional positions in the field of traffic engineering. Beginning with the academic year 1938, there will be available twenty-three graduate fellowships, fifteen of which are provided by a general grant of the Automotive Safety Foundation and eight of which are provided through a grant made by Alfred P. Sloan, Jr. The major financial support for the bureau will be through the Automotive Safety Foundation and its president, Paul G. Hoffman. Intensive training will be given covering the entire field of traffic engineering and administration. The staff of the bureau is composed of Miller McClintock, Maxwell Halsey,