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THE LIFE SCIENCES AT M.I.T.

When M.I.T. opened its doors in 1865, one of the six original subjects of instruction was "Science and Literature." Some biology was included in this subject because President William Barton Rogers, Professor of Geology and Physics, had considerable interest in paleontology, and he probably taught some biology. It was soon apparent, however, that the Institute needed a full-time biology professor. Indeed, the need was so critical that President Rogers suggested that the salary for the new biologist be paid out of his own stipend of \$2,500 per year; and in 1867, Dr. Samuel Kneeland, a medical clinician, became the first Professor of Zoology and Physiology. Subsequently, in 1878, Dr. Alpheus Hyatt joined Professor Kneeland as Professor of Paleontology and Zoology. A student of Agassiz at Harvard, Professor Hyatt was well trained in classical biology and paleontology. Ten years after his M.I.T. appointment Professor Hyatt organized the Marine Biological Laboratory at Woods Hole and became its first President; since then, M.I.T. has been closely associated with marine research at Woods Hole.

In 1871 the Institute established a new Course VII, "Natural History," designed to prepare those "whose ulterior objective is the special pursuit of geology, mineralogy, botany, zoology, or to prepare for medicine, pharmacy, or rural economy." Flourishing under Professors Kneeland and Hyatt, this course was further strengthened in 1883 when Dr. William T. Sedgwick, a graduate of Yale University with a broad training in biochemistry and basic medical sciences, came from doctoral studies at Johns Hopkins University as Assistant Professor of Biology.

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In the following years, under Professor Sedgwick's developing leadership, M.I.T. won renown as a center for the life sciences relating to microbiology and public health. Professor Sedgwick firmly established himself as the "father of American epidemiology" by applying the new knowledge of microbiology, developed in Europe by Pasteur and Koch, to the fields of sanitation and public health. In a brilliant series of studies he and his students succeeded in relating an epidemic of typhoid fever which swept down the Merrimac Valley to the contamination of the river by sewage which drained into it. Further investigations of this type provided detailed knowledge of the relationship of disease to pollution of water supplies and established Professor Sedgwick as a leader in the field of sanitary engineering.

At the same time that Professor Sedgwick was carrying on this outstanding research program, he set up a curriculum designed to train premedical students (Course VIIB). This Course included chemistry, physics, general biology, comparative anatomy, histology, and physiology as the core subjects and was similar to the current curriculum for premedical students in many universities. Far ahead of its time, M.I.T. was one of the first universities in the United States to place the preparation for medicine on a firm scientific basis.

In 1889, Professor Sedgwick was named Chairman of the new Department of Biology which brought together M.I.T.'s premedical training with the outstanding research and teaching in bacteriology and sanitary biology. The early work on water supplies led to similar studies on food supplies. Dr. Samuel C. Prescott, who came to M.I.T. in 1895, further developed this major interest in the bacteriology of foods. In collaboration with William L. Underwood, a part-time member of the Department, Professor Prescott developed procedures for the sterilization of canned foods which laid the basis for modern canning and greatly accelerated the canned food industry in the United States. This work on food sterilization generated an interest in all aspects of the preservation and processing of foods from which

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later developed the Institute's programs in food science and technology.

The emphasis on public health problems led in 1911 to a new name for the Department, Biology and Public Health; although the research program was primarily in fields of sanitation, the training of students remained basic. In 1886 Professor Sedgwick himself (with Professor Edmund B. Wilson) wrote the textbook An Introduction to General Biology which emphasized the use of type organisms for teaching basic principles. As late as 1940, the biology laboratory course still used the earthworm and the fern in accordance with Professor Sedgwick's directions. Now, only 25 years later, students in the same beginning laboratory use the ultra-centrifuge and the oscilloscope to study molecular and systems biology.

After Professor Sedgwick's death in 1921, Professor Prescott became Head of the Department; he served in this post until 1942, and during the last ten years of this period he also served with distinction as Dean of the School of Science.

In 1936, a committee made up of Dr. Karl T. Compton, then President, Dr. Vannevar Bush, Vice President, and Dr. John W.M. Bunker, then Professor of Biochemistry and Physiology and Director of the Research Laboratories of Biology, proposed that M.I.T. develop a new type of biology, biological engineering, that would utilize basic knowledge of physics, mathematics, chemistry, and engineering in the exploration of the life sciences. Dr. Francis O. Schmitt came to M.I.T. in 1942 to head this new Department of Biology and Biological Engineering, which offered undergraduate curricula in biology, food technology, and biological engineering with its emphasis on biophysics and biochemistry. At the same time the Department continued development of a strong graduate program.

In 1945 the title of the Department reverted to Biology, and the Institute moved to establish a separate new Department of Food Technology in response to the growing interest

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at M.I.T. and in the U.S. food industry for more basic research and advanced education relating to food processing. This new Department, under the leadership of Professor William L. Campbell, was the first to be established at the college level in the United States.

Professor Bernard E. Proctor became Head of the new Department in 1952 and continued to advance the field of food technology at M.I.T., making outstanding contributions to technical processes involved in food manufacture and distribution. In the postwar period this Department has been a world leader in basic research on the use of ionizing radiations to sterilize foods, and its contributions in other areas of special interest to the food industry have included extensive work on packaging, freeze drying, processing of sea foods, flavor and odor research, dosimetry of foodstuffs, toxicological studies, rheology of foods, studies of fats and oils and the relationship between food processing and nutritional values of foods.

Following Professor Proctor's untimely death in 1959, the Department was reorganized and expanded as the Department of Nutrition and Food Science under the leadership of Professor Nevin S. Scrimshaw, who came to M.I.T. in 1961. The reconstituted Department greatly enlarged M.I.T.'s commitment to basic research in the field of nutrition along with the earlier curriculum and research activity in food science and technology. Its new program emphasizes the basic science and biological aspects of foods and nutrition as an integrated, multidisciplinary field, permitting a greater interplay between the physical and biological sciences and engineering. It represents a significant departure from the orientation of nutritional studies within the context of a university medical school or curriculum. The departments of Biology and of Nutrition and Food Science now share a common undergraduate degree in the life sciences, with specialization in each department at the graduate level. In the Department of Nutrition and Food Science, there has been growing emphasis on problems of human nutrition and the metabolism of foods coupled with a graduate program

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of increased size and scope. Examples are the new doctoral and postdoctoral studies in Oral Science, Animal Pathology, and Food Toxicology.

Under the leadership of Professor Irwin W. Sizer, who became Head of the Department of Biology in 1955, work in molecular biology has been broadened with emphasis on biophysics, biochemistry, microbiology, and physiology-developmental biology. In addition to undergraduate and graduate education, the Department maintains a strong program for training medical doctors and postdoctoral students.

In 1964, the Institute established a Clinical Research Center to provide facilities for all of the faculty members who wish to carry on research with human patients and volunteers. Both the Departments of Biology and of Nutrition and Food Science extensively use this facility, which further strengthens M.I.T.'s efforts in postdoctoral medical training and research.

The Whitaker Building provides 134,000 gross square feet of air-conditioned space for the Center for Life Sciences. It was made possible by a gift from Mr. and Mrs. Whitaker, by a research facilities grant from the National Institutes of Health, and by gifts from individuals, foundations and corporations made to M.I.T.'s Second Century Fund. Architecturally, the Whitaker Building blends with the adjacent eight-story John Thompson Dorrance Building. The Dorrance Building, completed in 1953, is also occupied by the same two departments and forms a part of the new Center for Life Sciences.

The program of the Center embraces all of the teaching and research of the Departments of Biology and of Nutrition and Food Science, including work in the Whitaker and Dorrance Buildings, several activities in the field of communications science, and the Clinical Research Center. The interdepartmental Center for Life Sciences will thus for the first time make possible the integration and coordination of classroom and laboratory work, seminars,

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and research in the two departments while maintaining the autonomy of each. This enlarged program, centered in basic science, will be of primary significance for the advancement of medicine and the control of disease; it has special relevance to the food and pharmaceutical industries. It has already contributed importantly to these and other fields such as education, space science and technology, and world food resources.

Although the training of undergraduates, graduate students, and postdoctorates in the life sciences is mainly concentrated in the Departments of Biology and of Nutrition and Food Science, most departments and research laboratories at M.I.T. are today concerned in some way with the life sciences. In 1965, about one-quarter of all research projects in progress at the Institute are clearly related to the life sciences; for these, about one-third are conducted by the two departments that comprise the Center for Life Sciences. The remainder are widely scattered throughout the Schools of Engineering, Science, and Humanities, with special concentration in the Departments of Psychology, Physics, Chemistry, and Electrical Engineering and in the Research Laboratory of Electronics.

Many influences are now at work throughout the world to increase scientific endeavor in the life sciences. The creation of the Center for Life Sciences and the completion of the Whitaker Building assure that the life sciences will continue to be one of the principal teaching and research interests at M.I.T., extending and broadening the contributions in biophysics, biochemistry, microbiology, physiology, food science, and nutrition which have brought growing distinction to the Institute since its founding more than a century ago.

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