every worthy research undertaking, unless its opinion of the enterprise has first been sought by the government or other agency concerned. But this division will always hold itself in readiness to help any member of these associations, so far as it can, by supplying desired information and particularly by bringing the research worker in touch with other investigators who are engaged on identical or overlapping problems.

One reason why Germany, fighting against the world, was able to stave off defeat for four long years, is that she had to a remarkable degree mobilized her scientific brains. To the same marvellously planned and coordinated development of science in its applications to production, is traceable the world leadership she had won in many phases of industry.

What Germany was able to do under an autocratic régime in the way of fostering scientific investigation and making the results of research in pure and applied science of value to government and industry, it is distinctly up to America to do in a democratic way.

E. B. Woods, the distinguished sociologist, observing the trends of human progress, recently remarked, "The past fifty years have belonged to the men who could organize material production, but the present and the future belong to those who can organize men." He was evidently thinking of the organization of activities in public affairs, in religion, in business and manufacture, in labor relations, and in all movements for human betterment. A third group of leaders to whom both of these groups will turn for guidance consists of those who can organize ideas. I conceive it as a prime function of the National Research Council to organize American men of science for multiplied productivity in the organization of ideas. To such a program of cooperative effort within the enormously important branches of the sciences of man, the Division of Anthropology and Psychology of the National Research Council is dedicated.

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THE TECHNOLOGY PLAN

THE Technology Plan is an organized attempt to effect a closer cooperation between scientific and industrial effort; between the technical school and the individual industry throughout the country. Although a working relationship between educational institutions and industrial organizations has been discussed at great length, and on many occasions, little real practical progress has as yet been made.

The Technology Plan recognizes that for the present, at least, there must exist somewhere in this scheme of cooperation an element of individual and mutual responsibility on the part of those engaged in it. It recognizes that a purely philanthropic enterprise does not engender in the managers of industry that confidence which is an essential element in its success. Such men are not yet deeply interested in a strictly *pro bono publico* method of cooperative work. Hence, the Technology Plan is neither eleemosynary in organization nor philanthropic in its aims and methods.

The essential feature of the plan is an agreement, expressed as a contract, between individual industrial organizations and the Massachusetts Institute of Technology, under which the industry pays an annual retaining fee to the institute, in return for which the institute assumes certain definite obligations of such a character as it is in position to meet. These obligations are in very general terms as follows:

The great demand of the industries to-day is for men trained to solve the many problems with which these industries are confronted. This requires, first, a knowledge of the principles of science, and second, a training in the application of this knowledge to the solution of the ever-recurring difficulties. While the first requirement is reasonably well met by the undergraduate courses of instruction at the institute, only to a limited extent can the second be obtained in the four years allotted to undergraduate work. The student must be encouraged to spend an additional year or more in a research laboratory or advanced study. Since the best way to learn an art is

to practise it, the student is best taught to solve industrial problems by having him attempt the solution of such problems under able and experienced guidance. These problems, however, have their origin in, and owe their existence to, the industries themselves. The first point of cooperative contact, therefore, in this arrangement between industry and the Institute of Technology is that the institute agrees to use, so far as it can, such problems as the industry will submit to it as basic material for its research work for those graduate students interested in industrial development; to give men already well grounded in science the benefit of the opportunity of working under experienced instructors upon the type of work for which they are urgently required. It is true also that much investigation in "pure science" can be conducted as profitably in fields of research which are closely akin to industry as in those realms of science far remote from general interest. This does not mean that the search for knowledge for its own sake will not continue to subtend a large arc of the activities of the Institute of Technology; but rather that such search will be activated and inspired by the realization that the hard work involved and the results obtained are recognized as an essential part of a comprehensive whole. Hence, the institute agrees in its contract to maintain a steady stream of trained men constantly flowing into industry with the best preparation for scientific work which it is possible for it to give. At the same time, the results of the research work thus obtained will swell the store of knowledge on which the scientific progress of the community, as a whole, depends.

But a corollary of this duty of preparing educated men is the duty to see that, as far as possible, these men take positions for which their natural ability and aptitude most nearly fit them. Further, it is desirable that, as these men develop into specialists in any particular field, their sphere of usefulness be made wide as is practicable. Hence the institute undertakes to maintain a record of the qualifications, experience and special knowledge of its alumni; to advise the contractor where such knowledge and experience as it seeks is available; to assist the contractor to obtain the technical help he requires, whether from its own alumni, or from available engineers elsewhere. While this service has been rendered to some degree in the past, it has been a minor part of, and incidental to, other activities. It will now become a contractual obligation.

Coincident with the education of scientific men, there exists the necessity of educating the executives of the industries in the great economic value of science when applied to the business of their organizations. The sporadic "Yankee genius" of the past, productive though it was, must be replaced by the methods of scientific research. Genius must be provided with that most efficient tool yet produced —scientific method. While it is true that the world will ever need more knowledge, the pressing duty of industry for the present is to apply the knowledge now available. To meet this situation, the institute provides for conferences with members of its staff, not only in its own building but also at the factories of the contractor. It is hoped that the contractor will be so imbued with the possible benefits to be derived by the application of science that he will avail himself of one of the sources of technical aid readily accessible, not only at the institute, but among consulting engineers and industrial scientists throughout the country. A realization of that close cooperation between the industrial interests and the educational institutions of the country, which in Germany was made so effective by the domination of both by the state, can, in America, be brought about only by a voluntary personal relationship between the executives of the companies and the instructing staffs of the institutions. The Technology Plan aims to make this relationship more easily possible; to provide a point of contact between the two interests; to open a channel of communication through which the manufacturer and the technical consultant can more easily meet. The contractor can obtain the value of his retainer only by utilizing the facilities thus made available. There will, therefore, be present in the Technology Plan this incentive, to at least try.

The instructing staff of an educational institution is made up, at least theoretically, of men peculiarly adapted to render great public service by conducting research of a fundamental character, *i. e.*, they are seekers after new knowledge, and yet, at the same time, are teachers and trainers of young men. It is important that these men be not withdrawn into purely industrial work by reason of the greater financial return offered by great corporations, or the acute pleasure which many red-blooded men feel in being professionally connected with great technical developments. Hence, the Technology Plan provides a method by which the staff is enabled to profit by contact with men of affairs and receive the inspiration which comes from the capitalization of effort, and, at the same time, fertilize and capitalize the instructional work of the teaching staff.

The institute, therefore, agrees that if the contractor has special technical problems requiring extended consultations, investigations, test, or research work, it will advise the contractor where and by whom such service can best be rendered. When one considers the splendid laboratories with which the Institute of Technology is equipped, covering as they do, almost every department of applied science, and its staff, trained in the use of such laboratories, it is obvious that much of the work will be done within its own organization. But it is neither the desire nor the intention of the Technology Plan to limit the contractor to the facilities of the institute. It is the hope of the Division of Industrial Cooperation and Research, the organization set up to handle the one hundred and ninety contracts already made, that it can enlist the interest of the great body of able consulting engineers throughout the country. When, therefore, consultations, tests, investigations, or research work are of such a nature as can be best furnished by established commercial organizations, the institute will advise the contractor where, in its judgment, the work can best be cared for.

The Technology Plan is, therefore, a more effective means of introducing technical research to the manufacturer; of making the application of science to industrial problems popular; of creating an appreciation on the part of the leaders of industry of the value of science and the necessity of providing, not alone for its application, but for its continued growth and development.

It is earnestly hoped that the plan here outlined will be adopted with improvements by other educational institutions for the benefit of both education and industry.

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DOLOMIEU

WE have again to thank Professor Alfred Lacroix, of the Académie des Sciences, for the publication of a manuscript account by the French mineralogist Déodat Dolomieu of his travels in Sicily in the year 1781.[1]

Dolomieu, who was a Knight of Malta, had in 1771 incurred the displeasure of the Grand Master of the Order on account of his participation in a duel, and was obliged to absent himself from the island for several years. During this time he came to Paris, where he became acquainted with many of the leading scientists of the period, and frequented much the Jardin du Roi, the forerunner of the present Jardin des Plantes. The mineralogist Daubenton urged him to undertake a geological trip to the island of Sicily and gave him much valuable advice as to the observations he could make there. In a letter written June 9, 1776, to his patron, Duke Alexandre de La Rochefoucauld, Dolomieu says that by pursuing his investigations under the guidance of Daubenton's notes, he believes that he would be able to make a collection of characteristic marbles, which he would gladly share with the duke (p. 7).

By 1779, Dolomieu had made his peace with the Order of Malta, and had returned to the island, whence he started in 1781 for his trip to Sicily (p. 8). In a letter of August 6 to his friend Chevalier Gioeni, a distinguished nat-

[1] "Un voyage géologique en Sicile en 1781, notes inédites de Dolomieu," by Alfred Lacroix, Secrétaire Perpétuel de l'Académie des Sciences, Paris, Imprimerie Nationale, 1919, 190 pp. 8vo.