A Memorable Conference

THE HARVARD TERCENTENARY
1636 - 1936

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SOMEONE has said that the most valuable and rarest thing in the world is a new idea. It is the verdict of the intellectual world of science, of art and of music that progress centres largely about the thoughts expressed by the few great minds of the centuries. The work of the scientists of the world has been likened to a great canvas, the subject of which has been chosen by the few and the first bold lines inserted, but the great mass of colour and detail has been supplied by the many faithful apprentices. It was most fitting that the oldest and greatest of American Universities should celebrate its three hundredth birthday in an intellectual feast and that it should invite to its table as leaders of conversation the greatest minds of the world in those subjects which were proposed for discussion. Harvard has a magnificent record of intellectual tolerance and its hospitality was open to individuals of all nationalities and all religious and political creeds.

To Cambridge thus in the early days of September, 1936, there came, by invitation, a group of about two thousand five hundred American and Canadian scholars to participate in a memorable series of symposia led by a special group of sixty-seven eminent scientists and men of letters from fifteen different countries. These included no fewer than eleven men who had the greatest single distinction in the realms of science and of letters, the Nobel Prize. Five conferences were in session concurrently for the period of a week. The lecture halls of Harvard were taxed to capacity and the scene was that of an international gathering with its discordance of dress and language. Unlike the usual programme of a scientific or medical gathering the number of papers presented was small and each paper was of sufficient length to permit of general comprehension by the audience. In this respect the plan of the conference was original in this generation of scientific meetings. Instead of innumerable topics understood by few, here were few general topics of moment appreciated by many, a reversion to the Grecian and Mediaeval conceptions of the unity of science and the ability of the scientist to understand and contribute to the solution of problems of wide scope. In opening the conference Jerome D. Greene, director of the Tercentenary, emphasized this point of view in the following words; "The need of finding some unity in a maze of modern scholarship has been increasingly felt, not merely for the purposes of education, but for the guidance and what might be called the cross-fertilization of research itself." To this end was the choice of the symposium of the first day,—"Factors Determining Human Behavior". Various aspects of the Biological Sciences were presented for

the remainder of the week, embracing outstanding topics in experimental Embryology, Physiology, Immunology, Biochemistry and the applications of Physical and Organic Chemistry to Biology. Such is a brief outline of the conference.

The human aspect of the meeting vied in interest with the intellectual. Here were great names represented in person in the setting of the beauties of Harvard; Einstein, the mathematician, Hopkins, the biochemist, John Dewey, the philosopher, Barcroft, the physiologist, Landsteiner, the immunologist, Svedberg, the physical chemist, Hjort, the oceanographer, Eddington, the astronomer, Fisher, the statistician, Millikan, the physicist. It is the purpose of this report to draw a few word pictures of those whom the author was priviliged to see and hear, as well as to present as clearly as memory allows the substance of their communications.

At the very beginning everyone was given a silver medal. This was very fit and proper considering the distinction of the gathering. The medal served as "Open Sesame" to all the conferences and special lectures. The medallion ribbons were of different colours distinguishing the members of the different symposia; thus the special lecturers wore red perhaps to denote danger of high voltage material, those in the Humanities gray to denote their colorless nature as contrasted with science; those in the Biological Sciences green probably implying freshness and ignorance; those in the Physical Sciences yellow in analogy to age and decay. The freshman dormitories were used to extend the hospitality of the Harvard "Yard" to all those who wished to live in residence. The members of the conference were in some doubt as to the hidden meaning of this gesture after sauntering down by the river and admiring the beauties of the senior dormitories, Eliot House and Winthrop House.

I

In any venerable institution there is "atmosphere" and usually a subtle charm. America provides few instances of this whereas in Europe it is to be found in every corner. The city of Quebec has it and so has Provincetown on Cape Cod. This is particularly true of universities and their environs; in Heidelberg; the "Quartier Latin" of Paris; the Bloomsbury section of London and, of course, Oxford and Cambridge. Three hundred years cannot fail to leave glimpses of the past and noticeable contrasts. Harvard "Yard", the site of the first building, was given in 1636 to the institution, then nameless, by the municipality, after the General Court of the Massachusetts Bay Colony under Governor Winthrop had voted a sum of £400 towards the foundation of a "schoale or colledge." It was however the bequest of half of his estate amounting to £780 by the young Puritan minister, John Harvard, that permitted the college to open in 1638. Surely an act of clear vision and great courage. John Harvard, M.A., (Cantab.) of Emmanuel College died at the age of thirty-one. He bequeathed his library of four hundred books in addition to the new college. That was three hundred years ago when books were both scarce

and expensive. A modern professional man considers a collection of those dimensions a very respectable library. That was the crystallising centre of the great Widener Library of today housing almost two million volumes and pamphlets and conceded to be the largest college library in the world.

The bequest of John Harvard furnished the name of the college and served to change the name of its locality from "New Towne" to Cambridge, Harvard's Alma Mater. On one of the college gates is to be found this inscription,—"After God had carried us safe to New-England, and wee had builded our houses, provided necessaries for our liveli-hood, reared convenient places for God's worship, and setled the Civill Government; One of the next things we longed for, and looked after was to advance Learning and perpetuate it to Posterity; dreading to leave an illiterate Ministry to the Churches, when our present Ministers shall be in the Dust." Such was the interesting purpose in the founding of Harvard and, as pointed out by President Conant, the proportion of university men in the colony was higher in 1636 than it is now. This is readily believed when it is realized that the Pilgrim Fathers landed on Plymouth Rock in 1620.

The policy of wide tolerance was indicated as early as 1700 when Yale College was founded as a "true school of the prophets", once again showing the influence of religion in education and recalling the conditions surrounding the founding of our own college, Dalhousie, in 1818.

II

On the morning of Monday, September 7, the group assembled to hear President Conant officially open the conference in the Sanders Theatre of Memorial Hall. With every seat filled and many standing in the balconies Dr. James B. Conant entered the stage followed by the special speakers of the symposia. In Dr. Conant Harvard has a remarkable man,—a really eminent and able organic chemist who resigned his professorship in Harvard while still a young man actively engaged in research work to become its chief executive. There are few examples to my knowledge of scientists of any distinction who have considered relinquishing their chosen field for the presidential office. Dr. Conant is a Harvard graduate, forty-three years of age, a tall slight man in gray tones with keen and kindly blue eyes and an engaging smile. He has made important contributions to the field of indicators for the measurement of oxidation-reduction potentials and of the structural nature of haematin and of chlorophyll to the point where he might logically be claimed as a biochemist.

The first symposium presented the central idea of the "Factors Determining Human Behavior" as the theme for discussion. From Harvard's staff of senior professors a chairman was chosen for each meeting whose duty it was to introduce the speaker, to outline the importance of his work and to unify the topics of discussion. Professor Walter B. Cannon officiated on the first occasion, and exemplified the Harvard tradition of fine scholarship. Dr. Cannon is another alumnus of Harvard and

he has been associated with its Medical School, teaching in physiology, since 1900. He is recognized all over the world for his work on the physiology of digestion, the effects of emotion on glandular secretions and neurohumoral action. With quiet dignity he outlined the immensity of the problem and the lines of approach to it. As first speaker he presented the distinguished, debonair, Foulerton Professor of the Royal Society, E. D. Adrain, who has done most of his investigation at the University of Cambridge, and whose professorship allows him to devote his entire time to research. In a light deft vein of humor and with keen intellectual vision Dr. Adrian presented the case for the Nervous System, as the major factor in human behavior. Dr. Adrian has spent most of his life in experimental investigation of the central nervous system and its function. Every movement, he pointed out, is the result of the messages which pass from the central mass of nerve cells to the muscles, and the outgoing messages are varied according to the reports submitted by the sense organs. Only the simplest plans are possible if the nervous system is primitive, but to sell out an investment when rumors are heard that the company is unsound requires the ten thousand million cells of the human cerebral cortex. Human behavior is an affair of networks and impulses. Some of the activity in this system is automatic; some of it is controlled in response to the environment. The cerebrum is in a state of constant activity of varying degree with sleep as the minimum and emotional excitement as the maximum. The optimal condition for learning is intermediate. Dr. Adrian was pessimistic of the possible service of neurology in the control of human behavior and closed his contribution with the intriguing suggestion as to the possible behavior of men with brains twice their present size of cerebral cortex.

To Dr. J. B. Collip, was allotted the duty of outlining the part played by hormones in human behavior. Dr. Collip is Professor of Biochemistry at McGill University and a Canadian, born in Belleville, Ont. and trained at the University of Toronto. He is best known for his work with Sir Frederick Banting in the initial preparation of insulin from pancreatic tissue. But he is also famous for the extraction of a humoral agent from the parathyroids, "parathormone", and for his more recent discoveries of a placental hormone and the existence of "anti-hormones." Professor Cannon introduced Collip as a man more given to facts than fancies. Dr. Collip is a short thick-set man with great strength of character and the reputation of an insatiable appetite for hard work. In business-like manner the speaker pointed out the present conception of the function of the various glands of internal secretion stressing the dependence of the humoral system upon the nervous system. Yet he emphasized that acetylcholine or a similar substance was at the base of nerve action making the converse true. He pointed out the growing importance of our knowledge of the interrelation of the endocrine glands and told the following story in illustration.

A diabetic patient taking the insulin treatment was walking down the street one morning when he realized the onset of a hypoglycaemic reac-

tion. He had unfortunately omitted to provide himself with a chocolate bar against such an occasion. He proceeded to the nearest drug store but by the time he reached it his gait was unsteady and his speech incoherent. The druggist came to the wrong conclusion and unceremoniously ejected him into the street. This so incensed the man that he promptly recovered. The adrenals had come to the rescue.

The psychological factors in human behavior were presented by Dr. Jean Piaget, professor of child psychology in the University of Geneva, Professor C. Gustav Jung of the Technische Hochschule, Zurich, and Pierre Janet of the College de France, Paris. The ethereal realms of psychological thought left few impressions on a biochemical mind.

III

On the morning of September 8, Dr. Cecil K. Drinker, Dean of the Harvard School of Public Health, in easy charming fashion paid homage to the great contributions which English physiologists have made to the world. He stressed the close ties of friendship and the exchange of professors and students between Cambridge and Cambridge. Still a comparatively young man, Dr. Drinker is well known amongst American physiologists for his pioneer work on the composition and flow of lymph. He introduced Sir Joseph Barcroft, professor of physiology at Cambridge University, as an old friend to many in the audience. Barcroft is nothing if not thoroughly human. His smile and his manner of walking tell you that. He has no hesitation in saying that he does not know but would like to find out. He is famous the world over for many things. He has studied respiration under circumstances which have spread his name in bold-faced type over the front pages of London daily newspapers. He is the man who spent a week in a calorimeter. He is the man who allowed himself to be chilled almost to the point of loss of consciousness. He is the man who climbed the peaks of the Andes. All in the interests of the physiology of respiration, and shades of the physiological class room! He devised the dissociation curve of haemoglobin. In his address to the conference he described his most recent investigations into the fundamental nature of respiratory rhythm as determined by a study of muscular co-ordination in the developing foetus of the sheep. He illustrated with motion pictures the early spreading of reflex response to external stimulus and the increasing localization with progressive myelinization of the nerve pathways. He showed the early formation of the autonomic nervous system in the embryo.

Sir Frederick Gowland Hopkins, Professor of Biochemistry at Cambridge University, then spoke of the influence of chemical thought on Biology. In a low voice and nervous manner the speaker read a paper replete with original observations and pregnant with the possibilities of new suggestions. Hopkins has now received all the acknowledgements and distinctions which a grateful society can offer. He has been medallist, special lecturer and finally president of the Royal Society; he has been president of the British Association; he has been knighted by the

King. Of slender physique and nervous temperament he combines a brilliance of mind with emotional understanding to a most unusual degree. Among many scientific contributions the two most outstanding in originality and fruitfulness are his discovery of vitamins and of glutathione. The latter has led to an unprecedented attack all over the world on the problem of cellular oxidations. On one occasion the writer heard Professor Otto Meyerhof of Heidelberg refer to Hopkins' Laboratory as the home of Biochemistry.

Hopkins was followed by Professor Houssay, physiologist at the University of Buenos Aires who presented a paper of original investigation on diabetes as a disturbance of endocrine equilibrium. From experimental work involving glandular extirpations he pointed to the liver, the thyroid, the pituitary and the adrenal cortex as playing important roles in addition to the pancreas in the metabolism of carbohydrates. He deprecated the conception that diabetes was to be considered solely a pancreatic deficiency of insulin.

IV

The morning of Wednesday, September 9, was devoted to problems in the new field of experimental embryology as presented from the surgical and mechanical aspect by Professor Ross Harrison of Yale University and from the biochemical standpoint by Professor Hans Spemann.

Professor Harrison has acquired remarkable dexterity in the manipulation of embryos and embryonic sections at various stages of their development. He has investigated the possibilities of removing different parts of an embryo such as the blastula or gastrula or earlier stages and determining regeneration and the embryo produced. From this type of experiment he has formulated a theory of electrical polarity which he thinks controls the symmetry of the embryo. Dr. Hans Spemann is professor of Zoology at the University of Freiburg in Germany. He startled the biological world a few years ago by suggesting that a set of chemical "organizers" take over the direction of growth of the embryo in contradistinction to the genes of the germ plasm. This idea won for Professor Spemann in 1935 the Nobel Prize in physiology and medicine. He is able to transplant tiny pieces of tissue from one locality of an embryo to another and cause the transplant to develop the specific tissue of its surroundings. Thus if a piece of tissue which would normally become brain is removed from the very young embryo of a newt and replaced by tissue which would normally become skin, the latter does not become skin but brain. The command seems to be issued by the "inductors" or "organizers" of the host. There is at present no knowledge of the chemical nature of these agents.

The following day began with two papers on unusual aspects of parasitism, with Hans Zinsser as chairman. Dr. Zinsser is professor of bacteriology in the Harvard Medical School and famous for his excellent elementary text-book and his original investigations in typhus fever. His is a dynamic, positive personality unruffled by inhibitions; a keen ob-

server, an alert mind capable of rapid decisions, a proven leader.

The first speaker had come to Harvard from distant Tokyo in the person of Kiyashi Shiga to speak upon the subject of his life's work—the bacteriology and epidemiology of bacillary dysentery. With gray hair and beard, of the stature common to the oriental, and a dignified bearing, Dr. Shiga was a personality of considerable interest to Americans. Famous for his discovery of the bacillus which bears his name he reviewed his efforts at separation of the various strains with particular reference to epidemics which he has studied in Japan, and commented on the efficacy of serological treatment.

The second speaker was Karl Landsteiner of the Rockefeller Institute for Medical Research in New York City. He is generally recognized as one of the world's greatest serologists and was the recipient of the Nobel Prize in Medicine in 1930 for his work on human blood groupings. He is an Austrian by birth and a graduate of the University of Vienna from whence he came to America in 1922. Dressed in a well-worn black coat and gray trousers that had never been introduced to the pressing iron, Landsteiner addressed the audience with the clarity of expression of a Frenchman but with the caution in statement of a Teuton, confining himself largely to facts. He told of his recent investigations of sensitivity to simple chemical compounds aiming at the elucidation of the chemical nature of antigens and incidentally of drug idiosyncrasy. He showed how definite sensitization effects could be obtained with numerous and diversified chemical substances, comparable to the standard anaphylactic response. Thus idiosyncrasies to drugs he classed as allergic reactions.

V

The last phase of the conference became chemical. On Thursday afternoon the applications of physical chemistry to biology were presented by three speakers. Dr. August Krogh, Danish physiologist from the University of Copenhagen, discussed the use of isotopes in biological research with particular reference to detecting the transfer of chemical substances within living organisms. He spoke in particular of the use of "heavy" water (deuterium oxide) in this regard. Dr. John H. Northrup then told about his own work in the isolation and crystallization of the enzymes of the alimentary tract showing them to be definite protein entities. He also spoke about the autocatalysis or self-activation of some enzymes and likened this process to the phenomenon of bacteriophage, remarking that he had been able to concentrate this substance to a high degree. Dr. Northrup holds a research appointment in biochemistry at the Princeton branch of the Rockefeller Institute.

The remarkable work of the oil-driven turbine ultracentrifuge was next described by its inventor, Dr. Svedberg, professor of physical chemistry at the University of Upsala, Sweden. He explained in clear English the method of measuring sedimentation constants and their relationship to molecular weight. Finally he told of the application of the method to protein molecules and viruses.

Dr. Peter Debye of Leipzig spoke on the structure of liquids telling us that they were elastic solids more truly than condensed liquids. Dr. Hans Fischer of the Technische Hochschule, Munich, described his recent efforts at synthesis of the green plant, pigment, chlorophyll. Dr. Ruzicka of Zurich, Switzerland, recounted the preparation of compounds related to the male sex hormones of greater or less potency than those which have been discovered in nature.

The meeting closed with an account of the preparation of edible sugar from wood by the great German industrial chemist, Friedrich Bergius, professor of chemistry at Heidelberg. Sawdust or other waste wood can be converted into glucose by the use of concentrated hydrochloric acid in containers lined by a special ceramic material of unstated composition. This can be purified and crystallized as a fine white powder suitable for human consumption. This process is one of the greatest strides toward a nation's self sufficiency and economic independence in recent years.

This sketch would not be complete without some reference to the Harvard Medical School, situated on the Fenway adjacent to the Massachusetts General Hospital. The Faculty was organized in 1782, and from 1788 till 1811 conferred the M.B. degree. Since 1812 the M.D. degree has been given. The imposing white stone buildings on the present site were built in 1906 and have student dormitories on the opposite side of Longwood Avenue. There is a student body of 500 comprising four years of about 125 in each year. This group comes from about one hundred different colleges in the United States and Canada. Only about thirty percent of Harvard medical students are Harvard graduates. The school is proud of the fact that Oliver Wendall Holmes was professor of anatomy and physiology from 1847 till 1882.

The conference closed amidst expressions of regret and felicitation. It will long remain in the memories of those privileged to attend. May it bear fruit in the manner expressed on the occasion of its opening by President Conant, that in the deliberations, both formal and informal, of the participants the birth of new ideas would commemorate the occasion as no temporal ceremony or ritual could.

It is related of Sydenham that he at length told a gentleman of considerable fortune who was a victim of hypochondria that he could do no more for him but that there was living at Inverness a certain Dr. Robertson who had great skill in cases like his. The patient journeyed to Inverness full of hope, and, finding no doctor of that name, returned to London full of rage but cured of his complaint.

The man who has nothing to boast of but his illustrious ancestors is like a potato, the better part of which is under ground.—*Sir Thomas Overbury.*