
The Hippocratic Physicians

The physicians of the Hippocratic school remain, for the most part, patient observers of fact, sceptical of the marvellous and unverifiable, hesitating to theorise beyond the data, yet eager always to generalise from actual experience; calm, faithful, effective servants of the sick.—Dr. Charles Singer (The Legacy of Greece, 1921). The Quiet Art: A Doctor's Anthology. Compiled by Dr. Robert Coope. Edinburgh & London, E. & S. Livingstone Ltd., 1952, p. 50.
Conjectures and Some Conclusions

From what is known and explored thus far, I think it is sufficiently established that there is electricity in animals, which, with Bartholinus and others, we may be permitted to call by the general name of animal electricity. This, if not in all, yet is contained in most parts of animals; but manifests itself most conspicuously in muscles and nerves. The peculiar and not previously recognized nature of this seems to be that it flows from muscles to nerves, or rather from the latter to the former, and that it traverses there either an arc or a series of men or any other conducting bodies which lead from nerves to muscles by a shorter and quicker way, and flows most speedily through them from the former to the latter.

From this, moreover, two consequences seem chiefly to ensue, namely, that the electricity in these parts is, one positive, as we may believe, the other negative, and that one is wholly distinct in nature from the other; for when equilibrium is established, there is no motion, no excursion of electricity, no phenomenon of muscular contraction.

But forsooth, it is difficult to define in which of the designated parts one electricity resides, in which the other; whether, for example, one in muscle, the other in nerve, or both in one and the same muscle, and from which part it flows. In this obscurity of things, however, if it is permissible to have an opinion, my mind inclines towards placing the location of both kinds of electricity in muscle.—Luigi Galvani. Commentary on the Effect of Electricity on Muscular Motion. Translated by Robert Montraville Green, M.D. Cambridge, Massachusetts, Elizabeth Licht, Publisher, 1953, p. 60.
William Stokes

The other dominating figure in the Dublin School was William Stokes, Graves's pupil and close colleague at the Meath Hospital. His father was a prominent Irish physician, having succeeded Cheyne in the chair of medicine at the College of Surgeons. Young Stokes received his medical education in Edinburgh and then traveled to the leading centers of the Continent for advanced study. An early disciple of Laenée, he presented the first account in the English language of the use of the stethoscope. He is best remembered today for his collaboration in the lucid descriptions of Stokes-Adams syncope and Cheyne-Stokes respiration. Both were recorded in the many English, American, German and French editions of his cardiac classic, *Diseases of the Chest and Aorta*. Of less dramatic but possibly greater import in the history of medicine was Stokes's insistence on the need for instruction in public health in the medical school. His D.P.H. course in Dublin was the first in the British Isles, and his "Introductory Course on Sanitation" became a standard textbook in the epidemiology of communicable disease.—K. M. Cahill, M.D. *The Golden Era of Irish Medicine*. The New England J. Med. 266: 545 (March), 1962.
without mitral valve disease undergoing combined right and left heart catheterization. The heart rate and cardiac output rose while the left ventricular end-diastolic pressure, pulmonary vascular resistance, and total peripheral resistance fell, regardless of the status of the mitral valve. Infusion produced little change in the mean arterial blood pressure and the diastolic filling period per minute.

While the mean left atrial and pulmonary artery pressures fell in patients with normal or insufficient valves, these pressures rose in patients with mitral stenosis. Stroke volume tended to rise in all patients but those with mitral stenosis. In patients with combined mitral stenosis and insufficiency the insufficiency appeared to modify the hemodynamic response associated with mitral stenosis.

The presence of a lowered end-diastolic pressure in the left ventricle and an increased pressure in the left atrium in patients with stenosis suggests that isoproterenol has a direct or reflex effect on the left ventricle during diastole.

References

Too Much Reading
Excessive reading may be a form of laziness . . . If you spend most of your time in reading, you are likely to be left not only with no time for the more important occupations of observing and thinking, but with no mind wherewith to do these essential things.—Lord Horder (The Vocation of Medicine. Lancet 1948). The Quiet Art: A Doctor's Anthology. Compiled by Dr. Robert Coope. Edinburgh & London, E. & S. Livingstone Ltd., 1952, p. 42.

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Effect of Electricity on Muscular Motion

This morning in our Hospital of Saint Ursula, in which the Professor of Surgery is the learned and my most distinguished colleague Doctor Gaspar Gentili, excellent master of surgery, I tested, with my customary devices, an amputated leg and arm, immediately after the operation, in the presence of the aforesaid professor and other physicians and men of learning, and the flexor muscles of the thumb and of the adjacent digits were seen to contract, both of the hand and of the foot, and in consequence the aforesaid digits to move.

The device which I employed was to place a good part of the leg and of the foot, denuded of their integuments, immediately in warm water, and then to armature the corresponding nerves of the indicated muscles with tin-foil close to their entrance into the same; then I applied a little conducting metal cap, and singularly of silver, and I applied it in such a way that with one part it touched the edge of the tin-foil, and with another the portion of nerve uncovered or some contiguous part, so that there was, as I suppose, an arc composed partly of the aforesaid metals, partly of extrinsic moisture, which brought back to the external surface of the indicated muscles the natural electricity of the internal surface, which had ascended to the place of contact of the nerve, and from that had gone out through the force of the same contact.

The same nerves were then invested with wax or with some other insulating body, or else the same bodies were superimposed on the first armature, and no further contraction then was obtained. Therefore the existence of animal electricity seems proved, and its law in man also proposed.—Luigi Galvani. Commentary on the Effect of Electricity on Muscular Motion. Translated by Robert Montraville Green, M.D. Cambridge, Massachusetts, Elizabeth Licht, Publisher, 1953, p. 96.
Claude Bernard and Medical Science

In twenty years, Claude Bernard found more dominating facts, not only than the few French physiologists working beside him, but than all the physiologists in the world. The activity of different glands and particularly of the pancreas, animal glycogenesis, experimental production of diabetes, the existence of the vasomotor nerves and the theory of animal heat, the influence of poisons, studied in themselves and as a means of analyzing physiological phenomena, the endless number of fresh facts, keen deductions and ingenious and suggestive insights, contained not only in his special memoirs but in the fourteen volumes, from his Lessons in Experimental Physiology Applied to Medicine (1885-1886) to his Lessons on Diabetes and Animal Glycogenesis (1877), in which he collected each year the results of his investigations and a summary of his courses.—these things gave him the position of a master unquestioningly accepted in France and abroad.

In official life he also attained the highest rank. In 1854, a chair of general physiology was founded for him at the Sorbonne, which in 1868 he surrendered, with beautiful magnanimity and grace, to his pupil, Paul Bert. In 1858 he took Magendie's place in the chair of medicine at the Collège de France. Member of the Academy of Sciences in 1854, he was called in 1868 to take Flourens' seat in the French Academy.—L. J. Henderson. Introduction. Claude Bernard, M.D. An Introduction to the Study of Experimental Medicine. New York, The Macmillan Company, 1927, p. xv.

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HYPOXIA AND PULMONARY VASCULAR BED

In dealing with the rhythm of the pulse, Morgagni recognized two kinds of intermittency. One kind was of long duration and of serious nature, which he considered due to hypoxia; this was the kind of disorder with which Lancisi, according to his own testimony, was afflicted. Morgagni also recognized another type of intermittency, in which the intermission was brief; this is illustrated by the case of the distinguished professor of physic at Bologna, who happened to discover that once in a while his pulse was intermittent. Morgagni's advice was to tell this patient to take his finger off his wrist and not to inquire too anxiously about his condition. The advice was followed, and resulted in a complete recovery.—C. G. Tedeschi, M.D. Giovanni Battista Morgagni, The Founder of Pathologic Anatomy: A Biographic Sketch On the Occasion of the 200th Anniversary Of The Publication Of His “De sedibus et causis morborum per anatomem indagatis.” The Boston Medical Quarterly 12:122, 1961.


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**Training the Doctor of Tomorrow**

... When there is a real intellectual interaction between an excellent faculty and a well prepared student body acting as a catalyst, provided in a suitable environment and in an imaginative manner, the product will improve. The faculty should have the capacity to demonstrate their ability to light fires in the human mind because it provides a tremendous impetus to productive scholarship. The faculty should do nothing but promote the imaginative consideration of the various general principles underlying a career in medicine. The proper function of the medical school is the imaginative acquisition of knowledge because a medical school is imaginative and progressive or it is nothing—what nothing useful.

All courses of study should allow for both diversity and flexibility combined with freedom and discriminating discipline. Any set of courses which insists upon discriminating discipline defeats its own objects by dulling the mind. Any teacher of experience in a graduate school soon notes the dulled minds of those whose education in secondary school and a college has consisted of the requirement of inert knowledge or facts divorced from imagination. Pedants produce dullards.—Chester S. Keefer, M.D. *Training the Doctor of Tomorrow*, Boston, The Boston Medical Quarterly 12: 87, 1961.

The doctor occupies a seat in the front row of the stalls of the human drama, and is constantly watching, and even intervening in, the tragedies, comedies and tragi-comedies which form the raw material of the literary art. If the doctor is to be capable of his work, he must be a man of feeling; and if he is to do his work, his feelings must often in great measure be denied expression. Perhaps this is partly the reason why doctors express themselves in writing, but it does not explain why they so often express themselves well, nor why so many authors, some among the most distinguished, have come to the writing of poetry, plays or novels by way of medicine.—W. RUSSELL BRAIN.

Giovanni Battista Morgagni, the Founder of Pathologic Anatomy

In 1707 we find Morgagni in a scientific pilgrimage through the major cultural centers of the Republic of Venice. In Venice he became closely associated with Gian Girolamo Zanichelli, a chemist and naturalist of good reputation, and with Giovanni Domenico Santorini, a distinguished anatomist of the Ospedale dei SS. Giovanni e Paolo.

From overwork, Morgagni's health failed him for a time and he returned to his native town for a period of rest in 1709. Here, he took up the practice of medicine, and this new activity had much to do in directing his thoughts toward the correlation of the symptoms of common diseases with the underlying organic change.

It was not long before Morgagni made his return to the stage of academic life. The death of Professor Guglielmini had created a vacancy in one of the two chairs of theoretical medicine at the University of Padua. Professor Vallisnieri was promoted to the first chair, and Morgagni was offered the second chair, apparently on the instigation of Lancisi, the arbiter and most celebrated professor of the time. On October 8, 1711, Morgagni accepted the appointment.

The two main medical departments at the Medical School were those of practical medicine and of theoretical medicine. In 1714, with the death of Bernardino Ramazzini (1633-1714), the founder of occupational medicine, the Chair of Practical Medicine remained vacant. Although Morgagni was attracted to this position, Lancisi, his wise protector, advised him to wait for the Chair of Anatomy that, in his own words, "was more appropriate to him and carried higher prestige." One year later, with the death of Michelangelo Molinetti, this chair became vacant, and, on October 5, 1715, Morgagni was appointed ad anatomen ordinarium—the most important position in the School, at the annual salary of 2,200 golden zecchini. At the time of the appointment, Morgagni was thirty-three years old.

The Chair of Anatomy was held in the highest esteem. Actually, the teaching embraced both physiology and pathology, and the anatomy lecture was the synthesis of all practical and theoretical knowledge available at the time.

The teaching of anatomy that Professor Molinetti, the predecessor at the Chair, had limited to a few hours had been extended by Morgagni to include a full semester of seventy lectures that he delivered himself, year in and year out, to the end of his days, with the same enthusiasm, industry, and perseverance that characterized all his endeavors.

In the last year of his life Morgagni was writing to Sénac:

I am absorbed completely by the education of this youth entrusted to me by this most magnificent Republic, and to whom I devote humbly my effort.

This effort was fully appreciated by Morgagni's admirers and pupils who, on leaving the School (ateneo), carried to far lands not only the inspiration of a true intellectual message but also the treasure of a new investigative method.—C. G. Tedeschi, M.D.

The Dangerous Voyage

It is in medicine as in the piloting of a ship—rules may be laid down, principles expounded, charts exhibited; but when a man has made himself master of all these, he will often find his ship among breakers and quicksands, and must at last have recourse to his own craft and courage.—Dr. John Brown (Horae Subsecivae, 1861). The Quiet Art: A Doctor’s Anthology. Compiled by Dr. Robert Coope. Edinburgh & London, E. & S. Livingstone Ltd., 1952, p. 38.
Effect of Electricity on Muscular Motion

From the outcome and result here expounded, if I do not explain and express myself ill, it is clearly understood that muscular contractions can be produced by natural electricity in the living animal from three different causes: first from a violent overcharge of the muscular cell induced by the powers of the mind, and this seems to occur in voluntary motions; second from a forced overcharge, as when, by some external agent or irritation, the aforesaid electricity is determined to descend forcibly and violently from the brain to the muscles, as in reflex motions, and I call this action an overcharge, assuming that some charge, as seems very likely, is in the muscle constantly and naturally; third and finally from a charge equally violent and forced, as will occur when some external agent, applied to the nerve or to the brain, determines the electricity of the internal surface of the muscle to ascend through the nerve and go back to the external surface of that muscle.

Given these three causes, it seemed to me that I saw open a wide field for the felicitous explanation, not only of voluntary motions, but also of unnatural and violent ones; and of various nervous maladies and their causes, as also of their relations to terrestrial and atmospheric electricity.—LUDI GALVANI. Commentary on the Effect of Electricity on Muscular Motion. Translated by ROBERT MONTRAVILLE GREEN, M.D. Cambridge, Massachusetts, Elizabeth Licht, Publisher, 1953, p. 95.
News from the
American Heart Association

44 East 23rd Street, New York 10, New York
Telephone Gramercy 7-9170

AHA Awards $2,300,000
To Support Investigators

Research awards totaling more than $2,300,000 to support fellowships and investigatorships during the fiscal period beginning July 1, 1963, have been announced by the Association.

Additional national awards in the Grant-in-Aid category will be announced soon.

The fellowships allocations include continuing awards for 10 Career Investigators, 82 Established Investigators, 22 Advanced Research Fellows, 13 Research Fellows and two Career-Investigator-Fellows. New awards were made to 19 Established Investigators and 29 Advanced Research Fellows.

The list of awardees is carried at the end of this section.

May 15 is Abstracts Deadline
For AHA Scientific Sessions

May 15, 1963 is the deadline for receiving abstracts of papers to be presented at the American Heart Association’s 1963 annual Scientific Sessions in Los Angeles, October 25-27.

Papers intended for presentation must be based on original studies in, or related to, cardiovascular disease. Abstracts should be limited to 250 words and include a brief summary of results obtained and conclusions reached.

Forms for submitting abstracts may be obtained from Richard E. Hurley, M.D., Medical Associate, American Heart Association, 44 East 23rd Street, New York 10, New York. Applications for scientific exhibit space, returnable by May 15, are also available from Dr. Hurley. Space for industrial exhibits may be requested through Steven K. Herlitz, Inc., 280 Madison Avenue, New York 16, New York.

Registration Fees Adjusted
For AHA Scientific Sessions

The increased costs of conducting the Association’s annual Scientific Sessions required that registration fees be raised to $15 last year. The fee will remain in effect this year for all those who are not members of Heart Associations or AHA Councils. Previously, subscribers to Circulation and Circulation Research as well as members were admitted without payment of a fee.

As in the past, the registration fee will be waived for medical students, house officers, research fellows, graduate students and members of the U.S. Armed Forces. The fee will be pro-rated for participating para-medical groups, according to the length of sessions held in their fields of interest.

Chapter Donates Funds
To Aid National Research

A contribution of $3,500 has been received from the Tulsa County (Okla.) Heart Association to supplement the Association’s national research program. This brings to $193,838 the amount pledged by local heart groups to help support studies which the national Research Committee approved for 1962-63 but could not otherwise finance.

The Tulsa donation will be applied to the support of a Grant-in-Aid to Dr. Francis J. Haddy at the University of Oklahoma School of Medicine.
Arteriosclerosis Council
Abstracts Due May 15

Abstracts of papers for presentation at the annual meeting of the AHA Council on Arteriosclerosis, to be held October 23-24 immediately preceding the Heart Association's annual Scientific Sessions in Los Angeles, must be received before May 15, 1963. Forms for submitting abstracts, not to exceed 250 words, may be obtained from Richard E. Hurley, M.D., American Heart Association, 44 East 23rd Street, New York 10, New York. Members and non-members of the Council are invited to submit abstracts. The Council sessions will be open to all interested individuals.

Plasma Membrane Symposium Available in Book Form

A symposium on the Plasma Membrane, held under sponsorship of the New York Heart Association and carried in the November 1962 issue of Circulation, is now available in book form.

Edited by Alfred P. Fishman, M.D., the symposium brings together knowledge of the workings of the cell boundary and its properties as a regulatory mechanism. New explorations of the plasma membrane by electron microscopy, biochemistry, physical chemistry and electrochemistry are discussed by specialists. The result is a unique summary of where the scientist stands today in understanding this fundamental area and the problems still facing research.

The 250-page paper-bound book is available at $2.75 from local Heart Associations or the AHA national office.

Foreign Medical Schools Receive AHA Publication

To inform physicians and scientists throughout the world of clinical advances in the United States, the Association is now donating its monthly publication, Modern Concepts of Cardiovascular Disease to approximately 600 medical schools in foreign countries. The publication is also distributed to more than 100,000 physicians in the U.S. and Canada.

Symposium Scheduled on Anesthesics-Circulation

The National Research Council and New York Academy of Medicine have jointly scheduled a symposium on “Effects of Anesthesics on the Circulation,” on May 23-24 in Washington, D. C.

Subjects to be discussed include “Circulatory Regulation by the Central Nervous System,” “Cardiac Function” and “Regional Blood Flow.”

The symposium is to be an open meeting. Because of limited facilities, however, those desiring to attend should write to Sam F. Seeley, M.D., National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Meetings Calendar

April 3-5: American Surgical Association, Phoenix. W. A. Altemeier, Cincinnati General Hospital, Cincinnati 29, Ohio.
April 15-16: American Society for Artificial Internal Organs, Atlantic City. B. K. Kusserow, University of Vermont, Burlington.
April 28: American Federation for Clinical Research, Atlantic City. W. P. Deiss, Indiana University Medical Center, Indianapolis 7, Indiana.
April 30-May 1: Association of American Physicians, Atlantic City. Eugene A. Stead, Jr., Duke Hospital, Durham, North Carolina.

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Constitution Ave., Washington 25, District of Columbia.


Abroad
April 17-20: Portuguese-Spanish Congress of Cardiology, Porto. J. Pereira Leite, Hospital Escolar de S. Joao, Porto, Portugal.
April 22-25: Southeastern Surgical Congress, Mexico City. R. B. Howard, 301 Pasteur Bldg., Oklahoma City 3, Oklahoma.
August 11-16: International Congress of Gerontology, Copenhagen. Torben Geil, 19, Sakt Peders Straede, Copenhagen, K, Denmark.

AHA Award Recipients
The list of investigators who will be supported by the American Heart Association during the fiscal year beginning July 1, 1963, follows.

Career Investigators
Coons, Albert H. Harvard Medical School, Boston.
Gottschalk, Carl W. University of North Carolina School of Medicine, Chapel Hill.
Lieber, Victor. University of Minnesota Medical School, Minneapolis.

Morales, Manuel F. University of California Medical Center, San Francisco.
Pappenheimer, John R. Harvard Medical School, Boston.
Ratner, Oscar D. Western Reserve University School of Medicine, Cleveland.
Sprinaas, David B. Columbia University College of Physicians and Surgeons, New York.
Wannamaker, Lewis W. University of Minnesota School of Medicine, Minneapolis.
Wood, Earle H. Mayo Clinic and Foundation, Rochester, Minn.
Zilversmit, Donald B. University of Tennessee College of Medicine, Memphis.

Continued Established Investigators
Bloomfield, Daniel K. Comparative enzymology of the conversion of cholesterol to bile acid. Western Reserve University School of Medicine, Cleveland, Ohio.
Brieger, Neal S. Pathological physiology of chronic Bright's disease. Washington University School of Medicine, St. Louis, Missouri.
Briggs, F. Norman. Muscle relaxation; biochemical studies. University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania.
Carasquera, Gaspar. Electrolyte and water function of the kidney; mechanism of tubular ion transport and acidification of the urine. University of Louisville School of Medicine, Louisville, Kentucky.
Cooper, David Y. Steroid formation in essential hypertension. University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.
Dallam, R. Duncan. Cellular chemistry and bioenergetics. University of Louisville School of Medicine, Louisville, Kentucky.
Dennis, Warren H. Relationship between membrane structure and permeability. University of Wisconsin Medical School, Madison, Wisconsin.
Despopoulos, Agamanon. Parameters of cellular transport phenomena. University of Louisville School of Medicine, Louisville, Kentucky.
Dickerman, Herbert W. Basic amino acid transport and metabolism in the kidney. National Heart Institute, Bethesda, Maryland.
Elwyn, David H. Quantitative aspects of amino acid metabolism. Michael Reese Hospital and Medical Center, Chicago, Illinois.
Fales, John T. Oxygen consumption and heat production of resting and working skeletal muscle. Johns Hopkins University School of Hygiene and Public Health, Baltimore, Maryland.
Fisman, Gerald D. Synthesis and use of synthetic polyamino acids as models of proteins in structural and biological studies. Brandeis University, Waltham, Massachusetts.
Feinberg, Harold. Myocardial metabolism and cardiac dynamics. Howard University College of Medicine, Washington, D. C.
Fillis, Louis C. Purine and pyrimidine metabolism.

Friedberg, Samuel J. Metabolism of alpha and beta lipoproteins. Duke University Medical Center, Durham, North Carolina.

Glagov, Seymour. Pathology of arterial adaptation to changes in blood flow. University of Chicago School of Medicine, Chicago, Illinois.

Glauker, Stanley C. Molecular physiology of normal and abnormal hemoproteins. University of Pennsylvania Graduate School of Medicine, Philadelphia, Pennsylvania.

Gubler, Clark J. Enzymatic functions of thiamin. Brigham Young University, Provo, Utah.

Hansen, Irwin B. Relationship of the kidney, liver and adrenal glands to arterial hypertension. May Institute for Medical Research of the Jewish Hospital Association, Cincinnati, Ohio.

Harris, John B. Interrelationships between bioelectrical properties and electrolyte transport. University of California School of Medicine, San Francisco, California.

Hatch, Frederick T. Biosynthesis and degradation of lipoproteins. Massachusetts General Hospital, Boston, Massachusetts.

Heimberg, Murray. Hormonal control of fat metabolism. Vanderbilt University School of Medicine, Nashville, Tennessee.

Hoagie, Cecil. Blood clotting and fibrinolytic enzyme systems. University of Washington School of Medicine, Seattle, Washington.


Lacy, William W. Metabolism of uremia. Vanderbilt University School of Medicine, Nashville, Tennessee.

Lassiter, William E. Calcium transport in the mammalian nephron. University of North Carolina School of Medicine, Chapel Hill, North Carolina.


Martonosi, Anthony N. Functional groups of actin participating in the actin-actin, actin-ATP and actin-myosin interaction. Retina Foundation, Boston, Massachusetts.

Mitchell, Jere H. Reflex regulation of cardiorespiratory performance. University of Texas Southwestern Medical School, Dallas, Texas.

Morgan, Richard S. Ribonucleic acid structures. Brandeis University, Waltham, Massachusetts.


Nathan, Paul. Transplantation reaction in kidney and skin. May Institute for Medical Research of the Jewish Hospital Association, Cincinnati, Ohio.

Nelson, Gary J. Phospholipids and lipoproteins in the circulatory system and their relationship to arterial structure and atherosclerosis. University of California, Berkeley, California.

Page, Ernest. Ton fluxes in mammalian heart muscle. Harvard Medical School, Boston, Massachusetts.

Peifer, James J. Metabolism of lipids found in the blood-vascular system. Hormel Institute, University of Minnesota, Austin, Minnesota.


Pick, Ruth. Pathogenesis of atherosclerosis and its sequelae. Medical Research Institute, Michael Reese Hospital and Medical Center, Chicago, Illinois.

Pieper, Heinz P. Performance of the heart in the intact anesthetized dog studied with miniaturized catheter type instrumentatation. Ohio State University College of Medicine, Columbus, Ohio.


Portman, Oscar W. Dietary factors affecting cholesterol catabolism and atherosclerosis. Harvard University School of Public Health, Boston, Massachusetts.

Roden, C. N. Lennart. 1) Structure of chondromucoprotein, II) Biosynthesis of blood group substances. La Rabida University of Chicago Institute, Chicago, Illinois.

Samuels, Arthur J. Immuno-enzymology of heart muscle proteins; search for immuno-chemical evidence for configurational changes in enzymes of heart muscles during congestive failure. Dartmouth Medical School, Hanover, New Hampshire.


Sperelakis, Nick. Conduction in heart. Western Reserve University School of Medicine, Cleveland, Ohio.

Stoffyn, Pierre J. Chemistry of glycoproteins. McLean Hospital, Belmont, Massachusetts.

Straus, Werner. Investigation of “phagosomes” in various tissues of the rat. University of North Carolina School of Medicine, Chapel Hill, North Carolina.

Travis, Randall H. Aldosterone in congestive heart failure. Western Reserve University School of Medicine, Cleveland, Ohio.

Tsoboi, Kenneth K. Metabolism of nucleotides and related compounds in cardiac tissues. Stanford University School of Medicine, Palo Alto, California.

Versier, Robert L. Etiology and pathogenesis of diffuse cardiovascular disease in childhood. University of Minnesota Medical School, Minneapolis, Minnesota.

Ways, Peter O. Membrane lipids in normal and path-

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ological red blood cells of man. University of Washington School of Medicine, Seattle, Washington.

Wells, William W. Lactose diets and cholesterol metabolism. University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania.

Welsh, Richard S. Characterization of undegraded, non-fibrous forms of deoxyribonucleoprotein from calf thymus. University of California, Riverside, California.

Wortman, Bernard. Mucopolysaccharides of the nervous system and its blood vessels, with particular reference to the retina. Washington University School of Medicine, St. Louis, Missouri.

Ziegler, Daniel M. Mitochondrial electron transport system. Clayton Foundation Biochemical Institute, University of Texas, Austin, Texas.

New Established Investigators

Di Ferrante, Nicola. Chemical bonding of vasointestinal amines and peptides to receptor sites in target tissues. University of Cincinnati College of Medicine, Cincinnati, Ohio.

Glick, Gerald. Determinants of ventricular function and cardiac output. National Heart Institute, Bethesda, Maryland.

Goldstein, Irwin J. Chemical and enzymatic studies on the structure of polysaccharides. State University of New York at Buffalo School of Medicine, Buffalo, New York.

Herd, J. Alan. Central nervous system control of cardiovascular and renal function in unanesthetized animals. Harvard Medical School, Boston, Massachusetts.

Hoffman, Julien I. Ventricular responses to sudden or sustained changes of inflow volume or outflow resistance. Albert Einstein College of Medicine of Yeshiva University, New York, New York.

Jackson, Benjamin T. Fetal cardiovascular physiology, normal and pathologic. Medical College of Virginia, Richmond, Virginia.

Kalf, George F. Oxidative phosphorylation in sub-mitochondrial extracts. Seton Hall College of Medicine and Dentistry, Jersey City, New Jersey.

Katz, Arnold M. Physical and chemical reactions of the contractile proteins in normal and failing heart muscle. University of California at Los Angeles Medical Center, Los Angeles, California.

Litt, Mortimer. Role of eosinophils in immune processes. Boston City Hospital, Boston, Massachusetts.

Labash, Glenn D. Protein abnormalities in uremia. Cornell University Medical College, New York, New York.

Malt, Ronald A. Keratin synthesis and its relation to the differentiation of skin. Massachusetts General Hospital, Boston, Massachusetts.


Rothe, Carl F. Cardiac function and venous pressure control in hemorrhagic shock. Indiana University School of Medicine, Indianapolis, Indiana.

Scharf, Thomas G. Sugar and potassium ion transport in yeast. University of Louisville School of Medicine, Louisville, Kentucky.

Webster, George C. Structural units, functions and origin of heart microsomes. University of Wisconsin, Madison, Wisconsin.

Continued Established Investigator-Grantees

Barnett, G. Octo. System analysis of cardiovascular function and control mechanisms in the intact unanesthetized animal. Peter Bent Brigham Hospital, Boston, Massachusetts.

Bowman, Roger H. Sources of energy employed in the heart muscle and the regulatory factors involved. Vanderbilt University School of Medicine, Nashville, Tennessee.

Brady, Allan J. Link between excitation and contraction. University of California at Los Angeles Medical Center, Los Angeles, California.

Cerny, Lawrence C. Rheology of blood. Masonic Medical Research Laboratory, Utica, New York.


Goodkind, M. Jay. Enodocrine effects on myocardial metabolism and ventricular function. Yale University School of Medicine, New Haven, Connecticut.

Hall, Philip W., III. Amino acid-electrolyte interrelationships. Cleveland Metropolitan General Hospital, Cleveland, Ohio.

Hefner, Lloyd L. Relationships between heat production, oxygen consumption and work of the mammalian heart. Medical College of Alabama, Birmingham, Alabama.

Hess, Marilyn E. Relation of cardiac metabolism to heart function. University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.


Jensen, David. Basic mechanisms of cardiac automatism. Scripps Institution of Oceanography, University of California, La Jolla, California.

Katz, Joseph. Intermediate metabolism of lactating mammary gland. Institute for Medical Research, Cedars of Lebanon Hospital, Los Angeles, California.

LaBella, Frank S. Anterior and posterior pituitary hormones: formation, secretion and action on connective tissue. University of Manitoba Faculty of Medicine, Winnipeg, Manitoba, Canada.

Landau, Bernard B. Carbohydrate metabolism in hyperthyroidism. Western Reserve University School of Medicine, Cleveland, Ohio.

Levitt, Howard. Concentrating and diluting functions of the kidney. Yale University School of Medicine, New Haven, Connecticut.

Magly, Roy H. Coupling of metabolic energy and active sodium transport. Stanford University School of Medicine, Palo Alto, California.

Miller, Tracy B. Action of antidiuretic hormone.
State University of New York Upstate Medical Center, Syracuse, New York.

Pearce, Charles W. Tolerance of mammals to profound hypothermia and hypothermic preservation of organs. Tulane University School of Medicine, New Orleans, Louisiana.

Regan, Timothy J. Metabolic basis of ion transport in the heart and relationship to its functional properties. Seton Hall College of Medicine and Dentistry, Jersey City, New Jersey.

Soroff, Harry S. 1) Metabolic and hemodynamic effects of assisted circulation; II) Development of partial and complete prostheses for replacement of diseased aortic and mitral valves. New England Center Hospital, Boston, Massachusetts.

Spiro, Robert G. Structure and metabolism of glycoproteins. Harvard Medical School at Baker Clinic Research Laboratory, Boston, Massachusetts.

Watanabe, Shinzo. Mechanism of relaxation of glycerol-treated muscle fibers. Cardiovascular Research Institute, University of California Medical Center, San Francisco, California.

Wilson, Jean D. Mechanism of neutral sterol secretion into the gut. University of Texas Southwestern Medical School, Dallas, Texas.

New Established Investigator-Grantees


Peterson, Raymond D. A. Host factors in resistance to infection. University of Minnesota Medical School, Minneapolis, Minnesota.

Rohein, Paul S. Mechanisms of lipoprotein formation. Albert Einstein College of Medicine of Yeshiva University, New York, New York.

Continued Advanced Research Fellows

Bernstein, Eugene F. Intravenous arteriography. Under Owen H. Wangensteen, University of Minnesota Medical School, Minneapolis, Minnesota.


Dong, Eugene, Jr. Experimental subvalvular and valvular aortic stenosis. Under Norman E. Shumway, Stanford University School of Medicine, Palo Alto, California.


Gordon, David B. Renal and vascular factors in hypertension. Under Harry Goldblatt, Mount Sinai Hospital, Cleveland, Ohio.


Gulyassy, Paul F. Mechanisms of action of antidiuretic hormone. Under Isidore S. Edelman, Cardiovascular Research Institute, University of California Medical Center, San Francisco, California.

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Mahadevan, Vaidyanath. Lipids in relation to blood coagulation and clot lysis. Under Walter O. Lundberg, Hormel Institute, University of Minnesota, Austin, Minnesota.


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Cutler, Ralph E. Mechanisms by which adrenocorticoids may influence water homeostasis. Under J. Thomas Dowling, King County Hospital, Seattle, Washington.


Finn, Arthur L. Some kinetic aspects of calcium-magnesium-potassium interaction in isolated tissues. Under Jack Orloff, National Heart Institute, Bethesda, Maryland.

Glick, Mary Catherine. Synthetic studies of biological intermediates of chondroitin sulfates. Under Roger W. Jeanloz, Massachusetts General Hospital, Boston, Massachusetts.

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