

LIFE STRESS

AND

BODILY DISEASE

PROCEEDINGS OF THE ASSOCIATION
DECEMBER 2 AND 3, 1949
New York, N. Y.



WITH 345 ILLUSTRATIONS
83 TABLES AND 2 COLOR PLATES



Copyright 1950

Association for Research in Nervous and Mental Disease

Printed in the United States of America

RESEARCH PUBLICATIONS

I. (1920) *Acute Epidemic Encephalitis (Lethargic Encephalitis)

II. (1921) *Multiple Sclerosis (Disseminated Sclerosis)

III. (1923) *Heredity in Nervous and Mental Disease

IV. (1924) *The Human Cerebrospinal Fluid

V. (1925) *Schizophrenia (Dementia Praecox)

VI. (1926) *The Cerebellum

VII. (1922) *EPILEPSY AND THE CONVULSIVE STATE (Part I)

(1929) *EPILEPSY AND THE CONVULSIVE STATE (Part II)

VIII. (1927) *THE INTRACRANIAL PRESSURE IN HEALTH AND DISEASE

IX. (1928) *The Vegetative Nervous System

X. (1929) *Schizophrenia (Dementia Praecox) (Continuation of Vol. V)

XI. (1930) *Manic-Depressive Psychosis

XII. (1931) *Infections of the Central Nervous System

XIII. (1932) *Localization of Function in the Cerebral Cortex

XIV. (1933) THE BIOLOGY OF THE INDIVIDUAL

XIV. (1934) SENSATION: ITS MECHANISMS AND DISTURBANCES

XVI. (1935) *Tumors of the Nervous System

XVII. (1936) *THE PITUITARY GLAND

XVIII. (1937) *The Circulation of the Brain and Spinal Cord

XIX. (1938) *The Inter-relationship of Mind and Body

XX. (1939) *The Hypothalamus and Central Levels of Autonomic Function

XXI. (1940) *The Disease of the Basal Ganglia

XXII. (1941) *The Role of Nutritional Deficiency in Nervous and Mental Disease

XXIII. (1942) PAIN

XXIV. (1943) *Trauma of the Central Nervous System

XXV. (1944) MILITARY NEUROPSYCHIATRY

XXVI. (1946) EPILEPSY

XXVII. (1947) THE FRONTAL LOBES

XXVIII. (1948) MULTIPLE SCLEROSIS AND THE DEMYELINATING DISEASES

XXIX. (1949) LIFE STRESS AND BODILY DISEASE

*Out of print-not for sale.

OFFICERS

Harold G. Wolff, M.D. President 525 East 68th Street New York 21, N. Y.

DAVID P. BARR, M.D. Vice-President 525 East 68th Street New York 21, N. Y.

ROBERT F. LOEB, M.D. Vice-President 622 West 168th Street New York 32, N. Y.

CLARENCE C. HARE, M.D. Secretary-Treasurer Neurological Institute, 700 West 168th St. New York 32, N. Y.

ROLLO J. MASSELINK, M.D. Assistant Secretary Neurological Institute, 700 West 168th St. New York 32, N. Y.

TRUSTEES

Edwin G. Zabriskie, M.D.

Chairman

New York

Walter Timme, M.D. New York Foster Kennedy, M.D. New York S. BERNARD WORTIS, M.D. New York HENRY ALSOP RILEY, M.D. New York

WALTER L. PALMER, M.D.

Chicago, Ill.

Hans Selve, M.D. Montreal, Canada Milton J. E. Senn, M.D.

New Haven, Conn.

Donal Sheehan, M.D. New York, N. Y. Frank Fremont-Smith, M.D.

COMMISSION 1949

HAROLD G. WOLFF, M.D., Chairman New York

Franz Alexander, M.D.
Chicago, Ill.
Charles D. Aring. M.D.
Cincinnati, Ohio
Walter Bauer, M.D.
Boston, Mass.
Frank A. Beach, M.D.
New Haven, Conn.
Stanley Cobb, M.D.

Boston, Mass.
Eugene B. Ferris, M.D.
Cincinnati, Obio

ROY R. GRINKER. M.D. Chicago, Ill. CHESTER M. JONES, M.D. Boston, Mass.

CLYDE KLUCKHOHN, M.D. Cambridge, Mass.

Margaret Mead, M.D. New York, N. Y. I. Arthur Mirsky, M.D.

Cincinnati, Ohio
Francis D. Moore, M.D.
Boston, Mass.

New York, N. Y.
Homer W. Smith, M.D.
New York, N. Y.
EUGENE A. STEAD, JR., M.D.
Durham, N. C.
MARION B. SULZBERGER, M.D.
New York, N. Y.
Howard C. Taylor, JR., M.D.
New York, N. Y.

EDWARD WEISS, M.D.
Philadelphia, Pa.
JOHN C. WHITEHORN, M.D.
Baltimore, Md.

Stewart G. Wolf, Jr., M.D. New York, N. Y.

PROGRAM COMMITTEE

Harold G. Wolff, M.D. New York, N. Y.

EUGENE B. FERRIS, M.D. Cincinnati, Ohio

STEWART G. WOLF, JR., M.D. Ner York, N. Y.

CONTRIBUTORS TO VOLUME XXIX

- Abbot, Frank K., M.D., Cornell University Medical College and the New York Hospital, N. Y.
- Ackerman, Nathan W., M.D., College of Physicians and Surgeons, Columbia University, New York, N. Y.
- Alexander, Franz G., M.D., The Institute for Psychoanalysis, College of Medicine, University of Illinois, Chicago, Illinois.
- Almy, Thomas P., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- Baker, Harrison M., M.D., University of Cincinnati College of Medicine, Cincinnati General Hospital, Cincinnati, Ohio
- Bakke, John L., M.D., University of Washington College of Medicine, Seattle, Washington.
- Ball, Robert, M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- Barker, Susan, B.S., 40 East 83rd Street, New York, N. Y.
- BARKER, WAYNE, M.D., 40 East 83rd Street, New York, N. Y.
- Brenner, Charles, M.D., Montefiore Hospital, New York, N. Y.
- Broh-Kahn, Robert H., M.D., The May Institute for Medical Research, The Jewish Hospital, Cincinnati, Ohio.
- Brust, Albert A., M.D., University of Cincinnati College of Medicine, Cincinnati General Hospital, Cincinnati, Ohio.
- Carlson, Helen B., M.D., University of Illinois College of Medicine, Chicago, Illinois.
- CARMICHAEL, HUGH T., M.D., University of Illinois College of Medicine and the Illinois Neuropsychiatric Institute, Chicago, Illinois.
- Chapman, William P., M.D., Harvard Medical School and Massachusetts General Hospital, Boston, Massachusetts.
- Cohen, Mandel E., M.D., Cardiac Research Laboratory, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts.
- Console, A. Dale, M.D., New York Hospital, New York, N. Y.
- DAVEY, LYCURGUS M., M.D., Laboratory of Physiology, Yale University School of Medicine, New Haven, Connecticut.
- DAVIS, FREDERICK H., M.D., Allan Memorial Institute of Psychiatry and McGill University, Montreal, P. Q., Canada.
- Diethelm, Oskar, M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- DuBois, Philip H., Ph.D., Washington University School of Medicine, St. Louis, Missouri.
- Duncan, Charles H., M.D., College of Physicians and Surgeons, Columbia University, New York, N. Y.
- EWELL, JOHN W., M.D., Yale University, New Haven, Connecticut.
- Ferris, Eugene B., M.D., University of Cincinnati College of Medicine and Cincinnati General Hospital, Cincinnati, Ohio.
- Fleetwood, M. Freile, M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- FLYNN, JOHN T., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- Fortier, Claude, M.D., Institute of Experimental Medicine and Surgery, Université de Montréal, Montréal, Quebec.

FREED, H., M.D., Temple University School of Medicine and Hospital, Philadelphia, Pennsylvania.

FRIED, RALPH I., M.D., Bellefaire, the Cleveland Jewish Orphans Home, Cleveland, Ohio.

Friedman, Arnold P., M.D., College of Physicians and Surgeons, Columbia University, New York, N. Y.

FRIEDMAN, MEYER, M.D., The Harold Brunn Institute for Cardiovascular Research, Mount Zion Hospital, San Francisco, California.

Fulton, John F., M.D., Yale University School of Medicine, New Haven Connecticut.

Funkenstein, Daniel H., M.D., Harvard Medical School and Boston Psychopathic Hospital, Boston, Massachusetts.

Furer, Manuel, M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Gamm, Stanford R., M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital, Chicago, Illinois.

GANTT, W. HORSLEY, M.D., Johns Hopkins Hospital, Baltimore, Maryland.

Glass, George B. Jerzy, M.D., New York Medical College, Flower and Fifth Avenue Hospital, New York, N. Y.

GOODELL, HELEN, B.S., Cornell University Medical College and the New York Hospital, New York, N. Y.

Gottschalk, Louis A., M.D., Michael Reese Hospital, Chicago, Illinois.

Grace, William J., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Graham, David T., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Gressel, Gregory C., M.D., Washington University School of Medicine, St. Louis, Missouri.

GRINKER, ROY R., M.D., Michael Reese Hospital, Chicago, Illinois.

GROEN, J., M.D., Wilhelmina-Gasthuis, Amsterdam W, The Netherlands.

HAM, GEORGE C., M.D., Institute for Psychoanalysis, Chicago, Illinois.

HARDY, JAMES D., M.D., Cornell University Medical College, New York, N. Y.

HELDT, THOMAS J., M.D., Henry Ford Hospital, Detroit, Michigan.

Hellman, Leon, M.D., Sloan Kettering Institute, New York, N. Y.

Higgins, John, M.D., University of Cincinnati College of Medicine and the Cincinnati General Hospital, Cincinnati, Ohio.

HINKLE, LAWRENCE E., JR., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Hoagland, Hudson, Ph.D., Sc.D., Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts.

HOLLANDER, FRANKLIN, Mount Sinai Hospital, New York, N. Y.

Holmes, Thomas H., M.D., University of Washington, Scattle, Washington.

JANOWITZ, HENRY, M.D., Mount Sinai Hospital, New York, N. Y.

KAADA, BIRGER R., M.D., Yale University School of Medicine, New Haven, Connecticut.

Kaplan, Stanley, M.D., The May Institute for Medical Research, The Jewish Hospital, Cincinnati, Ohio.

Kaufman, M. Ralph, M.D., Mount Sinai Hospital, New York, N. Y.

Kennedy, Mary A. K., A.M., Cornell University Medical College and the New York Hospital, New York, N. Y.

Kepecs, Joseph G., M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital, Chicago, Illinois.

Kern, Fred, Jr., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Косн, R., M.D., Temple University School of Medicine and Hospital, Philadelphia, Pennsylvania.

Koskoff, Yale David, M.D., University of Pittsburgh Western Psychiatric Institute and Clinic, Pittsburgh, Pennsylvania.

LEDERER, HENRY, M.D., University of Cincinnati College of Medicine and the Cincinnati General Hospital, Cincinnati, Ohio.

LEVY, MILTON, M.D., Mount Sinai Hospital, New York, N. Y.

LIDDELL, HOWARD, M.D., Cornell Rehavior Farm, Cornell University, Ithaca, New York.

Lidz, Theodore, M.D., Johns Hopkins Hospital, Baltimore, Maryland.

LIHN, HENRY, M.D., Menninger Clinic, Topeka, Kansas.

LINDEMANN, ERICH, M.D., Ph.D., Harvard Medical School and the Massachusetts General Hospital, Boston, Massachusetts.

LIVINGSTON, KENNETH E., M.D., University of Oregon Medical School, Portland, Oregon. LIVINGSTON, ROBERT B., M.D., Yale Medical School, New Haven, Connecticut and Institut Marey, Paris, France.

Malmo, Robert B., Ph.D., McGill University, Allan Memorial Institute of Psychiatry, Montreal, P. Q., Canada.

MARCUSSEN, ROBERT M., M.D., Stanford University Hospitals, San Francisco, California. MARGOLIN, SYDNEY G., M.D., Mount Sinai Hospital, New York, N. Y.

MAYMAN, MARTIN, M.A., Winter Veterans Administration Hospital, Topeka, Kansas.

McCulloch, Warren S., M.D., University of Illinois College of Medicine, Chicago, Illinois. Menninger, Karl, M.D., Menninger Clinic, Topeka, Kansas.

Messier, Paul E., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

MILHORAT, ADE T., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

MIRSKY, I. ARTHUR, M.D., The May Institute for Medical Research, The Jewish Hospital, Cincinnati, Ohio.

Munson, Paul L., M.D., Yale University, New Haven, Connecticut.

Orchinik, C., M.D., Temple University School of Medicine and Hospital, Philadelphia, Pennsylvania.

Orringer, David, M.D., Mount Sinai Hospital, New York, N. Y.

Persky, Harold, M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital, Chicago, Illinois.

PFEIFFER, JOHN B., JR., M.D., Duke University School of Medicine, Durham, North Carolina.

PINCUS, GREGORY, Sc.D., Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts.

Portis, Sidney A., M.D., Michael Reese Hospital and the College of Medicine of the University of Illinois, Chicago, Illinois.

Prestwood, Rodney, M.D., University of California Medical School and the Langley Porter Clinic, San Francisco, California.

PRICTHARD, JOHN S., M.D., M.R.C.P., Massachusetts General Hospital, Boston, Massachusetts.

PRUGH, DANE G., M.D., Harvard Medical School and the Children's Medical Center, Boston, Massachusetts.

Ranschoff, William, M.D., University of Cincinnati College of Medicine and Cincinnati General Hospital, Cincinnati, Ohio. RAY, BRONSON S., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Reiser, Morton F., M.D., University of Cincinnati College of Medicine and Cincinnati General Hospital, Cincinnati, Ohio.

RICHTER, CURT P., Ph.D., Johns Hopkins Medical School, Baltimore, Maryland.

RIPLEY, HERBERT S., M.D., Washington University School of Medicine, Seattle Washington.

ROBIN, MILTON, M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital, Chicago, Illinois.

Rosenbaum, Milton, M.D., Cincinnati General Hospital, Cincinnati, Ohio.

Ruesch, Jurgen, M.D., University of California Medical School and the Langley Porter Clinic, San Francisco, California.

Salter, William T., M.D., Yale University School of Medicine, New Haven, Connecticut. Saslow, George, M.D., Washington University School of Medicine, St. Louis, Missouri.

Scarff, John E., M.D., College of Physicians and Surgeons, Columbia University, New York, N. Y.

Schneider, Robert A., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Schroeder, Henry A., M.D., Washington University School of Medicine, St. Louis, Missouri.

Schwab, Robert S., M.D., Brain Wave Laboratory, Massachusetts General Hospital, Boston, Massachusetts.

Scott, J. P., Ph.D., Jackson Memorial Laboratory, Bar Harbor, Maine.

Selye, Hans, M.D., Institute of Experimental Medicine and Surgery, University of Montreal, Montreal, Quebec, Canada.

Serota, Herman M., M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital and the Institute of Psychoanalysis, Chicago, Illinois.

Shagass, Charles, M.D., Allan Memorial Institute of Psychiatry, and McGill University, Montreal, P. Q., Canada.

Shapiro, Alvin P., M.D., University of Cincinnati College of Medicine and Cincinnati General Hospital, Cincinnati, Ohio.

Shapiro, Louis B., M.D., Institute for Psychosomatic and Psychiatric Research and Training of the Michael Reese Hospital and the Institute of Psychoanalysis, Chicago, Illinois.

Sheldon, William H., M.D., Columbia University, College of Physicians and Surgeons, New York, N. Y.

Shepard, Edward M., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Shobe, Frank O., M.D., Washington University School of Medicine, St. Louis, Missouri.

SIMMONS, LEO W., Ph.D., Yale University, New Haven, Connecticut.

Spiegal, E. A., M.D., Temple University School of Medicine, Philadelphia, Pennsylvania. Stein, Aaron, M.D., Mount Sinai Hospital, New York, N. Y.

Stevenson, Ian, M.D., Louisiana State University School of Medicine, New Orleans, Lousiana.

Straub, Leonard R., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

Swan, Roy C., Jr., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.

SWEET, WILLIAM B., M.D., Harvard Medical School and Massachusetts General Hospital, Boston, Massachusetts.

Szasz, Thomas S., M.D., Chicago Institute for Psychoanalysis, Chicago, Illinois.

- Taylor, Howard C., Jr., M.D., College of Physicians and Surgeons, Columbia University, New York, N. Y.
 - Treuting, Theodore, M.D., Tulane University School of Medicine, New Orleans, Louisiana. Van der Valk, J. M., M.D., 2nd Medical Service, Wilhelmina-Gasthuis, Amsterdam, The Netherlands.
 - Weninger, Frederick L., M.D., University of Pittsburgh Western Psychiatric Institute and Clinic, Pittsburgh, Pennsylvania.
 - White, Paul D., M.D., Harvard Medical School and the Massachusetts General Hospital, Boston, Massachusetts.
- Whitehorn, John C., M.D., Johns Hopkins University, Baltimore, Maryland.
 - WILLARD, HAROLD N., M.D., The Rip van Winkle Clinic, Hudson, New York.
- WINKELSTEIN, ASHER, M.D., Mount Sinai Hospital, New York, N. Y.
- Wolf, George A., Jr., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- Wolf, Stewart, M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
- WOLFF, HAROLD G., M.D., Cornell University Medical College and the New York Hospital, New York, N. Y.
 - WYCIS, H. T., M.D., Temple University School of Medicine and Hospital, Philadelphia, Pennsylvania.

PREFACE

It was held by some of us that the time was ripe for a review and criticism of the methods of study, observations and prevailing concepts concerning man's reactions to stress. This symposium was oriented about the view that adaptive and protective capabilities are limited, that the response to a variety of noxious agents in any given man may be similar, that the form of this reaction depends more upon the individual's nature and experience than upon the particular noxious agent evoking it. Also, that man, constituted as he is, is capable of reacting to symbols of danger as to actual assault. Since, further, he is a tribal animal with a long period of development and dependence, jeopardized as well as supported by his fellows, he may feel more threatened by cultural and individual human pressures than by other forces. Hence, conspicuous in such a symposium must be consideration of the effects of man upon man especially as they are relevant to disease. To what extent such a concept is tenable and profitable, the ensuing essays will testify.

Many thanks are due to the contributors to this volume who gave so freely of their time and substance to bring this meeting on "Life Stress and Bodily Disease" into being. Especial thanks are due Helen Goodell and Jean Moller for tireless efforts with manuscripts. Gratitude is also expressed to the Journal of the American Medical Association, to Psychosomatic Medicine and to the Journal of Clinical Investigation for permission to use certain material. Lastly, appreciation is expressed to the many other colleagues and friends whose aid was often sought, to the Commissioners whose discussions of the contributions added so much, and to the officers and Trustees of the Association who have made the meetings and this book possible.

H.G.W.

FOREWORD

In 1936, the author had an interview with Dr. Alan Gregg, Director of the Medical Sciences of the Rockefeller Foundation. He asked me what in my opinion was the reason for the fact that psychiatry had profited so little by the tremendous advances that had been made in the other branches of medicine during the last fifty years. I answered, as well as I could, that the development of modern medicine was largely due to the introduction of exact methods of thinking, the application of physics and chemistry to the study of disease and the experimental and if possible quantitative approach to clinical problems. The human mind, however, which is the domaine of psychiatry, had not been explored in this way and it was mainly through a lack of suitable methods that psychiatry apparently had lagged behind so long. The situation was made worse by the fact that most investigators accustomed to pragmatic thinking, shrank away from a field where analogies rather than measurements seemed to be the only available tool of research.

Dr. Gregg praised me for the explanation. "But", he said, "suppose I should ask you, as a modern physician, to improve the situation, to show how exact methods could be used in this field, what would be your answer?" To this question I had no reply. I had never given it a thought.

I recall this incident without too much shame, for my own ignorance was characteristic of almost all clinicians of that time. It is true that Pavlov and Cannon had done their pioneer work in physiology many years previously. In psychiatry Freud, Adler and Adolph Meyer had paved the way for a more systematic approach. It is also true that every clinician who could take a good history and who was not in the habit of regarding emotions (except his own!) as "mere nonsense," had had ample opportunity to observe almost daily how patients with peptic ulcer, hypertension, asthma and angina pectoris improved during a favorable life situation and got worse or died under adverse circumstances. In fact, such observations were so common that a wise practitioner once told me that he would never have dared to write a paper on the influence of emotions on bodily disease because it would mean writing about things which everybody already knew. In Europe, Schwarz, Alkan, Mohr and Wittkower had compiled and extended these clinical observations. In the United States Dunbar had published a comprehensive review, and Draper, Murray and Alexander had carried out their pioneer studies. All these attempts, however, had evoked more criticism than enthusiasm and the role of life situations as factors in the origin and course of human illness remained a field for speculation rather than investigation. The foundation of the xvi FOREWORD

American Society for Research in Psychosomatic Problems and the appearance of the journal "Psychosomatic Medicine" did much to stimulate interest among those who were already psychiatrically minded, but its influence among clinical investigators established itself much more slowly. Clinicians apparently saw no way to apply their physico-chemical approach to problems of disease connected with life stress and they could not be wooed to do so, even by the most clarifying concepts about the deeper mechanisms underlying human behavior or by the most impressive symbolic interpretation of disease phenomena. Without exaggeration it can be said that a meeting like the one which has just been held would have been impossible as little as ten years ago.

What then has brought about the change in attitude which was so manifest in this meeting, devoted entirely to the subject of life stress and bodily disease? Of course there is never one cause for any phenomenon in nature or in science. It is always a constellation of causes that brings about a change. The pioneers mentioned above had ploughed the field. Since then the second world war had confronted internists and surgeons all over the world with the influence of the emotional aspects of enlistment, combat and internment on the health of hitherto normal selected soldiers. The constantly negative results of the physico-chemical search for the cause of asthma, hyperthyroidism, ulcerative colitis, peptic ulcer, and hypertension had made some physicians more open to look for other, less tangible etiological factors. But these circumstances did no more than incite curiosity and pave the way. The real stimulus, the spark that ignited the chain reaction of investigational energy, came from the encounter with a seemingly unimpressive small man, named Tom.

The researches carried out on this gastric fistulous subject Tom and other subjects offering comparable opportunities for study, were not only just another set of good experiments. They showed to everybody who could see, that the problem of so called psychosomatic relationships could be studied with straight forward methods of clinical investigation. Their demonstration had a meaning that reached far beyond the problem of the influence of emotional factors on motility and vascularity of the stomach. What had been done with the stomach of a gastric fistulous patient could be carried out with other organs, provided a good methodological approach could be developed. In the following years the general applicability of this method was exemplified in investigations on hypertension, diseases of the nose, colon, the urinary bladder, and diabetes. This was the language which physiologists, biochemists, clinicians and clinical investigators understood and to which they responded. Much of the data presented at this meeting was obtained with the operational approach which, invented by

FOREWORD xvii

Cannon and Pavlov, tried by a few lonely pioneers before, had since then been systematically applied.

Apart from the importance of the data in the 69 papers that were presented, the realisation that the field of psychosomatic relationship was now wide open for a systematic and preferably quantitative investigation, was the main gain of this gathering. It is not too hazardous to predict that henceforward progress in our knowledge of the role which emotional stresses play in the etiology and course of human illness will follow in an accelerated pace. The coincidence of the meeting with the discovery of the great importance which the adrenocortical hormones play in the adaptation of the body to stress, will doubtless add another stimulus to our future research.

One of the most interesting general conclusions that could be drawn after the meeting was the realisation that the mechanisms which the organism utilizes in its continued efforts to cope with stress situations are often strikingly similar, whether the stress situation is of a physical (e.g. thermal), biological (e.g. nutritional or allergic), or emotional nature. This concept had already been expressed by investigators in various fields, on former occasions. This meeting, however, was one of the first attempts to bring together the factual data on which such a concept must rest before it can be accepted. In doing so the meeting demonstrated its trend towards a more scientific way of arriving at conclusions.

Another advance of a more general nature was noticeable during the two days of this gathering. The platform united at one table an unusual combination of psychiatrists of various creeds and psychologists, together with some of the leading internists, physiologists and representatives of the specialties of this country. In the course of the days it became clear that none of them sat there without a specific task. Apparently the subject of the effect of life stress on the human organism was so vast that here was a field where men from such a variety of disciplines could come together and attempt to integrate their distinct approaches to the problem into a composite picture. Certainly, it has been said often before that man is a unity and that this unity cannot be torn apart when man is ill. At this meeting, however, the philosophical concept of the organism as one whole, found its practical expression in the presence of investigators of so different background and point of view on the same committee. At this meeting it was possible for an internist to question the psychoanalyst on his concept of the unconscious, for the psychiatrist to ask the endocrinologist about his interpretation of life stress. The meeting, in other words, not only preached reintegration of the differentiated medical disciplines, it made a practical attempt to achieve it.

xviii FOREWORD

Every evaluation of the status of any branch of science must, in addition to the pointing out of its advances, pay attention to the field that is still uncovered and to possible dangers that may encumber future progress. The field that lies ahead of us is indeed vast. We realize that we are only beginning to understand some of the mechanisms that operate in the adaptation of the human organism to life stress. This, however at the present status need not frighten us any more: The field is open, the approach is clear, even if the methods to be employed for each particular problem have to be especially developed and carefully tested for their suitability.

Truly, just a description of personality traits and conflict situations in certain diseases is not enough to draw conclusions about the existence and nature of psychosomatic relationships in various diseases. The formulation of such a relationship must be supplemented by experimental, reproduceable evidence before it can graduate from an indication to a proof. But the careful taking of a history and the assiduous clinical observation of a patient's behaviour in various situations should never be forgotten or despised.

The production of data is the basis on which medical progress rests. An integration of the data, however, into comprehensive thinking is necessary to give the extension of our knowledge, its finishing touch and final aim. The following pages contain the data presented together with a provisional formulation. More leisurely contemplation of their contents will do much to achieve this end.

J. Groen
Amsterdam

CONTENTS

PART I

MECHANISMS INVOLVED IN REACTIONS TO STRESS	
 Adaptive Reactions to Stress. Hans Selye and Claude Fortier. Domestication of the Norway Rat and Its Implications for the Problem of 	3
Stress. Curt P. Richter. III. Situational Stresses and Extrapyramidal Disease in Different Personalities.	19
Robert S. Schwab and John S. Pritchard IV The Relative Importance of Social and Hereditary Factors in Producing	48
Disturbances in Life Adjustment during Periods of Stress in Laboratory Animals. J. P. Scott. V. The Reaction to Pain as Determined by the Galvanic Skin Response. Manuel	61
Furer and James D. Hardy with the assistance of Margaret D. Meixner and Rose Weiss	72
VI. Experimental Production of Human Convulsive Brain Potentials by Stress- induced Effects upon Neural Integrative Function: Dynamics of the Con-	90
vulsive Reaction to Stress. Wayne Barker and Susan Barker	90
and A. Dale Console. VIII. Reaction to Life Stresses Following Unilateral Prefrontal Lobectomy or Lo-	114
botomy, John E. Scarff	121
ing Factors in a Deteriorating Culture and Its Relevance to Bodily Disease. Leo W. Simmons.	127
X. Life Situations, Emotions and Idiopathic Epilepsy. John Higgins, Henry Lederer and Milton Rosenbaum.	137
XI. The Adverse Effect Upon a Family Resulting from a Radical Change of Personality in One Member after Frontal Lobotomy. Yale David Koskoff and	
Frederick L. WenigerXII. Some Specific Factors that Modify Tolerance for Environmental Stress.	
Howard LiddellXIII. The Effect of Thalamic Lesions upon the Emotional Reactivity (Rorschach	
and Behavior Studies). C. Orchinik, R. Koch, H. T. Wycis, H. Freed and E. A. Spiegel.	172
Part II	
THE PROBLEM OF SPECIFICITY IN BODILY REACTIONS DURING STR	ESS
XIV. Communication and Bodily Disease: A Study of Vasospastic Conditions. Jurgen Ruesch and A. Rodney Prestwood.	211
XV. Specificity of Bodily Reactions under Stress. A Physiological Study of Somatic Symptom Mechanisms in Psychiatric Patients. Robert B. Malmo, Charles Shagass and Frederick H. Davis.	231
XVI. The Predictable Association of Certain Emotions and Biochemical Changes in the Blood. Oskar Diethelm, M. Freile Fleetwood and Ade T. Milhorat	

XX CONTENTS

XVII. An Investigation of the Electrical Resistance of the Skin during Induced Emotional Stress in Normal Individuals, and in Patients with Internal Diseases. J. M. Van der Valk and J. Groen. XVIII. Life Situations, Emotions and the Excretion of Hippuric Acid in Anxiety	279
States. Harold Persky, Roy R. Grinker, I. Arthur Mirsky and Stanford R. Gamm	297
XIX. Life Situations and Serum Antibody Titers. John L. Bakke and Harold G. Wolff	307
PART III	
LIFE STRESS AND DISORDERS OF GROWTH, DEVELOPMENT AND METABOLISM	
XX. Socio-emotional Factors Accounting for Growth Failure in Children as Measured by the Wetzel Grid. Ralph I. Fried.	317
XXI. Stress and the Adrenal Cortex with Special Reference to Potassium Metabolism. Hudson Hoagland.	326
XXII. Studies in Diabetes Mellitus: Changes in Glucose, Ketone, and Water Me-	338
tabolism during Stress. Lawrence E. Hinkle, Jr. and Stewart Wolf XXIII. Life Situations, Emotions and Hyperinsulinism. Sidney A. Portis	
XXIV. Zest and Carbohydrate Metabolism. Warren S. McCulloch, Helen B. Carlson	
and Franz G. Alexander.	
XXV. The Relation of Life Stress to Arthritis. Leon HellmanXXVI. Changes in Body Heat Regulation Associated with Varying Life Situations	
and Emotional States. Helen Goodell, David T. Graham and Harold G.	
Wolff	418
XXVII. Hyperthermia as a Manifestation of Stress. Meyer Friedman	
Whitehorn	
XXIX. Dynamic Aspects of the Personality Features and Reactions Characteristic	
of Patients with Graves Disease. George C. Ham, Franz Alexander and	
Hugh T. Carmichael	
apy. John W. Ewell, Paul L. Munson and William T. Salter	
XXXI. Measures of Stress Responsivity in Younger and Older Men. Gregory Pincus	
XXXII. Effect of Agents Inducing Deliria on the Course of Certain Bodily Reactions to Stress, Thos. J. Heldt.	
PART IV	
LIFE STRESS AND DISEASE OF THE EYE	
XXXIII. Life Situations, Emotions and Glaucoma. Herbert S. Ripley	L
Part V	
LIFE STRESS AND DISEASE OF THE AIRWAYS	
XXXV. Life Situations, Emotions and Nasal Disease: Evidence on Summative Effects Exhibited in Patients with "Hay Fever." Thomas H. Holmes, Theo-	
dore Treuting and Harold G. Wolff	545

XXXVII.	Variations in Response to Standard Amounts of Chemical Agents during Alterations in Feeling States in Relation to Occurrence of Asthma. Daniel H. Funkenstein. Life Situations, Emotions, and Dyspnea. Harold N. Willard, Roy C. Swan, Jr. and George A. Wolf, Jr. Variations in the Secretion of Bronchial Mucus during Periods of Life Stress.	
11111	Ian Stevenson.	596
	Part VI	
	LIFE STRESS AND HEADACHE	
XXXIX.	Psychological Mechanisms in Chronic Headache. Arnold P. Friedman and	
	Charles Brenner Vascular Headache Experimentally Induced by Presentation of Pertinent	605
AL.	Life Experiences. Modification of the Course of Vascular Headache by	609
	Part VII	
	LIFE STRESS AND DISEASES OF THE STOMACH	
XLI.	Effects on Gastric Secretion of Frontal Lobe Stimulation. Lycurgus M .	01W
XLII.	Davey, Birger R. Kaada and John F. Fulton	617
	Life Situations on Gastric Secretion. I. Arthur Mirsky, Stanley Kaplan and Robert H. Broh-Kahn.	628
XLIII.	Psychosomatic Aspects of Salivary Activity I. Hypersalivation in Patients	647
XLIV.	with Peptic Ulcer. Thomas S. Szasz. Variations of Gastric Functions during Conscious and Unconscious Conflict States. Sydney G. Margolin, David Orringer, M. Ralph Kaufman, Asher	0.17
	Winkelstein, Franklin Hollander, Henry Janowitz, Aaron Stein and Milton Levy	656
XLV.	Correlation of Conscious and Unconscious Conflicts with Changes in Gastric Function and Structure and Observations on the Relation of the Con- stituents of the Gastric Juice to the Integrity of the Mucous Membrane.	
		665
	Part VIII	
	LIFE STRESS AND DISEASES OF THE COLON	
XLVI.	Life Situations, Emotions and Chronic Ulcerative Colitis. William J. Grace	679
XLVII.	Variations in Attitudes, Behavior and Feeling-States as Exhibited in the Play of Children during Modifications in the Course of Ulcerative Colitis.	600
XLVIII.	Dane G. Prugh	
XLJX	in Life Situations and Reaction Patterns. Erich Lindemann	706
	Fred Kern Jr and Frank K. Abbot	724