

A Symposium on the Child

Edited by:

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*Selected essays presented on the occasion
of the Seventy-fifth Anniversary of the
Johns Hopkins Hospital and the Dedication
of the Children's Medical and Surgical
Center, May 14-15, 1964.*

Edited by:

*John A. Askin, M.D., Robert E. Cooke M.D.,
and J. Alex Haller, Jr., M.D.*

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Introduction

The dedication of the Children's Medical and Surgical Center in May of 1964, on the occasion of the Seventy-fifth Anniversary of The Johns Hopkins Hospital, signaled the opening of a modern pediatric workshop for pediatricians and surgeons who are at this time associated with this institution. This new center, moreover, promises to be a haven for many future physicians and allied personnel who are concerned with the diseases and welfare of children.

The dedication did more than announce the opening of a new institution since an opportunity was afforded for reviewing the results of the training program and inspiring influences of The Johns Hopkins Medical Institutions of the past. The Symposium, "The Child," was therefore initiated. Physicians of outstanding reputation were invited to participate. Many of these had been trained or had taught or had worked at the old Harriet Lane Home. It became apparent during the Symposium that (1) Pediatrics at Hopkins has and continues to contribute a great deal to the advance of pediatrics in general, and (2) Pediatrics as a specialty was contributing a great deal to the advance of Medicine.

For historical value we have, at the suggestion of Dr. Robert E. Cooke, outlined the program of "The Child" and published in this volume most of the presentations.

This book is not intended to be one in which great discoveries are presented for the first time. Indeed, much of the material has been published in different form elsewhere. The

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purpose of this symposium is to identify important developments in the field of Pediatrics and Pediatric Surgery with former members of The Johns Hopkins Institutions. This record becomes documentary evidence of what these physicians have done for the well-being of children in general. This symposium should be an inspiration to the present and future generations of those associated with the new Children's Medical and Surgical Center.

We are particularly grateful to Dr. Edwards A. Park for his magnificent "The History of the Harriet Lane Home." His chronicle does much to help understand the conditions under which former members of the staff lived and worked. We are also indebted to Mrs. Karen Robinson and Mrs. Gloria Freeman for their diligent research and secretarial work which made this book ultimately possible.

J.A.A.

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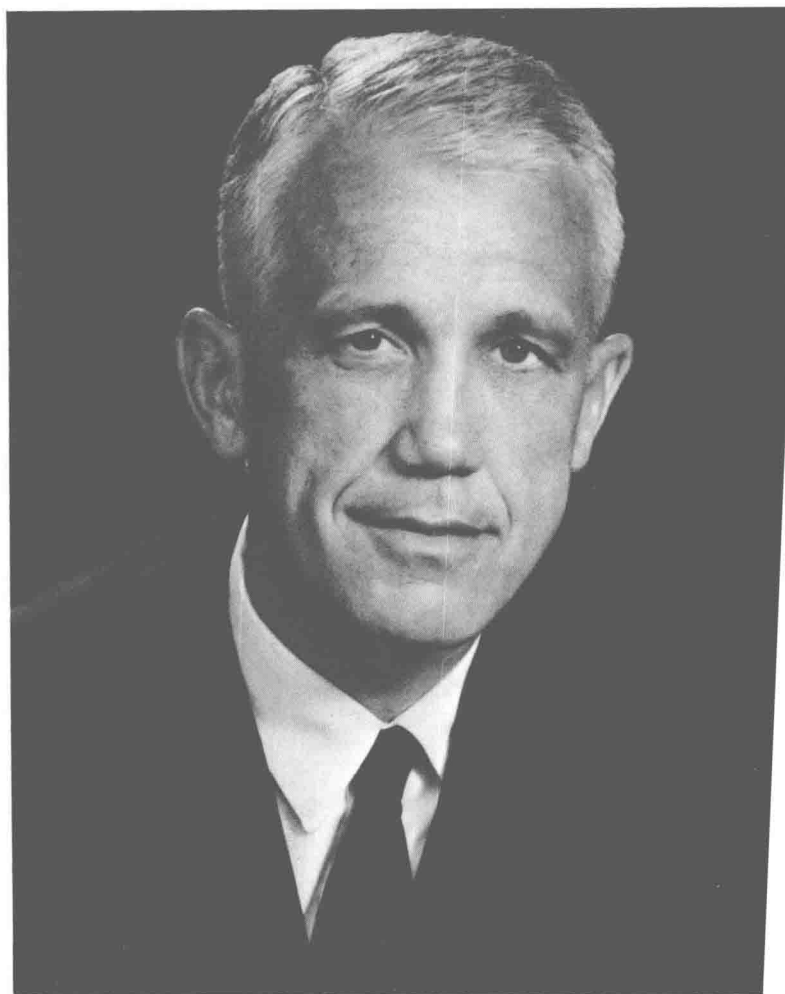
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*Robert E. Cooke, M.D.*¹

I. *The Biological Advantage of Man*²

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² Published in *Bulletin of The Johns Hopkins Hospital*, 1964, 115:297.



My concern here is not the contributions of pediatrics, or of surgery, or of medicine in general. This paper is not a chronicle of the achievements of men. I am concerned with the contributions of the child to man and with the high horizons to be attained thereby.

John Gardner, in his important book entitled *Self-Renewal*, pointed out that these are the days of fashionable pessimism. The eighteenth and nineteenth centuries held the view that man's life need not be grim; on the contrary, it might even be perfect if only man would use his powers of reason to good effect. He wrote that "the Rationalism, Optimism, and Millennialism of the Enlightenment spread into every area of intellectual life like rays from a thrown rock. It was widely believed that man was treading an onward and upward path that would take him inevitably to the perfect society."

In these days of fashionable pessimism the spirit of the Enlightenment has come in for lacerating criticism. "Pollyanna," though not a particularly charming name for a girl, has become a term of derision. The horror of World War II, the devastation of the bomb, the ever-present cold and hot wars cannot but sober. Newspapers, magazines, novels, and much of modern art are filled with the sensational tragedies of our world. Delinquency, race riots, and assassinations are the "big stories." It is little wonder that our generation concludes that man differs little in brutality and instinctive self-preservation from other animals.

I argue however, that fashionable pessimism is itself old-fashioned today. I am proud to be called a "Pollyanna." I present an optimistic approach—not because this paper is

given on a happy and festive occasion, but because the opportunity for improvement of man is a pediatric reality. The opportunity lies in the biological fact of man's immaturity at birth and his long period of development before attaining adulthood.

Indeed, to my mind the greatest single advantage which a member of the species *Homo sapiens* possesses, from the standpoint of exploitation, is to have been born immature and to remain immature for a long part of his lifetime.

Yet, somewhat paradoxically, the immature is more liable to death, to damage, and to crippling disorders than is the adult. His resistance to infection is low. He is totally dependent upon the caprices of his environment for his survival.

These deficiencies have been the subject matter and the responsibility of pediatrics for several generations. My great teacher and colleague, Daniel Darrow, properly stated that pediatrics began as a number of fairly independent *ad hoc* committees appointed from internal medicine and obstetrics to meet specific problems resulting from immaturity. The works of these *ad hoc* committees represent major milestones in the conquest of disease. The graduates of The Johns Hopkins University, the residents of The Johns Hopkins Hospital, the staffs of the Harriet Lane Home and of the Eudowood Sanatorium, and the advisors and participants in the Robert Garrett Fund for the Surgical Treatment of Children have all played leading roles in this undertaking.

The *ad hoc* Committee on Infant Nutrition met with great success. "When the Harriet Lane Home opened slightly more than fifty years ago," Dr. Park wrote to me, "rickets was on every side; scurvy was quite common; dysentery was exceedingly common, especially in the summer. Feeding difficulties were frequent, probably far in excess of those encountered now." Feeding routines were complex and inappropriate; protein intake often was inadequate.

Today, the presentation of a case of vitamin D deficiency rickets or scurvy would be a *cause célèbre*, attended by a full quota of house staff and students.

The by-products of the study of these disorders have extended into the physiology and pathology of bone through the

work of Park and the regulation of cell permeability as shown by Harrison only recently.

Infant nutrition became reasonable, comprehensible, appropriate, and simple as the result of the writings of Powers in the 1920's. "He clarified the requirements of infant feeding by pointing out that infant food must contain sufficient calories, water, salts, and other dietary essentials in mixtures giving certain proportions of the calories as protein, fat, and carbohydrate—a simple straightforward analysis that is so fundamental that the same rules can be used at all ages." (1) Nutritional problems now occur almost entirely as the result of ignorance and poverty.

Of even greater application to quantitative biology are the contributions of the equally successful *ad hoc* Committee on Diarrhea. Two products of The Johns Hopkins Medical Institutions, James Gamble and Daniel Darrow, were co-chairmen of this committee. Review of the *Journal of Biological Chemistry* for the decade 1920 to 1930 indicates the prominence of the Harriet Lane Home in the study of extracellular fluid. The analytical chemistry of acidosis, ketosis, and dehydration, and the role of sodium in the maintenance of extracellular volume and osmotic concentration were clearly demonstrated by detailed chemical analyses and balance studies. The methodology was taken directly from the advanced quantitative analysis of inorganic and physical chemistry of the time and applied to the study of human patients. Although the quantities of blood required have diminished, modern techniques have not exceeded the accuracy of the procedures worked out by Kramer, Tisdall, Gamble, and others.

From the same generation of uniquely individualistic investigators, Darrow unfolded the mysteries and the importance of the volume and composition of intracellular fluid in body physiology a few years later. He first successfully treated diarrhea in infants with potassium at the Harriet Lane Home. The reduction of intracellular potassium in alkalosis and the shift of intracellular water in disturbances of osmolarity represent two of the major contributions to the biological sciences resulting from the study of diarrhea.

The success of the pediatric groups working in infectious disease is best appreciated by a comparison of the mortality

rates of fifty years ago with those of today. There were 18 deaths per 100,000 in 1912 due to diphtheria; none in 1962. There were 9.3 deaths per 100,000 in 1912 from whooping cough; 0.1 in 1962. One hundred and fifty died of tuberculosis per 100,000 in 1912—only 5.1 in 1962.

In the conquest of tuberculosis the Eudowood Sanatorium played an important role in sensitizing the medical profession to the particular needs of the tuberculous patient. As early as 1911 it established an outdoor school for eight children with tuberculosis whose parents were in the Sanatorium. In 1928 the Children's Hospital for tuberculous patients was built and equipped by Mrs. Henry Barton Jacobs. In 1930 the first infant ward in any tuberculosis sanitarium was added. Dr. A. H. Finkelstein then became the only chief pediatrician throughout the history of the institution.

Likewise, the work of John Enders was carried out in a children's hospital—his work providing the tools by which all virus diseases may eventually be conquered.

Over a shorter but no less illustrious period than those of the foregoing, the Garrett Surgical Fund has provided resources for an *ad hoc* committee meeting the challenges of children's surgery. Consider the changes in anesthesia that have taken place over this period of years. I can still recall the pleasant sweet taste of chloroform administered as my tonsils and adenoids were removed at the age of four. Only a generation ago tracheo-esophageal fistula, pyloric stenosis, duodenal atresia, Hirschsprung's disease, and meconium ileus generally were fatal conditions, which now are remedied readily by children's surgery.

I would hope that no one will glean from this cursory review that the final reports of all the subcommittees are in—that all the jobs are done. New *ad hoc* committees have been appointed; new disorders and diseases demand solution. The Hoffberger Research Building and the clinical facilities of the Children's Medical and Surgical Center are prepared to meet these challenges.

What of latent infection? How does a virus remain quiescent in some kind of symbiotic relation with its host, to multiply and overwhelm when the host's resistance alters? What role does infectious DNA play as a mutagen combining or replacing in part the host DNA of somatic or even germinal cells?

Such questions will be answered by research as part of the Eudowood effort, spelled out several years ago by Dr. Walsh McDermott when economic life was breathed into the Children's Medical and Surgical Center.

What of congenital defects? This work, largely through the efforts of Blalock and Taussig, is under way. Not only the correction but the prevention of such defects is the subject of major task forces. The Garrett Surgical Service, possessed of a magnificent physical plant and generous support and resources, should lead this undertaking.

What of the biology of transplantation, the phenomenology of graft rejection and graft acceptance, the indefinite prolongation of life by renal and cardiac transplantation? *Ad hoc* committees in these fields will be chaired to great extent by Hopkins men as a direct result of the Garrett contributions.

A new and important effort has now appeared. Largely through the efforts of the man who was originally to have given this address, another committee has been created and given visible status. Tragically, an aberration of human behavior ended a great president's effort on behalf of the handicapped, particularly the mentally retarded, and presented all of us with an awesome assignment.

Research workers in the Kennedy Laboratories for the Study of Mental Retardation will be leaders in the conquest of the most disabling of all handicaps.

We are fortunate, indeed, that the proximity of the Laboratories to the care of patients does not permit anyone to forget why he is working. When Edward Séguin, the father of interest in the mentally retarded, laid the cornerstone in 1854 of the first building in this country for the education of the mentally retarded—called the New York Asylum for Idiots—he said: "God has scattered among us rare as the possessors of genius, the idiot, the blind, the deaf mutes in order to bind the rich to the needy, the talented to the incapable, all men to each other, by a tie of indissoluble solidarity."

Investigations in mental retardation merge almost imperceptibly with the study of brain function, learning, memory, mental capacity, motivation, and emotional reactivity. Here rests the great challenge for pediatrics and pediatric psychiatry as part of a massive investigational team. Furthermore, only in

the field of child health can effective application of such research findings be made.

I thus return to my first argument. The nervous system is immature at birth and develops slowly over a long period of years as a self-reinforcing system by which appropriate experience accelerates brain development, thereby preparing for assimilation of even more complex experiences. Through this long period of immaturity major improvements in the learning process may be effected, if such processes are fully understood—the ceiling being that imposed only by man's genetic endowment, probably an order of magnitude above his usual performance.

Unquestionably, the major contribution to biological science in this century has been the cracking of the genetic code. Yet the application of these findings to man's improvement has been in a sense a *negative* contribution. Because the genetic message is an assembly of so many small pieces, improvement by planned rearrangement seems virtually impossible. No one should hope for the improvement of man by systematic alteration of DNA base sequences. Beadle, in his excellent article, *The New Genetics* (2) pointed out that in any given organism mutations represent more or less random changes in an elaborate set of instructions that for generations has been selected for its appropriate message. His analogy may help make this clear. He wrote: "The Gettysburg Address is a carefully constructed and highly successful message. A random typographical error in copying it has a high probability of making it *less* successful." The contribution of genetics, then, must not be as the primary modifier of men but as one of the biological and behavioral investigative team, delineating those in whom particular environmental modifications may induce maximum improvement or failure.

Yes, man has the advantage of the longest ontogenetic preparatory period with opportunities for initial social training in every family. Significantly, the altricial condition of infancy increasing in primates toward man offers enlarged opportunities for a broader and deeper socialization of the young, related particularly to increasing potentialities for language, first non-verbal and finally, in man, verbal. Tobach and Schnierla (3) have pointed out that "theoretically man is in an infinitely

better position than any lower animal, including primates, to encourage the development of infants from their early stages of generalized biotaxic responses to acquire patterns of social behavior representing the best attainments of the group culture and social heritage." Although lower animals, such as birds and insects, have their territories, which have been used for long series of generations, and female primates pass on patterns of social interaction to their infants, these show scant resemblance to the essence of human folklore. History and conventionalized tradition on the other hand are given systematically to the human young. The chimpanzee resembles man recognizably in his emotional attributes, but he approaches the human level only very remotely in his capacity for social heritage.

What are the effects of environmental modification in infancy? Indeed what is the importance of critical periods in the human infant? Heinroth found that incubator-raised goslings, whose earliest approach experiences were with him, would later trail after him rather than joining goslings or geese. The process by which prior experience with certain stimuli at early stages of development affects the ensuing responses of certain birds and mammals descriptively is called imprinting. This type of response is probably also common among sheep, goats, and other animals with precocious young. Such imprinting, however, can occur only in a limited stage of development, termed a critical period. If the young duck is prevented from making contact early, the ability to imprint is lost permanently and no specific following occurs. Likewise, female rats prevented from manipulating solid objects during their youth do not nurse their young.

In humans the influence of environment during the long period of immaturity is exemplified by authentic descriptions of children raised in extreme privation, as by animals—for example, the two wolf girls of India. Such children have been reported to run on all fours and to resist any efforts to teach them to walk on two feet. They object violently to having clothing put on them, and they shun human company.

Examples of environmental reinforcement affecting the infant are just now being appreciated. Modern research gives an impressive documentation for the smile of the young infant being to a great extent under the control of external social

stimulation. Prior to twenty days of age there is virtually no smiling, and the rate diminishes sharply around six months to a point of virtual disappearance at eight months. Profiles for some reason are ineffective in eliciting smiles. In a series of operant conditioning experiments, it was shown that repeated exposure of the infant to a *nonresponding* adult face eliminates his tendency to smile and produces overt signs of discomfort and tension. In another series of experiments in three-month-old babies, the infant was rewarded for every vocalization by a smile and light caressing touch. The results showed that the rate of vocalization rose sharply during the conditioning trials. This reinforcement was social, not auditory. In the follow-up of children who had resided in a very inadequate orphanage, Skeels (4) noted an increase of approximately twenty to thirty points in intelligence quotient when these children were placed in an institution for the retarded to be cared for by older girls and women who themselves were retarded but who provided social experience for the infants. The intelligence levels of the young children rose to normal values despite the fact that they had been considered retarded on placement.

A critical period for the development of attachment behavior in human infants is between three and six months, and the six to twelve month period may be critical from the standpoint of deleterious effects associated with the disruption of the maternal-child relation. Language ability is likely to show more drastic retardation than any other type of function measured. Ainsworth (5) suggested that the deficiency of experience in hearing and interpreting adult speech is most responsible for the retardation which so often occurs in maternally deprived children.

The proposition of modifying man upward by early appropriate experience is not original with me and differs little from the statements of Terman a generation ago. In his monumental *Genetic Study of Genius*, published in 1925, he wrote: "It should go without saying that a nation's resources of intellectual talent are among the most precious that it will ever have. The origin of genius and natural laws of its development and the environmental influences by which it may be affected for good or ill are scientific problems of almost unequalled importance for human welfare." (6)