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DEVELOPMENT AND BEHAVIOUR OF CHILDREN*

BY

NORMAN B. CAPON, M.D., F.R.C.P.

Professor of Child Health, University of Liverpool; Senior Physician to Royal Liverpool Children's Hospital and Alder Hey Children's Hospital; Senior Paediatric Physician, Liverpool Maternity Hospital

I am deeply conscious of the honour conferred upon me, and upon the department of which I am Director, by the invitation to give this, the third, Charles West Lecture. And in expressing my appreciation and gratitude I should like to couple it with these words of Charles West, to be found in the preface to his lectures on the Diseases of Infancy and Childhood. "It is too late to hope for more than this: that when I have passed away, those to whom my memory will still be dear may hear my name sometimes mentioned as the founder of the first Children's Hospital that ever existed in this country." In this act of grateful remembrance, let us forget the touch of sadness—almost of bitterness—in his words, and let us rather rejoice that from the devotion and labours of those who have served the great institution which he founded has sprung much of the inspiration that has fostered the cause of paediatrics in this country during the past ninety years. No man can know how far his message will travel, and it is for succeeding generations to pay tribute where tribute is due—as I do now, to Charles West.

The outstanding characteristic of life during its embryonic, foetal, and childhood phases is the phenomenon of growth in mass (or weight) and in dimensions. It is accompanied by changes in the relative proportions of the component parts of the individual; by the development and elaboration of functions or skills consequent upon cellular specialization; and by a changing pattern of behaviour or reaction to internal and environmental conditions. The mode and degree of this evolution during childhood throw light upon the state of well-being of the individual, and its study is a source of great interest to all who deal with children, whether as parents, teachers, or paediatricians; but perhaps its special significance lies in the promise that it may carry for the future, when maturity succeeds to immaturity. Alexander Pope's famous line, "Just as the twig is bent, the tree's inclined," referred to the influence of education in childhood, but it is equally applicable to growth and development in a wider sense.

A vast store of information about growth, especially in regard to lower forms of life, is available, though the ultimate nature of the growth-urge and of the forces that restrain it still remains a mystery; and numerous studies of physical growth in childhood, and more recently of physiological and psychological development, have been made, especially in America (Gesell, 1945; Gesell and Ilg, 1946; Gesell and Amatruda, 1947; Tanner, 1949), and

have provided us with a mass of detailed and specialized data. There is, indeed, some danger—as there is in most branches of medicine—that the accumulation of so much factual information about a specialized subject—such as growth and development in childhood—may confuse thought, and the time seems ripe for an assessment of the present position to be attempted.

In undertaking this task I approach my subject as a paediatric physician, and I shall at once stress the significance of two concepts which are as old as Medicine itself, though I think it is right to say that during the past fifty years or so they have received much fuller and more practical consideration than ever before. I refer, first, to health and its maintenance; and, secondly, to the study of the patient as an individual—that is, as a separate and complete unit of life.

Health in Childhood and Its Maintenance

Most children are born in a state of full health; but there are many that subsequently deteriorate through the successive grades of "average" health to subnormal health and, later, to disease. It is well that we should keep these terms in mind when we try to assess health status and to give practical expression to our aims.

There has been, especially during the past seventy-five years or so, a steady improvement in the status of child health. Accepted standards have been determined mainly by the influence of public opinion reacting to the leadership of a few pioneers, some lay, like the seventh Earl of Shaftesbury, and some medical. But it is a well-known fact that in the past both the public conscience and the medical profession as a whole have been relatively slow to respond to the tragedies of morbidity and mortality in childhood. The labours of such men as Mead, Pringle, Lind, and Jenner, whose studies were in the field of general preventive medicine rather than paediatrics, undoubtedly did much to focus attention upon the practical possibilities of prophylaxis, and they prepared the way for William Farr and Sir John Simon.

When one considers the harshness of the times in which these two men lived, their contributions to the cause of preventive paediatrics were outstanding. They recorded (during the period 1850–65) the damaging effects of subnormal health and actual disease in the community as a whole; they studied with the utmost industry the social, occupational, and economic conditions of the people; and they suggested, with much foresight and remarkable courage, some of the means of prevention. For them the

*The Charles West Lecture delivered at the Royal College of Physicians of London on November 22, 1949.

problem was not solely a matter of life or death: "For those places where infants are most apt to die are necessarily the places where survivors are most apt to be sickly; and where, if they struggle through a scrofulous childhood to realize an abortive puberty, they beget a still sicklier brood than themselves, even less capable of labour and even less susceptible of education. It cannot be too distinctly recognized that a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race" (Simon, 1857).

The Report made in 1861 to the Privy Council by John Simon, who was then its medical officer, included specific reference to deaths in infancy; at that time the infant mortality rate in England and Wales was about 150 per 1,000. It is now under 40, and, although I shall not refer to the numerous influences that have played a part in causing this gratifying decline, I should emphasize that though the improvement is so satisfactory it does not justify complacency. Indeed, it imposes upon all those concerned with the welfare of children the duty of ensuring, so far as they can, that the standards which serve as ideals shall be still further raised.

Prophylaxis against death is a fine ideal, but prophylaxis against disease is still finer. And when we advance from this to prophylaxis against subnormal health—not amounting to disease, yet hindering potentialities for full development—we have ascended the heights from which the wide panorama of healthy childhood and manhood may be viewed. "Hitch your wagon to a star" is a suitable motto for those who aspire to make their contribution; but there must be care lest action ends with lip-service to an ideal.

The first step must surely be diagnosis—how are we to recognize subnormal health in childhood? I shall refer to this subject later, and for the moment it will be sufficient to emphasize that we must train ourselves to be sensitive to the positive attributes which characterize a healthy child. Some of these are physical—his colour, his posture, his delight in bodily exercise; some are intellectual—his zest to learn and his adventurous mind; some are emotional—his affection, his response to leadership, his loyalty. The differences between individual children are great and I am not suggesting that there is an accepted list of attributes and virtues which each child must satisfy before he can be called truly healthy. But it is only by making search for these and other evidences of health that the examiner can maintain his own diagnostic standards at a sufficiently high level; and in doing so he will find that he places increasing reliance upon the child's pattern of behaviour as a complete individual.

The Individuality of the Child

It is far from easy for a paediatric physician to make the sort of contact with his patient that an experienced general physician can establish with another adult; and without such contact, which implies an understanding of the patient's feelings and reactions, it is indeed difficult to assess a human situation satisfactorily. The passing of but fifteen years between the ages of 5 and 20—only one-fifth of an average life span, yet covering the whole mysterious transition from childhood to manhood—means a world of difference in human interests, emotions, and reasoning power, and it is hard, perhaps impossible, for most of us to recapture the outlook of our childhood days and to see life as our patients do.

Francis Thompson (1889) wrote of this difficulty as he, a layman, saw it: "We, of this self-conscious, incredulous generation, sentimentalize our children, analyse our children, think we are endowed with a special capacity to sympathize and identify ourselves with children, we play at being children. And the result is that we are not more child-like, but our children are less child-like. It is so tiring to stoop to the child, so much easier to lift the child up to you."

A doctor may understand that the dissimilarities between a child and a grown man are not to be measured merely by differences in weight and in relative size of parts; he may accept that the child, like the adult, has brain and spirit as well as body; he may have some knowledge of the patterns of physical and psychological reaction in childhood under normal and abnormal conditions. But these are only the first steps towards compounding his knowledge and experience into an understanding of each child as a separate unit of life—an individual in his own right, unique, capable of physical growth and development, and of mental, emotional, and social progress.

Whether the individual be sick or well, to understand his behaviour (using this word in the widest sense, to cover all his reactions to changes within himself and in his environment) as an individual or unit of life is one of our most important aims. "The proper study of mankind is man"; and this thought has stimulated enthusiasm for the recent developments that have been called psychosomatic medicine, social medicine, and industrial medicine. Latham (1836) emphasized the same point of view, in respect of sick humanity, when he wrote: "Diseases are not abstractions; they are modes of acting, different from the natural healthy modes—modes of disorganizing, modes of suffering, and modes of dying; and there must be a living, moving sentient body for all this."

To study the development of a child it is necessary to observe him through the successive phases of his life and to consider how he reacts to the conditions, normal and abnormal, that prevail; remembering always that the effects of trauma, infection, or other abnormal circumstances may be slow to show themselves. I propose, therefore, to make observations upon a child's progress from the beginning, at the fertilization of the ovum, through the successive embryonic, foetal, natal, and neonatal phases into the period of childhood proper; and to consider the more important factors or influences which act or may act in each stage. Genetic factors come first, chronologically, in the list; then the influence of intra-uterine conditions, including the effects that the mother's health and environmental circumstances may have upon her embryo and foetus. Later comes the act of birth, which must be thought of not only as physical separation of mother and child but also as the culmination of remarkable changes in foetal anatomy and physiology. Finally, after birth, the child comes directly under the influence, sometimes beneficial, sometimes harmful, of his environment, which includes both physical and human components. And all through these successive phases growth and development are susceptible also to internal endogenous conditions, such as the influence of ductless glands.

The child's reactions may be local or general, temporary or permanent, and it is noteworthy that the responses of the individual in each phase of life are apt to colour his reactions in later phases. Indeed, for most people the possibility of attaining full health and normality in adult life depends more upon their health in childhood than upon any other factor.

Genetic Influences

Though the science of genetics has advanced considerably since Harvey wrote, "Neither the schools of physicians nor Aristotle's discerning brain have disclosed the manner how the Cock and its seed doth mint and coine the chicken out of the egg," the problems facing those that undertake investigations of human heredity are enormous. It is, of course, agreed that genetic factors are important in determining an individual's future health, but the details of their operation are imperfectly known and it is seldom that the doctor can speak to parents with any degree of certainty about the probable condition of their unborn child even when an accurate family history is available to him.

It now seems likely that many malformations or disordered states (for instance, mongoloid defect and kernicterus) are due to an interplay of genetic and acquired influences, and it may well be that the effects of hereditary mutation are not infrequently simulated by those due to environmental conditions. It will only be by continued investigation of the largest groups available—especially when familial examples are found—that we shall get a better understanding of genetic influences. A good example of the success which may attend this type of investigation is provided by the studies of pancreatic fibrosis conducted by Dorothy Andersen and Hodges (1946) and by others. In a recent review of this disorder, Lowe, May, and Reed (1949) confirm that the disease results from a single Mendelian recessive gene which in the pure or homozygous condition causes a defect of the pancreas. These authors also concluded, from their studies, that between 2 and 18% of the general population carry the responsible gene in the concealed heterozygous state.

The detection of genetic carriers of inherited disease has valuable clinical significance, and the subject has been very well reviewed by Neel (1947). A most valuable compilation of the literature on human genetics has been published by Gates (1946).

Influences Operating During the Embryonic Period

It is obvious that the detailed study of man's development during embryonic life presents almost insuperable difficulties; yet it is a phase of life that is perhaps unequalled in the influence it may have, for good or ill, upon subsequent health and happiness. The urge to grow, measured by the relatively crude test of increase in weight, is stupendous. During the first six weeks of antenatal life the fertilized ovum, weighing about 0.005 mg., becomes an embryo of approximately 0.975 g., which is a multiplication of 195,000 times; it is as if a hen's egg (2 oz.) grew to a mass of 10 tons in the same period and proceeded to become a levathan of 33,000 tons by the end of the normal (human) antenatal period.

The forces which direct and restrain growth must be no less remarkable than the dynamic growth-urge itself; and notice must be taken not only of genetic or truly hereditary factors but also of the potential impress of many environmental states and threats. The subject has received much attention in recent years, and valuable reports are to be found in the first Charles West Lecture by Sir Leonard Parsons (1944); in his Blair Bell Memorial Lecture (Parsons, 1946); in numerous contributions by Warkany (1947); and in the Ministry of Health (1949) report on neonatal mortality and morbidity. A fascinating account of human embryology and the influences which may disturb it is presented by Corner (1944) in his Terry Lectures.

I shall attempt no more than a brief summary, emphasizing aspects of special interest to clinicians. Among these, perhaps the most arresting has been the steady accumulation of evidence that pathological changes in the embryo's environment may cause faults of growth and development exactly resembling those that in the past have been ascribed to pure genetic causes. In general it may be said that the harmful effects of trauma, intoxications, infections, and other potentially damaging processes vary not only with the nature of the offending agent and the structure and functions of the tissue mainly attacked but also with the maturity of that tissue; and experimental (animal) embryology has provided numerous examples of disturbed growth and development caused by such differing stimuli as trauma, irradiation, hormones, lack of vitamins, etc., when these operate during the organogenetic period. In man, chief interest has centred around the possible effects that faults in maternal diet, irradiation of the mother's pelvic organs, and various diseases of the mother may have upon the embryo.

Maternal Diet

In regard to diet, it would seem reasonable, on general principles, to believe that the embryo is unlikely to suffer by the range of variations in diet ordinarily taken by mothers in civilized countries, and the general conclusions reached at a discussion held by the Nutrition Society (1942) supported this view. Yet various surveys of nutrition in pregnancy (Ebbs *et al.*, 1942; Balfour, 1944; the People's League of Health, 1946; Hobson *et al.*, 1949) which have taken place during recent years have suggested that the stillbirth and prematurity rates can be reduced by improving the quality and quantity of the mothers' diets. In all probability the beneficial effects of a high-quality maternal diet operate upon the child in the later part of antenatal life rather than during the early weeks when organogenesis is occurring. But there is a possibility that specific dietetic deficiency may be harmful to embryonic growth and development in man; and in this connexion Warkany (1947) describes the deformities that can be produced experimentally in animals with diets deficient in copper, iodine, and vitamins A and B.

In regard to the possible effect upon the human embryo of irradiation applied to the mother's pelvis, there is not yet enough evidence to reach a definite conclusion. The contribution by Go'dstein and Murphy (1929) called attention to the danger, and since then gynaecologists have been on their guard, and it seems probable that a final answer will not be forthcoming for many years.

Rubella in the Mother

Although the aetiology of congenital malformations has been studied for centuries, it was not until Gregg's paper in 1941 that important evidence was published incriminating maternal disease (rubella) during the early weeks of pregnancy. It is now accepted that rubella and possibly other maternal infections may disorder embryonic growth, but their mode of action and the frequency of their operation are not known. A masterly review by Swan (1949) has surveyed the evidence against rubella, based upon more than 558 recorded cases in which there appeared to be a relationship between maternal infection and the development of congenital malformation, especially cataract, deaf-mutism (Clayton-Jones, 1947), cardiac deformity, and microcephaly.

Swan finds that on the available evidence a woman who contracts rubella during the first four months of pregnancy

has a 3 to 1 chance of giving birth to a congenitally defective infant; and Fox, Krumbiegel, and Teresi (1948) evidently accept the contentions of other workers that rubella during pregnancy increases the risk of congenital malformation from the usual figure of 0.9% to about 15%. But all those who have studied this question know that the histories given by mothers of their illnesses during pregnancy are often unreliable, and a committee of the American Academy of Pediatrics (1949) has recently emphasized the need for caution in interpreting this evidence.

Bradford Hill and Galloway (1949), using data collected by the approved societies operating under the National Health Insurance Acts before July 5, 1948, followed up 10 cases of rubella during pregnancy and found that of the seven babies born to mothers whose illness occurred during the first four months of pregnancy one had a congenital cardiac abnormality, one died when 5 weeks old (certified cause of death "pneumonia"), and five appeared to be free of any abnormality. In another report, Fox and Bortin (1946) followed up the records of 152 married women who had rubella during the years 1942-4 inclusive. Eleven of these women were pregnant at the time of the infection, five being affected during the first two months of pregnancy, four in the second to fourth months, one in the seventh month, and one in the ninth month. Of the six babies (one set of twins) born to the five mothers affected during the first two months of pregnancy one was stillborn (hydrocephalus) and one was said to be a "blue baby" at birth, with otitis media and hydrocephalus, but was later reported to have become "normal." The others were normal, as were also the six babies born to mothers affected by rubella subsequent to the second month of pregnancy.

The number of cases covered by these reports is admittedly small, but in general it may be said that the conclusions support clinical experience that in any series of miscellaneous congenital malformations the mother's history seldom reveals any infectious illness during pregnancy (Beswick, Warner, and Warkany, 1949).

My own private case records since early 1942 (and I present these rather than hospital records because I have taken the clinical histories myself and have been careful to inquire about German measles and other infections during pregnancy) include 243 examples of undoubted congenital malformation, made up as follows:

Mongoloid defectives	..	83
Other deformities affecting nervous system	..	37
Alimentary deformities	..	16
Congenital cardiac deformities	..	67
Urogenital deformities	..	5
Miscellaneous deformities	..	35

The mother of one mentally retarded baby had had German measles in the second month of pregnancy; the mother of one baby with congenital cardiac disease had had German measles 5½ to 6 months before the child was conceived; but in all the other cases the maternal histories were negative. The difficulty of assessing the harmful influence that maternal infection may have upon the embryo is increased by the fact that the frequency of congenital malformations appears to vary considerably—for example, geographically and in different social groups; furthermore, the accuracy of clinical observation and the criteria adopted will influence the findings. It is generally believed that, taking the country as a whole, the congenital malformation rate is about 0.5 to 1% of all births occurring after the 28th week of intrauterine life; but the figure is considerably higher than this in the practice of some maternity hospitals. For instance, during the period 1927-42 the incidence of malformations in the

Liverpool Maternity Hospital was 2.3% of all infants born alive—but it should be noted that this report includes even minor malformations such as small supernumerary digits.

It may be that some acute infections contracted by the mother during pregnancy destroy the embryo, which is then lost as an abortion; whereas the virus of rubella is seldom toxic enough to kill, and the child is likely to be born alive but possibly deformed. In this regard it is interesting to note, as evidence that maternal rubella may be fatal to the foetus, that Swan (1948) in a study of 760 stillbirths in South Australia (1939-45) found 16 instances (one doubtful) of maternal rubella during pregnancy, and in 13 of these cases the infection had occurred during the first four months.

From the preventive point of view, the possibility of granting immunity to potential mothers who have not had rubella during childhood has been considered, and Anderson (1949) has demonstrated that rubella may be transmitted by spraying suitably treated throat washings of affected subjects into the nostrils and oropharynx of volunteers. This artificially induced infection seems to confer immunity.

There is as yet no clear evidence incriminating the common infectious diseases, apart from rubella, as a cause of congenital malformations; Fox, Krumbiegel, and Teresi (1948) have made a recent report on this subject in regard to measles, mumps, and chicken-pox.

Influences Operating During the Foetal Period

Apart from untreated syphilis, it is unusual for disease of the mother to be transmitted through the placenta to her child, at all events in this country; and the placenta itself is seldom invaded either by infection, such as tuberculosis, or by growth, though Eardley Holland (1949) has reported an interesting example of malignant melanoma which was transmitted by the mother to her foetus.

Toxoplasmosis

Attention has been called in recent years to toxoplasmosis in foetal life (Sabin, 1941, 1942, 1949; Parsons, 1946; Adams *et al.*, 1948; Jacoby and Sagorin, 1948; Farquhar and Turner, 1949; Nutt *et al.*, 1949), but the frequency of this infection is still unknown. The effect of the protozoon is to cause a low-grade inflammation in the foetal tissues, especially in the nervous system, and its clinical manifestations in the early months after birth are numerous, the most frequent being meningo-encephalomyelitis, microphthalmus, bilateral chorioretinitis in the central area of the fundus, and hydrocephalus or microcephalus. The child is frequently retarded mentally and is liable to have convulsions; intracranial calcification may be seen radiographically.

The protozoon can seldom be demonstrated in the child during life, but every effort should be made to do so, and the most promising investigation would appear to be intracerebral inoculation of mice or guinea-pigs with either cerebrospinal fluid or the material obtained by liver puncture (Gard *et al.*, 1949). Rapid advances are being made in the study of complement-fixation and other diagnostic tests for the presence of this infection in mother and child, and particular attention is being given to the differentiation of active or recent maternal infection from former infections that have probably become inactive. Sabin (1949) asserts that, with the use of an improved antigen prepared from toxoplasma-infected chorio-allantoic membrane, it can be shown that toxoplasmic complement-

fixation antibodies can persist in the mother's blood for at least six years and that during this period she may give birth to uninfected babies. Macdonald (1949) has also reported upon two methods of demonstrating specific antibodies—a neutralization test on the chorio-allantoic membrane of the developing hen's egg, and a complement-fixation test using infected chorio-allantois to prepare antigen. Adams *et al.* (1949), in a survey of diagnostic tests for toxoplasmosis, conclude that the slide neutralization test of Sabin and Feldman (1949) is the most accurate, the most economical, and the quickest at present available.

It is, of course, probable that toxoplasmosis is not the only infection or disorder capable of causing the clinical picture that has been described above, and the newer methods of diagnosis will undoubtedly help in distinguishing those examples which are definitely not due to toxoplasmosis, though their cause remains obscure. It is noteworthy that intracranial calcification seldom occurs except in cases due to toxoplasmosis.

Pathological Processes Affecting Growth

Whether toxoplasma infection is frequent or not, these studies have revealed another possible cause of foetal disease and have suggested that others await discovery. They have also called attention to the damaging effect upon growth—for example, microphthalmus—that may be caused by pathological processes operating upon the foetus subsequent to the organogenetic period.

In this category may fall also those cases described by Terry (1943, 1945) as retrolental fibroplasia, and by Krause (1946) and Ingalls (1948) as congenital encephalophthalmic dysplasia. I have seen two of these cases recently. The baby is usually born prematurely, and the changes in the eyes may be seen at birth or may develop during the succeeding two or three months. A retrolental mass is observed, and there may be anterior and posterior synechiae, secondary glaucoma and cataract, and recurrent retinal and vitreous haemorrhages. Microphthalmus and strabismus are common; and the child may be mentally retarded, and may have microcephalus or hydrocephalus. In some cases single or multiple haemangiomas are found. The cause is unknown, but there is certainly no evidence of a genetic factor, and the lesion probably begins in the sixth or seventh month of gestation. In the earliest examples there seems to be a formation of connective tissue around the residual meshwork of the hyaloid artery; and in later cases there may be difficulty in distinguishing the condition from retinoblastoma, from metastatic encephalitis, and sometimes from tuberculosis and syphilis.

So much attention has been given in recent years to the fascinating subject of maternal iso-immunization by antigens present in the blood of the foetus (inherited from the father), though lacking in the mother's blood, that I do not propose to do more than mention it, as I must, of course, in discussing possible threats to foetal life. Recent general surveys are available (Medical Research Council, 1948; Cappell, 1948; Allott and Holman, 1949), and it is agreed that in most cases of haemolytic disease the antigen responsible is associated with the Rh factor, though, rarely, the blood group factors A and B may be the cause (Boorman *et al.*, 1949). Much remains to be discovered about the circumstances that transform a potentially dangerous situation into one of actual abnormality, for many babies that are at risk escape damage. It is apparent that some red cell antigens are more prone than others to produce immunization; and some women are more readily immunized than others.

Furthermore, a specific type of placental lesion may be necessary before the child is endangered; and little is yet known of the foetal defence mechanism against a maternal threat of this sort.

Mystery still surrounds those cases of foetal deformity in which the so-called amniotic bands (Simonart's ligaments) are found. A fibrous cord may completely encircle a finger, the wrist, or any part of a limb; or sometimes one end of the band is attached to the child's skin and the other end is free or is attached to the inner surface of the foetal membranes. It is not known whether these cords are the result of inflammation causing adhesion of the amnion to the child's skin, and whether they may amputate a limb or part of a limb by interfering with the blood supply.

It is rather surprising that disorders of foetal growth ascribable to abnormalities of the mother's hormonal mechanism appear to be infrequent. One example may be mentioned—the relatively rapid growth of the foetus of a diabetic mother, probably as a result of her excessive pituitary secretion (Bigby and Avery Jones, 1945). The child may reach the average birth weight of a mature baby by the 36th week of pregnancy and thus there may be obstetrical difficulty at birth. It is interesting also to note that the birth weights of infants born to mothers who subsequently develop diabetes mellitus are greater than the average normal, and the total foetal mortality rate in such pregnancies is greater than in non-diabetic pregnancies (Barns and Morgans, 1948).

Deformity of the child may be caused by faulty position *in utero*, and I have seen numerous examples of this type of physical distortion during the twenty-six years that I have had charge of the babies in Liverpool Maternity Hospital. Asymmetry of the head, deformity due to pressure of the head downwards upon the thorax, torticollis, and pressure atrophy of the skin are examples. In most cases the abnormality gradually disappears after birth, but when treatment is necessary—for example, in cases of talipes—it should be given without delay (Browne, 1934).

Premature Birth

The many problems presented by premature birth are well known to paediatricians, and I propose to refer only to the ultimate prognosis of survivors. It must be remembered that about 5% of all live births occur prematurely, and that the number of immature children (5½ lb. (2.5 kg.) or under) born annually in England and Wales is probably about 43,000; their future is therefore a matter of considerable importance to the health of the nation as well as to the individual and his parents. At one time the accepted opinion was pessimistic, and it was thought that children who had been born prematurely were often of poor physical and mental status; in recent years there has been a tendency to take a more optimistic—perhaps too optimistic—view.

Prognosis varies with the cause of prematurity, the type of labour and quality of the obstetrical service, the facilities available for the medical and nursing care of the infant, and the economic and intelligence status of the parents. No observer has yet been able to follow up the after-histories of a sufficiently large number of premature babies to justify an authoritative statement upon prognosis, but the recent reports of two British authors will repay study. Asher (1946), in a survey of 217 immature babies, came to the conclusion that both mental and physical development are often delayed by premature birth, and she discusses the part that may be played by cerebral anoxia and intracranial trauma—to which the immature baby is particularly liable—in causing this general retardation. Her paper includes a valuable survey of the literature from 1919 to 1945.

Drillien (1947, 1948) concluded her comprehensive study of prematurity with a survey of the progress of 103 immature infants, and she compared them with 174 full-term children. She found that the premature infants were relatively retarded in developmental progress (2 months in standing and walking; 4.2 months in talking), and showed a significantly higher incidence of nasopharyngeal and respiratory infection, especially during the first year. Behaviour disorders, especially in regard to feeding, were more frequent among premature infants; but the incidence of dental caries, rickets, and cervical adenitis was no greater than in the mature babies, and it is suggested that this may be explained by the more assiduous administration of vitamins to immature infants.

My own experience has convinced me that the immature baby's environmental conditions during the first twelve months after birth play a very great part in determining his future, and he is indeed fortunate if by the accident of birth he is born into a home where the parents are intelligent, well housed, and economically capable of providing the best possible conditions for him.

Influences Operating During Childhood

I must now refer to the more important influences acting upon the child's development and behaviour subsequent to early infancy; and although my aim is to focus attention, so far as I can, upon the study of the child as an individual, and upon his behaviour and reactions as a complete being—a separate unit of human life—it will be desirable, indeed essential, to introduce certain subdivisions, and I propose to consider physical aspects, intellectual aspects, and emotional and social aspects of child life separately, and in each case to make reference to the assessment of the child's status in that particular sphere, with comments upon some of the conditions that may operate adversely in regard to each.

It must be remembered, moreover, that each person, even in childhood, has certain qualities or attributes—physical, intellectual, and emotional—which can for convenience be grouped together as his individual or constitutional pattern and which we must try to recognize and accept as a background to his growth and development. These attributes are not always measurable, and sometimes they are difficult even to describe satisfactorily. For instance, there are children that are tall and lanky, others that are sturdy and squat; there are children of high intelligence and others that show an excess of stupidity; there are children that prefer to be solitary and others that are sociable. Some children are by nature difficult to manage, and their parents deserve pity rather than criticism. It is obvious that in some cases there may be an unrecognized cause, some disease or deformity, that is responsible for the feature observed, but in many it seems reasonable to assume that the characteristic is innate and to be explained only on a constitutional basis.

These varying physical, intellectual, and emotional types serve to remind us of the wide range of normality, and with experience one learns that an attempt to bring about a change of these characteristics by what we call "treatment" may be unwise. The child's own adaptations, with advancing months and years, will often enable him to adjust himself when modifications are desirable for his own comfort and for the harmony of the society in which he lives. We should perhaps be more concerned with the potentialities of body, mind, and spirit than with his present state; and we must be careful that rash interference on our part does nothing to hinder a natural process of evolution.

1. Physical Health

In attempting to assess the physical status of an individual we may expect considerable variation according to sex, race, family predisposition, environmental conditions, habits of life, etc. The criteria usually adopted are based upon: (1) certain biometrical tests in which physical characteristics such as weight, height, haemoglobin percentage, and visual acuity are measured and compared with standards based upon the examination of large groups of supposedly healthy subjects and (2) observation of the neuromuscular (or, as some would say, psychomotor) attainments of the child at successive ages, assuming that there is no detectable mental or physical disease to handicap progress and performance.

In individual cases, and sometimes in relatively small groups of children, other tests have been applied, usually for testing some specific aspect of physical condition, such as ascorbic acid blood levels.

Biometrical Tests

In regard to biometrical tests, the measurement of weight and height is, of course, simple to record, and the literature contains many reports based upon large-scale investigations which provide standards for comparative purposes. Widdowson (1947) quotes some of these records, in particular the Board of Education figures in 1938 (Menzies, 1940) and the American reports of Baldwin and Wood (1923) and of O'Brien, Girshick, and Hunt (1941), whose paper is especially valuable because it is based upon the heights and weights of 147,000 children in various social and economic grades and living in seventeen different States. Widdowson's own data were obtained by examination of 916 British children of middle-class status, apparently healthy and for the most part living at home, and they were found to be closely in line with the American figures. A recent survey of 5,684 London children under the age of 5 years, made by Gore and Palmer (1949), provides valuable details in regard to infants and younger children. Data relating to boys attending thirteen boarding schools and six secondary day schools are given by Friend and Bransby (1947). But all these surveys, though valuable in furnishing evidence about average weight and height at various ages, and high and low normal readings, help little in the individual case; for, unless one can assess the child's constitutional type, weight and height alone may have little meaning; and, in any case, comparison should be made with an "optimum" rather than an average standard. Their significance for the individual child is, of course, greater if the readings are recorded at intervals of time, to give some indication of progressive changes with age and the varying conditions of life.

Wetzel's (1941) studies went a stage further in the attempt to record and measure physical status in childhood. In his "grid" system he claimed that by plotting height, weight, and age on a special chart or "grid" it was possible to separate the individual effects of various physical attributes such as physique (or body build), developmental level, and nutritional grade, and from these to reconstruct a graphic picture of physical progress; and he claimed that by the use of this method it was possible to recognize the onset of malnutrition before any signs could be detected by the ordinary methods of clinical medicine (Coleman, 1949). A point of particular importance was Wetzel's (1943) emphasis upon the use of a method which aimed at showing whether a particular child was keeping up to the best progress of which he was capable, rather than comparing him with some other child taken as a standard.

Many other formulae have been devised to throw light upon a child's physical status and progress: for instance, Tuxford's index, which concerns the relative lengths of the upper half and the lower half of the individual; the arm-chest-hip index (A.C.H. index) of the American Child Health Association; the nutritional status index—an elaboration of the former test; and many other somewhat similar schemes. They are to be welcomed because they stimulate further inquiry and encourage accurate quantitative measurements; and in time they will certainly help to clear up the confusing complication of the

child's constitutional pattern and the significance of differential rates of growth, as a result of which the individual's form changes from month to month. It is well known that different types of growth curve can be demonstrated for skeletal, nervous, lymphatic, and urogenital tissues, and this obviously has a bearing upon the complexity of growth of the body as a whole. The external characteristics of the individual at any one time are surely worthy of more detailed study, and it seems reasonable to believe that Sheldon's (1940) somatotype system or some analogous method of observing and recording the cardinal features of body-build (for instance, that proposed by Tanner, 1949) might be usefully applied to children, especially as more extensive anthropometric tables become available. Ellis (1948) has stressed that in assessing growth and "nutrition" of children between 9 and 18 years maturity is almost as important as chronological age. No composite growth curves can form a satisfactory standard of comparison for the individual case unless the curves are constructed from measurements made of children maturing at approximately the same age.

In regard to certain rather specialized tests, such as radiography (to determine bone-age), haemoglobin estimation, detailed examination of vision and hearing (of much importance when there is a suspicion that a child may be intellectually slow or inattentive or of faulty posture), these, and others, have considerable usefulness, but there are obvious objections to their general application; and it is therefore desirable that further efforts should be made to evolve "screening" tests which might help the clinician in selecting those children that require special investigations.

Neuromuscular Attainments

In regard to neuromuscular attainments, the work of Gesell and others who have made special studies of the attainment and progress of infants and children is well known: it has been one of the major contributions of this century to physiology and medicine. Above everything, it has illuminated the details of the integration which has long been known to exist between the nervous system and all other systems, and has emphasized a point of view that is fundamental to both preventive and curative paediatrics because it takes count not only of specific localized competencies and skills but also of the attainments and behaviour of the whole child as a separate unique individual.

If an adult develops defective vision or hearing he makes a series of adjustments, some voluntary, some unconscious, by which he adapts himself to the new conditions of his life, and with these adaptations and the memory-stored experience of his environment he is often able to avoid any considerable alteration of his life and habits. But an infant is not simply a miniature man; to him even a slight impairment of visual or auditory perception cuts down the range of his environment—what Gesell has called his "space-world"—and limits his opportunities for gaining experience from his surroundings. It is not surprising, therefore, that a physical handicap of this sort may be responsible in childhood for an irregular development of neuromuscular attainments and adaptations, and that these in turn may lead to unusual reactions as revealed in his posture, manual skills, intelligence, and general behaviour.

Factors in Physical Growth and Development

I have said enough about the assessment of a child's physical status to indicate that, no matter how valuable the results of special examinations may be—and indeed in some cases they are essential—their application cannot be made general; and probably the clinical opinion of the doctor with wide experience of both healthy and sick children gives us the best answer obtainable at present. I have indicated elsewhere (Capon, 1945) the practical details of the examination; and the necessity for ensuring that those doctors responsible for this important work are adequately trained and competent is strong support for some interchange of duties being arranged between those paediatricians that are concerned mainly with prophylaxis and those that work in hospitals.

I can do no more here than outline the factors which, in addition to the inborn capacity to grow and the other influences already discussed, may play a part in stimulating or retarding physical growth and development during childhood proper. Some are intimately related to diet, but in a community that is not suffering actual deprivation of food it is doubtful whether luxury dieting would confer physical blessings upon children. In this connexion it is interesting to note Widdowson's (1947) observation that similar individuals may differ enormously and unpredictably in their food habits, and that marked departures from the average daily intake of food are compatible with normal physical development.

On the other hand, specific dietetic deficiencies, such as the avitaminoses, may be very harmful to normal growth and development, as in rickets and scurvy. Adverse hygienic conditions, such as lack of sunlight and fresh air, uncleanness, bad housing conditions, lack of adequate rest and exercise, may affect growth and certainly interfere with the development of a proper sense of values in regard to habits of life and standards of living. The diseases which disturb growth and development are very numerous. Gardiner-Hill (1937) called attention to the influence and interaction of four groups of possible factors—nutritional, infective, endocrine, and hereditary—and since that time there have been many advances in our understanding of these problems, especially in regard to endocrine disturbances.

2. Mental Health

Those who have devoted themselves to the study of psychology and psychiatry in childhood are the first to admit that many of their problems are likely to remain unsolved for many years to come; and clinicians who, like myself, possess no special knowledge of these subjects but can take only a general view of this aspect of a child's life need not, therefore, feel downcast by an inferiority complex. It is, however, a great pleasure to pay tribute to the special assistance that psychologists give to paediatricians, and in making the following comments upon mental health and intelligence status I ask for the indulgence of those with fuller knowledge of the subject than I possess.

If the child's intelligence is to expand to its greatest capacity the potentiality to develop must be present even before birth, and it is probable, unfortunately, that in about three-quarters of all cases of mental retardation the fault is inherited. Furthermore, the risks of antenatal, natal, and post-natal disease must be remembered. In addition, the integrity of the child's sense organs is very important; and he must have opportunities of learning under conditions, both at home and in school, that are likely to maintain full physical health and to bring contentment and happiness. The stimulus of encouragement is also needed by many children, though not by all; there can be no doubt that the results of mental training are greatly enhanced when the child's interest and enthusiasm can be aroused.

That is the background, and it is usually possible to discover by ordinary clinical examination and by common-sense inquiry whether any gross intellectual handicap exists. In many cases the clinician can go further, and is able to indicate, with a fair degree of accuracy, the cause of sub-normal or retarded intelligence: for instance, an inherited tendency, a defect of vision or hearing, a crippling disease such as spastic paralysis, a lack of incentive and interest, an emotional difficulty. But the recognition of minor degrees of mental retardation—"minor" only in the relative sense, for any handicap of this sort is likely to limit potentiality for full health and happiness—and the elucidation of

specific types of intellectual handicap require special investigation.

The introduction of the so-called intelligence tests was an attempt to record and measure a child's inherited intellectual endowment, and its expansion with age. There will be no need for me to give any details; the revised Stanford Binet scale, by which a child's mental age is compared with his chronological age and with accepted standards, seems to have received most general acceptance. But there are innumerable modifications and variations of these tests, mostly designed to throw light upon particular aspects of intellectual capacity—for example, logical thought and educative capacity, verbal facility, kinaesthetic facility, and general scholastic attainment. Perhaps it should be emphasized that the proper use of intelligence tests requires much care and considerable experience on the part of the examiner, whose work must be done in a sympathetic, understanding, and unhurried manner. The time factor necessarily restricts the general use of intelligence tests, and it is doubtful whether "group" tests will prove to be satisfactory.

The incidence of subnormal intelligence is not known, and in fact could not be determined unless agreed standards were first defined. It seems probable, however, that between 4 and 7 per 1,000 children are mentally retarded to a degree that brings them to the notice of the school authorities or doctors; and as there are approximately 9,000,000 children under the age of 15 in England and Wales, the extent of this menace is obvious. But I submit that in the study of mental retardation our attention should be directed mainly to the recognition and treatment of children suffering from relatively slight degrees of subnormal intelligence. Such examples are numerous, and we know that some of them become delinquents, many suffer frustration, and all are apt to cause disharmony at home and difficulties in school. As a general rule investigation of these states of subnormal mental health provides more information, especially regarding aetiology, than studies of grossly defective children.

3. Emotional Health

I do not know that there are any accepted criteria for the assessment of emotional and social health, except the common-sense tests of a child's happiness, his harmony with those who come into contact with him, and his conduct or behaviour. It is always easier to recognize the abnormal than to define the normal, and this is no less true of emotional than it is of physical health. Our energies should be directed to studying the positive expressions of emotional and social health, for with this object in mind we shall better understand the causes of emotional instability and ill-health, and prophylaxis may then become a practical aim. I shall therefore make some observations upon the emotional needs of children and their relationship to the individual's progress towards mature development. My remarks will be based upon my clinical experience as a paediatrician and, during a period of 21 years' service in a "teaching" hospital, as a general physician.

Though I do not pretend to understand many of the hypotheses propounded by psychologists to explain what clinical observation reveals, I am well aware of the important part that the emotional state of an individual, whether child or adult, plays in his life; and of the need for harmonious adjustment between the individual and his environment. Yet when one refers to the writings of general physicians and paediatricians prior to the present century it comes as a shock to observe that this aspect of health and disease received little formal notice, though we

are not entitled to assume that these observers were blind and deaf to the unusual manifestations of behaviour that may be exhibited by children, even when there is no obvious or demonstrable physical cause.

Charles West devoted to this subject 20 of the 878 pages in his *Diseases of Infancy and Childhood* (1884). Eustace Smith, in his 800-page *Disease in Children* (1884), states, "In the young subject signs of nervous disturbance may arise quite independently of actual disease in the nervous centres," but no more. Trousseau's (1868) lectures on *Clinical Medicine* (5 vols.) include one lecture on nocturnal incontinence of urine. Henoch devoted 38 pages to the subject in his lectures on *Children's Diseases* (1881), which extended to 930 pages. Ashby and Wright (1899), in their textbook *The Diseases of Children*, allocated no more than 12 pages out of 850 to nervous conditions such as night terrors, hysteria, and head-banging. Even in 1935, when the fourth edition of Pfaundler and Schlossmann's *Diseases of Children* was published in America, with the co-operation of 21 American paediatricians, only 84 pages of a total of 2,860 were devoted to the functional nervous disorders.

It is now generally agreed that insufficient attention has been given to the emotional development of children. If they are to be healthy and happy they must certainly have healthy bodies and minds; but in addition their nervous systems must be reasonably stable and capable of suitable adjustment to environmental variations. Maladjustment, which often leads to unhappiness, frustration, and sometimes to delinquency, may be related not only to physical disorder and to intellectual retardation and abnormality but also to emotional disturbances. Indeed, the correlation of physical, intellectual, and emotional disorders is so intimate that it may be impossible to say which fault is primary. And in the past there has been a tendency to regard emotional upsets in childhood as trivial complications occurring in the course of physical disease, or as demonstrations of wilfulness—sometimes actual naughtiness—which can be dealt with quite adequately by parents and teachers without resort to doctors.

It is, of course, true that sensible management of children in the home and school is important in preventing emotional disturbances; but there are three arguments which persuade me that these disorders of behaviour, and their early diagnosis and treatment, are well worthy of the attention of doctors. First, they cause ill-health and unhappiness to a considerable number of children and anxiety to their parents. Secondly, by recognizing the causes of these disorders and by ordering appropriate treatment the family doctor can make a splendid contribution towards achieving the ideal of full health. Thirdly, despite the scarcity of reliable corroborative evidence, a strong presumptive case can be made for the view that the seeds of nervous instability in adult life are often sown during childhood. My own experience is now long enough to have shown me—and there must be many present with longer experience who would doubtless agree—that a prolonged period of emotional imbalance in childhood may become ingrained in a person's constitution, and the instability may then be transmitted, in one form or another, to the next generation.

Instincts of Nutrition and Self-preservation

It requires no special knowledge of psychology to appreciate that the primary instincts of nutrition and self-preservation are powerful motive forces in children. The desire for food, stimulated by hunger, and the search for protection against environmental stresses and dangers are

fundamentals in life ; and the infant, like all young animals, turns to his parents for these services, for he has not yet learnt to seek actively for food that is not ready to hand, nor has experience taught him the adult's range of adaptation to changing environmental conditions.

Watch a cat with her kittens, or a mother nursing her baby, and you are at once struck by the fact that in this situation the young creature's fear—always more readily evoked than in later life—is in abeyance, and it appears to feel secure. There is usually some obvious evidence of affection (parental feeling for child, and love of child for parent) between the two, though it varies much in display ; and it is probably true to say that in humans, at all events, the display is not necessarily a measure of the depth or strength of the emotion. For full emotional health and development in infancy, parental affection and protection are necessary, and the child's needs for security and for the demonstration of affection must be supplied. Is it not true that mature men and women usually live fuller, healthier, and happier lives if they enjoy a sense of relative security—for instance, in respect of livelihood—and when they have someone with whom they can share affection ? And if this is true of adults, is it not still more true of children ?

To labour the point may seem unnecessary ; but it must be remembered that there are many homes where children are denied the satisfaction of these needs ; and in other places where groups of children are to be found, for instance in institutions, there may be a lack of respect for these emotional demands. This was one of the matters which Spence (1947) had in mind when he delivered his Charles West Lecture on the Care of Children in Hospitals. The Curtis Committee in its Care of Children Committee Report (1946) underlined the same point in paragraph 427.

Herd Instinct and Power Instinct

There are two other instincts which every doctor can observe when he studies children—the herd instinct and the power instinct. Most children are sociable, and seek the companionship of others of their own age group. For friendship, for play, and for amusement these associations satisfy elemental needs. But they are educational as well as recreational ; they provide standards of conduct and give opportunities for the “give and take” of life which may later develop into virtues such as loyalty and unselfishness. To desire possessions and to assert one's individuality in relation to environment are human characteristics which may become dominating and objectionable if they are not subjected to the restraining and guiding influence of a society made up of individuals at approximately the same stage of maturity. And this process of personality-moulding by contact with one's fellows does more than provide a pattern of behaviour ; it forms character, and conduces to the development of a well-balanced adult constitution.

But it is not enough to ensure that children enjoy affection, security (both physical and emotional), and the society of their fellows ; the immature organism needs some measure of guidance from without, until the habit of conforming to a pattern of life dictated by custom and conscience is learnt. And the guidance, control, or discipline—call it what you will—must be sympathetic yet authoritative, elastic enough to permit of self-tuition by some degree of trial and error, and based upon example and leadership rather than upon dictatorial command. (Miller, 1935, 1937.)

Hero-worship, the zest for adventure, and vivid imagination are childhood characteristics that may run wild without some beneficent control ; yet if they are suppressed

there may develop from the rich potentialities of childhood nothing better than a half-man, drab, timid, lacking the fire of imagination and what Rupert Brooke called the “quick stir of wonder”—a creature unsympathetic and ungenerous. “Know you what it is to be a child ?”—wrote Francis Thompson. “It is to believe in love, to believe in loveliness, to believe in belief ; it is to be so little that the elves can reach to whisper in your ear ; it is to turn pumpkins into coaches and mice into horses, lowness into loftiness and nothing into everything, for each child has its fairy god-mother in its own soul ; it is to live in a nutshell and to count yourself the king of infinite space.”

Few can rise to such flights of expression, but we can all appreciate—indeed *must* appreciate, if we are to keep high standards of health as our ideal—that the urges of childhood not infrequently have their wings clipped by lack of understanding and by deprivation of opportunity. But opportunity without guidance during immaturity may easily transform liberty into unbridled licence. And the best guidance for children, with their faculty for imitativeness and habit formation, is affection blended with the stimulus of good example (Capon, 1947).

Personal Clinical Experience

I have studied the factors which, so far as my own experience goes, are chiefly concerned when emotional and social health is disturbed in childhood, and my conclusions are based mainly upon a series of 450 children referred to me with complaints which, in my opinion, were more probably ascribable to the influence of their human environment than to physical causes or to intelligence status. It is a fact that relatively few of these patients were submitted to specialized tests of physical health—for example, radiography—or to intelligence testing. Their histories were recorded by me and in each case I carried out a full clinical examination. Probably some of these children had organic lesions which I did not discover—for instance, oesophageal stenosis or partial deafness ; and I do not doubt that some were of subnormal mental status, though to a degree not recognizable at ordinary clinical examination. But I have been careful to exclude any child whose condition left me in doubt about the presence of an “organic” cause, and I shall therefore not make any further reference to the part that physical ill-health, intellectual retardation, and defects of sense organs may play in causing emotional and behavioural difficulties.

It is notoriously difficult and perhaps impossible to classify such cases satisfactorily, but I have found it useful to subdivide the patients into the following groups, according to the dominant symptoms and signs.

Group 1.—Characterized mainly by abnormal neuromuscular activity. Examples are : habit spasms ; some disorders of speech, such as stuttering and stammering ; nervous vomiting ; nervous diarrhoea ; nervous dyspepsia ; enuresis ; breath-holding ; head-rolling and head-banging.

Group 2.—Certain disorders of mental function, such as forgetfulness and inability for mental concentration.

Group 3.—Certain psychoneurotic manifestations, such as anxiety neuroses ; phobias, including night terrors ; negativism to feeding, sleeping, defaecation, micturition, playing, and sociability ; timidity and shyness ; outbursts of temper ; nervous irritability and sensitivity ; day dreaming and fantasies.

Group 4.—Examples of antisocial behaviour, such as untruthfulness, pilfering, truancy, and cruelty to children and animals.

In my series, the percentage distribution was : Group 1, 35% ; Group 2, 7% ; Group 3, 52% ; and Group 4, 6%.

Bearing in mind the fact that more than one-half of the patients were "only" children, it is hardly surprising that excessive or unbalanced parental affection, often amounting to over-protection, was frequently disclosed in the histories in Groups 1 and 3. One of the most frequent sequences was as follows. An "only" child of conscientious parents developed a trivial feeding disorder often due to a breakdown of breast-feeding. Failure to gain weight adequately, and perhaps anorexia, with colic and fretfulness, caused the mother to worry unduly about the child's nutrition; then followed several months of subnormal health during which the parents, losing sleep because of the child's fretfulness and perhaps receiving complaints from adjacent flat dwellers, became increasingly "on edge" and lost confidence in themselves; then gradually, as a reaction to irresolute and vacillating management, the child developed negativism to feeding and other manifestations of a functional nervous disorder, the details of which have been described by many authors, and notably by Cameron (1933, 1946).

It is noteworthy that a careful history usually indicates that the perplexities of the parents—often based on over-protection and aggravated by the disturbing effects of certain types of popular lectures, newspaper articles, and semi-medical papers in popular journals—have existed for many months, and that the child's nervous system has become increasingly unstable during the whole of this period. From time to time the occurrence of actual illness accentuates a difficult situation; and the conflicting advice of grandparents and neighbours may cause additional trouble, especially when it results in disagreement between the parents. And it must be remembered that even when correct advice is given to the mother she may find difficulty in following it if she is herself of the highly strung conscientious type, and particularly when she has no other children requiring her attention.

No less harmful than excessive protection is the failure by the parents to exercise reasonable discipline. In practice this usually means that a child should not be expected to make decisions which are beyond his powers of reasoning; such decisions must be made by the parents, and the child must obey. Authoritative control of this sort needs gradual modification as the child grows older; and I need hardly say that the parents who are most successful in maintaining a beneficent type of discipline are usually well-disciplined in their own lives and their control of the child is mainly by leadership and example. To appreciate the extreme ill-effects of lack of discipline in the home it is instructive to study a group of juvenile delinquents; and in many of the so-called "problem" families "it is not so much the physical as the mental and moral environment that is pre-eminently at fault" (Stallybrass, 1946). Regrettably, it is only too true that in many homes there is a lamentable absence of leadership; and in some families the child's sense of security is undermined by discord between the parents, and he has to face the problem of divided loyalties.

The general conclusions that may be drawn from a study of the aetiology of functional nervous disorder in childhood point to the immense part played by a normal home life in the evolution of full health. It is from his human contacts, especially in the home, that a child derives emotional satisfaction and, with suitable guidance, develops self-reliance, unselfishness, and a sense of moral and social values. With this foundation his responses and reactions to the broadening experience of life that comes during later childhood and puberty will be encouraged to take shape in a spiritual sense. But if he is denied these advantages he is in danger of growing up under the handicap of an unstable nervous system, a victim to indecision and frustration

because his inherent potentialities have not been able to come to fulfilment.

Conclusion

To summarize, I have tried to give some account of the conditions which influence and mould life during the ante-natal and childhood phases and which play an important part in determining whether that life is to be healthy, happy, and of positive value in human welfare, or whether it is to be unhealthy, cramped, and—if not always unhappy to the child—at least a source of anxiety and distress to parents, and a demand upon the resources of society. Though it has been necessary to sketch the broad outlines of the subject rather than to give detail, I hope that I have been able to convey the idea that in childhood, perhaps more than in any subsequent period of life, it is essential that the highest standards of health should be demanded, and that nothing less than the best is good enough. Two tests of health in children stand out pre-eminently and form the basic criteria of a child's health status: the first is his growth and development; the second is his behaviour as a separate, though immature, member of society. The various methods of clinical examination, which are designed to provide information about the physical and mental condition of the child, are essential techniques towards this end, but they must be regarded as the preliminaries to a comprehensive survey of the child's conduct or behaviour as an integral unit of his society.

There is, of course, nothing essentially new in this idea: the wise doctor has always considered his patient as a man or woman who is suffering from, say, a growth or a tuberculous infection, rather than the uninteresting container in which some morbid process happens to be placed. But the evolution of the practice of medicine requires that, from time to time, attention should be focused upon some particular feature, and sometimes it may be advantageous that a new term should be coined to designate the idea and to stimulate—often critically and most usefully—the interest of the medical profession. Thus we have become acquainted with "positive" health, the psychoneuroses, psychosomatic medicine, social medicine, industrial medicine, and, most recent of all (and with a note of apology by its introducer), psychosocial medicine. I find myself on the side of those who hold that Medicine had always embraced the content of these novelties, though admittedly she has not always given them the encouragement and opportunities for free development that she might have afforded. But though I remain loyal to general medicine, I support the development of these offshoots, which the great advances of knowledge have made essential. This is not the time to speak of the relationships which should be encouraged between the specialist branches and the main trunk of the tree from which they have grown; but I cannot help hoping that no one will try to coin a word which is intended to crystallize the whole of this fundamental conception of paediatrics. Rather would I wish that paediatrics, which is general medicine during the period of childhood, should automatically and invariably signify that the patient as a whole has been considered.

One final word: I submit that the future offers to the medical profession still greater opportunities of service than it has enjoyed in the past—in both the curative and the preventive field—and that doctors engaged in paediatrics are likely to be especially fortunate in this respect, for their influence bears upon life during its formative period. To them are granted signal opportunities of helping children to grow up to manhood in such a way as to conform with Lord Morley's dictum that the great business of life is to be, to do, to do without, and to depart.

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VASODILATORS IN PERIPHERAL VASCULAR DISEASE

BY

A. H. DOUTHWAITE, M.D., F.R.C.P.

Physician, Guy's Hospital

AND

T. R. L. FINNEGAN, M.B., B.S.

House-physician, Guy's Hospital

Brilliant achievements in the field of therapeutics have deprived the aged of peaceful death from pneumonia. We shall necessarily be faced with an increase in the number of sufferers from obstructive disorders of the peripheral arteries and arterioles. Their treatment is still disappointing, though sympathectomy marks a therapeutic advance. It is a major operation fraught with hazards for the elderly, and in any case is disappointing in the long run because of the frequency of relapse.

The common vasodilators—for example, nitrites, thiocyanates, and nicotinic acid—though producing intense flushing of the head and neck, seldom, in tolerable doses, influence the circulation in the hands or feet. Throbbing, headache, giddiness, palpitation, and transience of action render the volatile nitrites useless. Glyceryl trinitrate, though persistent, is more likely to cause headache than flushing of the extremities. The thiocyanates in therapeutic doses seem to have no influence on the peripheral limb vessels. Nicotinic acid was hailed as a drug likely to relieve Raynaud's disease and intermittent claudication (inflammatory or arteriosclerotic). It is true that it may cause an appreciable rise in the skin temperature of the feet and hands and its action is more prolonged than that of the nitrites, but the intense burning, pricking, and flushing of the face which must be caused if the extremities are to be influenced renders its use insupportable to the majority.

In the local treatment of vasospastic conditions carbachol or "amechol" (acetyl- β -methylcholine) ionization is of proved value.

Benzyl-imidazoline

The quest for more satisfactory vasodilators led to the discovery of benzyl-imidazoline. The hydrochloride of 2-benzyl-4:5-imidazoline, known by the trade name of "prisol," consists of colourless water-soluble crystals. The structural formula is:

Reports on its efficacy as a vasodilator began to appear in 1939, but interest in the drug lapsed during the war years. Braun (1942) claimed that it dilated arteries, arterioles, and arteriovenous anastomoses but had no effect on