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GROWTH AND DEVELOPMENT OF THE YOUNG CHILD

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FOREWORD

THE Merrill-Palmer School began its program in the teaching of child care and training ten years ago, and during this decade has seen the work in child development and parent education established in many leading educational centers in the United States and Canada. There was a considerable body of knowledge relating to child growth and development previous to this period but for the most part it had been highly specialized, and uncoordinated. The establishment of research centers concerned with the study of the child in strategic places all over the country has made possible teaching programs based on scientific findings—both for the guidance of parents and for the training of the younger generation. Because the scientists concerned have become so highly specialized, however, it has been difficult for the teacher or parent to view the child as an organic whole and to achieve an integrated point of view from the subject-matter available.

Those concerned with education for home and family life in secondary schools and colleges have come to recognize the great possibilities for an understanding not only of child, but also of adult behavior afforded through the study of young children. There has been a need, then, not only for integrating subject-matter but also for presenting this subject-matter in such a way as to teach fundamental principles of mental and physical health.

This volume has been written with the idea of meeting the needs of such instruction through presenting an integrated study of early childhood. The limitations of our present knowledge are only too well understood, but we felt that a text in which facts as known at present were carefully selected and coordinated would be an effective contribution to the development of the fields of education for home and family living and of parent education.

EDNA N. WHITE.
Director, Merrill-Palmer School;
Chairman, National Council of
Parent Education.

PREFACE

THE past decade has witnessed unusual progress in both teaching and research in the field of Child Development,—a field which has become the focal point for investigation and study by psychologists, nutritionists, physicians, educators, sociologists, biologists, geneticists, and others. It has been inevitable that each science has regarded Child Development from the viewpoint of its own field with the result that any one person wishing to teach or to be informed in this subject has found it difficult to coordinate the material available from all the fields, and hence to evaluate and organize it for practical use either in teaching or in living. The authors of this volume represent the fields of Parental Education, Physical Growth and Mental Growth. Their close personal and professional association in the Merrill-Palmer School has served to integrate their thinking, and has made possible in the preparation of this book a unified presentation of the subject of Child Development. It is hoped that the book will be of service to students of Child Care and Development and to parents.

Every endeavor has been made to present the most thoroughly substantiated material in Child Development and to put the readers in touch with the knowledge of scientific sources and to convey the need for the replacement of mere opinion by scientific evidence wherever possible. Direct application has been made of scientific material to actual conditions of family life, and the discussions of growth and its determinants have been related to these practical situations.

It is our belief that a clear understanding of the growth and development of children involves a knowledge and appreciation of the part played not only by heredity but also by physical and social environment. This text concerns itself with the growth and development of young

children whose most insistent and everpresent environment is the family. The authors have therefore devoted considerable space to discussion of the philosophy as well as the practical aspects of family and home life. It is the conviction of the authors that many of the difficulties presented in the growth and development of children are traceable to the maladjustments in family life and that many of these maladjustments can be prevented if the members of the family have acquired a clear understanding of their part in the home, and have achieved a sound philosophy of family life.

In discussing a subject as controversial as heredity we do not feel that dogmatic statements can be presented with honesty. We recognize, however, that an attempt to present all viewpoints on heredity is not within the scope of this book. The endeavor has been to cite such authorities and such experiments as will make clear the present day trend of thought on that subject and indicate the fact that there is little agreement as to what traits can be inherited, and the part that heredity plays in growth and development. The chapter on heredity will be more significant to students who have a considerable background in this subject and may not be adapted for use with all students. The text has, therefore, been so constructed that its unity will not be destroyed if only the summary of this chapter is used in teaching.

The scientific world is recognizing with increasing clearness the fundamental relationship between prenatal care and postnatal growth and development. It is also recognizing the need for teaching such facts as are known, in order that the children of another generation may benefit by them. Knowledge alone will not suffice to induce changes in the growth and development of the child unless that knowledge becomes actually effective in prenatal care of the mother. The chapter on prenatal care endeavors to state such scientific facts as are established and to point the way to their application.

A list of reference books for supplementary reading has been appended to each chapter. A limited number only

has been suggested in this connection in order to keep the expenditure of the student for supplementary reading within reasonable limits.

The book has been made possible through the interest, the encouragement, and the opportunity for work in this field which has been generously given by Dr. Edna N. White, Director of the Merrill-Palmer School. Her vision of the development of the movement, her understanding of the needs of the field, and her realization of the essentials for a sound philosophy of family life have guided the thinking and have given inspiration to the authors.

The authors wish to express grateful appreciation to Dr. E. V. McCollum for his encouragement, help, and review of the manuscript, to Dr. Charles A. Wilson for his help and criticism, to Dr. Lucea Hejinian for her assistance in preparing the manuscript, to Miss Marian Breckenridge and Miss Elise Hatt for criticism and suggestions resulting from their experimental use of the manuscript in class room teaching.

The authors recognize the invaluable contributions made through personal discussion, and wish to acknowledge indebtedness for stimulation in their thinking, for the clarifying of their understanding, and for constructive criticism of trends in the field of Child Development made by Dr. Adolph Meyer, of John Hopkins University; Dr. Richard E. Scammon and Dr. John Anderson of the University of Minnesota; Mr. Lawrence K. Frank of the Rockfeller Foundation; Dr. Louise Stanley of the United States Bureau of Home Economics; Dr. Mandel Sherman of the Washington Child Research Center; Dr. George Stoddard of the University of Iowa; Dr. Harold E. Jones of the University of California; Miss Anna E. Richardson, Field Representative in Child Development of the American Home Economics Association.

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CONTENTS

GROWTH AND DEVELOPMENT OF THE YOUNG CHILD

CHAPTER I

THE PHILOSOPHY OF FAMILY LIFE

It is probable that most of us spend a large share of our lives in families. We are born into families and live in families and, if through some untoward circumstance that family is broken up, we tend to attach ourselves to some other family or build up some artificially formed group which we incorrectly but wistfully term "our family." Although the economically independent single woman today is often found in the large cities living in clubs or apartment hotels, the tendency still seems to be to form small groups and set up some form of cooperative family living with its attendant responsibilities as well as its attendant compensations. We live in families if we can and we would die in families. The old, wherever they may be, whether living alone in the shell which once housed their family, or in some place far removed from it, whether in the home of some relative or in the home built for aged which must spell itself in capital letters HOME, cling to the material evidences that they, too, were once part of a family and treasure their various reminders of the family life that has gone.

Society in its social work today places the emphasis on *family* life in some form, and boards the children who for one reason or another have been deprived of their own families, with other families instead of putting them into

the old time institution which made much of the word Home in their title and little of the word family. There is even a movement on foot today to do this same sort of thing for the aged, and to find families with which they may live in preference to institutional life. That is to say we look upon the family, not merely as a biological unit which provides population, but we look upon it as an important social, economic, and educational unit. Even when the biological family fails completely as a social, economic, or educational unit, we still consider family life so important that, although we must break up the biological family, we look to other families to carry on in the other functions so necessary for the child.

Why the emphasis on family life? What is the family, why is the family, and why is it good? Not all consider it good, and in truth in many instances it is bad. The fault is, at least partly, of the individual and not of the institution. Some of the more radically minded people even say it is a worn out institution that is done for, especially in its monogamous form, and that it must pass. But the balance of evidence would seem to indicate that it has been a satisfactory institution for society to have (it has certainly stood the test of time), and that in its finest and most democratic expression today it is better than ever before. Nevertheless, the family as an institution cannot ignore its critics of today; it cannot remain as it has been, but must change to meet the needs of modern life. It must discard age old customs and attitudes if, in the light of critical analysis, they are found incompatible with the civilization of today.

The family is the oldest of our social institutions, and is deeply entrenched in society in spite of all its critics may say. Students of primitive society tell us that the institution of marriage is rooted in the family and not the family in marriage as one might suppose from the chronological order in which they now appear in society. Marriage, not in the legal or religious connotation of today, but *marriage* in its fundamental meaning *is understood to be the more or less permanent union which is maintained between*

male and female and which seems to have developed permanency because of the cooperation in caring for helpless offspring. Marriage is not a human institution only, but is found even in permanent form among certain mammals and birds where the habit of cooperating in life activities has become established and has effected both members of the union to such a degree that they become mutually dependent and choose to continue to live together.

It was not necessary to develop marriage for the satisfaction of sexual desire, a transitory and recurrent thing. It was necessary, however, to care for the child during the period of his helplessness; thus the two individuals of whom that child was a part developed the habit of living together in order to care for that which, at least biologically, was jointly theirs. In this living together and assuming a joint responsibility they evidently found a satisfaction and an incentive to effort that did much to establish the permanency of the family. Part of the instinct for race preservation appears to be an instinct for nurture which is common to all those forms of life where the offspring has a period of helplessness, for unless cared for, the offspring will die, and the instinct for race preservation will be thwarted. When this instinct for nurture is felt jointly and when family life is maintained we have the institution of marriage. The child, therefore, has been the preeminent factor in establishing the family, and the family, not marriage, is the basic institution.

Biologically the family has been important because it has provided population. The quantity and quality of posterity has been determined by families. Statistics show that children born of a transitory sex experience where there is no thought of establishing family life, have less chance of living than have the offspring of those who have proclaimed their intention of living together.

Economically the family has been so important a unit that some people claim that it is because of its economic importance that it has endured as an institution. Until the development of machinery ushered in the industrial age the family was the great productive unit as well as a unit for consumption. The family has held the land and

other forms of property, and through its hands property has passed from one generation to another. The state up to the present has protected that right and although civilization is today watching an experiment which does not hold this viewpoint, the family must still be considered an important economic unit because of its control of property. The family has been the great motivating force which has incited man to work, and the family has been, particularly in the past, a strong force influencing the type of work undertaken by the sons of the next generation. It has cared for the dependent, the children, the sick, the elderly, and because of these functions has been of economic value.

Today the family seems to be less important economically in that it is no longer the great producing group. The fact that it has ceased to be a factor in production means that much of the work that woman did in the home has passed into other hands. When production was on such a scale that it called for the help of many who worked under the direction of the woman in the home, it called for a display of considerable executive ability. Under such conditions a woman, even though in her own home, was a producer of goods and therefore had the economic value and the satisfaction in production which a producer has. Today her economic value in the home may be found in her ability to handle expenditures well, but her function as a producer of goods in the home as well as her satisfaction in this activity are largely gone. The bakery, the cannery, the mill do for the mass what woman used to do for her family.

The close relationship between parents and children and between one child and another during the formative years has made *the family an educational and social unit*, the importance of which can be hardly over-estimated. So great has been family influence on the child that it has sometimes led us into the mistake of crediting or accusing heredity of giving to a child a trait or characteristic which in many instances has been the result of the influences playing upon the child since birth. Throughout the ages this powerful institution the family has maintained itself in one

form or another, but in whatever form it has always implied at least two generations living together and therefore the core of the family has been the relationship of parents and children.

The word family has been given various interpretations. To some it has meant a broad, a sometimes vague term including blood ties of various degrees of strength on one side of the family or another. Usually the emphasis has been on the paternal relatives of the same name, although there have been societies in which the family group has been centered around the maternal relatives. To others it has meant the group of two or even more generations living under one roof and has, especially in older civilizations, included those who serve the household as well as those held together by ties of blood. But wherever it has been and whatever its form there has been the child. The child makes the family and the family is the institution in which we have chosen and evidently still choose to have the child spend most of his childhood.

It is true, however, that the family is no longer serving so completely as the institution which is to meet all of the child's needs. The school takes him for part of the time at an earlier and earlier age;* camps during the holidays take an increasingly number of children.† Children of divorced parents are in some instances living what might be called a split family life with the possibility of an attendant stress and strain, but even with the supplementing and change children are still living in families and the stamp of approval, although perhaps not so firmly attached as formerly, is nevertheless still set by state, church, and society on family life.

It is perhaps curious that such an old institution with which we have been so intimately connected has for so long failed to catch the attention of students of social institu-

* Nursery schools which have been developing in this country during the past ten years and which had their beginning in England are taking children at eighteen months for from three to six hours during the day.

† Private camps, Scout camps and camps run by other organizations, have sprung up in great numbers in recent years.

tions, and has gone its own way until fairly recently without arousing anyone to an intensive study of its history, development, meaning or purpose. The very fact, however, of its nearness to us and our intimate connection with it, has perhaps made us take it for granted and feel little concerned about trying to trace and understand its development as we have various other of our institutions. But the family is at last claiming our attention. Scholars are giving us the results of their study and research on the various aspects of the family, and the general public is looking at the family with an intelligent and critical interest which it has not had heretofore. An indication of this is the large amount of space now given to the family in current magazines. What the family has done and why it has done it are becoming increasingly important to us for we are realizing what a powerful factor biologically, economically, physically, educationally, socially, and religiously it has been in the history of the world, and we know that we must understand it if we are to use it intelligently and if we are to modify it or change it in the interest of social progress.

Everyone of us has had some connection with a family. When we are scrutinizing the family, therefore, we are looking at something of which we are a part, and it is inevitable that anything of which we are or have been a part involves our emotions. It behooves us, therefore, in scrutinizing this institution, the family, to bear this fact in mind, and to be watchful of our emotional bias lest it betray us into wholesale commendation of the family as it has been and always should be, or into wholesale condemnation of it as an institution which has outlived its usefulness and must go. Perhaps among students there is little likelihood of wholesale commendation of the family as it has been, although it is easy to commend whole heartedly some particular phase of family life which is dear to our heart. We must remember that it is old, with an age that no other institution has, that living things which are old are not malleable as youth is malleable but that this does not mean that it has no capacity for change. It will change if the pressure brought to bear upon it has the weight of

seasoned opinion and is not the snap judgment of intolerance. We must remember that all that is old is not necessarily worthless, but at the same time we must remember that some things that are old have, in truth, outlived their usefulness and should therefore be discarded.

For a long time in the history of our civilization the *patriarchal type of family* has been the predominating type. Our laws and customs have grown up around the idea of the family as a social unit in which the father has been the supreme being, religiously, economically, and governmentally. Time and place have made some difference in the amount of power accorded him, but the family has remained patriarchal. The father has held the reigns of power in his hand. Today, however, this is less universally so, and the signs of the times indicate that the patriarchal type of family must be and is being greatly modified. Some people predict that it will disappear.

The family is certainly changing; perhaps in the last two generations it has changed more rapidly than it has in centuries before. The law in the United States and in other countries as well no longer consistently grants the father complete ownership of his family. No longer is his word law without question on economic, religious, and governmental matters of the household. The state long since in so-called "civilized countries" took from the father the right to say whether or not the child should live. It says today, although far from universally and in varying degrees of force, that the child shall be cared for and not abused, that he shall be educated, that he shall labor only under certain conditions, and that the mother as well as the father, shall have certain rights of guardianship.

The patriarchal type of family is still in our midst, however. There are plenty of evidences of this, and we should not necessarily wish to abolish every evidence of it simply because we are attempting to greatly modify it. Legally wives still take the surnames of their husbands when they marry, and children bear the father's name. It is the man who gives the family name, not the woman. Wives are today in some instances, especially when embarked upon a

career, choosing to carry on under what they call their own name, but they must remember when they are insisting upon doing this that they are in reality bearing their father's name and are therefore merely identifying themselves with their father rather than with their husband. They are not altering the fact that the man stamps his name on the family.

Our laws still look upon the man as the one who is responsible for the support of his family, and in divorce the wife, not the husband, is granted alimony—a situation which obviously needs reviewing in these days of childless marriages and woman's economic freedom. Added power for the woman should mean added responsibility, and therefore in the modification of the patriarchal type of family woman must realize that in the reallocation of power she will inevitably have new responsibilities with her freedom. It would seem as if the aims should be, not so much for a shifting of power, as for a joint assumption of responsibility with an allocation by mutual consent of certain functions to the one in the partnership best fitted to assume them. In the purely patriarchal type of family this mutual division of responsibility does not exist. The power is in the hands of the man, the state so recognizes it, and woman's function is to carry out whatever duty man imposes upon her. Whatever power she has had, and it must not be denied that woman has had power even in the patriarchal family, she has had to wield subtly, exercising her wiles to get that which no law recognized as hers by right.

The patriarchal type of family in its extreme form is passing, even though there are many vestiges of it in the type of family which is now emerging. *Various factors have brought about these changes in the family.* Changes in industrial conditions and the increased economic and educational advantages open to women have made it unthinkable that she should continue to be as she was in the past without legal status of her own and under the complete domination of the male head of the household, without property rights, and without guardianship rights over her children. Changes in the divorce laws have followed

the recognition of the rights of women, and with these changes marriage has become a less permanent thing than it was in the days when women were without the educational equipment which might make them economically independent.

The educational advantages open to women today have widened their vision and opened up many paths of work hitherto unknown to them. Women are today in business and professions as never before. The "women who work" (a phrase which amusingly is used in such a way that it excludes the woman at home—as if she did not work!) are found not only among those women who are compelled to work in order to feed hungry mouths, but are found also in all other classes. In some cases they represent women who desire to pursue their profession or their business even though married or perhaps instead of marriage. If married they may choose the pursuit of their profession or business instead of children, or they may attempt all three—marriage, children, and a business or professional career. If a woman is attempting the latter it may be that she chooses to go on with her work in order to maintain a certain standard of living to which she has become accustomed and which she feels is essential. There are standards for maintaining health, standards of education, standards in the cultural life that a woman and her husband as well may feel must be maintained not only for themselves but for their children. Yet, the maintaining of those standards may place an economic burden upon the husband which is more than he can carry. The wife, equipped with the education which has made her economically independent in the business or professional world, and realizing that in this modern industrial age certain functions have been removed from the home, decides that she wishes to continue in her earning capacity with the exception of such time as she must miss because of child bearing. Such women assume part of the economic burden and are indeed partners of their husbands in this family function. This raises the question as to whether or not there may be the possibility of merely relieving the husband of part of his

responsibility, thereby depriving him of part of his incentive for effort.

If the woman is continuing in business solely for economic reasons she must bear in mind the fact when making her decision that if she were to give her attention to the management of her home she would have an economic value even though it would not be expressed immediately in dollars and cents. The woman as the one in charge of the spending of money has an economic value as well as the person responsible for securing the income. The home which is economically run, and where the money is wisely spent is the home where one usually finds some one person in charge of this matter. Buying in such homes is not done in a hit or miss manner, but is the result of careful consideration on the part of some one individual. Waste and unnecessary repair is avoided because there is someone in charge who feels a responsibility for such matters. In spite of the many changes that have taken place in the home the woman still has an economic value as the one in charge of the household. It is often hard, nevertheless, for the woman who has received her weekly or monthly check for services rendered, to appreciate an economic worth which expresses itself in less concrete form than the monthly check; women are often reluctant to give up the satisfaction found in actually earning their own money.

Some women, because of the pleasure found in the work itself and because they feel adequate in the business situation and inadequate or almost helpless in the home situation, choose to continue with their work. There are women who frankly acknowledge that although biologically mothers they are not in other ways fitted to be mothers. They say that they are more successful in business, that household care and the care of children irk them, and that they prefer to work and pay someone else for taking care of their children. Possibly such women may be right. Grant that they may not be temperamentally fitted to carry on this important function of giving children the right start in the world from a physical, mental, social, and spirtual point of view, they must, nevertheless, recognize motherhood as an

important function—one which calls for skill of the highest type. They must not think that a little supervision from mother night and morning with hours of the day under the care of an untrained maid will suffice. Crises with children may arise at any time during the day, and they call for intelligence and wisdom of a high order if they are to be met in such a way that the child is not harmed. Women who do not wish to assume the care of their own children must look to those who have undertaken the care of children as a profession to "carry on" for them. This function if they do not assume it themselves they must be willing to pay for on a professional basis.

Many interesting questions arise out of this modern condition of the earning woman. For example, if, because of economic reasons the woman does assume part of the financial burden shall she still carry the home burden as she did? It is true that some of her home burdens have been lightened by the bakery, the laundry, the cannery, and other industries; but there are still many duties to be performed at home, especially if there are children. If she is her husband's partner in carrying the financial burden may he not be her partner in some of the home duties and share with her in the care of the children? Should he not learn about baby feeding and some of the other aspects of child care as well as his wife? Is there any reason why he should not help in the care of the sick child if his wife is carrying as heavy a work program as he is? If the husband is indeed to share with his wife in the training of the children should he not as well as she know something about what the care and training of children mean?

Another question which arises when women work and in fact which arises in many modern families when the struggle is for a more democratic form of family life, is the question of finances. In the patriarchal home there was no question about the matter. The man held the purse string and women submitted even to having their fortunes pass into the complete control of their husbands. This is not so today. The law has accorded women certain property rights, and woman does not submit so readily today to

what she considers the humiliating situation of having to ask her husband for money from time to time as she needs it. If she is of value in the family situation even though not contributing actual money there should be some recognition of the fact.

There are various ways in which families meet this problem of finances, and there are many instances where it has not been met satisfactorily and thus remains a source of irritation and friction. Sometimes there is a household allowance, sometimes a joint account, and sometimes other arrangements are made. The point that must be borne in mind is that the question of family finances is an ever present one, and deserves the thoughtful, honest, fair-minded consideration of husband and wife if the family is to break away from the patriarchal practice in this matter. One phase of the question must be viewed with fair-mindedness especially by the woman. Woman is so new a comer in the business world and her experience there has been so much more as an unmarried woman than as a married one, that she may easily look upon her earnings as peculiarly her own and not belonging to the family pocketbook. Man has for so long been the earning member of the family which he establishes that he feels it is his burden to carry the household finances, and he may look upon his wife's earnings as something belonging to her for her clothes, her vacation, her particular pleasures. Such an attitude on the part of husband and wife is not in reality a partnership attitude and may give rise to a situation in the family which is far from democratic. From this it is again evident that it is not an easy matter to slough off patriarchal traditions and practices and to make the family in reality the democratic institution which it seems to be striving to become.

The family is indeed going through a greater period of transition than it has ever before experienced, and like all things which are changing rapidly its weaknesses and failures are coming to the surface and are easily discovered in the light of the critical attention which students are today giving this age old institution. It is no longer the stable institution it was in the days when complete

authority rested in the husband and father and when conditions were such that life was more centered within the family. It is breaking down more frequently, and the rising tide of divorce is looked upon, especially by those who consider marriage a sacrament, as a serious menace and an indication of the evil effect of modern conditions upon family life. To these critics divorce is a disease and in its modern aspect a very serious disease. To others, however, this rising tide of divorce is a symptom of a disease that has existed a long time,—an outbreak against intolerable family situations which women and children are no longer called upon to endure. Statistics would indicate that it is something of both. In so far as it indicates an impatience and unwillingness to make the effort to adjust to married life, it is perhaps a modern disease, the undesirable by-product of the modern cry for the rights of the individual. In so far as divorce is a symptom that the family is going through a process of change from the patriarchal to the democratic type of family, it is merely a symptom of the canker which has been for long at the heart of the patriarchal family.

The family up to the present has in reality been the supreme thing. Individuals have been sacrificed to the institution of the family. For example, the inheritance of the bulk of the property by the oldest son often meant the sacrifice of the other members of the family. But the important thing was the carrying on of the family name, the perpetuation of the family as a social force, the maintaining of the family as an important economic unit. That individuals had to be sacrificed to that end was not then considered important. In these days of individualism, however, the family *per se* is not considered important. If it is important it is important because of what it can do for the individual, and therefore it becomes a means and not an end in itself. The optimum growth of the individual is the end, and in so far as the family may be a means of promoting that growth it is good.

In the days when the family was the important unit and not the individual, the patriarchal form of government was

particularly fitted to promote the family institution. But in these days when individualism is the cry, complete paternal authority in the family can no longer exist. In those days too the large family would naturally be the rule for it was then considered that the family must be powerful as a populating force as well as an economic force and must run no chance of weakening as a family. When the family itself ceases to be the end and becomes the means it no longer has the same stimulus to populate the earth that it did have, and smaller families where each individual is to be given his fair chance become the rule. The number of children in the family is no longer looked upon so universally as a matter entirely outside man's right of decision, dependent only upon the chances of nature. Instead, the claim is made that it is right that the number of children in a family should, in so far as is possible, be a matter of decision on the part of husband and wife.

It is coming to be felt that in mankind the sex impulse exists not only for the purpose of procreation, but also for the enriching of life together in its social and spiritual aspects. Therefore it is coming to be felt that the gratification of the sex impulse may be sought not only for the purpose of perpetuating the species, but to serve the spiritual purpose as well. The modern viewpoint claims that children have the right to be wanted, the right to the fairer chance which regulating the size of the family to a number which can be adequately cared for would seem to give them, and that it is right to make use of scientific knowledge to limit the size of the family. Scientific knowledge is used to prolong life, to save life, or even to increase the size of the family, for it must be born in mind that the problem for some people is not that of limiting the size of the family but of having children. Science has helped in this problem as well as in its opposite. It is in the factors which influence the decision of the husband and wife as to the size of their families that certain dangers lie. If those who seem to have a "goodly heritage" to pass on and who could give a child the right environment, choose for selfish reasons to have no children or to have only one or

two, and if those who are less fit populate the earth, the outlook for civilization does not seem promising. Decisions made for selfish motives without willingness to make personal sacrifice for the sake of children, without an appreciation for the needs of the race and one's responsibility for the future, are the types of decision which make one hesitate about the wisdom of giving information as to the methods to be used for limiting the size of the family.

It is well to remember in these days when the rights of the individual are being so loudly acclaimed that the family is in reality a negation of supreme individualism. Male and female are interdependent for the function of reproduction. They can each grow, think, carry on their business careers separately, and die separately, but if they would have complete and normal sex expression and would react to the instinct for race preservation they are not self sufficient individuals but must each find a mate. The offspring are helpless at birth, and for a long time must continue to be dependent, at least in part, developing comparatively slowly as independent individuals until they, too, even though they have been allowed every opportunity for developing as individuals, find that if they in turn would reproduce they must each find a mate.

Man does not live to himself alone. He seeks companions, and if he would live successfully with others he must be able to so modify his individuality that it can fit into the group of other individuals without calling upon any one individual to make too great a sacrifice. The family unit would seem to be the means whereby the individual can acquire this power. The family must allow freedom for personal development and yet must equip the individual with the brakes which respect for the rights of others, loyalty toward something outside himself, and love will put upon his actions. Such brakes need not be looked upon as devices whereby his individualism is inhibited, but as means which are under his own control and by which he may maintain himself in a normal state of growth and thus avoid an overgrowth of individualism.

Myerson[94*] in his book on *The Psychology of Mental Disorders* says: "Family life must be made up of at least two components, first, guidance and discipline, so as to bring into the child's life early the experience in customs and morals of his group, and secondly, freedom and individuality growth, so that his own natural tendencies in so far as they are good, may grow in order that he may learn to express his own will without too great a dominance on the part of his elders." The family today in its finest expression is probably a finer achievement than ever before, for it is a group in which children guided by the mutual cooperation and understanding of *both* parents are allowed freedom for self expression and yet are given the opportunity to learn those lessons in human relationships which make for satisfactory living with others and which the family group seems to be especially qualified to give.

When the desire for self expression on the part of one clashes with the desire for expression on the part of another trouble will ensue until those individuals have learned something of justice, of respect for the rights of others, of kindness, sympathy, and understanding, and by learning have found satisfaction in the give as well as the take of life. Such lessons one finds that children may begin to learn in babyhood from the intimate family circle in which they have lived the first months and years of their lives. The impressionable child, sensitized by the love element found as part of the environment in wholesome family life, acquires many things through imitation of those around him, possibly a characteristic gesture of hand or head, and equally possibly such fundamental attitudes as those toward himself, his God, and his fellow men which may become part of him for life. It is easy to lay certain traits in children to heredity; it is much less easy to face the fact that one's own daily example may be the cause of the child's attitude toward food or his selfishness with his playmates or his rebellion against authority. May not the thoughtless but scathing criticism uttered within the

* Numbers refer to the Bibliography in which the references are arranged in alphabetical order.

family circle of a neighbor who is met with honeyed and flattering words be an easy lesson in insincerity and intolerance which bears its mark in later life? Are religious and race prejudices and many other prejudices acquired as the result of one's own experience in life, or are they rather handed down from generation to generation not as a biological inheritance but as an attitude acquired in early life by imitation of some member of the family? It is well to remember that the lessons learned from the family may not be, in fact often are not, desirable lessons, but one does not because of this condemn the institution of the family. The family is a power in the life of the child. Whether it be a power for good or for bad rests with the individuals who comprise that family.

The child may have lived in a family where such virtues as kindness, tolerance, respect, and loyalty have not been practiced, and one may find even in the two-year-old child the beginning of a ruthlessness and a disregard for the rights of others which does not augur well for satisfactory social well-being. Reports on studies of juvenile delinquents and unmarried mothers bear out one's belief in the importance of the family in the development of the child. There one gets the adverse side of the picture and finds bad home conditions occurring in a high percentage of cases as a factor influencing behavior.

The family is a powerful influence in the life of the child because it represents both heredity and environment, and no matter what stand one takes in regard to the importance of one or the other the family gives both to the child. It must be born in mind that the family gives to each child a different inheritance, except probably in the case of identical twins. It likewise gives a different environment to each child, for no child comes into a family exactly like the family into which the former child came and no two children are treated exactly alike. If the family is so important a factor in the child's life it is well to think of how it may help the child to grow satisfactorily, physically, mentally, and socially, for one would hardly deny that the opportunity for satisfactory growth is the opportunity

which we would wish to give children. *The family provides the economic, the physical, and the social setting for the children in whole or in part during the growing and impressionable years.*

From the viewpoint of the child's benefit, and it is from that viewpoint that we are regarding the family institution today when we are thinking of it as a means whereby individual growth is to be fostered, the question of marriage becomes a very important matter. *The institution of marriage is going through a transition even as the institution of the family.* The biological meaning of marriage is found in the family, that is, in the parent-child relationship; but we are far removed from the origin of marriage and there is no reason to expect that while man has developed through the ages marriage should have remained an unchanged institution. It must change to meet man's development. State and Church made of marriage, which really grew out of a biological need, a legal and religious matter, decreeing that marriage is the forming of a permanent union, and should take place before the founding of the family. It is conceivable that one might contend that at that very point the mistake was made; possibly the union of man and woman should not be called marriage until there are children for whom they are mutually responsible. Man has made of marriage a social and spiritual matter through which he has sought to satisfy something far beyond a biological need. Marriage today will not be undertaken for the same reasons that it was undertaken in primitive society. It has taken on new meanings and must be judged in a different light.

The marriage of today which is undertaken by two individuals for their own personal desires because of a mutual attraction—love, desire for companionship and delight in each other, or whatever the desires may be—perhaps with the definite understanding that there will be no children at least for sometime, is far removed from marriage in a primitive sense. There are not the same basic reasons for permanency or for the support of wife by husband in marriage under such conditions, as when husband and wife

are bound together by the mutual responsibility of caring for children. When there are children whose periods of dependence overlap the husband assumes or should assume as his share of the burden the support of the wife during the time when she is bearing as well as caring for the children. The demand is made of marriage today that it shall be mutually satisfying to the husband and wife whether they be parents or not, and that if they are parents there shall be other satisfactions as well as the satisfaction of parenthood. In the days when the family was considered the important institution which individuals worked to serve rather than to be served by, families arranged marriages, having in mind the good of the family rather than of the individual. But when the individual began to come out from under complete family domination both man and woman demanded the right to make their own decision or choice as to a mate. Family needs affected them less and personal desires more.

The right of a responsible individual to choose one who, it is hoped, shall be a life partner one hardly questions in this day and generation. But it is equally evident that individuals should be given some standards for choice which may possibly save them from rushing into a marriage with someone for whom they feel a temporary attraction and with whom there is little chance for forming a successful partnership for their own satisfaction or for the rearing of children. So strongly entrenched in our thinking has been the attitude that marriage was either a family matter or an individual one, that states have been very slow to promote any legislation which would limit the right of free, individual choice. Such attempts as have been made to so legislate have been directed against the young, physically unfit, and those of such low grade mentality that they are dependent upon society. Even though marriage has been called a sacrament by the church it can still as a rule be entered into with the greatest ease by people who are doomed to make a failure of it. The question rises; how can we insure a greater number of successes in marriage? Can we in any way regulate marriage so that it may in truth become a sacrament?

Marriages which are successful do not end in divorce, for divorce is an acknowledgment of failure. Anything that is done to make marriage a success will therefore reduce the number of divorces. It is interesting to note that the usual attitude of any one starting upon a life career is that he is determined to make a success of it. Failure in it is likely to be considered something of a disgrace, and one hesitates to acknowledge failure in a career until one has made a mighty effort to achieve success. One does not find the same attitude prevalent toward the career of marriage. Groves* says, "It has become characteristic of our time not only to enter marriage under the spell of pleasure motives, but also to retreat from it just as soon as it ceases to advance happiness." This attitude toward marriage is an inevitable result of the claim on the part of the individual for a right to happiness, without a realization of the individual's responsibility to attain that happiness through his own striving toward a goal. There is today little if any feeling of disgrace when one has failed in marriage. The divorce after all is not the disgrace it used to be considered. One may call that a frank acknowledgment of failure. The disgrace lies rather in the fact that two grown people who, in this age, are supposed to have received at least a fair amount of education, have entered upon marriage without preparation or without having had developed within them an attitude toward marriage which would insure a chance, at least, of success.

Marriage is such a personal affair, so dependent for success on the adjustment sexually, emotionally, intellectually, and, one may say, practically (for every day living together assumes a very practical and ofttimes humdrum aspect), that it is no easy matter to attain success. Certainly success will not be obtained without definitely striving for it. It is well to remember, however, that success through effort is often the sweetest, and that there are many successful marriages today in spite of all the difficulties involved.

The question arises; are these successful marriages to be

* Groves, Ernest R.: Education for Family Life—a chapter from Rich, M. E.: *Family Life Today.*

just lucky chances or can we in some way insure more successes? It rests with the individuals. To be emotionally and sexually compatible, to supplement each other, and to be a stimulus to each other so that each one reaches a higher level of development because of marriage, to find with each other the satisfying companionship which means that pleasures are enhanced and burdens lightened by sharing them, all these things make marriage an experience which one supremely desires may be a lasting one. It would seem, then, that a marriage based upon a love which had in it not only mutual attraction and sex urge but also elements of unselfishness and willingness to adapt to another as well as elements which make for truly satisfactory companionship, had in it those elements which modern marriage requires. The purely romantic idea of marriage to which so many people have been exposed has not been a sound social basis upon which to build, since it presents marriage as a rosy state of love and happiness to be embarked upon without any thought of the effort which each partner must make to insure success or of the change which each will inevitably undergo. If, in addition to the mutual satisfaction found in each other, the husband and wife desire children and are prepared to assume an intelligent responsibility toward helping those children obtain satisfactory growth, we have a marriage which has laid the cornerstone for successful family life.

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CHAPTER II

THE FAMILY AND THE HOME AS BACKGROUNDS FOR THE GROWTH OF THE CHILD

Physical Requisites.—Granted that such a cornerstone as was discussed in Chapter I has been laid, and that this would seem to promise parents equipped to undertake the responsibility of bringing up children, what should be provided as the physical, economic, and social setting for the child in order that he may have the opportunity we desire for him? The economic condition must necessarily impose limitations on the physical setting, but there are certain fundamental physical requisites which must be provided in one way or another in the child's environment if he is to be given his rightful opportunity.

Physicians and psychologists tell us that we all, and children especially, need sunshine, fresh air, relaxation, rest, sleep, and exercise. The right kind of food which includes a safe milk supply and a pure water supply, and a satisfactory system of sanitation and protection against disease should be provided, not only for physical well being, but also for emotional and social well being. Some of these the community, in reality largely an aggregation of families and therefore with a family consciousness, provides. One finds that within the last thirty years especially, through various public health measures, more and more communities have secured for themselves proper sanitary conditions, a safe milk and food supply, a pure water supply and protection against the spread of communicable diseases. All families in the community, whatever their economic condition, have shared in these benefits. There are still other physical requisites, however, which are left to the individual family to provide, and it depends on the intelligence and economic condition of the family as to the extent

to which they will be provided. The responsibility belongs primarily to the parents. They will choose their home, their milk man, and the food they are to eat; they may choose intelligently with thought for the physical needs of the children, or blindly without due consideration for these needs, being blind often not because they choose to be blind, but because they have not had their eyes opened.

The economic condition, the place of business of the important earning member of the family, and the educational and social opportunities in the neighborhood necessarily influence and limit the choice of location of the home. If the community insures good sanitary conditions and a pure water supply, the parents will not have a responsibility in regard to them, beyond assuring themselves that these essentials are provided.

What, however, are the other physical things which the parents must provide to meet the children's needs? That the family must have *shelter* is so obvious that one hardly remembers to say it, but there are various kinds of shelter. The question is what should one think of in choosing that shelter? There is the single house, the double house and the apartment, which varies from the so-called "two-decker" to that hive of families, the apartment hotel on the one hand for those with greater economic freedom, or the large tenement house of our city slums for those who have little to spend on shelter. It is no longer so easy for apartment owners to say, "Families with dogs or children not allowed." Apartment houses are too numerous today to rule out children, and the problem now is to try and meet the needs of children in apartment houses. For example, a child must not be allowed to learn that he can get what he wants by crying because the thin walls in the apartment house make his mother fearful of annoying her adjoining neighbors.

Let us keep in mind what children need—*sunshine, fresh air, relaxation, rest, sleep, exercise*, etc. For exercise we must have space, outdoors certainly, indoors to some extent at least. The single house, set in its own yard seems obviously to offer space. It would seem, too, to offer

more opportunities for sunshine. But neither the double house, nor the apartment, nor even the tenement house need necessarily prohibit these things. Small playgrounds within easy distance of tenement houses, roofs made safe for children, balconies, a small back yard, a window into which the sun streams part of each day, at least, may be means by which the requisites of space and sunshine are provided. Apartment houses without elevators make it very difficult for a mother on an upper floor to take her baby in the street in a baby carriage, but a balcony or even a room where the window may be kept open and through which the sun streams may provide the essentials for the infant whose need for space is not so great as the child who has begun to explore the world on his own two feet. For him there must be space for real exercise, if his need and desire for activity is not to get on the family's nerves and thereby create a behavior problem. The important thing is to keep the essentials in mind and use one's ingenuity in providing them in one way or another.

Space has another value beside providing the child with exercise. People do not find it easy to live successfully together if they are in continuous and close proximity. "The world is too much with us" is often true, and that individuals, especially certain types of individuals, need a certain amount of solitariness and quiet is generally conceded. This brings up the question of the number of rooms in the house, a matter which also depends largely on finances, although perhaps not as much as one might think. The small apartment with many modern conveniences, with an impressive entrance hall, and located in a certain desirable street may look more inviting than the larger apartment on a side street and without all the extra conveniences; but the extra room or two are assets which must not be lightly discarded if they promise to fill some of the essential needs of the family rather than what is in reality a nonessential desire. Additional rooms give more air space, more chance for quiet, more chance for the children to have space which is their own where they may keep their own things and play their own games without

running the risk of having frequent complaints because they are underfoot.

The family is made up of adults and children and the needs of the two are in many respects different. They are, nevertheless, needs, and the problem often becomes one of adjusting to meet the needs of one without sacrificing the needs of the other. The house is built for adults, the furniture and equipment are for adults, but children live in that house and their needs must be considered. A respect for furniture and walls is not inherent in children and although it should be developed, a child misses something very important out of life if there are no chairs which he may tip over to make a train or to set up a house or tent by covering with an old blanket. Imaginative play is too important in a child's life to deprive him of it in his home. Yet the adults' needs must not be ignored. The mother who is in need of rest because of an unusually heavy burden that has been placed on her must be relieved from too close proximity to the play of eager little boys who become for the time being various kinds of air planes traveling from city to city over land and sea. Space is indeed an asset to family life that must not be overlooked.

The home should also provide *space for the child's things.* Whether it be but a corner of a room or a lower drawer or shelf, there should somewhere in the house be a space within reach of the child's arms which is the child's own for his own things; not only must the place be provided, but it must also be respected as free from intrusion. His things, no matter how absurd they may seem in the eyes of the unimaginative adult, should not be ruthlessly cleared out, although it sometimes is necessary to teach the child that he cannot keep in his bureau drawer the "dear little dead mouse" he had found. Individual possessions and provisions in the house for keeping these possessions in order make not only for a clear-cut sense of property, but also for habits of neatness. If, for example, there has never been a hook within a child's reach, it is hardly to be expected that he will acquire the habit of hanging up his coat. No things of his own, no space for his own things make for

difficulties in learning important lessons in life, viz., neatness, respect for property, and respect for the rights of others.

The matter of undue noise is another thing for consideration in choosing a home. Whether or not it has a permanently deleterious effect on the nervous system, the constant bombardment of certain types of noise seems to increase a tension which may end in an emotional outburst that brings stress and strain into the family situation. It may seem wiser on that account to take a house a block away from the noisy car line even though it seems less convenient. The chance for the children themselves to make a noise is another factor that must be considered. That "children should be seen and not heard" is no longer accepted as a maxim which should guide us in our training of children. Children are bound to be heard; it is right that they should make a noise, and children's noise, though it cannot be allowed to run riot, must in some way be provided for at some time in each day without becoming a source of irritation to the individual family or the nearby neighbors in the apartment downstairs.

As has been said, houses are built for adults and to a great extent are equipped and furnished for adults. But children are born into those houses and are to live in them. The home should provide for the child's physical needs but it should do more than that. It should be a help rather than a hindrance in forming desirable habits. A child, for example, can hardly be expected to form the habit of clean hands before meals and of using his own towel if washing before dinner is either a matter of a hurried wash at the high kitchen sink at the hands of some grown-up when he comes in from play, or if the washing entails a long trip upstairs to a bathroom where nothing fits his size. Small toilets and bowls are expensive and though enticing are not essential. The thing which is essential if one would have children acquire the habit of cleanliness is to provide some way so that children may easily learn to wash themselves, reach their own towels, face cloths, and tooth brushes. It can be done if there are low hooks or racks, a chair or box

to reach the high bowl, or a separate basin which can be set on a low stool. If the home is a house rather than an apartment, some arrangement for a downstairs toilet, for washing, and for hanging the out door things will help the child in forming desirable habits of cleanliness, elimination and neatness, for the child busy at play out of doors puts off going to the toilet until too late if that toilet is away upstairs and muddy feet must not be tracked through the hall.

The Economic Factor.—The economic factor in family life is an extremely important factor to be considered. It has much to do with the choice of a physical setting for, although family life may have been successful in its main elements, it cannot be denied that poverty and wealth inject certain difficulties into the family situation that sometimes are a predisposing factor to the family breakdown.

An income so small that it has no amount to allot to that essential, recreation (which is in truth re-creation) or which allows no margin for meeting the emergency of sickness or for saving, puts upon those responsible for the care of the children, especially if they are carrying that responsibility conscientiously, a burden which is difficult to bear without worry. Worry means a stress or strain which makes for tension and thereby destroys a certain serenity important to family life. A sense of insecurity is difficult for adults as well as children and a sense of insecurity about the money which is to provide some of the children's needs is indeed difficult for parents. One must not forget, however, that wise planning and an ability to differentiate between the essentials and the nonessentials of life can do much to alleviate some of the difficulties of maintaining a satisfactory family life on a limited income. There are indeed certain values to be gained from life in a family where there must be careful counting of the pennies. A spirit of cooperation, of helpfulness, a self reliance, a willingness to do without, a willingness to give up in order that some one else may have, are more easily fostered in the home where the income seems to need stretching, than in the home where the economic situation is such that these traits are not naturally

required. The difficulties of having too little are obvious, and are often very great when the discrepancy between income and standards of taste and living is wide, but the dangers of having too much are, though less obvious, nevertheless important. The home in which there is plenty of service, in which it is economically easy to provide the child with everything that he needs must watch out lest the child has no chance to learn to wait on himself and lest he become selfish because not only is his every need supplied but his every desire is gratified. It becomes difficult to learn to differentiate between the essentials and the nonessentials of life when one is not called upon to decide upon what one must do without.

It is not possible to translate the term "sufficient income" into dollars and cents, for many factors enter into the decision. Time and place, the cost of living, and standards of living (a product itself of many different conditions) make "sufficient income" almost an individual matter. The children must be sheltered, clothed, fed, protected against disease, cared for if sickness occurs, and educated to meet life as successfully (not used in the material sense) as possible; but so varied are the individual interpretations as to how this should be done that it makes a definite statement impossible. There is a goal of physical and social well-being which we desire that children may reach, but the ways by which it may be reached are varied. The human body has a tremendous power of compensation in the physical realm. It learns to adjust itself sometimes to almost unbelievably difficult handicaps, and it would seem as if this principle were true in the intellectual and social life of the individual as well. One would not deliberately set up economic, physical, or social handicaps for any child, but if they do occur one must not consider them necessarily overwhelming, dooming the child to what the condition seems to indicate. There may be inherent in the very challenge of difficult situations compensations worthy of consideration.

Social Aspects.—Family life in its social aspects as well as its physical and economic aspects presents wide varia-

tions, and in one case there must be compensation for one thing and in another case compensation for another. Each family has certain assets and certain liabilities. Some of the liabilities are not inevitable but may be done away with, perhaps by a change in attitude on the part of the parents, but some of them must undoubtedly be met and compensated for in one way or another. For example, the chronic illness, possibly of an elderly relative in the family, seems in many ways a distinct liability in family life, making a certain amount of play and noise impossible, tending perhaps to inject an element of repression into the situation. Yet that very situation has in it the possibility of giving children invaluable opportunities to learn the lessons of thoughtfulness and consideration for others, as well as a self reliance which comes from learning that even though little, one can share in the care of one who is old.

There are many types of relationships that exist in family life. In the intimate life of those who are sharing life under one roof one may learn to live with those of all ages, of the same sex and of the opposite sex, of a sympathetic point of view and of an unsympathetic point of view. Within the family one may run the gamut of almost every experience which life offers. Constant association necessarily brings its irritations as well as its satisfactions and the lesson of meeting irritations with success is a lesson that is an important one to learn. Constant association also gives one an opportunity to get another's point of view, to learn to read between the lines of action and to know that what seems like unaccountable behavior may be but the cloak to hide an emotion which others do not suspect. The intimate experiences of family life, especially if one has the rich experience of living with many personalities, are experiences which reveal much as to the causes of human behavior if one's eyes are open. Brothers and sisters, parents and children, guests of the family, possibly grandparents and children, boarders and children, servants and children, each situation offers opportunities for children to learn how to live with people in such a way as to benefit themselves and their people. We live in a world of people like and unlike and

until we learn how to do this successfully, beginning these lessons in the family, there can be no peace.

Family Conditions and Family Attitudes.—It is a fact well known to clinic workers and others who observe children closely that *certain family conditions and family attitudes exert a profound influence upon children's behavior.* Children respond more or less immediately and more or less completely to a rise or fall in family fortunes, presence or absence of illness in the family, to an increase or decrease in family happiness, to excitement, anxiety, tension or strain of any kind. They also reflect family attitudes toward work, play, religion, sex, and other important things in life. Likes and dislikes, loves and hates, are often only the reflection of likes and dislikes, of the loves and hates of those who surround us in early childhood.[46]

There is evidence, however, that a given condition will not always produce the same kind of behavior in all children, but that individuals differ in their reactions and behave in a manner which depends somewhat upon the general type of personality to which they belong. Before we undertake further discussion of the important family conditions and attitudes which influence the behavior of the child, then, we must understand something of the three or four general types of personality usually agreed upon as determining the child's reaction to specific situations.

Types of Personality which Determine the Reaction of the Child to Family Attitudes.—Cameron,[18] an English writer says that there are at least two major types of physique and personality to which people belong. He says that people are born either with a tendency to be *stable* or *unstable.* Watson[152] and certain other writers dispute this, saying that although the individual shows tendencies toward stability or toward instability at a very early age, he is not born so, but acquires the tendency as a result of his experiences during the first few days or weeks of life. We have not yet enough evidence to settle this argument. For practical purposes we need only to recognize that, whether the traits are inborn or are acquired shortly after birth, children do seem to lean toward stability or instability very early in life.

The stable child is the so-called "good baby." He does not cry easily, he takes the breast easily, has slight trouble learning to drink from a bottle or a spoon, is not easily upset by changes in food, or changes in light or temperature. He sleeps soundly through ordinary noises or distractions, is not particularly upset by physical pain, and is not especially liable to disturbances of digestion. As he grows older he is steady-going, adaptable, and usually happy.

The unstable child is a picture of all the reverse qualities. He is likely to have trouble in learning to take the breast, is inclined to be easily upset by change of any kind, cries easily, fatigues easily, runs a temperature with slight cause, and is susceptible to digestive disturbances. As he grows older he gives evidence of overexcitability and hyperactivity which often lead to excessive fatigue. This fatigue is of the type that deceives parents, since an overexcitable child when tired does not as a rule become sleepy, but is likely to run faster, shout more loudly, and appear unusually alert. When finally put to bed he will, if overtired, take a long time to go to sleep and will, after the first exhaustion is slept away, spring into action again, driven by an over excited nervous system to demand entertainment or attention at four or five o'clock in the morning. It is usually hard to convince parents that these symptoms point to the need of more rather than less rest. The unstable child is likely to be changeable in mood, and is particularly likely to over-react to any nervous strain or emotional tension in the family atmosphere.

An unfortunate aspect of the unstable child's history is that he is usually born of unstable parents; but, not only must he bear his heredity, he must, if he lives with his parents, live during his most impressionable years in the unstable environment which unstable parents inevitably produce. Thus he has no ally in his environment to help him overcome the handicap of his heredity. We can indeed feel the tragedy of the child who, needing more than most children a quiet stability of environment, must be surrounded by the persons whose heredity forced the need

upon him, but whose very nature makes them least fitted to fulfill that need. Tragic as it may seem, it is the unstable parent who is most likely to burden a household with the bugaboo of the word "nervous," who himself flies to pieces in the very crises with his child that demand quiet self control. He, the parent of an over excitable child, is most likely to produce an atmosphere of overexcitement. The unstable child, most in need of regularity in routine, most easily disturbed by irregularity of feeding, of sleep hours, of elimination, is usually the child whose parents are most likely to offend by interruptions in routine. The stable child, who could best survive extra movies, delayed meals, haphazard hours for toilet attention, is seldom the one who has to adjust to such difficulties. His parents do not crave the stimulation of constant parties and extra guests in the home; nor do they worry too much, nor keep themselves in an over-fatigued state of hypochondria.

Charles and Sally illustrate this point. Charles, a tense, high-strung boy of three, is constantly on the move. He runs about, seldom slowing his movements down to a walk, is likely to shriek with excitement every few moments in his play, cries easily when hurt, and finds it almost impossible to relax at nap time. He is never ready to go to bed at night, often lying awake until ten or eleven o'clock even though put to bed early. In spite of this he is usually to be found jumping about in his bed or running about his room ready for action at five o'clock in the morning. His family seem unable to help him achieve rest. Both his father and his mother are quick-moving, high-strung people whose voices are inclined to shrillness and whose presence adds tension and excitement rather than relaxation and quietness to the family atmosphere. The mother has tried rubbing Charles' back at night in order to help him to relax, but her own tenseness serves only to key him to a still higher pitch. The remedy for Charles' excitability is not to be found in rigorous insistence that he sit quietly for certain periods of the day or that he spend more hours in bed, much as these would help. The real solution lies in a change of family atmosphere—a reorganization of family

routine to minimize hurry and to build up more of a feeling of leisure, a definite rest period for the mother in order to decrease her fatigue and feeling of tension, and fewer family excursions of an exciting nature.

Sally, on the other hand, is a child who plays hard but who stops to sit quietly when she becomes tired. She alternates quiet periods of handiwork or of looking at books with periods of vigorous play. Her voice has the quiet pitch of a rested child, and is seldom shrill or whiney as is the voice of an over-excited or over-fatigued child. She is hungry at meal time, eating her meal with dispatch, and trots off quietly to nap or to bed where she drops to sleep within five or ten minutes. She wakens refreshed and smiling. Sally's parents are quiet-voiced, well-poised people who have a great deal of pleasure but who seldom allow themselves to become over-fatigued to the point of irritability and tension. They go out frequently and have guests in their home, but always manage so well that Sally has a fairly quiet supper and gets to bed before guests arrive. The mother plans the day's routine so that breakfast can be an unhurried meal, that dressing, toilet, and other essentials are allowed for in time, thus minimizing the feeling of tension and hurry which plays so large a part in Charles' life.

The unstable child needs special regularity; yet even he can suffer by being "over-routinized,"* and over protected. A fairly safe rule for any child, stable or unstable, is to see that he leads a fairly regular life, yet one which is not monotonous or devoid of interest, and to see that, while leading as normal and satisfying a life as possible, he is protected from exposure to nervous strain, emotional tension, or overstimulation of any kind.

Another dichotomy into which people may be divided is that of introverts and extroverts. Some children have a tendency to be *introverted*, others to be *extroverted*. These words mean to *turn in* or to *turn out*, and when applied to people mean that some people have a tendency to turn their attention and interests toward a center inside them-

*See case study Anna at the end of the chapter.

selves, and some toward a center outside themselves. The one type called introverts, are more interested in ideas than in people or things, and are more inclined to "sit and think" than to "go and do." They are likely to be the students and philosophers of the world. The other type, called extroverts, are more interested in people and things than in ideas. One usually finds them among the business people, the mechanics, the political, social and business leaders. Most people belong neither to one marked type nor to the other, but have some traits of both types as we shall see later. Insofar as the child leans toward one type or the other, however, he is likely to react to specific situations in one way rather than in another. To seize upon the following discussion as a basis for diagnosing personality types would be to presume too greatly upon the scientific knowledge now available about personality. The only aim of such a discussion is to clarify the idea that specific situations in family life will inevitably give rise to specific and predictable behavior reactions in all children. Not all children react to given situations in the same way, but will differ at least somewhat in accordance with the tendency toward one personality type or the other.

When an introvert has met with unhappiness he is likely to retreat into thoughts and day dreams; the extrovert is likely to try to "work it off" in action, or to seek solace from people. If a child has, for lack of normal companionship, developed imaginary companions, the introvert child will find such companions very real and so satisfying that he is inclined to cling to them even when flesh and blood children are provided for him to play with. The extrovert child, however, finds imaginary companions a pale substitute for live children, and when exposed to children abandons his shadows promptly in favor of real substance.

If a parent nags his child too much, the introvert child is likely to give submission in action but to withdraw to his world of dreams for his interest and satisfaction in life; whereas the extrovert child is likely to fight his parents, to become "negative" and resistant, because he can find interest and satisfaction only in the real world, a world in

which he finds himself so constantly intruded upon that he must resist. One should not punish an introvert child by making him "sit and think"; he has too much tendency to do this already and may get from his punishment only a habit of magnifying grievances and "building mountains out of molehills." On the other hand, a short period of "sitting and thinking" may be just what the extrovert child needs to make him take time from his numerous active interests for a quiet analysis of his own motives.

The introvert child, being quiet and withdrawn, usually slips past his parents and teachers without attracting much attention or causing much anxiety. He is not troublesome, and hence is seldom reported to clinics for help unless it appears to the adults in charge that he is uncooperative. He usually meets his problems alone and unaided, burying his difficulties within himself or retreating from them to his day dreams. The extrovert child, on the other hand, meets his troubles in the open. Symptoms of conflict or of unsolved problems are immediately evident. If he finds life unchallenging or unsuccessful he promptly feeds his natural curiosity by probing and investigating—often in forbidden places—or seeks success in mischief. He throws pin darts in school or incites rebellion against the teacher to keep from being bored. He may steal or lie to create excitement. In any case, he finds something to do which, though often producing trouble, at least provides a growing mind with something substantial to feed upon, or permits a real outlet for emotion. The introvert child, unchallenged or unsuccessful, retreats quietly. He is no trouble, so we miss the fact that he may be feeding his mind on shadows, or collecting steam from unsatisfied longings which occasionally bursts forth in explosions or resentments. The psychologist is likely to worry about the future of the child who is docile and withdrawn—the child about whom parents and teachers often congratulate themselves most—, and likely to feel comfortable about the future of the child who "is the despair" of his parents and teachers.

We must bear in mind that there is no clear-cut demarcation between stable and unstable, or between introvert

and extrovert. The great mass of people are somewhat stable and somewhat unstable, somewhat introvert and somewhat extrovert. The familiar bell shaped curve (Fig. 1) illustrates the probable distribution:

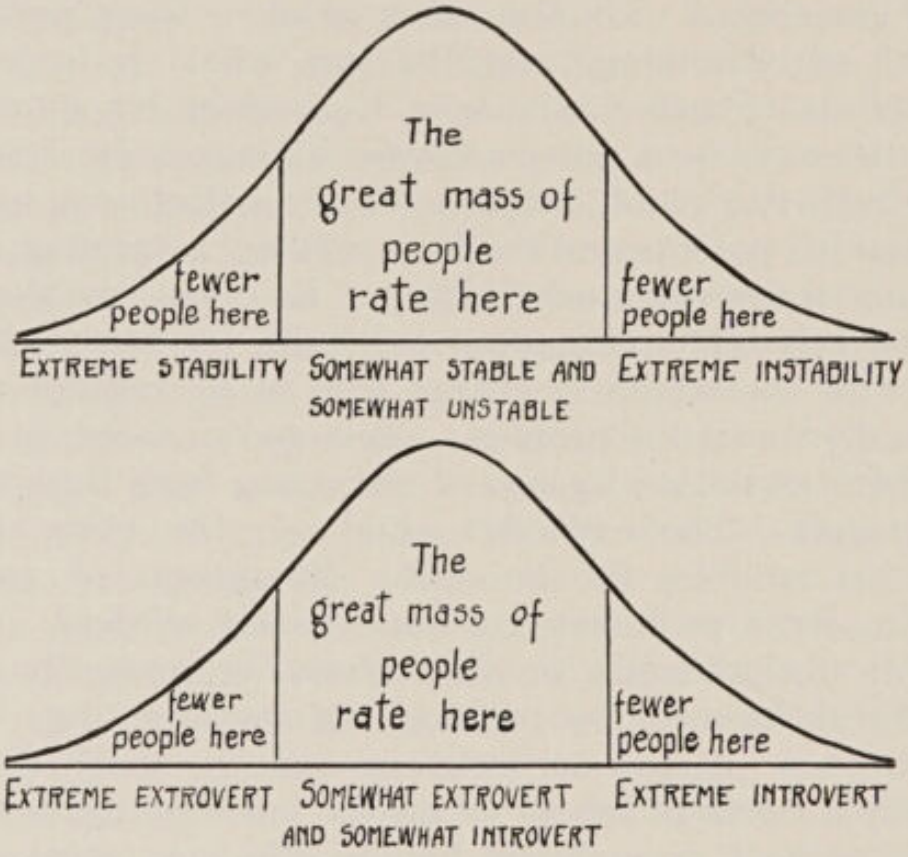

Fig. 1.

Neither extreme of stability or of instability, of introversion or of extraversion is to be cultivated as an ideal, but each should be achieved to the extent that stability is seasoned with adaptability, instability with a basis of sound habits; introversion and extroversion should temper each other. Wickes[160] states the case for these. "Introversion must be guided so that it may not become morbid introspection, which shuts the person away from the world of human activity and human relationships, but rather a process making for the understanding of these and leading at last to a realization of the good within. Extroversion must be controlled so that men may not become lost in the multiplicity of things, but may be able to meet squarely

the responsibilities of adaptation to the world. Neither of these two forms of psychic activity may be emphasized at the expense of the other if man is to develop as a whole. Any attempt to stimulate the growth of one side while suppressing the other must result in frustration."

We should remember when dealing with children to watch for tendencies toward one extreme or another of type, and should accept such tendencies as important in producing behavior and determining reaction to guidance. We should take them into consideration when we make demands upon children and when we evaluate and treat their behavior, moulding our program to produce best results not only for immediate solution of problems, but also for the future personality growth of the child.

Constitution of the Family.—The effect of the constitution of the family is important as an influence upon children's growth and behavior. Not only is the size of the family important, but the child's place in the family is of consequence, for even though several children may be brought up in the same family they do not have the same environment. Goodenough and Leahy[43] of the Minnesota Child Guidance Clinic made a study of 293 children whom they had rated in a number of traits by their teachers, and whose place in their families was investigated. It was found that the oldest children showed tendencies toward lack of aggressiveness and self-confidence, lack of qualities of leadership, much suggestibility, some seclusiveness and introversion. The middle children showed these traits in a lesser degree. The youngest children showed no outstanding characteristics excepting an unusual individual variation in traits. The only children showed high ratings for aggressiveness, self-confidence, for gregarious interests, and for instability of mood, and flightiness of attention.

The oldest child has had at least a year or so in the family as the only child, after which he is forced to yield part of the attention and affection of his parents to a younger child. If he has been prepared to share his place willingly with the new baby and if he finds himself shifted to a position of older brother and in this rôle is given a new type of attention and

affection, he will probably take the change in his fortunes gladly. But if he finds only that the arrival of a new baby means complete displacement for him the change will cost him much in emotional strain. The oldest child suffers another handicap. Having been the first child he has had to serve as practice material for his parents, and has had to suffer from whatever mistakes they made through ignorance. There is hope that oldest children can be spared this handicap as the movement for pre-parental education grows, since through pre-parental education there can be provided a knowledge of the principles of parenthood before the arrival of the emotional strains and responsibilities of children. In some families the oldest child remains the favorite and is spoiled accordingly. In other families he becomes a substitute parent for younger children and has too soon too great a burden of responsibility. He may, for example, be the one who cannot have advantages of higher education, yet is sacrificed to produce that advantage for younger brothers and sisters.

The youngest child in the family, on the other hand, is likely to suffer because he has no occasion for giving place to a successor and thus remains the baby of the family too long. He may be deprived of the privilege of carrying a normal burden of responsibility, and may grow up a spoiled, dependent type of personality because he had no practice in sacrificing himself for the welfare of the family group. Occasionally the youngest child suffers for another reason. With all the older members of the family not only to wait on him but to "boss" him, he may become irritable and defiant, or quiet and sullen because he is subject to too constant and too inconsistent commands. It is particularly important that the youngest child be given the same opportunity for growth toward independence and self responsibility that other members of the family have.

The middle child or children may suffer because, being neither first nor youngest, they are allowed to slip into the background of parental attention and affection. They are likely to inherit the clothes of the oldest, and to spend their lives trying to imitate the behavior or win the approval of

the older brothers and sisters, thus failing to live their own lives or to develop their own personalities sufficiently.

There is a traditional belief that *the only child* will inevitably turn out badly. This, of course, need not be true. Only children often turn out extremely well. There is, however, some danger when two parents have only one child upon whom to lavish all of their attention and affection. They are likely to find it too difficult to deny any of his whims or to discipline him for undesirable behavior. There is double danger for the only child, since if parents fail in discipline, in large families the brothers and sisters are fairly sure to see that selfishness and other bad behavior are curbed. If, however, the parents of an only child fail him in this respect he has no brothers or sisters to help him. Parents of only children should be especially careful to see that these children receive adequate discipline, and that they have adequate opportunity to learn the natural lessons of independence, of unselfishness, and of the give and take of life. These lessons can best be learned in free contact with other children; so for this reason, as well as to insure normal social development, only children should from an early age be encouraged to make contacts outside the immediate family and to select their own companions with some degree of freedom.

The only boy in a family of girls and *the only girl* in a family of boys are usually in some degree selected for special treatment by the other members of their families. The danger here is not only that such a child may receive an undue share of attention and affection, but that he, or she, may get the idea that there is something particularly sacred about the sex to which he, or she, belongs. Any situation in a family which permits undue privileges to one sex, either to boys or to girls, at the expense of the other sex is harmful to the growth of the children of both sexes. Each sex should be taught a fundamental consideration for the viewpoint and the happiness of the other. Whether a boy or a girl, each child should learn that there are far greater differences of personality within either sex than between the sexes; that kindness, generosity, sweetness,

courage, strength on the one hand, or brutality, selfishness, ugliness, cowardice, weakness on the other are traits to be found within both sexes, and that none of them are to be assigned sweepingly to either sex as a sex characteristic. One owes loyalty or dislike, not to one's own sex or to the opposite sex, but to certain persons who display given characteristics regardless of sex.*

Families made up of boys only or of girls only should see that cousins or neighboring children of the opposite sex are introduced often enough and for long enough periods that close acquaintance follows. Acquaintance with members of the opposite sex in the routine of school and of daily living is advisable not only to give acquaintance with personality traits of the opposite sex during school years, but also to give the knowledge of differences in anatomy of the sexes which child training specialists feel should be achieved before children are of school age. Acquaintance with the anatomy of the opposite sex comes naturally and easily if boys and girls share the daily routine of living in infancy and up to four or five years of age. Practically all authorities in sex education agree that natural and early acquaintance with the essential differences in sex anatomy is desirable because it satisfies a very natural curiosity at an age when emotional factors have not risen to attach undue significance to the information.

Regardless of sex, age, ability, or appearance there should be no obvious favorites in any family. This does not mean, of course, that all members of a family can or do love all other members with equal intensity or with equal understanding or rapport. It does mean, however, that each member of the family should at all times and under all circumstances show reasonable respect and consideration for all the other members of that family. Only in so far as we achieve this can we hope to achieve eventual harmony and progress in society at large, since social habits learned within the family largely determine general social viewpoints.

We should recognize, too, that *differences in ability and differences in appearance* may, and usually do, conspire

*See case of The Smith Family at the end of the chapter.

to produce differences in the amount of attention and affection given to children. A single normal child in a family of superior children, a single dull child in a family of normal children, or a single unattractive child in an attractive family is almost sure to suffer because of the constant unfavorable contrast. If such contrast becomes obvious to the child, the resulting sense of inferiority may prove disastrous to his personality growth, and may keep him from developing to the maximum whatever ability or appearance he may have. Attempts to avoid inferiority feelings should not, however, be allowed to develop into situations in which weaknesses of body or mind are allowed to serve as excuses for wholesome effort toward achievement on the part of each child in the family. Even though a child may be handicapped by a crippled body we should insist that he make a real effort to carry his share of family responsibility. Otherwise he may learn to cherish his weakness as a means of attracting attention or as a ready excuse for laziness, and may thus grow up not only with a crippled body but with the handicap of an undesirable personality as well.

On the other hand, a single superior child in a family of normal children, a single normal child in a family of dull children, or a single attractive child in an unattractive family may receive altogether too much attention, and may develop an unwarranted sense of superiority, thus growing into conceit, intolerance, and laziness.

Each child in the family should be awarded praise or blame according to his effort as well as according to his product. Each should come to recognize his capacities as well as his shortcomings, and should develop a sense of responsibility for contributing, first to the family, and later to society, the best that he has to give. Each should learn the value of humility for his faults and shortcomings and should grow up with a determination to overcome his failings if reasonably possible. No child should take upon himself the credit for inheritance of a superior brain, or an attractive body; yet, he should appreciate his gifts and should feel responsible for their proper care and development. Attrac-

tive or unattractive, brilliant or dull, every child should learn the value of good work habits, of unselfish consideration for others, and of tolerance.

Relationship between Parents and Child.—In family life one of the most important factors which influences the growth and development of the child, especially his emotional development, is the relationship existing between parents and child. Fundamental to this relationship are such considerations as the amount and kind of affection existing between parents and child, the amount and kind of discipline given by parents to the child, the ambition parents hold for the child, and other similar considerations.

Amount and Kind of Affection.—Perhaps the first thing parents think of in connection with their relationship to their child is how much they love him, or as sometimes happens, how much bother it is to have him about. It seems impossible to most of us that parents could fail to love their children; yet some parents do fail in this respect. The effect is inevitably disastrous to the child, for all children crave the security of knowing that they are loved.

Dr. Josephine Baker[5] in speaking of the mortality rate among infants in foundling hospitals says: "High mortality rates are common to institutions of this type. They are in no sense an indictment of the way in which the institutions are managed. There are few foundling hospitals at the present time that are not conducted as well as any modern baby hospital. Practically all of these institutions have competent medical boards, use the most improved and modern methods of hygiene, and give the children under their care the best possible health supervision that can be afforded by any institution. The difficulty seems to be not in neglect, but in the mere fact of 'institutionalism.' There can be no question whatever that babies cannot be raised wholesale. The most important factor in the welfare of a baby is his mother. Moreover, babies cannot be kept alive by routine care, no matter how efficient or systematic it may be. Babies who are merely nursed, bathed, and turned at regular intervals are quick to lose their vitality.

Every baby needs mothering." It is a fact well known to nurses in children's hospitals that after the critical stage of an illness has been passed, if the convalescence is long children and infants gain strength faster at home where they can feel the love of their parents than they do in hospital wards where they are deprived of that love.

Some parents, as has been said, do not love their children enough. The general type to which the child belongs determines in some measure what his reaction to insufficient love will be. If he is of the stable introvert type and receives too little love he may brood quietly, withdraw into himself, and will perhaps develop an abnormal appetite for affection, though giving the appearance of hard indifference to affection. If the child is of the stable extrovert type he may throw himself into busy activity in an attempt to forget the slights of his parents. If he is of the unstable introvert type he may grieve himself into illness; or if of the unstable extrovert type may become delinquent and destructive, taking his resentment out on the world about him, or making a desperate attempt to command the attention of his parents.

On the other hand, parents sometimes love their children too much in the wrong way, showering gifts upon them, protecting them too much from the ordinary hardships of life, kissing and caressing them excessively.[22] Children react variously to this, too. One child may yield himself utterly to the warm, protective atmosphere; may fail to achieve a desire to stand on his own feet, may learn to shrink from facing a world in which he is not pampered and protected. Miss Van Waters[146] refers to such a child as " . . . the child that emerges from the warm bath of possessive affection weakened for anything but the evasive, indirect and passive rôle." Even worse than this, such a child usually develops an excessive appetite for physical caresses, and becomes so dependent upon them that he can understand or tolerate no other expressions of love, but goes about through life seeking constant gratification of his appetite. We need no amplification of this point to see how seriously handicapped in life such a child is. Another

child may grow to regard the hothouse atmosphere of too much love as stifling to his urges toward independence. If he does, he will probably generalize from his childhood experience and develop a harsh intolerance toward all manifestations of love, feeling that any evidence of love is dangerous to individual freedom. Still another type of child may come to assume blandly that the world owes him constant evidences of love and appreciation for which he need make no effort or return. It seems fairly evident that none of these reactions to excessive appreciation, protection, or fondling are conducive to successful or desirable personalities. Least of all do they prepare an individual for the understanding and skill in love which are essential to happiness in marriage.

Another common practice with children, doubtless often motivated by a desire to insure the development of social technics which will make them socially attractive, is to encourage them to "play up to" and caress people in general, in some cases even to strangers. We may well pause thoughtfully when we see in a nursery school center a three-year-old child who approaches every newcomer with her arms held up and the demand, "Love me." A moment's thought will serve to make us see that it is unwise to teach children to kiss people indiscriminately—the habit is too likely to fix itself.

In discussing the physical caressing of children Watson[153] states an extreme view which several psychologists have reached after dealing with the many cases of childhood tragedy and adult neuroticism traceable to excessive demonstration of affection by parents and other adults. He says: "There is a sensible way of treating children. Treat them as though they were young adults. Dress them, bathe them with care and circumspection. Let your behavior always be objective and kindly firm. Never hug and kiss them, never let them sit in your lap. If you must, kiss them once on the forehead when they say good night. Shake hands with them in the morning. Give them a pat on the head if they have made an extraordinarily good job of a difficult task." It must be remembered,

however, that this is a statement of the extreme view, and that many authorities differ from it rigorously.

We may turn for guidance in the matter of desirable amount and kind of parental affection to a brief survey of symptoms which are pretty sure to appear in the child's behavior if all is not well. Any deviation from the average in a child's emotional expression should suggest to the parent, teacher, or clinical examiner at least the possibility that the environment of affection needs investigation. Emotional apathy, emotional instability, excessive shyness, excessive boldness, negativism, feelings of inferiority, excessive demands for attention, jealousy, too great or too little dependence on adults may any of them indicate difficulty in this field. This is, of course, a negative approach. A positive approach is obviously better, for if we wait for symptoms of wrong relations to appear we will probably find it exceedingly difficult to bring about changes in those relations. Then, too, prevention is vastly more efficient since it avoids useless waste of time, energy, and what is more important, of human happiness. Moderation is a safe rule. "A nice balance must be kept so that physical expression shall neither be rebuffed nor allowed to exist in and for itself."[160]

Another abuse of the love relationship between parents and children is the use of love as a discipline measure. "Mother loves you when you're good," "Daddy can't love you if you are bad," are commonly used as lashes to whip children into shape. Often times if the verbal appeal is not sufficiently powerful with a young child he is rewarded for good behavior with ardent caresses, or the parent conveys the idea of hurt feelings with pretended sobs. Such methods are usually extremely effective in producing immediate results, since children are notoriously tender-hearted. There are several reasons, however, why we should not govern children by this drama of affections. One reason is that it is so effective—it tempts us to excess, with the attendant evils of excess which have been discussed above. More than this, we must recognize in this connection a fundamental principle in child care: *excessive stimulation*

of any emotion in childhood should be avoided whether the emotion be one of fear, anger, grief, exhilaration, or of love. Another reason why we should avoid the use of love as a disciplinary measure is that if we love a child at all we must of necessity lie to him when we say that a single bit of behavior can win or destroy that love. He can gain from such statements only an example of lying, or, if not that, a false notion that love is something to be lightly given or withdrawn as a reward or punishment for trivial bits of behavior.

To summarize the discussion of affection let it be said that children should receive enough affection to make them feel secure in love, but not so much of the over-protective, over-demonstrative kind that they are cut off from independence or are given an excessive appetite for appreciation and physical demonstration of affection.

Amount and Kind of Discipline.—The second question that arises in the minds of most parents when they think of their relationship to their children is the question of obedience. Unfortunately, many parents do not stop to think about the matter at all, but live with their children from moment to moment exacting obedience or excusing disobedience by whim rather than by principle. If a discussion on the subject arises, however, we will find two extreme viewpoints and all grades of variation in between. On the one hand, some parents will say that they expect instant and unquestioning obedience from their children, and will give as their defense a statement that obedience is a difficult but necessary life lesson which must be learned early and thoroughly. On the other hand, some parents will say that the most important thing for children to learn is to make intelligent and independent decisions and to express their inner thoughts freely. Obedience as such, they say, has no place in child care and should never be exacted; all behavior should flow freely from within outward. "Self-expression," in other words, should be supreme.

As a general principle in child care, it can be said that *extreme views are seldom right.* So in this case neither

extreme of discipline is desirable. Parents represent all authority to the young child. The attitudes which he develops toward them are important to his attitude toward all authority in adulthood. Whether he obeys the laws of his state or church, whether he obeys the dictates of convention, of society at large or of his own immediate group, or whether he defies these laws and dictates will in large measure be determined by his habit of obedience to the authority represented by his parents, his home, and his school. Many writers believe that the child must respect his parents as worthy ideals and as worthy censors of his natural behavior if his growth is to be sound. Parents must serve, then, as worthy examples of behavior, and as worthy disciplinarians if the child is to develop an effective "super-ego" or "efficacious inner power" with which to oppose "the instinctive impulses which urge for gratification."[119] Yet, his parents must give him discipline in such a way as "to direct human behavior without injuring the human being."

If as the result of a program of extreme rigidity in discipline an individual goes through childhood yielding instant and unquestioning obedience to authority, we can scarcely expect him to behave differently toward authority in adulthood. He will, if sufficiently trained in docility, do anything he is told. He will, if trained to depend on other judgments than his own, be unable to think for himself. The freshman who enters college unable to decide where to live, what courses to take, what clothes to buy, which friends to make is a familiar spectacle to every Dean. Being unable to resist commands he does as nearly as he can whatever he is told to do by anyone no matter how unwise for his own welfare the commands may be. Such docility is the usual reaction of the introvert child brought up under a regime of instant, unquestioning obedience.

The introvert child may, however, react to rigidity in quite a different way. Instead of becoming docile he may develop the habit of sullen withdrawal, growing up to resent direction and to react to it by pouting or sulking; or he may give surface obedience but live in reality a life of

stubborn resistance. In this case he usually becomes apt in the art of deceit, appearing to do what he is not really doing, appearing to think what he is not really thinking. Of such is the essence of hypocrisy.

On the other hand, an extrovert child is likely to react to repressive authority by open rebellion, and may grow to adulthood with a completely negative attitude toward authority. Such people are familiar to us as needing to be "handled with gloves." They are unable to hold positions because they "fly off the handle" when given orders; they "simply can't stand to be bossed." They are the anarchists of the world, the typical "aginers," being against anything which smacks of authority. Every college dean knows these people, too,—the students who want to cast aside everything that is upheld by convention or tradition for the naive reason that they "can't tolerate being dictated to."

Perhaps enough has been said to make it clear that the "instant and unquestioning obedience" program is not conducive to sound growth for any type of child. Let us analyze the program at the opposite extreme where unlimited "self-expression" is encouraged. The child who gets the idea that he need obey no dictates but those of his own impulses is indeed in a false position. He may soon discover (for his own welfare we would hope the lesson would come early) that even though his impulse may crave flying across the room as he has seen Peter Pan do at the theater, he may not do so because the physical law of gravity is more powerful than his wish. More serious than this, he may wish to live his days without eating vegetables only to learn too late that impaired health results. He may try to express his impulses of snatching toys or of striking other children, only to learn that he is soon ostracized and left to play alone. Breaking the neighbor's window, or pulling up his father's garden is hardly to be condoned simply because he happens to feel that he is expressing something inside himself. Yet, hard as it is to believe, there are parents who actually fail to see that such *extravagant "self-expression" does not free the child but only makes him*

the slave of his own whims. Impudence or lack of consideration for other people should never be confused with independence or creative expression. They are utterly different.

Sometimes this attitude of reverence for the child's wish is only a compensation on the part of parents who, refusing to work on the old principle of despotism in child training, feel the necessity of working on some sort of a principle, and have found nothing less extreme than a complete "hands off" policy. Yet, as Seabury[119] points out, few parents have the courage to exercise this policy to its natural conclusion. They give the child extreme liberty until they find him about to learn a severe lesson as the result of some inexpert choice of behavior; then they step in to protect him from the natural consequence of his action, and hence deprive him of the opportunity to learn the need of natural restraint within liberty. Parents who give verbal loyalty to the principle of "self-expression" but who lack the courage to let the child learn the discipline inherent in such a policy are doubtless the parents to whom Seabury refers when he says: "Thousands of American homes are without the ancient despotism in child training. There is only an empty void in its place. These parents cannot accept or successfully apply old ideas, and so they apply none. Son and daughter grow up in a protected, loose, undirected liberty, sure that they will be supported, taught not to exert themselves, made to be parasites, permitted to be self-indulgent, helped to be indolent. Tragedy results."

There are also parents who think that obedience should never be expected unless the child understands the full reasons for his action. On the whole this is an excellent principle, but most children soon learn that if parents are always ready to explain reasons, they may be side tracked from carrying out commands or persuaded to withdraw them altogether when bombarded with enough "whys." Children should never be allowed to use "whys" as a means of postponing obedience once they really understand the nature of the command given. We must, of course, make sure that commands are really understood before we become

arbitrary about seeing that they are executed. A few rules may help in this respect:

1. Before giving a command take care to gain the child's attention.

2. Phrase the command in language that he can understand. A four-year-old, for example, does not understand "in the upper right-hand corner you'll find so-and-so."

3. Enunciate slowly enough and clearly enough to be sure he follows you. Children of less than five are still learning to distinguish the meanings of individual words.

4. Do not give too many commands at once. Children of five can execute three exceedingly simple commands at once, but only if they are repeated at least once under concentrated attention before he sets out to obey.

5. Be consistent in commands. Do not tell him to do one thing today and a contrary thing tomorrow.*

6. Ask him to do only the things you really intend to have him do. Do not, because you have not stopped to think, or simply to show your authority, give needless commands which you do not carry to completion or which you lightly withdraw when you realize their uselessness.

7. Be sure that you are reasonable and right in your requirements; then see that commands are carried out.

8. Do not give commands or allot punishment in anger.

9. Do not use threats or bribes as a means of gaining obedience.

10. Do not make misbehavior interesting by making it exciting or profitable.

We must realize, too, that there are certain emergency occasions when commands must be obeyed instantly for the sake of safety and other occasions when the reasons behind commands would be incomprehensible to the child. Implied in both of these cases is a habit of obedience to an authority which the child has learned from experience is reasonable, consistent, and interested in his own ultimate welfare. To delay obedience under such circumstances because of insistent "whys" would be either dangerous or unreasonable.

*See case Betty at the end of the chapter.

On the whole the child should have a gradually developing experience in independent judgment of authority, since adjustments to authority comprise one large class of adjustments necessary in adult life. Whether we wish to admit it or not, no individual can do as he pleases. He may fondly imagine that there is no authority outside the realm of his own individual autonomy, but in practical living he must constantly make adjustments to physical and to social law. He must recognize that, no matter how much he may wish to place his hand on a hot stove without burning it, he may not do so because physical law dictates that flesh becomes injured by burning when exposed to a given temperature. He must learn that society has organized itself according to a mutually agreed upon set of traffic rules, and that, even though he as an individual may wish to disregard a red traffic light, he may not do so without danger to his life because the rest of society regards the counter green light as a "go" signal. The same principle holds of the less well codified social laws: individuals are not autonomous in themselves but must accept the inevitable consequences which follow, entirely regardless of individual wish, upon the heels of specific types of behavior. For example, there are certain rules for friendship—rules of fair play, of generosity, of respect for other people's wishes as well as for one's own—rules which can be broken only at the cost of loss of friendship. Thus, infringement on social law or rule, like infringement upon physical law entails specific consequences. It is no good to say, "I am a law unto myself." No one is a law unto himself. Adjustment to law and authority is absolutely necessary to sound mental health.

Each individual must learn what constitutes a desirable adjustment to authority, and the sooner a child begins his lessons in this type of learning, the better his adjustment will be. What is it, then, that he must learn? In order to achieve a sound adjustment to authority:

1. He must learn what constitutes a good and desirable authority: what kind of law it is wise to obey; what kind of superior wisdom and experience it is desirable to consult.

2. He must learn what constitutes a bad authority: what kind of opinion it is wise to disregard; what kind of advice is worthless or vicious.

3. He must learn self-discipline enough to comply with a good authority.

4. He must develop strength of will enough to resist a bad authority.

Real wisdom in judgment of authority and real courage in acting upon such judgment comes only as the result of practice. Children should, therefore, be encouraged to assume such responsibility as rapidly as they have achieved enough experience to make their judgments sound; they should be taught to weigh good advice, yet to value their own experiences for whatever those experiences may be worth. They should, in other words, learn to achieve that fine balance of adjustment to authority which means compliance without weakness.

Ambition of Parents for Their Children as a Factor in Determining Behavior.—Another relationship between parents and children which is extremely important to the development of the child is that of the ambition of parents for their children. Since self-preservation is a first law of life it seems natural that people should be more interested in themselves than in anyone or in anything else. The chief exception to this principle is the interest that parents have in their children, for children, being the first extension of their parent's egos, are often identified with the most intimate thoughts and secret ambitions of those parents.

This identification of parent with child, this refusal to grant the child an individual personality (ego) of his own is one of the greatest sins of selfishness. In its most generous form one sees self-effacing parents who make every sacrifice that their child may have possessions and privileges denied them in their own childhood. We hear these parents say, "Bob will never have to work as I had to," or "Betty is going to have all the good times I missed when I was a girl." Insofar as work and suffering are a detriment to growth children should, of course, be protected from them. Abuses of children and the understanding that abuse

is destructive to growth have lead to child labor laws, children's protective agencies, and similar expressions of the desire to spare children undesirable hardship.

We must not, however, lose sight of the fact that a certain amount of striving for achievement, of struggle for fulfillment is fundamental to rapid and desirable growth.* Overprotected children, like over-indulged children, suffer a handicap for the very reason that they have been denied the opportunity for strength which struggle gives. Parents who deprive their children of struggle and discipline deprive those children of the very experiences which lent strength and meaning to their own lives. They fail also to realize that gifts too easily acquired cannot be appreciated for their full value, and hence these indulgent parents find themselves bewildered when their children attach little importance to the so-called "blessings showered upon them."

In its less generous form the identification of parent with child becomes a refusal to understand or tolerate the fact that children are not duplicates of parents,—a refusal to grant the child any individuality in wishes and desires. Sometimes we hear a mother say, "Betty wants a bicycle for Christmas, but when I was her age I was just crazy for a doll. I've the most beautiful doll for her; I just know she'll love it." And Betty's disappointment on Christmas morning leaves the mother with only a bewildered self-hurt, but with no clearer understanding that Betty is not a duplicate of herself. One father who had always wanted to be a lawyer refused to permit his oldest son to study for medicine because "the young scoundrel doesn't know the thrill of arguing before a jury. Just wait until he's tried it; he'll be grateful to me for insisting." The father, denied expression of his own wish and intent upon moulding a law career through his son, failed to see that he was denying his son the same expression of an equally strong wish. This desire of parents to live again through their child, to find in him the pleasures they missed, the satisfactions they failed to achieve, is an urge to make up through

* Adler develops this thesis clearly in his Individual Psychology.

the child for the disappointments and failures of their own lives, and is detrimental to the development of the child.

Less specific than these urges to live the detail of joy or disappointment through the child is the general urge to find success through the child in no matter what form. In this case the parents do not force any specific career upon the child, but insist upon success wherever the child seems most likely to achieve it. Difficulty often rises here when parents, refusing to recognize mediocre or inferior ability in the child drive him far beyond his natural ability. Many modern families who have never boasted a college graduate have come into enough financial prosperity to afford these four additional years of training. They insist that the son or daughter must go to college even though the child, either recognizing his academic limitations or finding his natural level of success in mechanics or business begs to be spared. In many cases parents insist because college represents to them a generalized brand of success, if only an indication that father has succeeded well enough to afford four more nonearning years for each of his children. Thus we see the desire for glory and success in a reflected form. The parents live success if their child succeeds; they feel their own egos inflated when their child has achieved glory.

The urge of parents for the feeling of success through their child takes another form. If a child can recite an endless chain of nursery rhymes when he is two years old, or if he can graduate from high school at fourteen, thus persuading people to remark, "What a bright child!" parents can feel, "He is mine; he inherited his brightness from me; therefore I am brilliant." Or, if he can be trained to perfect manners at a very early age people can be encouraged to remark, "What a well-trained child. He must have very unusual parents," thus gratifying the parental ego directly. Such commercialization of the child for the sake of parents is usually entirely unconscious on the part of the parents, but it is unfortunate nevertheless.

Sayles[117] says, "A natural and inevitable accompaniment of normal parental love is the wish to see the child succeed." It is not the parental wish to see the child

succeed that is dangerous; often the very wish for success and faith that it will come is the motive which produces it for the child. Trouble rises when the parental wish becomes selfish. When the major drive behind the wish is gratification of the parental ego or a desire to live again one's own life through the child parents rob the child of individuality, and force the development of interests that are not native or dwarf capacities that should be dominant.

Again, trouble results whenever parents refuse to accept inherent limitations and continue to drive beyond native ability. No amount of hard work can make up for serious native deficiencies. Nothing but failure can come to a child driven beyond reasonable effort. Whenever a child has made a serious effort the feeling that he has failed to meet the expectations of his parents is disastrous. Continued disappointment of parent in child produces a discouragement which inhibits even the measure of success that would otherwise be possible. The child in school who does not even try because he is too discouraged or too terrified of failure is a familiar spectacle. One of the most brilliant women chemists in America has never found the happiness or self-assurance due her from her work because her father has never allowed her to forget that she "failed him when she failed to become a musician."

We have also the abundantly successful parents who need to find no vicarious or compensatory success in their child, but who feel that they have a tradition to maintain. The father belongs to "a long line of doctors," the mother to "a long line of musicians," and so on. These parents, proud of their own success and of that of their forbearers can tolerate no let down in the family tradition. Regardless of individual capacity or interest, therefore, the child must carry on. Sometimes this "family tradition" is set by an older child who succeeds brilliantly in business or in music, so that a younger child, neither able nor interested in these lines but drawn toward another line of work, is regarded as disloyal if he fails to follow the pattern set.

The whole subject of praise and blame is involved here. Too ready praise can breed habits of laziness and self-complacency. Lack of serious competition or lack

of sufficiently high standards of accomplishment are almost sure to leave wells of capacity undeveloped. On the other hand, too constant blame can breed habits of failure and self-effacement. Too serious competition and too rigid standards are almost sure to blight development. Thorndike,[139] after extensive study in the psychology of learning has said, "Being told that a thing is right, is several times as effective in making one do the same thing at the next opportunity, as being told that a thing is wrong keeps one from doing that same thing at the next opportunity." In other words, comments on successes make learning proceed faster than do comments on errors; praise is more effective in teaching than is blame.

Myers,[92] too, has made clear that the method of teaching children by celebrating their successes has a great advantage over teaching by nagging about mistakes. This does not mean that pointing out mistakes is to be avoided in every instance, but means that the emphasis should be laid on the right learnings rather than on the wrong ones. The chief thing to be borne in mind in this connection is that *parental ambition must be adjusted to the capacity and the interest of each individual child.*

Standards should be high enough to exact maximum development of native capacity, but flexible enough to adjust to incapacity. Praise and blame should be awarded according to effort as well as according to product, and the concept of success should be broadened to include the achievement of a good disposition and of a desirable social viewpoint, and should not be limited to the attainment of material prosperity.

Case Studies

Case I. Betty V.—Betty V. is a pale, unhealthy looking child of four, who illustrates the effect of unsteady discipline and of crowded housing conditions. Most of the time her expression is unhappy. She whines continually and is exasperatingly slow over the performance of all the routine duties. She is erratic in her behavior and variable in her attitudes toward adults as well as toward children. At times she is cooperative and willing to enter into activities; at times she cries and fusses. She will play quietly with a child, and then suddenly begin to whine or bully. She will throw her arms

around a smaller child, help him in his work and stand up for him against the other children, and then forsake him or knock him down and snatch away his toys. She will play well with another little girl for a short time but after the novelty of a playmate wears off, she begins to get "bossy" and to demand the lead. She has tried to play with one little boy in particular, but she pesters him continually and, when he retaliates, she runs crying to a teacher. She has tried continually to make herself a member of the group but her method of attack is very unsatisfactory, for she tries to force herself in and she teases the other children. Her work is spasmodic, her concentration is poor, and she has little originality or initiative.

The home picture would lead one to expect a child of this type. The apartment is small, two bedrooms, a living room and a kitchen, all of the rooms opening from the living room. Betty sleeps in her parents' room, the extra bedroom being used for the father's home studio. She has very few toys—some dolls, a carriage, a toy victrola, and two or three books, but little that can be used for constructive play. She has her supper at half past seven and, after a romp with her father, is put to bed. As a result of the romp she takes a long time to get to sleep. She gets up at about eight in the morning, which means that since she arrives at school at quarter of nine there is always a rush to get her through her breakfast. On the whole her health regime is unsatisfactory.

Her father is an artist and is quite irregular about the time of his home coming. He is quiet with Betty but not consistent in his treatment, as he sometimes demands instant obedience and at other times laughs at her misbehavior. The mother nags the child continually but she rarely follows through on any command. She allows Betty to tease her for information but does not give definite or satisfactory answers to the child's questions. She complains when Betty gets in her way because she wishes to help her mother, but she does not provide any work that the child can do.

The relationship between Mr. and Mrs. V. seems quite satisfactory but he gives the impression of being the leader while she sits by in a placid way. The only demonstration of affection that was evident during a long visit in the home was shown between Betty and her father. Mrs. V. said, "Mr. V. and his family are very demonstrative and it is hard for me to act affectionate toward them. It is even hard for me to show affection to Betty. Her father's demonstrativeness toward her makes quite a contrast."

Betty seems to reflect this home atmosphere in her behavior. She uses the teasing, pestering method that she has found to be successful with her mother; she nags the other children as her mother nags her. She alternately caresses and scolds the younger children, the method her father uses with her. Her inability to adapt to a routine may probably be due to the lack of system in her home. Inadequate sleep and an unsatisfactory health regime account for a good deal of her behavior.

Case II. John M.—John M. presents a very different picture. He is a happy child when in the nursery school, and is full of interest in everything and everybody, but he runs about aimlessly and seems unable to concentrate on any activity for more than a fraction of a minute at a time. He is not, as yet, one of the group, being only two years old, but he is just reaching the age where playmates are

beginning to mean something to him. He is entirely sure of everyone's affection and is exceedingly quick to take advantage of any adult he can win by acting in an "appealing" way. If one is in the midst of scolding he will smile, try the effect of a hug and let forth a perfect torrent of chattering talk, watching carefully for the result. He is, to a certain extent, spoiled. He begs adult aid in any difficulties with the children, cries at the slightest bump, asks for sympathy, and demands a great deal of adult attention. Most of the time he is happy and contented, but every once in a while when the day starts badly he is cross and fretful. He is often over-tired, behaving like a thoroughly overstimulated child.

John's father and mother have been married for eleven years and he is the first and only child. His father is seldom at home as his business keeps him downtown late and he sees the child only on an occasional evening and over the week ends. His mother is small, of a characteristic "doll faced" prettiness, but one is amazed by the sound common sense and the amount of theoretical knowledge she displays in bringing up the child. In carrying out the principles of child training she has acquired, however, she has had to face two rather difficult obstacles. Mr. M. obeys John's slightest whim. If John asks father to undress and go to bed with him at half past seven, father does it. He cannot bear to punish John or cross him in any way and seems to have no conception of any attitude on the child's part beyond that of the present moment.

The second difficulty lies in the presence of the grandmother, Mrs. M.'s mother. She is over demonstrative with the child, sympathizes with every difficulty—real or imagined—that comes into his life and allows herself to be completely guided by his wishes. She works during the day, getting home about quarter of seven. Having been away from John all day she encourages him to play and romp with her at night which gets him in an excited state just before bedtime. She takes John's part against his mother when he has been punished, either by actively showing her feelings or by concealing them badly. John is quite aware of his ability to enlist her cooperation and he takes every advantage of it when grandmother is there, but he is also quite well aware of the fact that when his mother says "No" she means it, and he plays quietly and contentedly by himself when they are alone. The father and grandmother constantly vie with each other for John's favor, bringing him numerous toys, sweetmeats, and so on when they return home at night. It is not at all unusual for each of them to appear the same evening bringing the same new nick-nack; so that John not only has an excessive number of toys, but has duplicates of many of them. Overstimulation and lack of concentration, both of which seem to threaten John's physical and personality growth, can easily be traced to such a home situation.

To the adults in the nursery school he reacts as he has learned to at home: he tries his cajoling method first,—if that fails he manages by himself. If, on the other hand, it succeeds, he never forgets the particular association he has built up. In proportion as the constructive influence of the school and the mother can dominate the destructive influence of the father and the grandmother John will develop in self control and consideration for others. Meanwhile there can be seen already in his bursts of irritability the beginning of

conflict which is inevitable when children are torn between different types of discipline.

Case III. Bob A.—Bob A. is a pale, wiry child of five. In the nursery school he is cooperative with adults, and is most willing to play with the children but is seldom sought by them as a companion. His mood is variable. Although he generally occupies himself with quiet concentration, he has streaks of "showing off" during which he rushes about madly, talks loudly, and sets up cries of "Dumbell" and "You're garbage." He has a persistent habit of masturbation which he forgets occasionally when intensely interested in something else, but which often tempts him away from absorbing work or play. He has had one short period of nail biting.

Bob's father is a night watchman, married to a woman much better educated than himself. He once had ambitions to superior training but these were frustrated by the war, so that he has a keener feeling of inferiority than if he had never had a desire for further education. He is full of the compensations of a man who feels himself a failure, being a brusque and blustering person with a bad temper which flashes out and leads him to explosions of bitterness and sarcasm. After the temper is over he refuses to refer to the episodes. Aside from these compensations, which are quite unconscious, he is a man without pretense, who talks quietly and naturally about his work or about anything else which happens to interest him. He is very fond and proud of Bob, talking a great deal about him and displaying his good points, but seems to lack utterly an understanding of the gentler type his son represents.

Bob's mother is a high-strung, sensitive woman who seems somewhat bewildered and rather more than somewhat discontented with her lot in life. In order to supplement the family income she teaches and is away from home almost all day. She has had a great deal of difficulty in adjusting to her husband's temper and feels keenly the lack of companionship she had always hoped marriage would mean. Her attitude toward Mr. A. is quite intolerant. Before other people she often corrects statements he makes and tells him that he can not repeat information accurately. She also objects when he interferes with Bob at the table. She seems to resent his methods of discipline with Bob. Toward Bob she is all kindness and understanding. In contrast to the father's brusque manner toward Bob the mother's patience and gentleness are conspicuous. She worries about the child a good deal, however, being anxious because he is underweight and because she cannot get him to go to sleep quickly at night. She is disturbed about his masturbation and his bad language, but she is wise enough not to nag him about them.

There is a close relationship between the mother and child, who talks to her constantly while he seems unwilling to make any contacts with his father. However, it was interesting to note that when he is away from his parents, Bob's conversation centers entirely around his father and the things his father can do. Some of his bombastic behavior in the nursery school is doubtless an attempt to imitate his father's traits. He repeats many of his father's religious and racial prejudices in the same explosive wording he has heard his father use. At five years of age his attitude about these matters seems almost determined.

Bob's parents are devoted to him although they disagree about his upbringing. The most important factors in his environment—factors which readily explain his bad habits, and his other evidences of tension—are the irregular hours of his parents' work, the explosiveness of the father and his lack of ability to understand Bob, the worrying of the mother, and the underlying current of disharmony between the husband and the wife which expresses itself in petulant nagging of the husband by the wife. Until harmony and tranquility can somehow be created in this home we cannot expect relief in Bob's behavior.

Case IV. Anna B.—Anna B. is twenty-nine months old. She is a delightful child, well built and physically robust. The daintiness of her clothing, the evident emphasis in the home placed on her routine and the constant attendance of her nurse lead one to describe her as "giving the impression of being rather too well cared for." She has a happy disposition and is quite willing to carry out the nursery school regime, but she reminds one distinctly of the "absent minded professor." When started on some routine duty, work or play, she will attend for a few minutes and then wander off. As is usual at her age, she seldom plays with the other children, but unlike most children, she is rarely busily active about her solitary play.

Her father and mother are separated. Anna lives with her mother and a nurse. The apartment is small, but every effort has been made to give the child the proper physical environment. Her routine is worked out on schedule and is scrupulously carried out. She has quite a number of toys, most of which have been intelligently selected, but her chief interest has centered, and has been encouraged to center, around a victrola which she can now operate alone.

Her mother is in business but is usually at home when Anna returns from nursery school. The mother is a pleasant person and a good conversationalist; is called broad-minded by her friends and glories in the fact. She seems, in many ways, to be adolescent rather than adult in her outlook, a fact which probably explains her inability to achieve anything like real insight into Anna's most fundamental needs. She is extremely ambitious for Anna and wants her to have every cultural advantage. She seems to feel that travel will provide these advantages and so talks a great deal about her plans for travelling when Anna grows a little older. One can see in these plans, however, that the mother's fundamental aim is the pleasure of travel for herself, and that she is only using Anna as a means to an end. She knows very little about young children and seems incapable of putting herself in Anna's place to a degree that will provide by insight what she lacks in knowledge. As a result she fusses at Anna continually, and constantly directs her about being careful of her toys and her clothes, failing to realize that such young children cannot be as skillful as adults in management of objects and care of clothing. On the other hand she encourages the nurse to wait upon Anna constantly.

Anna's home gives one the impression that it is over-directed, and that Anna suffers because of an over-emphasis on physical hygiene at the expense of mental and social well-being. Too much care in the physical order of life by the nurse and too many commands from the mother have tended to produce babyish dependence. Too much conversation about the future and too little attention to companionship in the present have produced dreaminess and absentmindedness

in the child. There is too little provision for independent expression; too much of a tendency for the mother to absorb the child's personality.

Case V. Barbara and Betty B.—Barbara and Betty B. are sisters four and one half and three years old, who illustrate the need of impartiality in dealing with children and the need of sound adjustment in the amount and kind of affection given. They are attractive though frail looking children, both of whom were distinctly under par physically when they entered the nursery school. Both were lacking in initiative, dependent on adults, unable to meet children of their own ages successfully. Barbara was a particularly pathetic child. She rarely spoke; she never played with the other children. She sat at a table during work period, apparently devoid of ideas, staring into space or gazing about her, or stood about on the playground doing nothing. Efforts to draw her out or engage her interests if made by children met with no response, or if made by adults resulted in strong attachments to those adults. She would select some student or teacher for attention, would cling and follow her about, seeming to gain some feeling of security from the contact. If spoken to or asked to speak before the other children she seemed overpowered with shyness and quite wretched. In the course of a year she began to make an adjustment to the other children although she would still sometimes ask adults if other children liked her. She came at the end of two years to talk and laugh,—even to indulge in silly streaks, although even after such long contact with the nursery school her silliness was often a self-conscious bid for attention. She became less dependent upon adult attention and less intense in her attachments, however, as her contacts with children became more satisfactory.

Betty, though lacking in initiative and independence, has never seemed to be as starved for attention nor as excessively self-conscious as Barbara. Although both children have had difficulty in meeting other children, they have always played together smoothly and seem very fond of each other. Barbara, timid and self-effacing before other children, dominates and often imposes upon Betty when they are together.

It was not easy upon investigation into the home to find there any tangible reasons for the excessive shyness, lack of adaptability, and almost complete lack of initiative of these children. Yet their history reveals much that is significant. Until Betty was a year old financial difficulties kept both mother and father at work, and the problem of caring for the children was solved by placing them with their maternal grandparents, thus separating them from their parents. Betty was the grandfather's favorite, and partly because of this, partly because she was the less sickly of the two children, she was played and romped with more than Barbara. The grandmother, too, was more attracted to Betty, and allowed herself to indulge in obvious partiality. Thus Barbara, for eighteen months the only child, was suddenly forced not only to share attention and affection, but to give them up almost entirely. Her lack of confidence in herself, her overaggressive behavior toward Betty, and her excessive bids for love are the natural result.

When Betty was a year old the parents had succeeded in establishing a home for the children, and the family, plus the grandparents, came to live together. The parents, naturally drawn in affection more to

Betty than to Barbara, continued the practice of favoritism until it was pointed out to them that most of Barbara's disagreeable traits were probably traceable to that situation. They have made a conscientious effort to correct their attitude and practice, but the grandparents, particularly the grandfather, still fail to conceal their partiality. Mrs. B. whose love Barbara seems to crave most, still works, however, and being naturally an undemonstrative person, has neither the time nor the understanding necessary to meet the child's love needs.

Betty, on the other hand, has had too much protection and attention. Her dependence and lack of adaptability are the result of too much petting and waiting on.

This case is interesting because it demonstrates that two children of the same sex, only eighteen months separated in age, can be brought up in the same home, yet live in widely different environments. Still more interesting is the fact that the picture of behavior is similar enough to deceive an off-hand observer into thinking that such similarity is in itself proof of similarity of environment. Yet, careful study of the situation shows that the two pictures of dependence, lack of adaptability, and lack of initiative are due to diametrically opposite features of the environment—the one to too little attention and affection, the other to too much.

Case VI. The Smith Family.—The Smith family is interesting as an illustration of the effect of constitution of the family upon the behavior of individuals within the family group.

Barbara, the oldest, was ten when the family first came to the clinic; she was beautiful, talented, successful. She lead her class at school with ease, was socially a most effective and attractive person. She played the piano, sang, rode well, and was outstanding in several sports.

Doris, age eight, thrown constantly with Barbara, was the ugly duckling. She had straight, fine hair of an ordinary color, and dreamed of golden curls like Barbara's. Her eyes were badly crossed, making glasses a necessity, and her vision was so defective that she could not devote herself to school work in order to achieve the success for which her alert mind and her frustrated emotions hungered; nor could she pursue music, in which she gave real promise until the oculist forbade further work. Her self-consciousness and sense of frustration had conspired to produce a cross, petulant disposition, and to destroy grace of manner. She was awkward at the table where she often spilled things much to the disgust of the rest of the family. When summoned to meet a guest she was likely to stumble and bump into things. She was gven to bursts of temper and fits of selfishness. In constant contrast with a sister who was beautiful, Doris was forced to try to convince herself that physical attractiveness was not important; so she endeavored to convince the world of the same thing by defiance: she was untidy, refused to bathe or to brush her hair. We can imagine her defiant attitude sometimes melting into a pitiful feeling of "what's the use." In this there appeared only an aggravating child, perverse, rebellious, sullen, stubborn—unwilling even to make the best of what she had.

Bob, age five, and the only boy, was a handsome youngster, possessed of the charming social manners common to all the family

excepting Doris. He was, however, very high strung and a bad feeding problem. Being the only boy, and adored by his sisters, he was already convinced that his sex entitled him to certain privileges,—the largest dish of ice cream, the right to choose where the family was to picnic, the front seat beside the driver, and above all, the right to "manly" behavior which, in less complimentary terms, would be referred to as temper tantrums. The father was largely responsible for this misinterpretation of what was "manly" and, hence, desirable behavior. He was convinced that "boys are different from girls"—should be expected to mind less well and to rebel more against authority. He thought that modern scientific findings in nutrition and in psychology were "all nonsense." Thus attempts on the part of the mother to correct Bob's behavior, especially his temper and his feeding habits, met with but persistent resistance from the father.

Elizabeth, age three, promised to reproduce the triumphs of Barbara.

In such a family the problems are not easy to solve. Bob, of course, can and should be taught the obligations of gallantry and the manliness" of self-control. Doris' problem is more difficult. The mother, in an attempt to treat Doris as generously as she did Barbara dressed Doris and Barbara exactly alike, thus unwittingly emphasizing the contrast between them. The ruffles and dainty colors which enhance Barbara's feminine beauty serve only to sharpen Doris' lack of it. The mother was open to suggestion, however, and dressed Doris in more tailored clothing which soon taught the child that she could be much more attractive as an individual type than as a pathetic copy of Barbara, and soon convinced her that tidiness and cleanliness were inherent aspects of her particular type. Success in school and in the social accomplishments of music and dancing may always be impossible for Doris, but the charm of a sweet disposition and of constant consideration for others has already come within her vision, and social grace waits only for sufficient beginnings in social success to put her at her ease. She can never be the thrilling source of pride that the other children are, but she understands now that she can win a sincere affection from all of the family if she wins a clear enough victory over herself.

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CHAPTER III

HEREDITY IN ITS RELATION TO GROWTH

It would be unfair to any discussion of child development not to recognize the part heredity plays in the life of a child. A number of volumes would be required to present all the scientific evidence concerning the physical and intellectual characteristics which are carried forward from one generation to the next. It is not within the province of this text to weigh all the evidence in the controversies which have arisen and to draw conclusions but rather to accept the opinions of leaders in those scientific fields where the major investigations are being made. There are, however, traditional ideas which are fairly well rooted in the minds of students and parents which need to be questioned and other ideas which science is confirming. The questions most often raised when groups discuss heredity are: What physical traits do children inherit? Why do blue-eyed parents have brown-eyed children? Does the height of the parent determine the height of the children? What physical abnormalities are inherited? Do we inherit disease? Do certain diseases tend to "run in certain families"? Are feeblemindedness and insanity inherited? Are personality characteristics and "special aptitudes" such as musical talent, mechanical skill and artistic ability passed from generation to generation? Can the trend of heredity be altered?

The following discussion is presented with the hope that it will throw light on some of these queries and stimulate students and parents to further reading in the field of genetics.

It must be recognized that the very term "heredity" is loosely used by the average person and indefinite in its meaning to them. When asked to define what is

included there is vagueness, confusion and inexactness in their definition.

The subject of heredity is an inclusive one dependent on scientific observation and experiment, involving so many factors that in themselves must be studied and analyzed, that a life time of research could be devoted to only one aspect of it. It must be understood that the material presented here is in no sense a complete discussion of the problem of heredity, but simply a presentation of certain results which have been obtained in the past few years, an effort to point out what seems to be their meaning in relation to child development. It is hoped the aspects of the subject discussed will (1) indicate the involved nature of the problems which are faced when heredity is studied; (2) give an understanding of the coordinated research necessary to find out facts and to establish conclusions; (3) encourage open-mindedness in regard to the findings of science in this field in which there are now largely uncritical generalizations only; and (4) give to students of child development a point of view regarding the subject.

To indicate the wide variations in the conception of the term "heredity," the interpretations of McClung, Jennings, Little, and Conklin are cited. We are indebted to McClung[76] for reviewing the field, and studying the contexts in which the term "heredity" is used and the definitions given. He says, "When all these definitions of heredity were considered carefully in relation to the context from which they were dislodged, it gradually became evident that there was some community of understanding amidst the diversity. So far as I could interpret it, this appeared to be that heredity involves a condition, or state of organization, maintained in a succession of individuals by processes of reproduction. Foregoing the unattainable ideal of a perfect definition, we may conclude therefore for the purpose of this discussion that heredity involves the elements of a form of organization, a succession of individuals, and a process of reproduction."

Little[71] from the field of Biology defines it more broadly. "Any substance or any characters developing from any

substance passed by one generation to another may be considered as inherited." He also makes the distinction between substances "actually transmitted as so much baggage by the germ cell" and "the inherent parts of biochemical constituents of the germ cell which are the underlying causative determinants of the truly genetic characters of the organism."

Conklin's definition[23] comes from the same field and is even more inclusive. He defines heredity as "the continuity from generation to generation of certain elements of germinal organization. Heritage is the sum of all those qualities which are determined or caused by this germinal organization."

Jennings[61] writing from the field of Zoölogy, clearly sets forth the difficulty of defining the term "heredity" when he says, "Experimental biology has shown that at its beginning the organism is a complex thing, containing a great number of *separable substances—what we call the genes.* By the interaction of these thousand substances with each other, with the cytoplasm, with materials brought in from outside, with the forces of the environment—development takes place, the individual is produced with all his later characteristics."

In studying a child it is difficult to analyze any one set of factors that may have been potent in his development because they are interlinked with so many other factors. It is desired here to apply in so far as possible the method used by biology, and to see his heredity in the light of what traits, physical, mental, social, and moral with which nature has endowed him from the beginning. Immediately the questions arise—what innate capabilities has he? How is he like other children? How does he differ from them? How has his development been influenced by the succession of individuals who have preceded him as ancestors? What has been his response to the general laws of development? How has the "world outside" altered his development? How many of the effects produced by the "world outside" can be changed and how many have become a part of his mental and physical, social and moral constitution?

It is easy to assign familial traits to heredity when their occurrence is due to undiscovered factors in the family environment. Mental characteristics, personality likenesses and behavior need especial care in their study since they are developed and secondary and may or may not have their basis in heredity. One of the commonest statements heard in the average family is "he has a temper exactly like his father." A true student of the child would inquire if the expression of temper was an imitation of his father, was a reflection of home environment, was failure to have learned self control, or an inheritable trait like eye-color.

There is, however, great difficulty in obtaining satisfactory data on human beings since small families, slow breeding and late maturity make it difficult to obtain records of large numbers of individuals of the same family. There must also be considered the fact that in spite of the most honest and conscientious effort on the part of both the informant and the investigator subjective interpretations tend to color the data. It is difficult after a characteristic has occurred in two or three successive generations, not to regard it as hereditary. No doubt the recurrence of such characteristics plays an important part in the popular confusion regarding inheritable traits. The refinement of scientific methods and the improvement of technic, together with the invention of more powerful lenses for discovering and studying forms of life previously unidentified has helped in the differentiation between genetic and environmental factors.

An example of confusion between inheritability of disease and causative factor is found in the history of yellow fever. For many years in countries where yellow fever prevailed, heredity was regarded as the determining factor in resistance or nonresistance to it. It is true that in Havana and Guayaquil reliable records show whole families to have been decimated by it. Not until the cause of the malady was finally found through scientific discovery was it possible to determine whether nonresistance was an inheritable trait in the individual or the result of an environmental factor.

Another example of confusion existing between inheritable condition and one due to external causative factors is feeblemindedness. The brilliant studies of Goddard of Vineland furnished statistics which seemed to prove the inheritability of feeblemindedness. He has cited cases in which the family history for five generations showed the same dire sequence of insanity, idiocy, epilepsy, or feeblemindedness from generation to generation. A typical example given by Dr. Goddard shows 13 descendents of a supposedly normal father (possibly a carrier of feeblemindedness) and a feebleminded mother, of whom seven were feebleminded, the other six dying in infancy. The mother herself was one of seven feebleminded children, who were in turn the descendents of feebleminded parents. The mother of that generation had five feebleminded brothers and sisters. The conclusion was that feeblemindedness was inherited from the mother.

Recent investigation has shown, on the other hand, that feeblemindedness may be due to suppression of normal development by extraneous factors operating during prenatal life or early infancy rather than to heredity. In fact, Guyer[50] points out that one-third of mentally deficient members of the population are accounted for on other bases than heredity. It is estimated that 30 per cent of the feebleminded cases are so-called "Mongolians," which type of feeblemindedness, according to Guyer, appears to be due to some interference in prenatal development such as malnutrition in the mother and endocrine disturbance, rather than necessarily to all inherited characteristics. Wallin,[50] who has studied mentally defective children, believes that destructive agents, especially toxins, may permanently injure either the germ plasm or the brain tissue of the fetus, and hence may become the causative factor for much feeblemindedness which formerly had been attributed to heredity.

Before accepting sweeping conclusions regarding the heredity of physical and mental traits it is important to keep in mind the accumulated advances in developmental physiology, in genetics and in experimental morphology,

which according to Riddle[108] indicate that "the specific conditions under which a gene or factor operates and develops have an equal value with the germinal factors in the appearance of anything that can be called heredity. The factors distributed by germ cells set limits to the nature and appearance of adult characteristics. So do conditions." Jennings* agrees with this point of view and very aptly draws the contrast between external condition and genetic character in these words: "The character of the adult is no more present in the germ cells than are those of an automobile in the metallic ore out of which it is ultimately manufactured. To get the complete, normally acting organism the proper materials are essential; but equally essential is it that they should interact properly with each other and with other things. And the way they interact and what they produce depends on the conditions."

Theory of the Gene.—Many theories have been advanced to explain the way in which hereditary characteristics are carried from one generation to the next. It is generally accepted that the actual thing which is transmitted by the germ in inheritance is not the character itself but something which will determine the character of the offspring. "Any differential cause in a germ cell which is instrumental in establishing a particular attribute of a part or an organism is called the determiner, gene, or factor of that attribute."[50] Genes are the co-operant parts that together form a unit character or attribute. The theory of the gene as the unit of all inheritance appears now to be the most fundamental of all the theories advanced. Just as in a chemical solution the character of the solution depends on the individual chemical substances dissolved in the solvent, so a unit character depends on the genes that enter into its formation. If, in the chemical solution one of the individual substances is removed, the chemical composition of the solvent is changed; so in a unit character, if an individual gene is changed, specific and striking effects are produced in the unit character, the change in the gene probably upsetting the established relation between all the genes of that unit

* Jennings, H. S., *Prometheus*, Dutton & Co., 1925.

character. It is generally accepted that it is the interrelations of the genes themselves and not the ways in which they are arranged in the cell which determines the course of development and the unit character.

Looking about us the very complexity and diversity of living plants and animals bears testimony to the differences which have originated in the past, and have been carried forward to succeeding generations. Inquiry into the nature, origin and inheritability of these differences is not within the province of this discussion. It is, however, conceded that variations, using the term as the biologist does, may occur apparently in almost any conceivable direction, being either useful to the species or harmful or indifferent, and being either transmissable or nontransmissable. Variations may occur in a definite direction for several generations or they may be fortuitous.*

General interest in human heredity has centered about the study of resemblances to progenitors, of those characteristics which mark off one individual from another, and of mental and physical defects. Human inheritance offers peculiar difficulties because of its complicated nature and the fact that any one unit character which is inherited depends upon a number of independently inherited genes and upon their inter-relationship with each other.

An example will serve to illustrate the complexity of the problem. Congenital feeblemindedness due to a single gene defect is perhaps the most pronounced and the very simplest example of a gene defect that has to be met. Yet as Jennings[61] cites, "if gene defects are recessive they are carried by ten times as many healthy individuals, not showing the defects, as by individuals in which the defects are manifest." The children of such healthy individuals receive defective genes, as do the children of defective individuals. If this type of feeblemindedness is to be eradicated, those normal individuals carrying defective genes must be prevented from propogating as well as those who are feebleminded. This would demand the devising of methods by which not only those whose feeblemindedness is easily determined, but

* For further discussion see Guyer—*Being Well Born*, p. 233.

also those individuals carrying defective genes can be distinguished.

However true the theory of the inter-relationship of the genes may be, recent research seems to question the immutability of physical or bodily characteristics and closely associated with this the immutability of psychical predispositions and impulses. If these findings are satisfactorily verified then such theories as the "integrity of racial blood" so ardently championed by some geneticists must be critically examined in the light of these new facts. Also the theory that "innate racial differences" are the result of differences in climates will be equally challenged. According to some authorities no amount of training would make the average Chinese as good a boatman as the average Eskimo—the Eskimo's ability as a boatman being considered an "innate racial characteristic." Ultimately the question of whether certain skills and abilities in races are accounted for by biological differences in the mentality of certain races or by their environment will be settled by research but at present the thoughtful student will recognize such a question as, at least, essentially controversial.

Possible Confusion of Genetic Traits with Traits Resulting from Environmental Condition.—In observing children among the first questions to arise is—can the trend of heredity be changed? Are the physical characteristics which finally appear the result of the heredity or are they the result of environment? The work done in the past decade by scientists in embryology, experimental breeding of plants and animals, statistical treatment of observations and measurements of parents and children, has thrown light on the causes of certain physical conditions which were formerly considered the result of heredity.

So long as an individual is normal, there is nothing to set apart his physical and mental characteristics. When he is unusually tall or unusually short, that is, without the range of the average, when he is unusually dull or undeveloped, he is regarded as abnormal and investigation and speculation is made as to the cause for this abnormal condition. Most of the illustrations for the inheritance of physical and mental

characteristics are chosen from pathologic and undesirable characteristics rather than from desirable characteristics, partly because they are more easily identified and studied, partly because diagnosis has been more completely developed regarding them and partly because the abnormality sets aside the individual from the normal group.

The Possibility that Prenatal Conditions Influence the Course of Heredity.—The exact nature of prenatal influences, the physical conditions in the mother induced by environment, the degree to which these conditions affect the fetus, await more exhaustive study before even causative factors can be differentiated. In a study of human beings this knowledge is difficult to obtain and yet its significance is evidenced by the statement of the late Professor Charles S. Minot* of Harvard that "more than 95 per cent of the actual development of the individual has probably been accomplished before the time of birth, and growth from babyhood to manhood represents less than five per cent of the important developmental changes which are actually accomplished by the individual."

Stockard[131] states that after fertilization takes place, the cell development tends to follow a definite pattern provided certain important factors in the environment such as water, oxygen and temperature are stable. If any of these factors are disturbed by unusual variation during the developmental period, the organism is either limited in its development or dies. In the field of animal experimentation it is a well recognized fact that animal eggs require a definite supply of water, and if water be removed and they are allowed to dry, development stops and they die. Likewise, when the oxygen supply is reduced, development becomes slower and if the condition is continued long enough the organism dies. If the development continues, but progresses at an abnormally slow rate, abnormal structures and deformed individuals will result.

The eggs of almost all species are disturbed by unusual variations in temperature during their development. The

* Quoted from Stockard, C. R., "Hormones and Structural Development," p. 8.

embryos of mammals are guarded against temperature changes by the mother's body but the eggs of animals that develop outside the body of the parent must have more or less constant environmental temperature. Thus in spite of perfect hereditary composition, the egg is unable to develop into a strong, normal individual in other than a particular environment.

The Confusion between Inheritance and the Effect of the Internal Secretions.—Investigations on the secretion of the thyroid gland have added much to our knowledge of the part that internal secretions play in influencing physical and mental characteristics of the child. For example, marked evidences of thyroid deficiency are the disproportionate broad face, low nose-bridge, overhanging forehead, undershot jaw.

At once the question arises—are such physical abnormalities in children the result of hereditary, prenatal or post-natal conditions? Among cretins they are generally ascribed to post-natal conditions which affect the individual, and to endocrine deficiency, especially of the thyroid gland. On the other hand the Mongoloid imbeciles are supposed to be the result of endocrine disturbances in the mother or of fetal nutritive deficiency.

However, Guyer[50] points out that prenatal conditions in Mongoloid imbecile may not be as significant as generally thought, since the Mongolian broad facial type with low nose-bridge, overhanging forehead and undershot jaw is prevalent in cretins, and may possibly result from insufficiency of thyroid secretion during the post-natal growth period. Jennings,[61] on the other hand, holds that "such physical abnormalities are defects due to the genes, but defects in genes become as open to remedy as defects in nutrition. A defective thyroid product is replaced by manufactured thyroxin; the individual is restored to normality. But his genes are not changed; they remain defective; they are transmitted to his descendants. His descendants too must be treated with thyroxin . . . If the thyroid secretion is defective, either from poor genes or poor nutrition, the individual fails to develop normally; it

becomes that pitiful half-formed thing, a cretin, an idiot . . . But chemical therapeutics discovers that disorders due to defective genes can be remedied, if we know the means, just as other chemical processes may be influenced. The consequences of a defective thyroid secretion are remedied by introducing the thyroid with the food; the pitiful cretin becomes a normal human being . . . In principle, it is clear that defects in the store of chemicals given us by heredity may be supplied by other means, that undesirable things in the store of genes may be cancelled or corrected; that reactions among them which take an undesirable turn may be altered, set right."

Davenport[25] even raised the question as to whether "we are what our endocrines make us" rather than the result of heredity. He says that in cretins there is a physical resemblance as great as that of members of the same race or family. In fact two cretins may be as "alike" as two brothers. A visit to an institution for the care of the feebleminded could not fail to impress this fact on even the casual observer. It is generally accepted that the causative factor that contributes to their "alikeness" is the improper functioning of their endocrines.

Not all physical deformities, however, can be attributed to endocrine deficiencies, as for example, achondroplastic dwarfism, which is distinguished by short and somewhat twisted legs and arms, and head and trunk of approximately normal size. Guyer,[50] in discussing such deformities says they cannot be attributed wholly to improper functioning of some endocrine gland of the affected individual, since certain of these developmental anomalies reveal their presence far back in the young fetus before its endocrine glands are functional. Hemihypertrophy, which is abnormal increase in the size of one-half of the body or of a part of the body, such as the limb, is described by Gesell[41] as representing "a failure of growth regulation in an early embryonic period, which brings about physical asymmetry, with abnormal consequences both physical and mental."

While the present state of our information does not lead us to try to explain all physical anomalies by endocrine

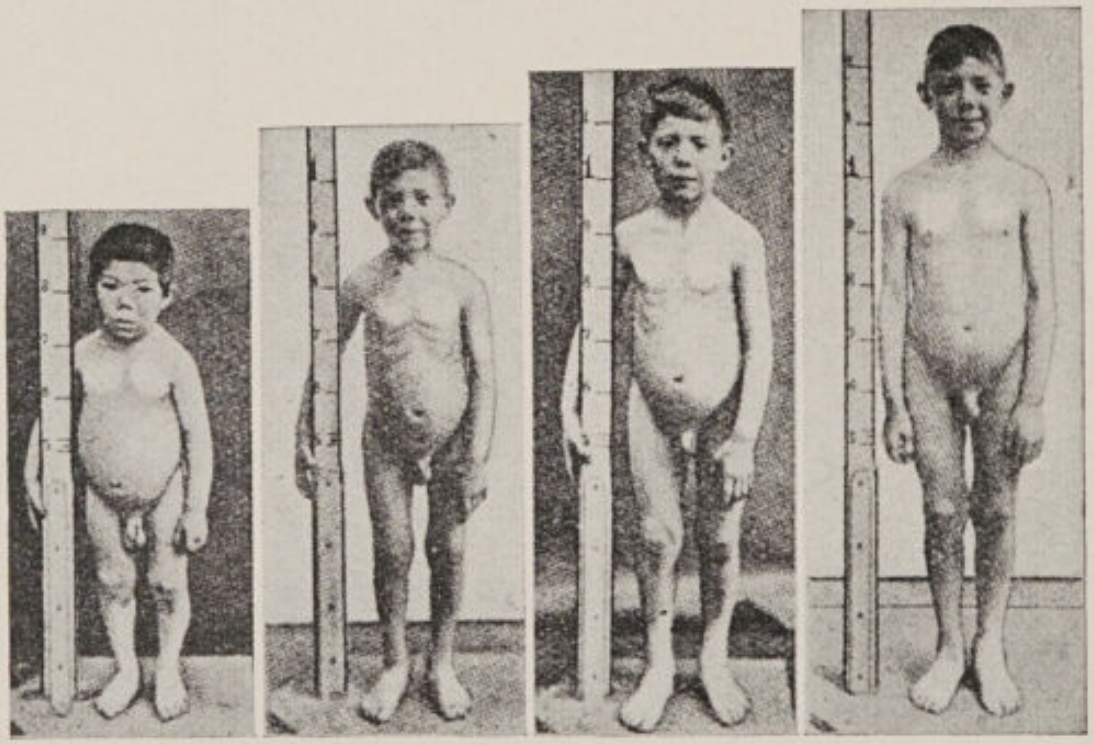
disturbances, it does not, however, allow us to accept the theory that all such conditions are inherited. Increasing evidence from the field of experimental medicine and especially from endocrinology tends to break down the belief in the sweeping conclusions, widely accepted, for many decades, that all types of cretinism, Mongoloid

Fig. 2.—Hindu dwarfs compared with normal Hindu. From left to right. 1, cretin, 2 and 3, true dwarfs, 4 and 5, achondroplastic dwarfs; 6, normal Hindu. (From Treasury of Human Intelligence.)

idiocy and certain physical conditions are inherited. Present investigations seem to indicate that each case of abnormality must be independently analyzed and its causative factors found before it is accepted as inherited.

Physical Conditions Due to Nutritional Deficiencies Confused with Inherited Traits.—The inheritability of thyroid deficiency has already been mentioned in the

discussion of cretinism. That the thyroid deficiency itself is a nutritional disorder has been shown clearly by the response of individuals to the administration of thyroxin and other iodine compounds. Not only is the iodine content of the diet of an individual important, but Yoakum[165] has shown that only 35 per cent of the infants of mothers who had iodine treatments during pregnancy had goiter as compared to 60 per cent of infants born of mothers having no treatment. It is almost needless to mention the impor-



Age 10½ 11½ 12½ 13½

Fig. 3.—Effect of thyroid extract on growth. (The Practitioner.)

tance to human beings and to animals of having iodine in the soil, and in vegetation. The effect of lack of iodine on the human population in endemic goiter regions in the United States has been evident in Montana, Michigan, etc., as well as in Switzerland. Evidence points to the conclusion that nutritional deficiency and not heredity as was once supposed, is the underlying cause of thyroid abnormalities.

Not only iodine deficiency, but protein deficiency—both in quantity and quality, mineral deficiency such as calcium and phosphorus either in small or large amounts have been

repeatedly shown to affect appreciably optimum growth in stature from generation to generation in experimental animals. It is clear that such constitutional changes are not due to inherent changes in the genes but to an alteration in the environment. A slight unbalance of equilibrium in the tissue fluids bathing the body cells may alter appreciably the development of the individual. However, it is not to be denied that there is an intimate relation between genetic factors and their environment and that the most promising avenue of approach to the germ cells in the hope of inducing hereditary modifications is through the medium and with the aid of environment.

The short stature of the Italian and some other foreign nationalities has been generally accepted as due to hereditary influence. Manny[81] has found that many cases, supposedly limited by race, are capable of decided increases in height as well as in weight. Holt holds that racial differences usually ascribed to climate are largely the result of differences in food. He has observed that adult Russian Jews who emigrate to the United States are about the same height as the Italians, but the children of those who are prosperous are often four to five inches taller than their parents, while the children of those who are poor do not make any such noticeable gains in height. The improved nutrition would appear as the causative factor responsible for this increase in height, rather than climate or heredity.

McCollum[75] discusses the effect of differences in food supply upon Japanese children born in America as compared to those born in Japan. Those born in America, both boys and girls are larger at all ages than are Japanese children born and reared in Japan. Without doubt it is the superior food which they have received that has made them outgrow their relatives across the Pacific. The question is often raised whether size is not entirely a racial characteristic and inherited rather than determined by such agencies as nutrition. Some very good evidence on this point McCollum found in the history of his experimental rats. When the nutrition of these animals fell just below a certain standard, there was no easily observable sign of

malnutrition. Their appearance and fertility remained such that they could be judged to be "normal," yet the size diminished from generation to generation. The inferiority of successive generations, he thinks may be the result of injury during the nursing period or due to confining the young after weaning to the same inferior diet as that of the parents. The increase in size of Japanese children born in California and fed upon the products of its farms, over that of children of same ages in Japan, harmonizes with this view. Holt[55] also believes that the size of the Japanese is greatly influenced by their food intake during the growth period. He quotes from information furnished by Dr. Hirai, professor of pediatrics at the Imperial University of Kyoto, who indicates that their diets are low in growth proteins, vitamin A and calcium. Comparison of growth curves of American and Japanese children shows that during the first year there is almost no difference, while after this age when children are given a varied diet the divergence is very marked. In Japan, as in China and the Philippines, the amount of cow's milk available for young children was small until recent years and the diet of the child the first few years after weaning is in certain respects less satisfactory than that of children of the western hemisphere. It is becoming generally accepted that the present generation of American children is taller and heavier than their parents. Physicians believe that this increase is due to better feeding in infancy and childhood and more outdoor recreation. There seems to be increasing evidence that height which has been considered an unmodifiable factor is apparently up to a certain point affected by nutrition.

Recent nutritional research on laboratory animals would confirm the importance of protein, minerals and vitamins as determining factors of body height. The early experiments of Osborne and Mendel[99] have illustrated the striking differences in the value of proteins from different sources for the support of growth. They also found that animals remained stunted for long periods when the protein content of the diet was limited in amount. However, they found

that interruption of growth does not necessarily result in the loss of capacity to grow and when the amount of protein in their diet was increased the rats resumed growth at a "normal" rate.

More recent investigations undertaken by Osborne and Mendel as well as Mendel and Cannon have strikingly brought to light the fact that the albino rat has shown more rapid rate of growth than the rate of growth as standardized by Donaldson in 1912. This has been attributed as "not due to selection or marked changes produced in the stock through breeding, but primarily the result of a more appropriate diet than had hitherto been employed in the experimental feeding of rats." In other words, according to Mendel and Cannon, "the inherent capacity for the rat to grow has in the past rarely been given full play in the laboratory."

Boas has made a study of the children of immigrants in New York City which, according to Stockard, furnishes most important data on the environmental modification of types. Central continentals from Europe of short stocky type when bred in a maritime environment for several generations tend to become of the tall slender type. Stockard[131] says, "the gland quality that produces the type is certainly inherited but the action of the gland itself is actually modified by environment and the race stock in the new environment is changed in spite of heredity."

Pellagra is a condition which usually manifests itself in soreness of the mouth, disturbance of the digestive tract, including diarrhea, and a peculiar bronzing of the skin which occurs on exposed parts of the body, hands, forearms, neck and face. The skin of these exposed parts thickens, becomes darkened in color and often becomes infected in certain areas. As the disease progresses mental disturbances develop. For many years pellagra was regarded as inherited, later as contagious. The fact that it appeared in nursing infants and that it occurred among the children of pellagrins seemed to point to its hereditary character. The fact that the children of pellagrins are poorly constituted, physically and mentally, was lost sight of in reaching

such a conclusion. Many physicians had thought the cause of the disease was in some way connected with diet but the relation was not definitely defined until Goldberger showed that by including generous amounts of milk, lean meats, eggs and fresh vegetables, especially green leafy ones, that the diseased condition could be relieved. It is not entirely established whether pellagra is due to a deficiency of vitamins or to lack of some of the digestive products of protein, or whether both factors play a part in inducing the disease, but Goldberger has demonstrated that it is due to a nutritional deficiency.

Davenport and Muncey[26] however, obtained evidence from family histories concerning the rôle of inheritance in the transmission of pellagra. Davenport demonstrated that while certain families showed mental symptoms, others showed intestinal symptoms and still others skin symptoms as the result of pellagra. In other words, there seemed to be "family tendencies" toward the form of pellagra which was contracted.

These studies raise the question also as to whether some constitutional types may not be more susceptible to nutritional deficiencies than others and whether these constitutional types may not be the result of generations of nutritional defects.

Gesell[41] splendidly sets forth the far reaching effect of the doctrines of heredity and environment on education and reforms. He says, "There are two sharply contrasted doctrines of development. One emphasizes heredity and the powerlessness of environment. The other exalts environment and makes it the architect of the growing organism. The former doctrine traces the make-up of the individual to all the determining unit characters or genes. Even psychological characters are attributed to these original packets of chromosomal material. The alternative doctrine suggests that even physical characteristics are molded by the conditions of development; and that mental characteristics, including capacity, talent and temperament are ultimately the result of training and conditioning."

Since our concern is primarily the child and his development the search is for direct evidence which will give a true estimate of the relative value of environment and heredity in determining the physical and mental characteristics of the human being. Perhaps the most striking evidence of the effect of environment on children of the same heredity is to be found in a study of identical twins, who were separated for a number of years. Such studies have been made by Newman and by Muller. Newman[95] studied 5 cases of identical twins. In one of the cases the twins were born in London and separated at eighteen months as the result of the death of the mother. O. was adopted by relatives, A. by friends. O. moved to Ontario, Canada, at the age of two; A. lived in Chelsea. They were separated for seventeen years except for one short visit. The two environments were completely different. "If environmental differences are effective in shaping mental and emotional characters, they should have been effective in this case." Newman gives the physical differences, differences in disease, schooling, social environment and psychological tests. The mental differences of the two at maturity were great according to Newman's interpretation. He found differences in environment and training had been responsible for bringing about a significantly great diversion in intellectual ability, but that the temperamental or emotional traits of the twins had remained unusually similar. On the basis of this one case alone, one might conclude that emotional and temperamental characteristics are more strongly inherited than purely mental traits.

Newman studied another pair of identical twins. These twins were separated when about eighteen months old, reared apart and entirely unknown to each other until they were twenty-one. They were born in New York and after a short time were taken to an orphanage until adopted, E. at eighteen months and G. at two years, by two families living in different parts of Michigan. They were at the time of the study twenty-seven years of age and for the last four years previous to the study, they had lived in the same city and seen much of each other. Physical similari-

ties gave assurance that they were identical twins. Whatever differences appeared in their physical and mental makeup can be very largely attributable to the differences of environment and training. Since the environment in general seemed to be very similar for both, the difference in training must have been the modifying factor. The difference in mental age between E. and G. is nearly three times the average difference of twins reared together. As might be expected, G., the twin with the more extensive education, has a better mind. The conclusion drawn by Newman was that these twins were remarkably similar after being separated at eighteen months of age, and unknown to each other for nineteen years, but they had been profoundly modified by the very different educational careers. In every test of mental capacity whether of so-called "native ability" or of achievement, G., the more highly educated twin had distinctly the superior mind. In contrast with the difference in mental power stands the fact that in all the tests of emotional traits and of temperament the twins give the impression of being remarkably similar. These twins show a very much greater similarity temperamentally than they do intellectually. "One might conclude that the emotional environment was much more similar for the two twins than was the intellectual environment, and no doubt this is true. It might also be claimed that emotional peculiarities are more strongly inherited and less modifiable by environmental factors than are intellectual traits, and this would not be true."

In the third case studied by Newman, C. and O. were born in a small Illinois village in 1905. C. was adopted at two months by Mr. and Mrs. C. of Cadillac, Michigan. O. was put in a Chicago orphanage at seven months from which he was adopted almost immediately by Mr. O. of Milledgeville, Illinois. The first meeting after separation took place was on July 4th, 1927, when they were twenty-two. When they were interviewed they behaved almost as strangers to each other and showed little if any mutual affection. It was concluded that these twins reared apart are not significantly different mentally, though separated for over twenty

years. What little difference is present is in favor of O. who has had a little less formal education. Newman concluded from a study of these twins that "the environment and training of the twins were closely similar in general, at least in so far as we were able to ascertain the facts, yet the 'personalities' of the boys were utterly different. In native mental ability they seem to be nearly identical. The one outstanding difference was in their general personalities. C. impresses one as more dignified, more reserved, more self-contained, more unafraid, more experienced, and less friendly. He seldom smiles, has a more serious expression about the brows, eyes and mouth. He stood more erectly with chin held in and brows drawn down somewhat over his eyes. O. was the opposite in all of these respects. He was more the typical country boy, laughed readily and was not on his dignity at all. He seemed to seek society more than C. and enjoyed a good laugh. Because of the difference in expression, C. gave the impression of having a stronger nature and was distinctly good-looking, while O. seemed to lack something in this respect."

Müller[89] also studied identical twins reared apart. His twins B. and J. resembled each other physically to a remarkable degree, being within $\frac{1}{2}$ inch in height, within 1 pound in weight, and showing similarities in strength of grip, blood grouping, head measurements, facial features, and so on. They were separated at two weeks of age and remained separated until eighteen years of age, after which time they still lived apart about nine-tenths of the time; B. was reared in Wyoming and J. in Arizona. They were studied by Müller when they were about thirty years old. Both girls spent much time out of doors in childhood. J. was considered the healthier baby, but both showed health disturbances in the late "teens," B. having experienced a nervous breakdown and J. having almost had one. B's foster parents changed locality frequently so that B. had only four years of formal schooling. She began clerical work at fifteen years of age and followed this with a strenuous, successful business career. J's foster parents owned a

ranch and roadhouse. J. finished high school and did summer study at a university. She taught school until her marriage at twenty-one years of age Both girls read voraciously when young; both were energetic, capable and popular. At thirty their intelligence test ratings were remarkably similar in spite of their differences in educational opportunity. On the Army Alpha test B. scored 156 and J. 153; on the Otis Advanced Intelligence Test B. scored 64, J. 62. In a test of emotions and social attitudes* and in the Downey Will-Temperament tests, however, they were no more alike than any pair of individuals taken at random. Müller concludes that these twins showed remarkable mental resemblance but more than ordinary differences in temperament.

Newman found that difference in environment had affected mental traits, while Müller found it had affected personality traits. The very different conclusions as to the effect of environment upon the individual reached by these scientists illustrates the controversial nature of the evidence and the complexity and diversity of the factors involved in personality, mental and character traits.

Another pair of studies which illustrates this same type of complexity in studies of heredity are those of Freeman and Burks on the intelligence of foster children. Freeman[36] reports a study conducted in Chicago and set up to determine whether the intelligence of children is affected by the character of their environment. A large group of children were tested before placement and after several years of residence in foster homes. He found that children in better foster homes gained considerably more in intelligence than did those in poorer homes, and that children adopted at an early age gained more than those adopted at a later age. The study was carried on along several lines, checks being made on the development of children whose parents were both feebleminded, on unrelated children reared in the same house, and so on. Freeman's conclusion was, "the facts appear to indicate that an improvement in environ-

* The Pressy X-O tests.

ment produces a gain in intelligence," and that the studies "give evidence that the character of the home affects the child's intelligence to a marked degree."

Burks,[15] working with Terman at Stanford University, has also made a careful study of the intelligence of children in foster homes. She endeavored to learn to what extent ordinary differences in mental level are due to nature and to what extent they are due to nurture. She approached the problem through a comparison of mental test resemblances obtaining between parents and their children on the one hand, with those obtaining between foster parents and their foster children on the other. The study was conducted under carefully controlled conditions; the main conclusions were stated as follows:

"1. Home environment contributes about 17 per cent of the variance in IQ; parental intelligence alone accounts for about 33 per cent.

"2. The total contribution of heredity (*i. e.*, of innate and heritable factors) is probably not far from 75 or 80 per cent."

Burks[14] says in connection with this study, "Certainly it seems a far stretch of the imagination to attribute equal effects to heredity and environment when environment, even in extreme cases, may stimulate or depress the IQ only by about twenty points, while heredity can produce alike the idiot of twenty and the genius of two-hundred IQ."

These two studies (Freeman and Burks) employed somewhat different methods and types of subjects but were undertaken to gather evidence upon almost identical problems. Both deal with the influence of home environment upon the mental development of children. The investigators agree in attributing small but significant increments of IQ to superior environment. In the main, however, their results seem to differ conspicuously, the Freeman study leaving the distinct impression that environment is predominantly important in its influence upon intelligence, the Burks study leaving the impression that

heredity is the predominant factor. Since both studies were conducted by persons whose research skill is unquestioned, the conclusions seem once more to emphasize the extreme complexity of factors involved in studies of heredity and the extreme difficulty encountered in drawing final conclusions.

Can Acquired Characteristics be Inherited?—For more than a century there has been controversy as to whether habits and physical characteristics acquired by an individual during his life are transmitted to his children. Morgan[88] in his work "Evolution and Genetics" says, "The will to believe in the inheritance of acquired characters is widespread and an interesting feature of human behavior. The eagerness with which each new claim is listened to is only too familiar to those who concern themselves with evolutionary controversies.

"The willingness to listen to every new tale that furnishes evidence of the inheritance of acquired characters arises perhaps from a human longing to pass on to our offspring the fruits of our bodily gains and mental accumulations. While every scientific investigator has sympathy for this human weakness, he cannot allow it to influence him in his examination of the facts as they actually exist. In our hope for the best we forget that we are invoking a principle that also calls for the inheritance of the worst. If we cannot inherit the effects of the training of our parents, we escape at least the inheritance of their misfortunes. A receptive mind may be a better asset for the child than a mind weighted down from birth with the successes and failures of its ancestors."

Pavlov conducted a startling series of experiments with white rats to find if they could be "conditioned" to the ringing of electric bells so that the animals would run to their feeding place at the sounding of the bell. The first generation required three hundred lessons, in which there was combined the feeding of the mice with the ringing of the bell in order to accustom them to run to the feeding place. The second generation required only one hundred

lessons to obtain the same result. The third generation learned to do it after thirty lessons. The fourth generation required only ten lessons. It was Pavlov's expectation that probably after some time a new generation of mice would run to the feeding place on hearing the bell with no previous training. From his experiments Pavlov concluded "that conditioned reflexes, *i. e.*, the highest nervous activity, are inherited."

Vicari[147] carried out for several years a carefully planned series of experiments with mice, in which records of each individual and its pedigree were made. The results did not confirm the findings of Pavlov. MacDowell[77] in his experiments on the possible effects of alcohol in inheritance as tested by ability to learn a maze and, as a control, made records of related rats trained by the same tests as were used for the alcoholics. His data showed no improvement in the offspring of trained individuals over those not trained. Halsey Bagg* has published significant material on mice tested in a maze; his experiments covered three generations and he found no evidence of improvement resulting from the training.

It must be kept in mind that the methods used by the investigators were not the same as those used by Pavlov, so that further investigation must be looked forward to, but the findings of Vicari, MacDowell and Halsey Bagg warn us not to generalize as to inheritance of training. Morgan points out that if such an inheritance were substantiated how simple our educational questions would become, for at the sound of the school bell the children of the present generation would learn their lessons in half the time their parents required. He says that if Pavlov's conclusions are corroborated, "we might soon look forward to the day when the ringing of bells would endow our great grandchildren with all the experiences of the generations that had preceded them."

Mutilations of an animal are not inherited so far as can be determined now. Men have been docking dogs' and

* Archives of Psychology, Vol. XXVI, 1920.

horses' tails for many hundred years, and trimming the ears of dogs, and yet the succeeding generations are born with tails and ears which continue to grow just as if the ancestors' tails and ears had never been touched. Weisimann cut the tails of mice for twenty-two succeeding generations and found it had no effect upon the tail of each succeeding generation.

Whitney[159] thinks racing of horses does not make their colts faster; forcing cows to give great quantities of milk up to their limits does not make the calves better milk producers. "What it does do is to bring out their abilities so that the best may be used to sire or bear the next generation." That is, that only the very best racing horses or milk producing cows, after proving their abilities are selected for breeding purposes.

Little* in a recent address before The Race Betterment Conference gives a very pointed illustration of the law that "weakened germ plasm will undoubtedly result from weakened individuals as parents." The Russian peasantry due to natural selection has resulted in a type of individual adapted to great nutritional deprivations, famine, and dietary deficiency, possibly resulting in an individual that does a "certain amount of work at a relatively low speed," as well as a mind working at a "relatively low ebb and flow of energy." If the theory propounded by Little is true, the Russian peasant "would make an interesting study because he would show natural selection of a type of germ plasm tending to adapt the individuals arising from it very successfully to rather stringent environmental conditions."

Recent experimental evidence given by Stockard on the influences of alcohol; by Guyer on the influence of anti-lens serum; Griffith and Detlefsen on the effects of long continued rotation; of Bogg and Hansen and Little on some of the effects of radium and of *x*-rays, furnishes according to Morgan a hint as to the way in which some of these results have been produced. Many of the facts can be

*Little, C. C., Proceedings of Third Race Betterment Conference, Jan. 1928.

accounted for on the basis that the reproductive cells have been injured by treatment, that is, that the chromosomes themselves may have been altered.

Can the Trend of Heredity Be Altered?—Many investigators have conducted convincing experiments demonstrating the effect of the external environment upon the mutability of the genes. Among these experiments Morgan's[131] work with the fruit fly illustrates strikingly the point. He found that "in certain breeds of fruit flies raised in an unusually humid environment, a germ change or mutation occurred which showed itself in the form of an abnormal or deformed abdomen. This definite genetic character bred as a sex linked dominant. When flies carrying the abnormal abdomen were transferred to a dry environment they ceased to give rise to offspring with abnormal abdomen —all developed into perfectly normal specimens. This line of individual was bred in the dry environment for nine generations as perfectly normal specimens. They were then transferred to the humid environment and immediately gave rise to the abnormal abdomen in the expected fashion. The ordinary strains of fruit-fly bred in the humid environment do not, of course, give abnormal abdomen. This particular line of flies had a distinct mutation for the abnormal abdomen which has arisen in the humid environment. When a generation was bred in a dry environment they failed to exhibit the mutant condition. This case is particularly interesting since it shows that animals with a definite genetic composition may, under certain conditions develop perfectly normal bodies and under other conditions abnormal bodies."

In this connection the following questions might be raised that have a bearing on the problem of the physical changes produced: First, does any unfavorable environment produce a so-called "deformity"? Second, may simply inhibiting the rate of development in the embryonic life be sufficient to induce deformity? Third, are there critical periods in development when the process may be interrupted and deformity produced and passive periods when interruptions do not affect structure of the embryo?

While it is unwarranted to apply the findings of the experiment with the fruit-fly to human beings, such research does give evidence of the structural changes which are produced by humidity in less complex forms of life and does challenge the thoughtful student to open-mindedness in thinking of the direct effect of environment upon physical characteristics. To what degree climate, food supply, amount of sunlight, humidity, over-crowding in cities may have induced changes in the physical conditions of human beings are questions which await more complete analysis and study but they are factors which should be kept in mind as one thinks of the development of the individual child.

INHERITANCE OF HUMAN TRAITS

Guyer has said that the fundamentally important discovery of Mendel was the unitary nature of the inheritable characteristics with which he worked, and their independence in heredity. These may be a bringing together of the genes of two traits in the second generation while in the third generation the two distinct traits may be set apart again, thus showing their independence. However, the inheritance of a human character may depend to a great extent upon the intensity of the character in the genes and the interrelationship of genes.

There are certain normal characters in man which seem to follow the Mendelian formula of heredity. The following are mere lists of the fragmentary knowledge of the present day, which it is hoped will clarify our thinking and stimulate sincere interest in further scientific investigations which will develop in the future in the field of heredity. Adopting the method of Feldman* in tabulating the inheritance of human traits, both normal and abnormal, Table I shows the traits which seem to be recessive and those which seem to be dominant according to the Mendelian ratio.

* Feldman, W. M., *The Principles of Ante-Natal and Post-Natal Child Physiology.* Longmans & Co. 1920.

TABLE I

1. MENDELIAN

(a) **Normal Characters**

Dominant	Recessive
Hair	
Dark (due to golden brown pigment that looks black in masses.)	Light and red.
Curly (transverse section, oval).	Straight (transverse section, circular).
Skin	
Dark	Light
Normal pigmentation.	Albinism or blonde
Eye-color	
Front of iris pigmented (eye—black, brown, etc.)	Only back of iris pigmented (eye—blue).
Countenance	
Gentile type	Jewish type
Hapsburg type (thick lower lip and prominent chin)	Normal
Temperament, Intellectual Capacity, and Talent	
Nervous	Phlegmatic
Average	Very great (*e. g.* mental capacity, painting, singing, etc.)
Average	Very small

(b) **Pathological and Abnormal or Deformed Characters**

Transmitted in the Ordinary Mendelian Fashion

Dominant	Recessive
Hair	
Beaded (diameter not uniform)	Normal
Skin	
Keratosis (thickening of epidermis)	Normal
Epidermolysis (excessive formation of blisters)	Normal
Hypotrichosis (hairlessness, associated with lack of teeth)	Normal
Eyes	
Hereditary cataract	Normal
Retinitis pigmentosa*	Normal
Glaucoma†	Normal
Coloboma (opening in iris)	Normal
Displaced lens	Normal
Ears	
Normal	Deaf mutism
Normal	Otosclerosis (thickened tympanum, with hardness of hearing.

* Retinal sclerosis with atrophy and pigmentation.

† Disease of eye characterized by increased intraocular tension.

Skeleton	
Achondroplasia (Dwarfism, with short stout limbs, but with bodies and heads of normal size)	Normal
General size	True dwarfism (with all parts of the body reduced in proportion.
Hands and Feet	
Brachydactyly*	Normal
Syndactyly†	Normal
Polydactyly‡	Normal
Long Bones	
Exostoses (abnormal growth of bone)	Normal
Fragilitas ossium (brittleness of bones)	Normal
Metabolism	
Diabetes insipidus (Excessive secretion of urine)	Normal
Diabetes mellitus (Excessive flow of sugar-containing urine)	Normal
Normal	Alkaptonuria (Urine dark after oxidation)
Nervous System	
Normal	Epilepsy (Davenport and Weeks) (after eliminating syphilitic and other cases)
Normal	Feeblemindedness (Goddard)
Normal	Insanity (Rosanoff and Orr) (after eliminating environmental causes, such as alcoholism, syphilis, apoplexy, cerebral tumors, injury to brain, etc.)
Normal	Alcoholism
Normal	Hysteria
Normal	Multiple sclerosis
Normal	Friedreich's disease (degeneration of the spinal cord)
Normal	Ménière's disease (aural vertigo)
Normal	Chorea (Involuntary muscular twitching)
Normal	Thomsen's disease (Disease characterized by tonic spasms of voluntary muscles)
Huntington's chorea (Chronic chorea which is progressive.)	Normal
Muscular atrophy	Normal

* Abnormally short fingers or toes.
† Union of two or more digits.
‡ Having more than normal number or fingers or toes.

Guyer adds to this list a number of other abnormal traits which he regards as recessive:
Chorea (St. Vitus dance)
Tendency to bronchial asthma
Pernicious anemia and splenic anemia
Cretinism
Chlorosis
Predisposition toward such maladies as cancer, pneumonia, hernia.

The dominance or recessiveness* of a characteristic trait is not always so well defined nor so simple as it would seem from the above tabulation. As has been emphasized throughout this discussion, our knowledge of the factors or hereditary characters which enter into the nature of either normal or pathological characters which are inherited is too limited and too indeterminate to make any hard and fast classification as distinctly dominant or recessive. Each inheritable character is itself composed of a number of factors, some of which are probably "a nulliplex gene" (that is the condition in which no determiner of a given character exists in a particular individual), and these are inter-related with other genes, so that the resulting character cannot be described as distinctly dominant or recessive. Until further research has been done we do not have sufficient dependable evidence to draw well defined conclusions, because there are too many factors outside the germ plasm which enter into the production of these complex human traits.

Jennings' statement seems to summarize our present knowledge,[61] "There can be little doubt, from the general picture presented by genetic investigation, that diversities in the genes, in the original constitution, of different individuals, affect every characteristic, of whatever sort without exception. There can be little doubt that, other things being equal, some genetic constitutions are more

* Mendel, in breeding tall with dwarf peas, found that the mixture did not produce peas of intermediate height as one might have expected, but rather that the mixture produced tall peas. Tallness as a trait had *dominated* dwarfness. The dwarfness, although capable of being carried as a trait in heredity (being capable of appearing again to view if bred under certain circumstances) had *receded* when bred with tallness. Mendel called tallness a *dominant* trait and dwarfness a *recessive* trait.

readily attacked by plague, by smallpox, by typhoid, by pneumonia, by tuberculosis, than are others. Certain constitutions yield more readily to extremes of temperature, to exposure to the elements, to unfit food. Certain combinations of genes are more likely to come off victorious in a struggle with a wild-cat; or to survive a bite from a rattlesnake. Under such emergencies, those genetic combinations which survive are more desirable.

Any radical change in the environment alters the incidence of selective elimination; consequently alters the characteristics of the population in later generations."

Some Inheritable Physical Traits.—The question often arises "why do blue-eyed parents have brown-eyed children?" According to Little, in the majority of cases this is due to a single Mendelian unit difference between pigmented (brown) and unpigmented (blue) eyes with perhaps additional genetic complications in certain families which explains certain cases in which blue-eyed parents produce brown-eyed children. Pigmentation (brown eyes) seems to be a dominant character in contrast to unpigmentation (blue eyes).

Piebald spotting occurs in its most striking form in the negro race in which it produces an individual with a broad white stripe through the face and forehead, over the head, and affecting the face and hair. This character behaves like a Mendelian dominant without any particular relation to sex. White blaze, as more commonly described the "congenital lock of white hair," behaves as a dominant Mendelian character, is sometimes affected by sex, and sometimes apparently independent of sex.

In 1917 Davenport[71] published an interesting paper on inheritance of stature in man. Utilizing a large amount of data, he reached important general conclusions, among them that the offspring of two tall parents are less variable in stature than those of two short parents; when both parents are "tall," or "very tall," and of tall stock, practically all of the children are tall or very tall; when both parents are "very short," or "short," and of short stock, all of the children are short or very short . . .

Hair form, curly, wavy and straight seems to behave as follows: straight hair is commonly recessive, and wavy is the heterozygous* form between curly and straight. Certain physical defects have been shown to be inherited; hare lip and cleft palate both are inherited as Mendelian dominants. Huntington's chorea, hereditary ataxia (Friedreich's disease) have been demonstrated to behave as a dominant over the normal condition. Diabetes insipidus has been demonstrated to behave as a Mendelian dominant, while diabetes mellitus behaves as a recessive.

Cancer.—A considerable amount of research has been carried on to determine the manner of inheritance of cancer. There are many factors to be considered when all types of cancer are included. There seems to be a clear correlation between mammary tumors and the female sex. Slye† has shown that neoplasms in mice occur in strains in which many of the individuals develop cancer of a particular type, as well as inheriting the tendency to form neoplasms. This tendency to be susceptible to spontaneous cancer, Slye has shown in her laboratory experiments, occurs as a Mendelian recessive character in mice. She states that there are two factors necessary to induce cancer (1) an inherited local susceptibility to the disease and (2) irritation of the appropriate kind and in the appropriate degree applied to the cancer susceptible tissues. In regard to inheritance of cancer, Little states,[71] "The facts of inheritance for mice undoubtedly give us a clue to the conditions in humans and we may safely accept the fact of inheritance of various tendencies to different types of neoplasms and await further investigations to give us clues as to the *nature of the process.*"

Research in the field of animal experimentation has sought to discover the possible influence of diets which were adequate and inadequate in their food essentials, on the susceptibility of animals to tumors and cancer and the influence on the rate of growth of the cancer or tumor.

* Heterozygous—a form produced through the union of germ cells which are unlike in determiners.

† Proceeding of Third Race Betterment Conference, p. 36.

These studies while giving added information are not as yet conclusive.*

Multiple Births.—According to Davenport† about one per cent of human births are twin births. He has made the following statement based on his study of families having multiple births. "The sisters of twin producing fathers have twins in 8.2 per cent of labors, while the sisters of twin producing mothers have twins in 5.5 per cent of labors. Among the children of brothers of twin producing fathers, 6.5 per cent are twins; among the brothers of twin producing mothers 4.5 per cent of the children are twins. These figures indicate that the twin ratio is increased 4 to 7 times in twin producing families and that the ratio of twin production is about as high on the father's as on the mother's side of a fraternity which contains two or more twins. This result disposes of the statement that fathers play no role in twin production . . . "

Sex-linked Characteristics.—A certain number of traits in man may be characterized as sex linked in their manner of inheritance. The following traits are listed by Little as being sex-linked recessives, being transmitted by daughters to sons,—muscular atrophy, hemophilia, atrophy of the optic nerve, color blindness, multiple sclerosis, and certain forms of myopia and nystagmus. It should be pointed out that there is a difference between sex linked and sex limited characters. Sex-linked recessives are not transmitted directly from father to son while sex limited characters commonly are.

Mental Characteristics.—The matter of inheritance of mental and character traits is even more difficult to follow and establish. Due to the fact that traits of personality and types of mental disease have not been classified in any generally agreed upon categories until very recently their differentiation in most attempted studies of heredity has not been clear. It is difficult enough for professionally

* The work of Saiki and Fuzimaki, of Nakahara, of Suguira and Benedict (S. R.), of Benedict and Rahe, and of Drummond is offering important experimental data to our knowledge. (For summary see McCollum, Newer Knowledge of Nutrition, 4th edition, (1929) p. 494–500.)

† Davenport, C. B., "Heredity of Twin Births," Proc. Soc. Exp. Biol. and Med., Vol. 17, p. 75 (1920).

trained experts to diagnose or classify personality traits or mental diseases when the subject who is being diagnosed is present and can be studied over a long period—often several years. Yet, as Myerson[93] points out most of the classical studies of inheritance of mental traits have been based upon diagnoses made by untrained investigators from information no more closely related to the person being classified than word-of-mouth stories passed on through several generations of relatives. Such "long-distance" diagnoses serve as the bases of the familiar Kallikak family, the Jukes, the Hill folk, and others which have long been regarded as classic evidence of the inheritance of feeble-mindedness and insanity. The chief difficulty with most of the studies has been the assumption that mental defects and mental diseases could be classed into two categories: feeblemindedness and insanity. To so class them for study is analogous to classing cancer, tuberculosis, encephalitis, blindness, rickets, and all other physical defects and diseases into one or two categories and from such studies to presume to draw conclusion about the inheritance of physical abnormalities. Myerson concludes, "That long and arduous studies await us before we can even prepare to understand the problem of family mental disease needs no argument, but that is only another reason why they must be made."

Little[71] has also recognized the difficulties inherent in attempts to study the inheritability of mental and character traits. He says that not only methods of securing accurate data over several generations of humans are subject to error but also that the very manner of inheritance of mental traits is complicated. He feels that although some types of insanity seem to be inherited, the method of inheritance is uncertain. "The principle of incompleteness of dominance, and modifying factors and the influences of sex limitation might well produce such a mixture of results as to lead to great difficulties before a satisfactory explanation or interpretation could be attained." The same is true of epilepsy in which there are many forms of the diseases and several causative agents.

Guthrie[49] adds, "The forces of heredity are mysterious, complex and little understood. It is, therefore, unjust to parents and children alike to exaggerate the scanty knowledge we possess."

White[158] carries forward the warning against dogmatism: "The laws of heredity established upon study of existing cases and their histories are useful to explain *what has happened* but of almost no value in predicting *what will happen* as a result of a particular human fertilization."

Healey and Bronner[53] maintain the same general thesis as a result of their studies of the success or failure of Juvenile court cases. They say, "Our data indicate that it is an unwarranted assumption that the outcome (of cases)* is dependent on heredity. Poor traits appearing in the family backgrounds of our cases do not correlate highly enough with outcome to afford a reliable criterion of potentialities inherent in the individual."

It seems wise to accept the statement made by Little in his comment upon the discussion of the relative value of heredity and environment in determining eminence in scientific work and in general mental capacity,—"The point for us to bear constantly in mind is that *both* influences, heredity and environment, are operative and efficient and that the greatest mental ability is not and never can be realized unless the optimum of inheritance is combined with the optimum of environment."

SUMMARY

In the study of the forces which have affected the physical and mental life of a child one of the most potent is heredity. Heredity is interpreted as "continuity from generation to generation of certain elements of germinal organization. Heritage is the sum of all these qualities which are caused by germinal organization."

There are serious handicaps in securing on human beings data which are adequate for establishing conclusions. Often students of children, untrained in careful observation and evaluation of data, attribute physical characteristics and behavior to heredity, without any basis for their con-

* Parenthesis ours.

clusions. It is difficult for students untrained in the sciences on which genetics is dependent to distinguish between hypotheses built on assumptions and scientifically established facts. The trained scientist in genetics must be looked to for evaluation of the data and determination of what evidence obtained from animal experimentation is significant in interpreting the phenomena among humans.

It is satisfactorily established that human beings inherit apparently certain simple Mendelizing characters; some are normal, some are pathologic. The exact method of inheritance is not so clear because of sex limitation, incompleteness of dominance, or difficulty of diagnosis. Among those things which seem to be inherited are: eye color, shape of head, facial features, hair form (curly, etc.), stature (although this can be slightly modified by nutrition), special abilities (although the case for inheritance of these is less clearly established). Certain physical defects such as hare lip, cleft palated and certain nervous conditions such as Huntington's chorea, seem to behave as Mendelian dominants over normal conditions. However, biological experiments have proved, for example, that many types of abnormalities formerly accepted as due to heredity, are in reality induced by the character and quantity of internal secretions. It has even been shown that a slight unbalance of equilibrium in the tissue fluids bathing the cells may induce abnormality of function and structure in the body, such as is seen in pellagra, low stature, goiter, which apparently have their inducing cause in a nutritional condition, and not in the genes. Evidence also points to the conclusion that a modification in the rate of development is followed by a modification in the structure of the species.

Valuable research is being carried on to determine whether or not susceptibility to physical and mental diseases is inherited, and if so, in what manner. The case for these is not yet clearly established.

The student interested in human growth must follow with discrimination the seemingly slow, although significant advances of the correlated sciences on which genetics depends for its experiments and observations. It is impor-

tant to keep in mind the difference between significant conclusions drawn from proved facts, and myths, no matter how long accepted.

Heredity and environment are not antithetical as is frequently considered even by well trained scientists, but are supplementary and reciprocal. Since in the process of normal growth their complete integration is achieved they must be considered conjointly. The point to be remembered is that when interest is directed to growth and development the child becomes the center of consideration. Then, not only the organic mechanism becomes relatively important, but also the conditions favorable or unfavorable to the process become significant.

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CHAPTER IV

BEGINNINGS OF LIFE

THE reproduction of an individual can result only from the union of two germ cells, one from each parent, the ovum being produced by the female organism and the sperm by the male organism.

In the discussion of this process it is desirable to understand the part that sex plays not only in its relation to the reproduction of new individuals, but also in its relation to life as a whole. In the evolution of animal life, as the struggle for existence grew more complex and involved, differentiation among cells took place—a differentiation which gradually expressed itself in functional and structural changes. If these changes are traced through the different forms of life they show the way in which both the function and the structure of the special systems have evolved; one for digestion, another for hearing, another for seeing, another for feeling, another for perpetuation of the species. Just as epidermal cells, glandular cells, and nerve cells are adapted in structure according to their function in the human organism, so the sex cells are adapted for the special function for which they have been destined.

In the complexity of the higher forms of life it was not possible for a single cell, nor a group of like cells to insure their ultimate purpose, so organs developed with their specific functions. Among these organs were the sex organs, which like organs for respiration, digestion, and elimination have a special function to perform. Research has shown that the sex glands function at least in part as endocrine glands which produce significant differences in bodily structure, in behavior, and in organic necessity. It is now recognized that growth and development are influenced by the secretion of the organs of sex, that certain vital processes are stimu-

lated by their hormones, and that perpetuation of the species, though vastly important, is only one of their services to the body.

Viewed in the light of total human development sex is one of the inherited endowments of the individual, a great physical force, but something more than a mere physical need; it is a part of the rhythm of life running through all higher creation.

The reproductive organs of male and female are strikingly similar in functions. It is doubtless a significant fact in human anatomy that the generative organs in the fetus of both sexes are within the pelvic region and that only a month or two before birth do the testes of the male emerge from the body cavity. In each sex there is an organ which has for its function the production of sex cells (or gametes). In the male, the testes produce spermatozoa and in the

TABLE II
FUNCTION OF MALE AND FEMALE REPRODUCTIVE ORGANS

	Function.	Male.	Female.
I.	(a) Produces gametes: male—spermatozoon female—ovum (b) Produces an internal secretion which influences the development of secondary sex characters.	2 testes (in scrotum)	2 ovaries
II.	Facilitates passage of sex cells	2 vasa deferentia 2 ejaculatory ducts 2 spermatic cords penis	2 uterine tubes (Fallopian) uterus vagina
III.	Increases sensitivity and area of contact by means of erectile tissue.	penis	clitoris
IV.	Lubricates the ducts and protects germ cells	2 seminal vesicles 1 prostate gland 2 Cowper's glands	2 vestibular glands

female the ovaries produce ova. Both of these organs produce an internal secretion important in the normal development of secondary sex characteristics, such as body distribution of hair, development of the breasts, and change in voice. Both the male and female reproductive systems contain a passage and mechanism for the transportation of the germ cells. Both sexes have glands important for the preservation of the germ cells.

Table II gives the anatomical names and the function of the male and female reproductive organs.

Secretions of Ovaries and Testes.—The evidence that the ovaries secrete more than one kind of internal secretion is circumstantial but convincing. The periodic changes which take place during menstruation in the ovary itself, the uterus, the vagina, the mammary glands, and even in general metabolism are dependent on a stimulus of some kind supplied from the ovary. If the ovaries are removed, the menstrual flow is discontinued. If another ovary had been previously transplanted to some other region of the body before the ovary was removed, menstruation would not have ceased. The theory is that the stimulus is transmitted by the blood and is probably in the nature of a hormone. Steinach[129] has proposed that the interstitial cells in the ovaries and the testes which are considered responsible for this hormone be designated as the puberty glands, on the theory that they control the development of secondary sex characteristics which make their appearance during puberty.

The removal of the ovaries and testes in animals has given evidence of the influence of these organs upon those aspects of development which are characterized by difference in sex. The pullet whose ovaries are removed develops the wattles and plumage of the male; the male whose testes have been removed increases in weight, and mothers young chickens as hens do. Among mammals, castrated animals tend to develop the characteristics of the opposite sex, thereby approaching a neutral type. Little is known in regard to the nature of the so-called "hormone" secreted by the interstitial cells and no decisive experiments are

reported upon the physiological effects of extracts of the tissue. There is, however, an evident relationship between the ovaries and the nutritive condition of the uterus. When the ovaries are removed in a young animal before puberty the uterus fails to develop, remaining in an infantile condition. If the removal takes place after puberty the uterus atrophies.

There is an increasing body of experimental evidence throwing light on the relationship between the corpus luteum* formed after ovulation and the implantation of the fertilized ovum. The normal development of the fertilized ovum fails if the corpora lutea are destroyed. This result has been explained on the theory that the corpora lutea furnish a secretion which is essential to implantation of the ovum. There seems to be an interrelationship also between the corpus luteum and the mammary glands during pregnancy. The growth of these glands seems to depend on a secretion furnished by the corpus luteum. The retrogression of the corpus luteum toward the end of pregnancy may be connected in some way, which is not now clearly understood, with the termination of pregnancy and with the production of milk.†

The ovum differs little from an ordinary cell in appearance and structure, consisting of a minute mass of protoplasm globular in shape, about $\frac{1}{125}$ of an inch in diameter. The cytoplasm, or cell plasm of the ovum, contains a nucleus wherein the genes or "bearers of heredity" lie, and a

* As the ovum begins to grow in the ovary its little egg case or follicle fills with fluid and approaches the surface of the ovary. As the result of over-distention the follicle (named Graafian after its discoverer, de Graaf) ruptures and the ovum escapes, being carried into the Fallopian tube and down into the uterus, or being lost in the peritoneal cavity. The empty Graafian follicle becomes filled with a blood clot which is permeated by cells carrying a yellow pigment (lutein), and the follicle becomes transformed into a yellow body about the size of a hazel-nut. This is called the corpus luteum. If pregnancy follows the ovulation (ripening of the ovum and its discharge from the ovary) the corpus luteum persists until after the baby is born, after which it is absorbed; if pregnancy does not follow, the corpus luteum is absorbed in a few weeks, leaving only a tiny indentation in the ovary.

† For more complete presentation see Marshall "Physiology of Reproduction," 2d Ed. London, 1922.

definite collection of food material or yolk which furnishes nourishment for the early development of the embryo. The sperm cell is shaped somewhat like a tadpole, consisting of an elliptical head, a rod shaped middle piece, and a tail that gradually tapers. It is smaller than the ovum, measuring only $\frac{1}{500}$ of an inch in length. The head contains the chromatin material wherein lie the genes or "bearers of heredity" furnished by the male organism.

The tail portion of the male reproductive cell has a vibratory motion due to cilia-like contractions which enable the sperm cell to pass more readily up the Fallopian tube of the female, where fertilization of the ovum usually takes place. The spermatozoön joins a ripened ovum which has shortly before detached itself from the ovary and which, unless it reaches one of the fallopian tubes and is fertilized by the spermatozoon probably within a short time, will disintegrate and pass out from the body of the woman. As the ovum has no power of movement within itself, the manner in which it reaches the fallopian tube is most interesting. Each ovary, though very near the open end of the Fallopian tube, is not attached to it. The generally accepted theory, according to Williams[162], as to how an ovum reaches the tubes, is that the cilia or little hair-like structures at the open end of the tube give rise to a current in the fluid which lies between the various organs, and that the ovum is drawn by this current into the open end of one of these tubes. The same little hair-like cilia, lining the Fallopian tube, sweep the ovum, which is powerless to move even after it is fertilized in the Fallopian tube, down into the uterus. Undoubtedly the ovum has a certain power of attracting the freely moving spermatozoon.

An ovum matures and detaches itself from one of the ovaries about once in twenty-eight days; and about that time the lining of the uterus becomes congested and thickened, going through certain significant changes to make it ready to receive the mature ovum if it is fertilized. This changing process probably lasts about seven days. If the ovum is not fertilized, the changes in the uterus, induced in preparation for the fertilized ovum, become unnecessary

with the result that the uterus returns to its usual condition. In order to accomplish this, small blood vessels in the congested wall of the uterus rupture. The blood escapes and so menstruation occurs, the so-called "second stage" in the menstrual cycle lasting about five days. During the third stage, the uterus returns to its former state, taking about three days for this. The fourth period is one of rest until the process begins again.

The First Stages in the Development of Life.—When the ovum and sperm unite, a new single cell has formed having within it the potential characteristics, whatever their nature, physical or otherwise, which are to be passed on from preceding generations to the new life. The fertilized cell gets an equal number of paternal and maternal chromosomes or genes, and thus shares the hereditary characteristics of each parental stock.

After fertilization in the Fallopian tubes the ovum begins to segment and meanwhile is carried toward the uterus. Upon reaching the uterus it becomes attached to the mucous membrane on the inner surface of the uterus, usually near the fundus (top). In the meanwhile the wall of the uterus has become much thickened in preparation for the fertilized ovum. The portion of the uterine wall where the ovum becomes attached eventually develops into the placenta, or the organ through which the maternal nutriment is supplied to the fetus.* Before reaching the uterus the ovum has made considerable progress in its development, having surrounded itself with two membranes, called the amnion and the chorion. The chorion develops villi which burrow into the uterine membrane at the point of attachment and establish the connection between the mother and the child. It is of importance to remember

* "The placenta is a compact mass of closely intertwined villi, and resembling a flat cake. The umbilical cord leading from the child is inserted on one side while the other is attached to the inner surface of the uterus. The mother's blood flows in and around the placenta. The organ is made up of a number of lobes, each lobe containing a large number of trees of chorionic villi. A villus is a tiny, finger-like filament which dips into the maternal blood in the placenta and through which the above mentioned changes take place." De Lee.[29] P. 59.

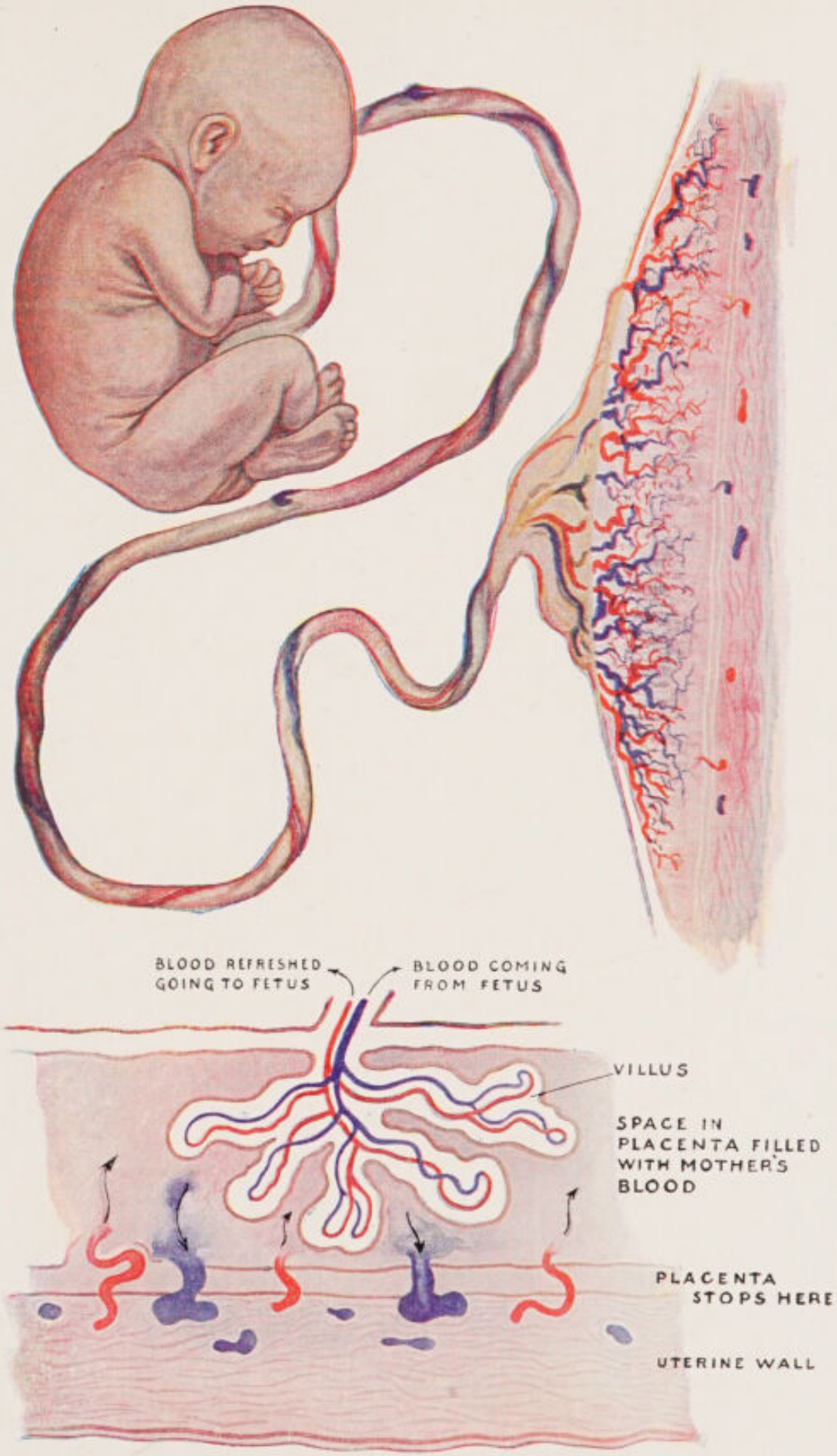


Fig. 4.—Diagrams to show the relations of the maternal and fetal circulations. (From De Lee, Obstetrics for Nurses).

that the fetal and maternal blood do not come into actual contact. Most of the evidence at hand indicates that nutritive materials and oxygen pass from the maternal to the fetal blood, and the waste products of fetal metabolism—carbon dioxide, nitrogenous wastes, etc.—pass from the fetal to the maternal blood by a process of diffusion. The nutrition of the fetal tissues is maintained in much the same way as though it were an actual part of the maternal organism. The blood of the child flows through the blood vessels of the cord to the placenta, then through the inside of the villi. The villi dip into the maternal blood, and since there is no direct connection between the blood of the fetus and that of the mother, the interchange of foods and wastes must occur by osmosis and the vital cellular activity of the walls of the villi.

Since the only path for communication is the indirect one by way of the blood stream, there is no nerve connection between the mother and the child. Mental experiences travel only by way of the nervous system, and can communicate themselves in no other way. We are therefore compelled to believe that the whole matter of direct specific influence of the mother's mind upon the developing fetus is a myth. Beliefs that structural changes produced in the unborn child corresponding to some mental experience of the mother, usually a vivid impression or strong emotion, have no scientific basis.

In general, it is evident that for a long period the maternal organism digests and prepares the food for the embryo, excretes the wastes, regulates the conditions of temperature, etc., as it does for a portion of its own substance, but as the fetus approaches "term" (end of ninth calendar month) its tissues and organs begin to assume more of an independent activity, as must be necessary for the sudden change at birth. With these facts at hand it may be clearly understood that proper hygiene, regular elimination, and an adequate and well chosen diet are factors important for the well-being of the developing fetus as well as the pregnant mother.

Development of the Embryo.—The fertilized cell increases by simple division until a group of cells has formed which as it grows assumes the shape of a hollow globe. This shape is not long maintained for gradually it changes its

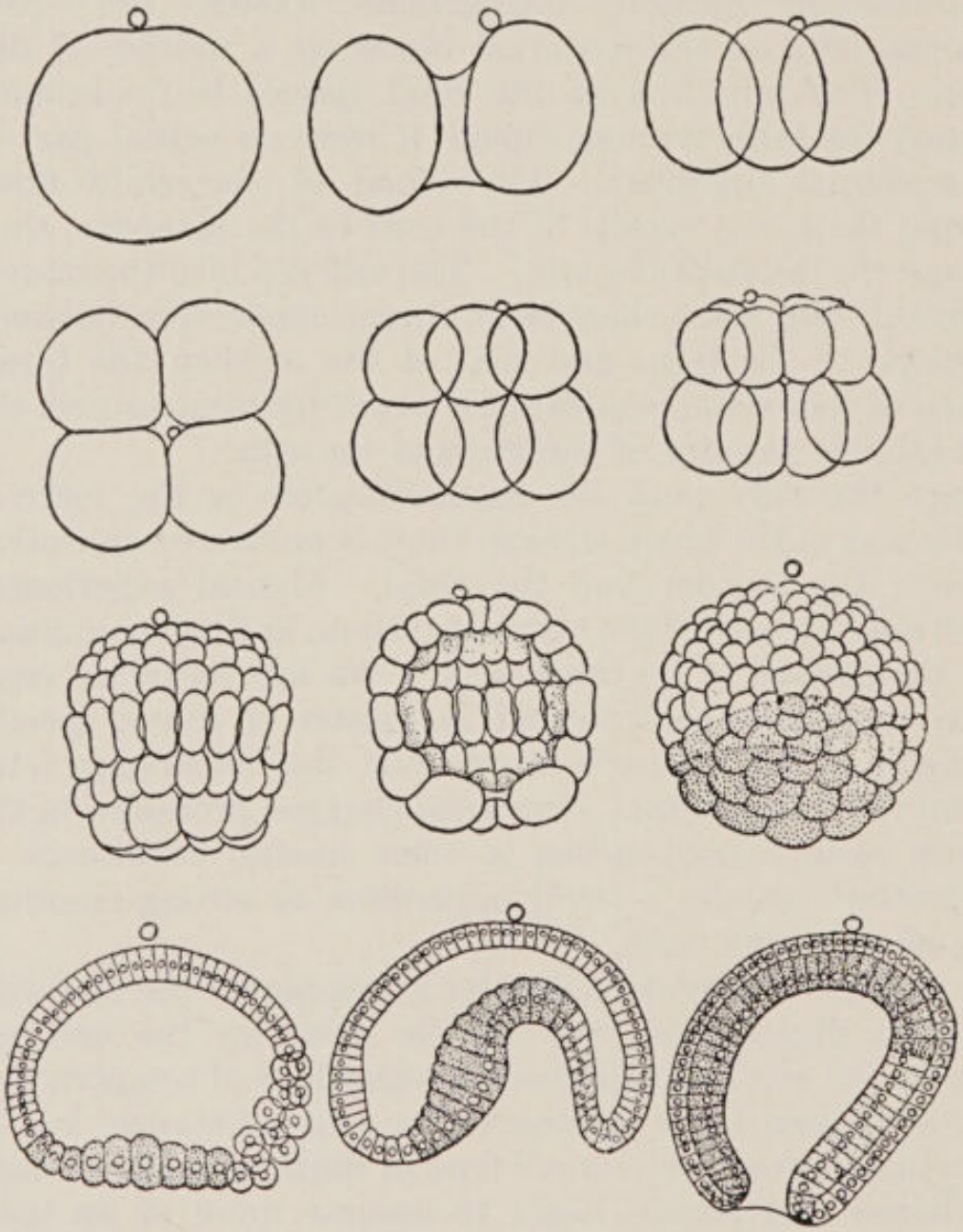


Fig. 5.—The first stages of growth in any animal. (From Conklin.)

globular shape and a crease appears along one side of the globe. This crease gradually grows deeper until it has sunk into the other side of the globe. Then the edges unite and half of the globe is now inside of the mass and half outside. The outside layer is known as the ectoderm; the

inside as the endoderm and the middle layer as the mesoderm. Between the ectoderm and the endoderm lies a cavity, which later separates into an inner and outer layer and forms the body cavity.

From the ectoderm arise the outer portion (epidermis) of the skin together with the functional cells of its glands; the essential parts of the nervous system and the sensory portions of all sense organs; the lining of the nose, mouth, and vent; the enamel of the teeth; the lens of the eye; and the nails and hair.

The endoderm gives rise to the walls of cells which line the digestive tract (except its beginning and termination) together with the various outgrowths such as the larynx, trachea, thymus and thyroid glands, lungs, liver and pancreas, associated with it; likewise, the lining of the bladder and, in part, of the outlet (urethra) from it.

From the mesoderm are formed the lining of the body cavity and the large lymph-spaces; the deeper layer of the skin, the kidneys and most of the reproductive system; the muscles; the various supporting and connective tissues (with a few exceptions) including bone and dentine of teeth, the muscular and outer covering of the digestive tract and its outgrowths; and the vascular system including heart, blood, blood-vessels, and lymphatics.

Practically all of the fundamental organs of the body are established and well started in development by the end of the second month.

The Rate of Growth of the Fetus.—The developing child is called the embryo until about the end of the second month, after which it is termed the "fetus." There is, however, no sharp line drawn between embryo and fetus.

The fertilized ovum, less than $\frac{1}{125}$ of an inch in diameter, must, within two hundred and eighty days (ten lunar or nine calendar months) grow to a body weighing approximately $7\frac{1}{4}$ pounds, capable of maintaining a separate existence, and made up of the highly differentiated cells by which the extremely complex processes of the human body are maintained. Jackson has shown that growth proceeds with extreme rapidity in the first lunar month, gradually declining, until at birth it is only a minute fraction of its early

value. The rates are as 9999 during the first lunar month compared to 0.45 during the tenth lunar month.

At the end of the third month the human fetus weighs only about $\frac{3}{4}$ of an ounce and is approximately 3 inches long. By the end of the fourth month it weighs between 4 and 5 ounces and measures about 6 inches in length; the muscles of the limbs are capable of producing movements; ossification is beginning in certain bones of the skull. The end of the fifth month finds the fetus weighing 10 ounces and measuring 10 inches in length; hair and nails appear; and ossification in the pelvic bones is in progress. By the end of the sixth month a weight of 1 pound and a length of 11 to 12 inches has been attained; closed eyelids with eyelashes are discernible; and fat is developing under the skin. At the conclusion of the seventh month the fetus usually weighs some 3 to 4 pounds and is from 13 to 15 inches long; the eyelids are open; considerable fat is present under the skin, and the skin is covered with a greasy substance (vernix caseosa). By the end of the eighth month, the weight is 4 or 5 pounds, and the length from 16 to 18 inches; the nails are completely developed. At the end of the ninth month, which is knonw as "full term," the fetus, now ready for birth, weighs from 5 to 9 pounds and has a length of from 17 to 21 inches.

Changes in the Body of the Mother.—The two distinct effects upon the mother that result from pregnancy are the growth of the uterus and the growth of the mammary gland. The uterus, situated within the pelvis, must stretch from a small, almost solid organ, shaped something like a pear, about three inches long and weighing about two ounces, and must grow into a thin walled muscular sac, weighing about 2 pounds which will hold a 7 or 8 pound or even larger baby, a placenta weighing about $1\frac{1}{4}$ pounds, about 20 inches of umbilical cord and a quart or more of amniotic fluid by which the baby is completely surrounded. The capacity of the uterus has to increase about 500 fold in order to do this, and its total weight and contents becomes about 15 pounds. This thin walled muscular sac must have, when the time comes, power to contract with such force that the

baby and placenta will be expelled from the uterus through the vagina into the world in which the child is to live. A woman, to accommodate herself to the change in size, weight, and position of the uterus, sometimes noticeably changes the way she carries herself, tending to throw her head and shoulders back.

Because the uterus is attached to ligaments which are fastened to the pelvis, and is not fixed in a stationary position, it is enabled as it grows to push upward into the abdominal cavity, which it does about the fourth month, the top of it reaching the umbilicus by the sixth month and the diaphragm by the ninth month. During the last two or three weeks the uterus drops back toward the pelvis again, and the change in the contour of her body indicates to a woman that she is drawing near the end of her pregnancy. The greater part of the growth of the uterus occurs during the first three months of pregnancy. This increase in weight is due partly to the growth of new muscular tissue and partly to an increase in the size of the muscle already present.

Accompanying the growth of the uterus as one of the maternal changes in pregnancy is the enlargement of the mammary glands. At the time of puberty the mammary glands increase in size, but this growth is confined largely to connective tissue; the milk producing or glandular tissues remain rudimentary and functionless. At the time of conception the glandular tissue is in some way stimulated to further growth. During the latter part of pregnancy the mammary glands produce an incomplete secretion, scanty in amount, known as colostrum. After the child is born the glands are again brought under the influence of special stimuli. They become rapidly enlarged and a more abundant secretion is formed. For the first day or two after the child is born this secretion still has the characteristics of colostrum, but on the third or fourth day the true milk is formed.

It is evident that there is a physiological relationship between the developing uterus and the mammary glands. That the ovary also shares in this influence, either directly

or through its effect on the uterus, is shown by the fact that after removal of ovaries the mammary glands degenerate. This influence of the ovaries upon the mammary secretion has been attributed both to an action of the central nervous system and to the effect of an internal secretion of the ovaries.

The growth of the fetus has also an important influence upon general metabolism and therefore upon the whole maternal organism. Changes have also been attributed to organs in the maternal body other than those immediately connected with the fetus or its nutrition. Increase in size of the thyroid and parathyroid, the adrenal glands, as well as of the anterior lobe of the pituitary gland, have been known to occur.

There can be little doubt that the addition of a mass of new and active protoplasmic tissue such as is represented by the fetus will result in an increase in the total metabolism of the pregnant woman as contrasted with the same woman in a nonpregnant condition. The new growth represents an addition of some 10 to 14 per cent of the original body weight and must add an extra quota to the number of calories required for maintenance. Harding[51] cites the work of Root and Root who followed fortnightly the basal metabolic rate in a pregnant woman from the fourth month of pregnancy until the ninth week of lactation. They found that from the sixth month the rate steadily rose until some six weeks before delivery when it was 23 per cent greater than at four months. The total increase in weight was but 14 per cent, and a nonpregnant woman showing similar increase in weight would have increased her metabolic rate only 5 per cent.

The question of the changes which may take place in the heart and blood is not settled, but there are various theories in regard to these matters and further research is necessary before a solution can be reached. Every portion of the maternal organism reacts to a greater or less extent under the influence of pregnancy. Formerly, these changes were attributed in great part to nervous impulses originating in the pregnant uterus, but more extended clinical observations

and experimental work show that such is not the case, and indicate that such changes can be explained only by the supposition that they are in some way connected with the circulation in the blood of substances concerning whose nature we are as yet ignorant. It is also believed that certain changes take place in the respiratory tract during pregnancy. There is during pregnancy, especially the later part, a normal increase in the vaginal secretion, which has antiseptic qualities. This is looked upon as an additional safeguard against infection during labor.

Various organs in the body seem during pregnancy to be more active and possibly less stable. Skin glands increase their activity, the skin being an important excretory organ, and perspiration may increase. There may also be a more luxuriant growth of hair, and some women whose hair has been lifeless and brittle before pregnancy notice that it seems to show a much more healthy condition during pregnancy. Although there may be various discomforts during pregnancy and although there may be serious complications, it is often true that women show during this period an improvement in their general health which continues even after the baby is born.

Signs of Pregnancy.—The sign universally accepted by women as an indication of pregnancy is the cessation of menstruation. Its cessation cannot, however, be taken as a positive sign of pregnancy, although its continuance may be considered as fairly good evidence that pregnancy is not existent. There may be some bleeding which occurs at fairly regular intervals during pregnancy which is due to other causes and is not true menstruation. In case of an abdominal pregnancy a woman may menstruate regularly. The cessation of menstruation as well as some of the other probable signs of pregnancy may be due to other causes. In no case should a symptom which may be due to another cause than pregnancy be taken as positive proof that a woman is pregnant.

The missing of a menstrual period by a woman of child bearing age, who is ordinarily regular and who is in good health, should make her suspect pregnancy. She should

in such a case seek her doctor for confirmation of her diagnosis and for advice. The woman whose menstruation has not become reestablished following the birth and nursing of a previous baby will not, of course, be able to count on this as a sign of pregnancy.

Other indications of pregnancy which a woman notices about the second month are an increase in the size and firmness of her breasts and the greater prominence of the veins of the breast. The nipples become darker and more prominent, and the areola (the dark circles around the nipples) increase in size and also darken, particularly in brunettes. There is often a pricking or tingling in the breasts even before they increase in size. Sometimes they become very tender soon after conception and may remain so for some time. Later on in pregnancy small lumps appear in the areolae.

Early in pregnancy there may be an increased frequency in the desire to urinate due, not as so many women think, to kidney trouble, but to the congestion of the base of the bladder, as all pelvic organs are congested at this time. The need for frequent urination is so often a sign of some nervous tension that, by itself, it cannot be considered a sign of pregnancy. It is simply additional circumstantial evidence when other signs of pregnancy are also present.

About the time that the first menstrual period is missed, within the first six weeks of pregnancy, women may in the morning, shortly after rising, have a sensation of nausea with or without vomiting, known as "morning sickness." Some women experience this nausea at other times in the day; others do not experience it at all. It is not an inevitable accompaniment of pregnancy.

Other signs of change in her body which the woman will notice as additional indications of her pregnancy are the enlargement of her abdomen (noticed about the fourth month) which is accommodating itself to the growing uterus. The movement of the baby is noticed between the eighteenth and twentieth weeks. As the skin stretches over the enlarged abdomen the tissues just under it sometimes give way and pinkish or blue streaks appear which are called

striae. These striae turn white and remain as scars on the abdomen after the baby is born and the abdomen has returned to its normal size. As the abdomen enlarges the umbilicus (navel) instead of being deeply indented, flattens out and sometimes protrudes. There may be also a deepening of color in other parts of the body. A dark streak may appear on the abdomen stretching from the umbilicus to the pubic hair. Yellowish blotches sometimes appear on the face and dark circles under the eyes.

These various changes in her body which the woman herself may observe are all so-called "probable" rather than positive signs that she is pregnant. To sum up, one may say: The woman who is of child-bearing age, whose menstruation ceases although usually regular, whose breasts enlarge and tingle for a time, and whose nipples darken, who soon after the cessation of menstruation has an increased desire to urinate, especially at night, whose abdomen enlarges and who perhaps has some sensation of nausea during the day, is probably pregnant.

But the proofs positive as well as additional probable signs of pregnancy are found by the doctor. The detection of the fetal heart beat about the twentieth week or shortly after is an absolute sign of pregnancy and can be detected by the stethoscope or sometimes by placing the ear against the abdomen. The rate of the fetal heart is about 140 per minute or about twice that of the mother. It is sometimes by hearing two fetal hearts of different rates, that a diagnosis of twins is made.

A second positive sign by which the doctor can make a diagnosis of pregnancy is by palpating the fetus. He can by about the seventh month feel the outline of the baby's body through the mother's abdominal wall, and in this way can tell the position in which the baby is lying in the uterus, knowledge of which may be helpful to him at the time of labor.

The third positive sign is the detection of the active and passive movements of the baby. The mother may herself detect the active movements of the baby, and the doctor by a special technic may detect the passive movements.

In doubtful cases of pregnancy, *x*-rays are sometimes taken at about the sixth month, and if the baby shows up in the pictures, it is a positive sign; but the absence of indications of the baby in the pictures does not always mean that there is no baby in the uterus.

There are probable signs of pregnancy which the doctor can discover in the early months before the positive signs can be detected and which may be considered fairly reliable signs. Characteristic changes take place in the shape, size, and consistency of the uterus very early in pregnancy and can be detected by vaginal examination by a physician.

Twins.—Although women most frequently give birth to but one baby, twins occur about once in ninety pregnancies and triplets about once in seven thousand. Six is the largest number of simultaneous pregnancies on record. Identical twins are twins of the same sex who have developed from one ovum and one placenta. Twins of opposite sex must have developed from two ova ripened about the same time and from two placenta; twins of the same sex may have developed from two ova instead of one. Biologically twins from two ova are not really twins but are two simultaneous pregnancies. Twins from two ova develop each in their own membranes, whereas twins from a single ovum are usually enclosed in one chorion.

How the Baby is Born.—After about nine months of uterine life the baby is ready to be born, which means that the uterine muscles must begin to contract at diminishing intervals until the baby is expelled, a process which is called labor. Just what excites these muscles to begin the necessary series of contractions is not known, and it is still a question for which the answer must be sought by further research. Suffice it to say, that, when the uterus begins these contractions the woman begins to feel labor pains, and she knows that her baby is about to be born. She should notify her doctor immediately. If the woman is to be at home, she should have the nurse with her, or if she is to go to the hospital she will get directions from her physician as to when to go.

The duration of labor varies greatly from a very short time to thirty-six hours or longer, but as a general rule the first labor lasts longer than labors which follow. During the course of the labor, the neck of the uterus must stretch sufficiently to let the baby through into the vagina. The vagina, too, stretches from the small opening into a canal big enough for a baby to pass through; and the perineum, a triangular shaped muscle between the vagina and the anus, must also stretch as the baby's head presses down upon it. Skillful handling on the part of the physician does much to save the perineum from being badly torn. Sometimes the perineum will not stretch sufficiently and the physician may decide to cut it, rather than to let it tear. In either case the perineum should be repaired immediately after the birth of the baby without undue discomfort to the mother.

Labor is divided into three stages. The first and longest is preparatory and lasts from the first sign of labor until the time when the cervix is completely dilated. During the second stage the baby actually leaves the uterus and passes through the birth canal into the outside world. The third stage consists of a brief period of uterine contractions which serve to expel the placenta.

The normal position of the baby in the uterus is such that the head will be born first. The proportions of a baby's body are very different from the proportions of an adult's body, the circumference of the head being slightly larger than the circumference of chest or abdomen. Hence, if the birth canal is large enough to let the baby's skull through, it is large enough to let the rest of the body through. One remarkable provision for facilitating the birth of the baby's head through the rigid pelvic opening is that it is not like an adult skull, which is absolutely rigid and impervious to outside pressure. The bones of the new-born baby's skull are not firmly united by osseous tissue; instead the baby's head has spaces between the bones. This not only allows for the increase in the size of the brain which will take place especially in the first two years of life, but also permits of a certain amount of mould-

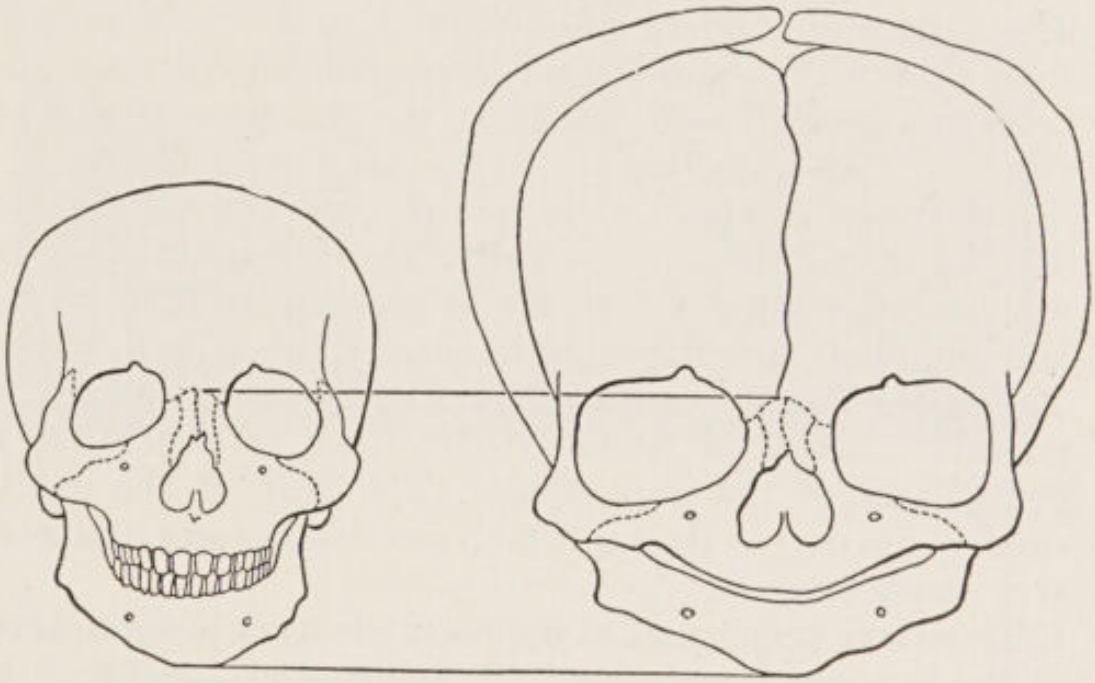
ing of the head by the overlapping of the bones as the baby goes through the birth process. This malleability of the skull which adapts it to the opening through which it must pass, frequently makes a newborn baby seem to have a queerly shaped head, a condition which might seem alarming unless one understood its cause and realized that within a short time the skull would assume its normal shape. On the top of the baby's head at the meeting of the frontal bone and the parietal bones there is an open space between the bones, almost an inch in diameter. This is called the anterior fontanelle, which usually does not close until the baby is about eighteen months old. Late closing of this fontanelle is in most instances an indication of rickets. At the meeting of the parietal bones with the occipital bone there is another and much smaller opening called the posterior fontanelle which closes in about two months.

Following the birth of the baby, the mother goes through a period of what might be called restoration, when her body must undergo the changes which will bring it back to its pre-pregnant state with the exception of the establishment of lactation. After the exertion of what is rightly called labor, it is important that she have a period of rest; and as soon as she is made comfortable and the physician has assured himself that there is no indication of hemorrhage, she should be left in quiet to get some sleep. For the following nine or ten days or longer she should remain quietly in bed. The usual aseptic precautions should be taken to prevent any infection. The breasts especially should be given attention, and the nipples kept scrupulously clean.

The woman who can be given some assistance in the care of her baby for six weeks is having the chance of going through practically the whole puerperal period with adequate help. At the end of four or six weeks, the examination made by the physician should indicate whether or not her uterus has returned to its normal state and position, and if this is not the case, treatment can be instituted at that time to correct any condition which is not satisfactory.

The Newborn Infant.—At birth, as has been stated in the previous chapter, the baby must immediately begin to make certain necessary adjustments to life. To breathe is of absolutely primary importance. With the taking of air into the lungs, the baby must establish its own circulation and oxygenate its own blood. When he has done this, when his eyes have been bathed with a solution of a silver salt, and when the cord has been severed and dressed, he can be said to begin his independent life.

Physical Appearance.—As one examines a newborn baby, one realizes how different he is in contour from an adult



A B

Fig. 6.—A diagram illustrating the post-natal changes in the proportionate height of the cranium and face. A, adult skull; B, skull of a newborn child. The two specimens are drawn so that the facial heights (from nasion to pogonion) are equal. (After Holl.)

or even a little child. The head, as has been said, is slightly larger than the chest. According to Feldman* the height of the head in an adult is only $\frac{1}{7}$ of the total height, while that of the infant at birth is as much as $\frac{1}{4}$ of the total height of the body, so that an infant's head is proportionately twice

* Feldman, Ante-natal and Post-natal Child Physiology, W. M.

as large as that of an adult, although absolutely it is much smaller.

The most striking characteristic of the skull is the relation of the cranium to the face. The relation between the two at birth is as 8:1 as compared to the ratio of 2:1 in the adult. This ratio of 8:1 is reduced to 6:1 by the end of the second year.

The circumference of the head (occipito-frontal) according to Grulee[48] is equal approximately to $\frac{1}{2}$ the length of the body plus 10 centimeters, and is equal to or exceeds slightly the circumference of the shoulders, and is about 2 centimeters more than that of the chest at the nipple line. The head circumference is usually 1 to 2 centimeters less than that of the abdomen. These relationships are not, however, perfectly constant, as the amount of body fat varies in each individual.

The upper portion of the face is much more completely developed than the lower. The orbits are large and rounded with sharp margin. The nasal aperture is large, broad, and rounded, and the inferior nasal spine is well marked. The upper and lower jaw are broad and very low. They present a series of rounded elevations that contain the dental sacs of the milk teeth. The base of the skull is small compared to the top which extends beyond it laterally and posteriorly.

The whole upper part of the body seems out of proportion to the legs which are short and almost seem bowed as they are held with the soles of the feet facing each other. The arms are relatively shorter than in the adult. The clavicle (collar bone), the first bone in the body to ossify, is short and therefore helps to produce the narrow sloping of the shoulders of the infant. The radius and ulna of the forearm are more nearly equal in thickness than in the adult. The pelvic cavity of the newborn is much smaller relatively than in the adult and is more vertical in position than lateral. Sexual differences in the pelvis can appear as early as the fourth fetal month and are quite marked at birth, the pelvis of the newborn male being larger than that of the female. During the first two years the pelvis

grows rapidly in all dimensions. The body proportions as given by Taylor* from his measurements of 250 living newly born infants are as follows:

The span (distance from finger tip to finger tip) is greater than the total length of the body.
The center of the body is slightly above the navel. This is more likely to be so in girls and in the less mature infants.
The trunk length is longer than the length of the arms and legs. The length of the arms exceeds the length of the legs.
The length of the foot exceeds that of the hand only by about one centimeter.

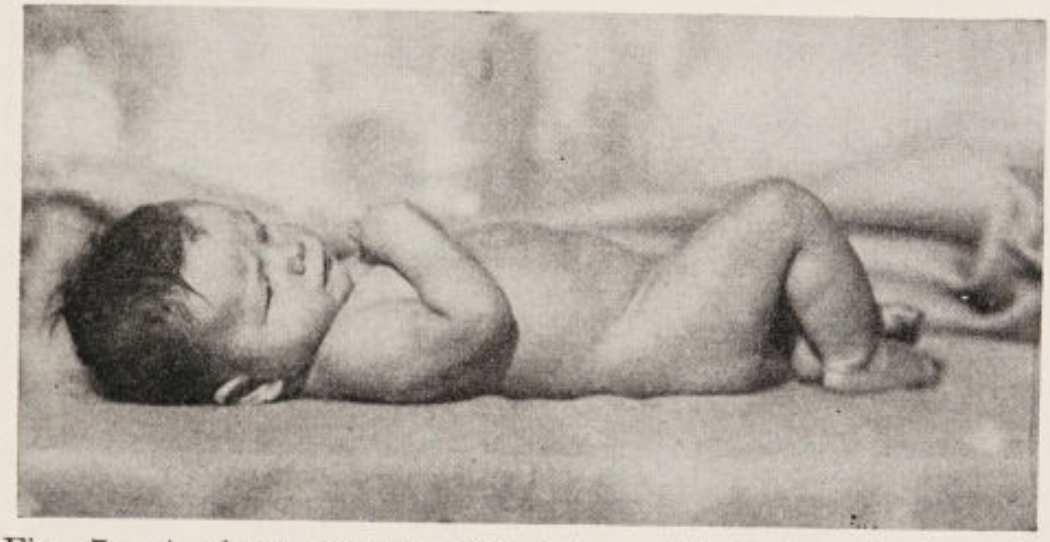


Fig. 7.—A three months old baby. Illustrates the length of trunk in comparison to the length of arms and legs and the proportion of length of head.

The neck is very short, and in a baby of normal weight, the flesh lies in deep folds or creases in the neck as well as in the thighs and arms. In the newborn the muscles of the head and trunk form a little over 40 per cent of the total weight of the musculature, while in maturity they form 25 to 30 per cent. Apparently the muscles do not grow as fast as the remainder of the body during infancy, but in later childhood they increase so rapidly that at puberty, as in later life, they form 40 to 45 per cent of the total body weight.

The bones of the newborn baby are soft and cartilaginous. Certain bones which unite later are unconnected. This makes the skeleton of a baby more flexible

* Quoted from Grulee (48) p. 21.

than an adult's and less liable to fractures* or dislocations. The flesh is firm and elastic and the skin as soft as velvet. The color is a deep pink or even red which usually fades rapidly to the traditional rose petal pink of babyhood. There may be a soft downy growth of hair over the body, especially on the back, when the baby is born, but this too disappears very shortly. Covering much of the body, especially the back and creases, is the vernix caseosa, a soft cheese-like fat substance, the product of the glands of

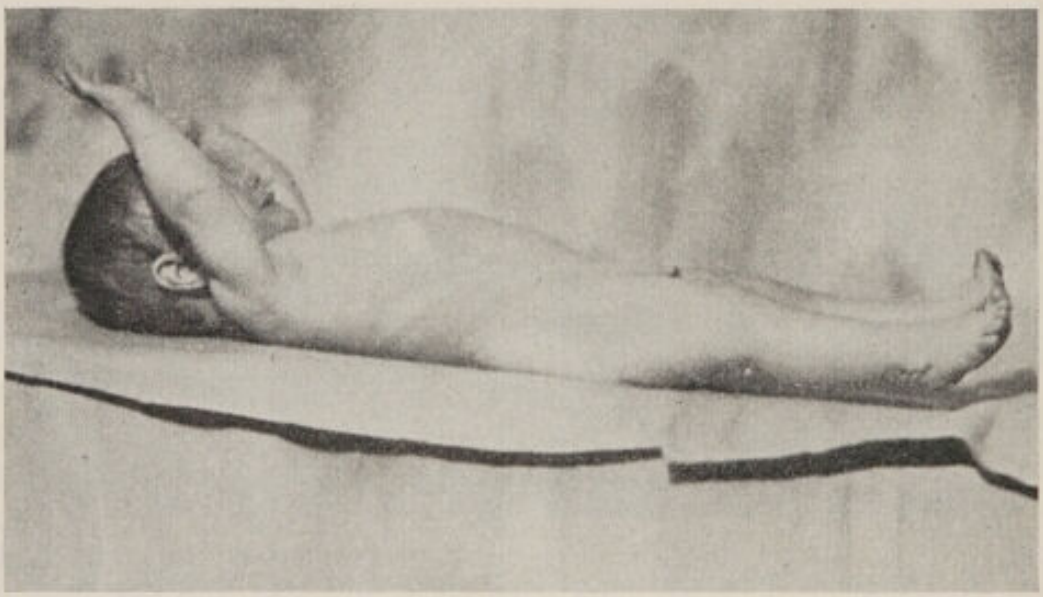


Fig. 8.—A six months old baby. Illustrates the length of trunk as compared with length of arms and legs.

the skin. This is easily removed when the baby is first oiled or greased and it does not reappear.

The baby's breasts sometimes seem full and contain milk but this disappears within a few days without intervention. The head may be covered with a fine downy growth of hair, which usually comes out in the first few months. Some babies have quite a heavy growth of hair, others have almost no hair. The eyes are a stove black-blue color which gradually changes to whatever the permanent color may be. There are no tears for some weeks at least. As there is difference of opinion as to just when

* If a fracture does occur in a little child or baby it is usually a so-called "greenstick fracture;" that is, the bone bends and splinters as a green stick rather than breaking sharply as a dry twig does.

tears appear, there is probably much individual difference as to the time.

Mouth.—The cavity of the mouth in the newborn baby is very shallow, the hard palate is flat, and has not the concavity characteristic of the adult palate. The mouth is dry owing to the imperfect secretion of the salivary glands. In the act of sucking, the infant uses the tongue, hard and soft palates, the two cheeks, the uvula, the gums and the lips. The act is greatly facilitated by the sucking pads, small masses of adipose tissue in each cheek. The function of the pad is supposed to be to distribute atmospheric pressure and to prevent the drawing in of the cheek and buccinator muscle between the gums during the sucking act. The sucking pad persists throughout childhood and even into adult life. When the child's mouth assumes the position for sucking there are formed three cleft-like spaces through which fluids can be carried to the pharyngeal cavity.

Occasionally a baby may show one or two teeth at birth but this is unusual. The salivary glands are only slightly active at birth but become increasingly so at about four months, and as the baby has not yet learned about swallowing the increased saliva, he lets it run out of his mouth and is said to "drool." As this usually occurs at about the same time that teeth begin to appear it is by many people attributed to the teething rather than to the real cause.

Cord.—As has been said, the cord is given the aseptic treatment of a surgical wound. A sterile dressing is kept in place by means of a flannel binder which must be pinned tightly enough to keep the dressing in place and yet not so tightly that the intestines receive undue pressure. The physician may order the use of some powder in addition to the dry sterile dressing. Within a few days the cord begins to shrivel and dry up and eventually drops off, leaving the baby's umbilicus slightly raw for a few days. The cord may come off within a week or it may be two weeks or longer but this is no cause for concern. The important thing is, that it shall be kept free from infection.

Respiration.—According to Scammon* the number of respirations is from 40 to 45 per minute at birth and is reduced to 25 by the end of the first year. Later the number of respirations is reduced gradually so that the average during rest and sleep at two years of age is about 24 per minute, at five years about 20 per minute, and at ten years about 18 per minute. With increasing age the individual respiration grows deeper, the mechanism works more economically, and shows greater elasticity.

Pulse.—The absolute weight of the heart in the newborn baby averages from 20–25 grams, about $\frac{1}{112}$ the adult weight of the organ. The weight of the musculature of the right and left ventricle is usually about equal at birth, but the left ventricle is double the weight of the right at the close of the first six months. The pulse is more frequent, ranging from 134 during the first year and gradually decreasing in rate to 90 in the eighth or ninth year. The complete circuit of blood is more rapid than in the adult.

Temperature.—The healthy infant maintains a temperature between 98.2 and 99.0 F. almost continuously without the aid of external heat. However, since the heat regulating mechanism in the baby is incompletely developed and unstable, unnecessary exposure to cold cannot be met as successfully as in the adult. Clothing therefore becomes important as a protection against sudden losses of heat by radiation and against too long continued exposure to cold. Too heavy clothing may on the other hand cause waste of energy in perspiration, restriction of freedom of movement, and discomfort.

Weight and Height.—A baby's average weight at birth is from $7\frac{1}{4}$ to $7\frac{1}{2}$ pounds, and its length about 20 inches. Boys as a rule are slightly heavier and longer than girls. There is a wide variation in weight, but a child weighing less than 4 or 5 pounds at birth rarely thrives, though a few cases are on record of children surviving, who, when born, weighed only 1 pound. Babies sometimes weigh 9 or 10 pounds but babies over that are unusual and if

* Feer, "Textbook of Pediatrics"—Anatomic and Physiologic Peculiarities by R. E. Scammon, p. 3.

much over 10 pounds present a grotesque appearance. There is a usual initial loss of weight of from 6 to 8 ounces during the first week in life, but after that the increase in weight should continue steadily at a fairly uniform rate. There is less variation in height than in weight. Generally speaking, babies of first pregnancies are smaller than babies of later pregnancies.

Sensory Equipment.—The sense organs and central nervous system are fairly well developed at birth, and the growth is so rapid that they are nearly as sensitive to stimuli at three years of age as they will ever be. Sight, hearing, taste, smell, and touch, however, seem far from efficient in function at birth. There are few carefully checked studies to show just how efficient the senses are or how they develop, but a number of observations of newborn and young infants are available in published form. Most of these observations (Shinn, Preyer, Rasmussen, Fenton, etc.) are studies of individual children, and are valuable as studies of patterns of growth but, since most of the children thus observed were mentally superior children, they cannot be used as standards for mentally average children. Several studies of groups of young infants (Blanton, Gesell, Simon, Watson, etc.) have been made, however, which are useful as standards. These latter writers agree fairly well in their conclusions about the sensory equipment of the newborn infant.

They find that the *sense of touch* is the most nearly perfect in function at birth, the greatest sensitivity being found in the lips where a slight touch sets up sucking movements. Several writers report that a touch on the nose is followed by closing of the eyes, and that blowing on the face causes drawing away or crying, depending upon the vigor of the air stream. Koffka reports that the bathing water must be the right temperature or it will be refused by the infant; all writers agree that the temperature which surrounds the baby should not vary markedly or he will become uncomfortable, but that he does not seem to be particularly sensitive to stimulations of heat or cold on small areas of the body. All writers report that the sensitiveness to

pain is not acute, and several comment upon severe scratches or blisters that do not seem to cause discomfort to the baby.

Not many observations on the *sense of smell* have been made. Shinn, Stern, Preyer, Koffka, Dearborn, and Valentine each report one or more instances in which the odor of a drop of milk or a drop of perfume caused the infant to stop crying, or in which the odor of petroleum, oil of amber, or other evil smelling substance caused an avoidance reaction.

Opinions about the sensitivity of the *sense of taste* differ. Shinn says there is no sign of a sense of taste until some days after birth. Preyer, Koffka, Fenton, Dearborn, and Stern, on the other hand, all report instances in which markedly bitter, sour or salty flavors were rejected by new-born infants, while sweet or mint-like flavors were accepted. Fenton reports that castor oil was objected to violently by a six-day-old baby; Dearborn found no objection when it was given to his child of one hundred nineteen days of age. It seems quite evident that sugar is a welcome taste, and, once given, is missed if removed from the diet later.

All writers seem to agree about *the sense of hearing*. They assure us that children are deaf for a few hours after birth. Many report reaction to violent sounds within a few hours, however, and all writers report instances of reaction to such sounds as harsh or sudden sounds, the tick of a watch, a long, low whistle within the first week. Shinn reports no sign of reaction in a twenty-six day-old infant to either high or low notes struck on a piano; Valentine, however, reports that his baby on the twentieth and fiftieth days stopped crying at once when low chords were played loudly on the piano.

The *sense of sight* is so imperfect at birth that reactions to sudden and pronounced changes to light seem to be the only sight reaction observed by any of the writers on the subject. Stern[130] says that the seeing of objects is out of the question. Preyer,[105] however, reports that on the eleventh day, his baby fixed its gaze upon the light. Dearborn[28] reports that his baby "looks interestedly at her mother's face" on the thirteenth day; Shinn's[122] niece "main-

tained her glance on pleasing, bright surfaces" at the end of the second week. Seeing as an "intelligent, active expression" is reported by Preyer on the twenty-third day, Shinn on the twenty-fifth day, Valentine[143] "before the first month is over." Such attention to objects is probably to be regarded as achieved by average infants during the first month.

The newborn infant, then, is possessed of the equipment for sense reactions, but he must learn by practice to use it effectively, and must through experience, associate meanings to the vast number of sensations which he has learned to entertain by the time he is a month old. Born into a "buzzing, booming confusion,"[62] he finds his senses bombarded with meaningless experiences against whcih the imperfection of his sense equipment gives him fair protection at first but little protection after he is a month old. The task which lies ahead of him is to learn skillful control over his sensory equipment so that he may use it effectively and selectively upon his environment, thus providing materials for his growing intelligence.

Motor Behavior of the Newborn Infant.—Probably the first thing to mention in connection with the motor behavior of the newborn infant is that he is a fairly efficient living machine. Until he is born, the child's breathing, eating, and eliminating have been done for him by his mother's blood stream. At birth he suddenly comes into the need of doing these things for himself. The birth cry is usually given credit for inflating his lungs and introducing them to the task of respiration. A touch on the infant's lips sets up a sucking movement, a motor response which upon presentation of the mother's breast furnishes the infant with his food. Even though he does these organic things for himself, however, he is still entirely dependent upon others for his food supply and for his physical needs.

Outstanding in the motor behavior of the newborn infant is his almost ceaseless random movement during his waking moments. He wriggles, stretches, fans his hands, waves arms and legs, and moves his lips, his eyes, his nose. These movements are notable because of their random, uncoordi-

nated nature. It is not unusual to find an infant of a few hours experience picking out and learning the coordination necessary to place its fist in its mouth repeatedly. Since sucking is intensely satisfying to the newborn infant, this is probably to be explained on the basis of the law of habit formation which states that keen satisfaction attached to behavior facilitates learning.

The newborn infant has a surprising number of reflexes, being possessed of most of the reflex behavior peculiar to human beings at any age. He gasps, coughs, chokes, sneezes, swallows, hiccoughs, and yawns with facility. Whether or not he winks in response to objects threatening the eyes is a point of dispute among authors. Tanner[136] says the first winking appears between the forty-third and sixtieth days; Watson[154] says that it occurs the first or second day; Koffka[68] says that the eyelids do not close when an object threatens the eyes at birth, while Shinn observed a closing of the eyelids in the first day when bright light or a touch threatened the eyes. Gesell[42] states that winking occurs during the first day.

Two reflexes are present at birth, but disappear later, and while present, indicate an immaturity of spinal centers. These are the Babinski (a "fanning" of the toes with an extension of the great toe, when the sole of the foot is stimulated) and the grasping or Darwinian reflex. According to some authors the Babinski is not present in all infants. The only dispute about the presence of the Darwinian reflex at birth is one concerning the amount of strength the infant displays when grasping. Watson says that the grasping reflex is present in practically all normal babies. Both the Babinski and the Darwinian reflexes disappear as the spinal centers mature. The Babinski is usually gone at the end of six months and is never present after the second year if development is normal. The Darwinian is distinctly weakened at the end of a month and is usually gone by the fourth month—at about the time when purposeful reaching is established.

Emotional Behavior.—The newborn infant is capable of emotional response apparently so complicated in its

mechanism that it calls into play almost every part of the body. Just what rouses his emotions and just what emotion he shows as the result of specific stimuli is a matter of dispute. But that he becomes roused to emotion by remarkably few types of stimuli and that the number of his emotional reactions is limited seems to be agreed upon by recent writers.

Watson[152] in collaboration with Jones at Johns Hopkins University and at the Heckscher Foundation in New York City found that the newborn infant is capable of only three emotional responses, namely, those of love, of fear, and of anger. He found also that these responses can be roused only by an extremely limited set of stimuli. Fear is roused by a loud noise like the banging of a dishpan or the slamming of a door, and by loss of support as when the blanket is jerked from under the infant, or when he is carelessly handled. Anger, expressed by stiffening of the body and loud crying, is caused by hampering of bodily movements as when the head is gently held in one position and the arms and legs gently pinioned to the sides. Love, expressed by cessation of crying and gurgling, cooing, and visceral reactions, is caused by stroking of the skin, particularly of lips, face, breast, and the sex zone.

There has been a tendency in child training literature to accept Watson's findings in this field as final since his work was carefully done and stood as the only study of its kind for several years. Watson himself in his more serious writings has never claimed onmiscience in this matter, but has appreciated the limitations of available scientific work in this field. Jones[64] in discussing the emotional responses of young infants says that Watson omits mention of the emotional reaction to pain. Although infants are not acutely sensitive to pain, there can be no question that pain stimuli elicit emotional responses even during the first few weeks.

Sherman,[121] writing after extensive work with infants, says that they show an emotional response to puffs of air against the cheek. He found, too, that when he dropped infants through several inches of space (sudden removal

of support) they did not always respond with emotional behavior. He took motion pictures of his experiments, getting pictures of the various stimulus situations and of the infants' responses. He then cut the film and reassembled it so that the responses which had been characterized as anger responses followed the so-called "fear stimuli," and so on. He showed this rebuilt film to a number of psychologists, none of whom were able to discriminate clearly between the various emotions displayed. Thus Sherman won his point that the emotional behavior roused by various stimuli applied to infants is of a general rather than of a specific nature.

This much seems clear from all studies that have been made: the emotional behavior of infants is limited; it is roused by probably not more than four or five distinct stimuli; it becomes varied in kind and amount depending upon the experience of the child; early emotional experiences may make deep impressions which last into adult life, moulding adult ideas and behavior. Whether or not the final emotional pattern of adult life is "set" by the age of two years, as Watson maintains, is a point of dispute. That it is "set" to an important degree by the age of seven is unquestioned by most writers in education and psychology. Many writers feel that the pattern of emotional behavior cannot be changed after adolescence, although the most astute observers of human behavior know that it can be changed at any age if the individual is willing to make the effort. The point is that after adolescence the effort required to change emotional behavior is tremendous—almost superhuman—and few people ever become sufficiently interested to attempt it.

Behavior with Reference to Food.—The newborn normal baby is not in immediate need of food and is usually not put to the breast for twelve or more hours after birth, giving the mother ample opportunity for resting after the exertion of labor, and giving the baby an opportunity to lie undisturbed, warm and quiet during the first hours of adjustment to his new environment. The lips and tongue of a baby, as has been said, are extremely sensitive to touch,

and the stimulus of a touch on the lips is sufficient to start the sucking reflex, but the fact that the baby sucks does not always indicate that he is hungry. There may be some difficulty, however, in the first few days in getting the baby to nurse satisfactorily, and those first few nursings must not discourage or worry the mother. She must think of it as one of the first learning processes which the baby is going through, and realize that it will take a little time before the habit is well established. The act of the baby's sucking at the breast not only stimulates the breasts to secrete milk, but in the first few days after birth stimulates uterine contractions and so assists in the involution of the uterus.

For the first few days, the fluid in the mother's breast is colostrum, such as could be expressed from the breasts during pregnancy; but by the third or fourth day, the mammary glands begin to be very active and the breasts become full of milk.

Early Elimination.—The baby may pass urine during the birth process, or if not, within a few hours after birth. He is likely to pass it frequently for an hour or two after eating and then less frequently until more fluid is taken into the body. The bowels move within a few hours, and for the first few days the movements are a dark green, tarry substance called meconium, the material which has collected in the intestines during fetal development. The colostrum which the baby gets during the first few days of nursing, besides having some slight nutritive value, may act as a laxative which helps rid the bowels of meconium. When regular feeding is established, the stools change to a color, consistency, and odor characteristic of the food which the baby receives. If a breast fed baby, the stool is a golden yellow, a soft pasty consistency, acid in reaction, and with a characteristic odor. A breast fed baby usually has from two to four movements in the course of twenty-four hours. If a bottle fed baby, the composition of the formula will cause a characteristic stool. If the formula is similar in composition to the composition of mother's milk the stools are usually fewer in number, a lighter yellow, a little less pasty, and with a somewhat different odor.

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CHAPTER V

PRENATAL CARE OF THE MOTHER AND THE PREPARATION OF THE FAMILY FOR THE BABY

THE maternal mortality rate, that is the number of women dying from causes directly connected with pregnancy or childbirth, compared to 1000 live births was 6.5 in the U. S. Birth Registration area for the year 1926. Twenty other countries in the world had a better rate than this for that same year, a fact of which the richest country in the world should not be proud, particularly when it is an acknowledged fact that the rate may be lowered if all women have adequate care during pregnancy and childbirth.

A comparison of the maternal mortality rate of an organization like the Maternity Center Association in New York which secures adequate medical and nursing care for women during pregnancy and childbirth with the maternal mortality rate of the city itself gives 2.4 for the M. C. A. and 5.3 for the city at large. In the areas in which the M. C. A. worked "the maternal mortality rate among women who did *not* receive care from the Association was 7.5 per 1000."* In this same bulletin it says: "The lives of two out of every three American women who die each year, during pregnancy, in childbirth or shortly after childbirth, could be saved if these women received proper medical and nursing care." The fact of which every man and woman should be aware is that adequate prenatal care and obstetrical care lowers a maternal mortality rate. Women live who otherwise would die. An unduly high rate indicates that women are going without that care.

A study of maternal mortality made by the Childrens Bureau, U. S. Department of Labor and reported in Bureau

* Quoted from Statistical Bulletin, Metropolitan Life Insurance Company, February, 1930.

Publication No. 158, gives puerperal septicemia (infections of the birth canal and uterus) as the most important single cause of maternal deaths. Forty per cent of the maternal deaths in 1921 were due to this one cause and a large percentage of puerperal infections are preventable. The physician who practices the correct technic for surgical asepsis is seldom the physician who loses cases from puerperal or childbed fever, as it is sometimes called. Toxemia (puerperal albuminuria and convulsions) which causes more than 25 per cent of maternal deaths in the United States is a condition which can be detected in its early stages by the physician and which, in most instances, responds to treatment. Undetected and untreated it may cause the death of both mother and baby. If the deaths from these two causes alone were lowered, the maternal death rate in the United States would be appreciably lowered and we would no longer have a rate for which we should feel shame.

A study also of the causes of infant deaths reveals the fact that practically one-half of the deaths in the first year of life occur in the first month of life after birth, and one-half of these occur in the first day of life from causes relating in some way to prenatal or obstetrical conditions. It would seem then that whatever can be done to lower this high infant mortality rate in the first weeks of life must be done by giving the mother skilled care during the prenatal and obstetrical period.

The toll from improper care is not paid by death alone. Many a woman living far below her optimum of physical and nervous vigour at a time in life when, with growing children, it is most important that she should be able to give the best to family life, is thus handicapped because she did not have adequate prenatal and obstetrical care.

Dr. Matthias Nicoll, Jr., Commissioner of Health, State of New York, says: "The deaths annually of 14,000 or 15,000 women from causes directly connected with childbirth, and the chronic invalidism of many times that number, constitute a much graver problem than an equal number of deaths among the general population or among infants and young children, since in a large number of cases

the death of a woman in childbirth involves the disruption of a home, the future welfare of many dependent children, and other sociologic and economic factors, with which it is very difficult to deal."*

One great trouble is that the general public, men and women both, are not aware of these facts as they should be. When the public actually believes the facts that are available they will demand adequate care for the mothers and babies of their country.

The general comment of the public has been that pregnancy is a normal function, therefore, why all this bother about prenatal and obstetrical care? The primitive woman had her baby without any difficulty. Perhaps so, although we have no statistics on the maternal and infant mortality rate among primitive women and babies.

But we are not living in a primitive state of society. We are living in a highly complex state of civilization which obviously brings with it certain advantages but which brings dangers as well. Civilization is a development from primitive life. We have certain perquisites which the primitive woman did not have but we also face certain dangers that the primitive woman did not face, dangers which are the inevitable accompaniment of our way of living. We should no more expect a woman of today to go through pregnancy and labor without the safeguard of the good care which she may have, than we should expect her to live in a cave without furnishings or some of the other seemingly essential products of this stage in our civilization.

Slowly, it often seems, but surely, the country is awakening to the fact that adequate prenatal and obstetrical care is important. In 1921 Congress passed the Sheppard-Towner bill, an "act for the Promotion of the Welfare of Maternity and Infancy" which provided that States should have Federal aid to be matched in part by the State's appropriation for carrying on some type of work, the purpose of which should be the reduction of maternal and infant mortality.†

* Presidential Address delivered before the State & Provincial Health Authorities of North America, Washington, D. C., May, 1929.

† In June, 1929, the Sheppard-Towner bill went out of existence and the Newton bill which proposed an extension of the Sheppard-Towner Act for five years did not come to a vote.

This was obviously a recognition of the fact that something should and could be done to lower the high maternal and early infancy mortality rate of this country. The states in developing their programs under the Sheppard-Towner Bill recognized that the first thing to do was to educate the public to the importance of prenatal and obstetrical care and what constituted adequate care. Through the printed word, pamphlets, circulars and newspapers, through the services of public health officials, physicians and nurses, through lectures before organizations, and through clinics, they carried on educational programs which had for their purpose the convincing of the public as to the importance of prenatal and obstetrical care and what such care meant.

Obstetrics has developed as a special branch of medicine and more women are today receiving the care of obstetricians, or those with special training in obstetrics, during their pregnancy and at confinement. Certain products of our industrial age have made the services of specialists, the obstetrician particularly, more easily available to women scattered over a larger area. The telephone, the automobile, good roads (an inevitable result of automobiles) make it possible for a physician to care for certain types of cases over a wide area instead of caring for every type of case in a small area which was all he could possibly cover in the days when people had to go to get him and when he could go only as far as his horse could take him. The fact that hospitals can serve people scattered over a wide area, since patients too can travel generally by automobile, is another factor which has facilitated the development of specialties in medicine. The time consumed in visiting from house to house is eliminated as more people make use of hospitals.

Wide areas of our country are still, however, without adequate medical service, a fact of grave moment to those concerned with the problem of lowering the maternal mortality rate of this country. A thoroughly awakened public would do much to better conditions.

It is interesting to note the attitude of the public in regard to paying for the services of the obstetrician. To have

adequate care a woman should consult her physician as soon as she suspects she is pregnant and she should report to him at frequent intervals during the pregnant period. Various tests should be made from time to time. At the time when the baby is born the physician may have to give hours of skilled care to the woman, care on which her life and the life of the baby may depend. For ten or twelve days after the baby is born the physician will visit his patient regularly and before discharging her he will want to see her about a month or six weeks after the baby is born to make an examination and assure himself that the condition of the uterus is as it should be. The usual reaction on the part of the public is to expect this service for a very small fee and yet this same public may pay without murmuring a much larger fee to the surgeon who takes out an appendix, a matter of a comparatively short time. The woman and her baby need skilled care if the maternal and early infant death rate is to be lowered and the optimum of health for mother and child secured. The practise of obstetrics must be recognized as a specialty needing highly skilled physicians whose services can be called upon especially for the difficult cases. It is not to be expected that every woman in the country can have a specialist, but we can certainly look forward to a time when women can have adequate care by well trained physicians and nurses who can call upon the more highly skilled if the case presents difficulties which they themselves are not prepared to handle.

Pregnancy is, nevertheless, a normal function; one which most women experience and which they can, in a high percentage of cases, experience successfully if they have been taught what good care is and how they can obtain it for themselves. A knowledge of this process so vital to the race should be had by all women and men too, if this important time in a woman's life is to be met with the intelligence and wisdom it deserves. The pregnant period, even though pregnancy is a normal function, is a time in which enormously significant changes are taking place within the body of the woman. Every possible care should be taken to

bring those changes to a highly successful conclusion for both mother and baby. Many physicians advise that the patient should see her physician once in three weeks for the first five months; every two weeks until the end of the seventh month; every ten days through the eighth month, and once a week through the ninth month.

Disturbances in Pregnancy.—It is recognized that every woman during pregnancy may react individually to the physical changes taking place in her body. Certain types of disturbances due to heightened metabolism, pressure of the enlarged uterus upon organs, blood vessels and nerves in the pelvis, and the increased strain upon abdominal muscles are to be expected.

It is estimated that $\frac{1}{3}$ of all pregnant women suffer at some time during pregnancy from nausea or "morning sickness." It should be borne in mind that "morning sickness" is not inevitable. Most physicians are convinced that a psychic element often influences this phenomenon, and that many women suffer from nausea because they expect to and for no other reason. Even when the nausea is the result of actual physical disturbances, however, simple measures, and suggestions made by the physician will prevent it from developing into a habit. One's attitude of mind has much to do with this happening and it is important that women should cease taking the attitude that they are bound to have "morning sickness" and that nothing can be done about it. Physical disturbances which cause nausea are negative nitrogen balance, fatigue, acidosis, and starvation. The cause of nausea is most commonly attributed to acidosis. That acidosis will in itself produce vomiting is destitute of proof, since in cases of diabetes where severe acidosis is present there may be an entire absence of vomiting.

"Heartburn" is another discomfort which some women have during pregnancy. This sensation which has nothing to do with the heart is due to a gastric condition and may be relieved by simple remedies prescribed by the physician. Flatulence or gas in the stomach or intestine annoys some women. The action of bacteria on the foods generates the

gas and it is probably increased in pregnancy because as the uterus enlarges it presses on the intestines and slows up peristalsis. For this reason regular and free bowel movements are most important in order that waste products will not linger in the intestines.

When one realizes the great increase of the uterus within the woman's body, it seems reasonable to expect that as it takes more room it is bound to press on other parts of the body and cause disturbances which, though not serious if treated correctly, are annoying. The downward pressure of the uterus as the woman is on her feet sometimes causes, in the latter part of pregnancy, swollen feet and legs, varicose veins, hemorrhoids and cramps in the legs. In addition to the downward pressure symptoms there is an upward pressure against the diaphragm which causes shortness of breath. Pressure on nerves by the uterus may cause pain either at the spot where the pressure occurs or at a nerve ending. If the former, the pain is usually felt in the lower part of the back; if the latter, it usually causes cramps in the legs. All these various pressure symptoms are likely to be increased during the last few weeks of pregnancy when the enlarged uterus drops back into the pelvis and the head of the baby lies in the inlet through which it must pass at the time of birth. Any mechanical means which help to relieve pressure will help these symptoms.

As has been said there is a normal increase in the vaginal secretion during pregnancy and if this white discharge, called leukorrhea, seems excessive, it should be reported to the physician as it may indicate a condition which calls for treatment.

Itching of the skin may sometimes be noticeable during pregnancy, but when one remembers that the skin glands are more active as an excretory organ during pregnancy, it is not to be wondered at that the skin is irritated by some of the extra waste products which may be excreted through it. It is important that the other excretory organs, the kidneys and bowels, be kept as active as possible and in that way the waste product which is irritating the skin may be carried off in other channels.

Constipation is a very common complaint during pregnancy but the foregoing discussion indicates how important it is that it should not be allowed to continue. Pressure on the intestinal tract is probably a contributing cause as is also the possible weakening of the abdominal muscles because of stretching. It may be necessary to resort to laxatives of some sort to relieve the condition, but every effort should be made to control the difficulty by diet.

The physical disturbances of pregnancy thus far discussed, as well as others which occur less frequently, are often annoying but not often serious, and it must be borne in mind that many women experience pregnancy without suffering from any of these disturbances. Simple hygienic measures usually relieve them, and the attitude of the obstetrician always is that they should be relieved and never that they must be endured as an inevitable accompaniment of pregnancy. It is, therefore, important to report any discomfort to the physician and get his advice as to methods of relief.

In addition to these less serious disturbances of pregnancy there are the *more serious complications* which are the cause of such a high percentage of the deaths of mothers and babies. Of these the toxemias of pregnancy are doubtless the most serious. These are more likely to occur during the latter part of the pregnancy when the waste products thrown off by the fetus into the mother's circulation are increasing rapidly in amount. If something occurs to interfere with the metabolic process anywhere in its course the individual will suffer from some form of autointoxication. The fetus sending back through the blood vessels in the umbilical cord the waste products of his nutritional processes into the mother's circulation places an extra burden on her. If she is not able to meet this burden she suffers from a toxemia varying in degree from mild to extremely severe and dangerous, ending sometimes in convulsions and death. It is of the utmost importance that a pregnant woman should give every heed to living as hygenic a life as possible in order that she should give her body every chance of performing its functions satisfactorily, allowing no

opportunity for the accumulation of waste products in her body.

An increase in the blood pressure and albumin in the urine may be the first indications that a toxemia is impending. Symptoms which the woman herself may notice and which should be reported immediately to her physician are, persistent headache, dizziness, blurred vision, spots before the eyes, puffiness of face, hands or feet, (the latter, of course, may be due to pressure), vomiting which is more severe than "morning sickness," and severe pains in the abdomen. They may not necessarily be due to a toxemia but it is important to discover immediately whether they are or not, and the physician is the one to make the discovery and institute immediate treatment. A specimen of urine should be sent to the physician as soon as these symptoms are noticed. It is in order to guard against the development of toxemia that a physician as a routine measure, takes the blood pressure and examines the urine of a pregnant woman whenever she reports to him.

Overfatigue, malnutrition, bad falls or heavy jolts may induce an abortion or a miscarriage, but the uterus, because of the way in which it is suspended is wonderfully well equipped to withstand rather severe mechanical shocks without a miscarriage occurring. The uterus seems to be particularly irritable at the time in the month when the menstrual period would occur if the woman were not pregnant, and it is, therefore, wise to take extra precautions at that time, especially if a woman has had a previous miscarriage. The usual symptoms of miscarriage are bleeding and recurrent pain in the lower part of back and abdomen. They do not necessarily mean that a miscarriage will occur, but they are warning signs and a woman who notices them should go to bed and notify her doctor. Such precaution may prevent disaster. One of the dangers of miscarriages is the fact that women do not consider them serious and even neglect to call a physician when one occurs early in pregnancy. It is most important that a physician should be called as it is necessary to ascertain that the entire products of conception have been expelled from the

uterus, otherwise the uterus will not return to its normal state and the woman runs the risk of trouble of various sorts later on. Another possible cause of trouble is that the woman may not take proper precautions after a miscarriage. She may fail to go to bed at all or get up too soon, and therefore the return of the uterus to its normal state is made difficult or prevented.

The expectant mother in the past has had comparatively few avenues for learning about the physiology of pregnancy, the meaning and significance of her physical disturbances, and what is to be expected as normal in pregnancy. This, no doubt, has been a contributing factor in one of the difficult problems with which physicians have had to deal in pregnancy—the *undesirable psychological condition* of some prospective mothers. Without the scientific knowledge which explains some of the symptoms and conditions peculiar to pregnancy, women have in the past been dominated by the fears, anxieties, insecurity, and maladjustment to their lives, all of which may become magnified out of their true proportions during pregnancy. If the true sense of proportion about the basic adjustments of life becomes lost in pregnancy the resulting state of mind may be potent enough to induce physical conditions which border on the pathologic. Self-consciousness, the undue scrutiny of body functions, such as respiration and beating of the heart which go on automatically, minute analysis of feelings, and a tendency to introspection may lead to serious misinterpretation of conditions and sensations which are normal to pregnancy.

It is during the early months of pregnancy that patients are most likely to be self-centered and consequently suffer from the physical discomforts which are induced by poor mental health. Some women adopt during pregnancy a state of semi-invalidism and give way to nervousness, irritability, moodiness, fits of introspection, feeling sorry for themselves as part of their "rights" due to their physical condition.

The question of the effect of abnormal emotional conditions on the growth and development of the human fetus is one involving a number of complicated factors, and

direct evidence and scientific data are difficult to secure. Since the nourishment of the fetus is through its blood and is made by diffusion without its blood stream coming into contact with that of the mother, it is obvious that only definite alteration of the composition of the blood of the mother would affect the growing organism. Guyer[50] says "there is not the least doubt that malnutrition or serious ill health on the part of the mother often has a prejudicial effect on the unborn offspring . . . Severe shock or grief, worry, nervous exhaustion, the influence of certain diseases, poisons in the blood or tissues of the parent, such as lead, mercury, phosphorus, alcohol and the like, may all act detrimentally, but they operate either by rendering nutrition defective, by direct poisoning or by generating toxins in the blood of the parent which then poison the fetus . . . Such factors operating on the unborn young or possibly even on germ cells may cause malformations, arrests of development, instabilities of the nervous system and general physical or mental weakness. The effects are general, however, and not specific."

Although scientific findings have corroborated the usual traditional belief that severe emotional shock may injure mother or child physically, there is *no scientific evidence whatever that any experience of the mother during pregnancy can produce a so-called "birth-mark" or can in any way affect the personality or character traits of the child directly.* Familiar but unfounded beliefs are that playing the piano will make the child musical; looking at works of art will give artistic ability; seeing a mouse will mark the child's body with a patch of mouse colored hair. There is no foundation for such beliefs.

Hygiene of Pregnancy.—The foregoing discussion of the condition of pregnancy, its disturbances, and complications indicates how important it is to be under the care of a competent physician and how necessary it is for the woman to live the kind of life which will keep her in good condition. It is well to remember that pregnancy is on the whole a normal function, though fraught with the possibility of danger, and therefore it is right that the woman should

expect to live a normal wholesome life, taking certain precautions to avoid mishaps. On the whole she should live about as any woman lives who lives healthfully, avoiding excesses of any sort, but carrying on her ordinary work and play, and living a life which is satisfying to her emotionally and sexually.

It is well to consider what living healthfully means since it is so important to a successful pregnancy. In the first place the whole question of the nourishment of our bodies is extremely important. To eat the right food, digest it properly, make the right use of it and get rid of the waste products is a most important cycle.

Dr. Mendenhall[86] emphasizes the importance of *diet* during pregnancy. "We must give up the present prevailing view that the pregnant mother's diet can be left safely to chance or to whims of her appetite and no longer counsel her to 'eat what she is accustomed to' or 'plenty of good nourishing food.' "

Randall[106] at the Mayo Clinic has made a very interesting study of weight as a diagnostic factor in pregnancy and of the importance of watching weight during that period. The following shows the figures obtained from 200 normal primiparas (women pregnant for the first time).

Average total gain—23.2 pounds (10.5 Kg.)
7.75 pounds added in last eight weeks
100 multiparas: (women pregnant, but not for the first time).
Average gain—21 pounds (9.5 Kg.)
5 pounds added in last eight weeks

Randall has made a comparison of the weight gain of toxemic and normal pregnant women. The average total weight gain of toxemic patients was 44.5 pounds as compared to a gain of 23 pounds for normal patients in first pregnancies and 21 pounds for normal patients in other pregnancies. This total weight increase is not as significant as the fact that 25.4 pounds was gained by toxemic subjects during the last eight weeks of pregnancy, compared with 7.75 pounds for first pregnancy and 5.00 pounds for later pregnancies. During the first three months the toxemic women have a greater tendency to lose weight. Randall

has concluded, therefore, that excessive gains are dangerous. It should be kept in mind that every pregnant woman with excessive gain in weight is not to be considered predisposed to eclampsia—but wherever excessive gains occur additional precautions should be taken.

It is interesting to note in this connection case M. G., a multipara, who was observed at Merrill-Palmer School during the whole of pregnancy. Her initial weight was $121\frac{6}{16}$ pounds, which was below standard for her height. At the end of the fourth month she weighed $130\frac{10}{16}$ pounds, having gained $9\frac{4}{16}$ pounds during the four months of pregnancy. Her last weight taken during the ninth month was $150\frac{8}{16}$ pounds making her total gain $29\frac{2}{16}$ pounds. Her labor was brief and normal and she gave birth to a healthy infant weighing $8\frac{7}{16}$ pounds. Such an example indicates the variation from the averages given by Randall, which may, nevertheless, still be normal.

Slemons and Fagan[125] like Randall, emphasize the need of precaution necessary to avoid overweight. According to them the total gain in weight during pregnancy should normally be 15 pounds if the woman is of normal weight at the beginning of pregnancy. In order to maintain such a weight they recommend very light meals, eliminating cake, candy, pastry, pie, and rich desserts. They advise milk only during the first period of pregnancy, indicating that after quickening is experienced milk should not be taken because it is too fattening. In order to limit increase in weight a diet of only 2000 calories is given. The following gives a sample of this diet:

> For Breakfast: Coffee or tea with toast and very little butter.
> Mid-morning: A cereal with milk—no cream.
> Lunch: Bread with egg or soup or salad.
> Mid-afternoon: Orange juice, tea or bouillon and crackers.
> Dinner: One chop, or an equivalent, 2 vegetables in moderate quantity without second helping; a simple dessert preferably fruit.

According to other authorities, this diet does not seem to be "ample in vitamins and calcium for the optimum growth of the fetus and maintenance and repair of the mother's tissues," as Slemons and Fagan claim it to be.

Sansum,[116] on the other hand, advises 2200 to 2500 calories for the pregnant woman, with exercise and reduction of fat rather than of carbohydrates in the diet to control weight without endangering the acetone type of acidosis. He believes that the diet of the nursing and pregnant mother should be high in protein. In addition to the normal amount of protein she should have not less than 1 quart of milk per day. He believes the mother needs two eggs, one serving of meat, fish, or fowl or the equivalent.

According to Day[27] the pregnant woman should have from 2000 to 3000 calories of food a day. He makes the following statement in regard to protein containing foods: "Meat, fish and eggs should be taken in moderate sized portion daily unless kidney condition or increased blood pressure makes it necessary to diminish the amount." He recommends 3000 or more calories during the first period (first three lunar months) particularly if she is undernourished, while during the second period (second four lunar months) she can have less, and during the third period (last three lunar months) the caloric intake should be about 2000 calories especially if she has a tendency toward obesity.

In view of the fact that the energy requirement of a woman during pregnancy, especially toward the end of the period, is considerably above that of the same woman in the nonpregnant condition (estimated at 2400 to 2800 calories) 2000 calories does not seem adequate. The metabolic determination made by Root and Root,[110] indicates that six weeks before delivery the basal metabolic rate of a pregnant woman was 23 per cent greater than it was at the four month period.

The diet for the pregnant woman as outlined by Royston[114] seems to fulfill the daily food requirement of the average pregnant woman: whole grain cereals; fruit, raw or cooked, 200 Gms. (7 ounces), raw or cooked vegetables, preferably the green leafy variety such as lettuce, spinach, cabbage, onions, etc., 300 Gms. (10.7 ounces); cow's milk, 1 quart or 30–50 Gms. of cheese (1 to $1\frac{1}{2}$ ounces); citrous fruit juices for vitamin B and C, 200 Gms. (7 ounces); meats

of any kind but especially liver, valuable for vitamins or blood regenerating properties; fish for its iodine content; fats rich in vitamins, cream and butter; fluids $1\frac{1}{2}$ quarts to 2 quarts per day.

Mendenhall[86] advises the addition of 500 calories to the diet of an active woman who is pregnant and this should be largely added in milk, eggs, fruit and vegetables. She points out the effect of long undernourishment of mothers in Central Europe as a result of the world war. The birth weight of the new-born, the ability to produce milk, the quality of the milk produced, and the appearance of rickets in the offspring, as well as osteomalacia (hunger rickets) in the mother herself were all results of undernutrition.

Park* has written, "Personally, I believe that if pregnant women received ample well-balanced diets, in which green vegetables were abundantly supplied and cow's milk was regularly taken, and kept a sufficient part of their time in the open air and sun, and if their infants were placed in the direct rays of the sun for a part of each day and were fed cod liver oil for the first two or three years of life, more could be accomplished in regard to the eradication of caries of the teeth than in all other ways put together, and that rickets would be abolished from the earth."

Minerals in the Diet during Pregnancy.—Emphasis cannot be laid too strongly upon the importance of adequate minerals in the diet especially during pregnancy, and calcium is one of the most important of these because of its relationship to the bone and tooth formation in the fetus. The calcification of the teeth of the fetus probably begins before the fifth month of pregnancy. Table III from Hoffström indicates the amounts of calcium needed in the diet during the last eleven weeks of pregnancy when 25.12 Gms. may be added to the ovum or 2.09 Gms. per week.

Lusk in commenting upon the figures of Hoffström says that rapid growth of the fetus began during the twenty-ninth week of pregnancy, at which time the calcium retention by the organism greatly increased and the excretion of calcium in the feces of the mother diminished. From

* Quoted from Sherman.

TABLE III
GROWTH OF THE HUMAN FETUS COMPUTED FROM THE TABLE OF MICHEL*

Week of pregnancy	N.		P.		Ca.		Mg.	
	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.
16.....	4.28	1.13	0.67	0.20	0.38	0.41	0.026	0.017
20.....	8.81	.....	1.47	.....	2.03	.....	0.095	.....
21.....	.....	1.81	.....	0.25	.....	0.43	.....	0.017
28.....	23.28	.....	3.58	.....	5.39	.....	0.234	.....
29.....	.....	6.87	.....	1.28	.....	2.09	.....	0.064
40.....	105.76	6.87	18.93	1.28	30.51	2.09	1.004	0.064

* Lusk, Graham, "Science of Nutrition," Fourth Edition p. 535 (1928).

the above table it is obvious that during the last ten weeks of pregnancy the demand of the growing fetus for calcium is greatly increased. Therefore, the diet of the mother should be especially rich at this time in calcium containing foods. Milk is the most economical of these, while recent research emphasizes the importance of ultra-violet rays as related to calcium metabolism.

Mendenhall believes that the need of the pregnant woman for calcium is half again as much if not twice as much, as that of the nonpregnant woman, or not far from 1.1 to 1.4 Gms. of calcium daily. Ultra violet rays are important in the utilization of calcium; vitamin D (in the form of cod liver oil) or sunlight are as important as calcium and phosphorus especially during the winter months in northern climates.

Iron as a mineral essential for blood building of the mother and fetus follows next in importance to calcium and phosphorus. Day indicates as a standard for iron requirement 0.0001 Gm. per pound of body weight. The total adult daily requirement is frequently estimated as 0.015 Gm. It is quite evident that this requirement is increased during pregnancy. Fruits, vegetables, egg yolk, red meats, and glandular organs such as liver, kidney, etc. are high

in iron content. Recent research points to the relation betweeen copper and iron metabolism as well as a possible relationship between iron metabolism and vitamins especially vitamins A and D.

Iodine is also important in the diet of the pregnant woman. There are certain regions in Europe as well as this country—such as the Great Lakes, and the north-west states—where the amount of iodine in soil, water and food stuffs is very low and is not sufficient for certain persons who are predisposed to an inadequate iodine metabolism. Oleson[98] of the U. S. Public Health Service states that "during pregnancy iodine should be administered under the direction of a medical attendant, thereby preventing the development of goiter in the child as well as in the mother."

At the present time an adequate diet cannot be discussed without reference to *vitamins* which during the last ten years have contributed much to the growing interest in diet not only through the research of science but also, through the family kitchen. The foods essential for providing vitamins and minerals in pregnancy, recommended by Mendenhall[86] are:—"1 quart of milk, one egg, one raw vegetable salad, such as lettuce, celery and tomato, one citrous fruit, one cooked green vegetable, two slices entire wheat or graham bread or $1\frac{1}{2}$ ounces whole grain cereal. If a helping of lean meat, potato, and three servings of butter and cereal or bread are added to these foods, a diet sufficient in calories and adequate except possibly in iodine, will be furnished a normal mother. More fruit and vegetables may be substituted in place of additional carbohydrates, if the energy needs to be curtailed." Such a diet high in green vegetables and fresh fruit, whole cereals with butter, possibly a small amount of cod liver oil ($\frac{1}{2}$ teaspoon) will have sufficient of all of the vitamins.

Sansum[116] makes a very special point of emphasizing the importance of bulk in the diet. He believes that "individuals who are taking a quart of milk per day together with two pounds of the fruit and vegetables so necessary for the prevention of constipation, and the supplying of an adequate amount of alkaline and mineral foods need have

no fear about vitamin deficiencies." The residue-containing foods are fruits, vegetables, and whole grain products, a lack of which foods results in constipation, which is usually alleviated by irritating cathartics or enemas, with resultant bowel distress. Apples, bananas, dates, figs, and raisins are, according to Sansum, especially efficacious. As has been said, diet should be used as the method for controlling constipation, rather than cathartics.

Water is important in the normal functioning of the body, and especially so in pregnancy. Day advises six to eight glasses a day which includes the amounts taken in beverages, soups, etc. The expectant mother should take care that her water intake is adequate for this is essential for adequate elimination both through the kidneys and skin. No increased burden should be placed upon the kidneys by a limited water intake.

Elimination.—Food intake is one important aspect of the nutritional cycle. The other important aspect of this cycle is elimination. The need of a regular bowel movement cannot be too greatly emphasized. It is not a matter to be ignored until pregnancy occurs, for the establishment of a regular bowel movement at a regular time each day from early childhood is essential as a health measure at any time but is especially important as a safeguard against the trouble of constipation in pregnancy. If in spite of a well established habit in regard to the bowel movement, constipation does occur a woman may add certain laxative foods to her diet and increase the amount of water she drinks, taking a glass or two on first rising in the morning, which stimulates peristalsis if she has not already established this excellent habit. She should keep up her usual amount of exercise unless for some reason the doctor has advised against it, for a change to a sedentary life after an active one sometimes increases the tendency to constipation.

The importance of the kidneys as an excretory organ has already been stressed, but so important are they that they cannot but be mentioned again when discussing the hygiene of pregnancy. The patient knows herself whether or not her bowels are moving adequately each day, but she cannot

tell whether or not her kidneys are functioning properly unless she reports to the doctor. He will want to know the amount of urine passed in twenty-four hours, and will also want a sample of urine at given intervals. The woman can help her kidneys to satisfactory functioning by not giving them too much work to do, that is, by eating a proper diet and by drinking plenty of water.

The skin, too, may be helped to do its work in a satisfactory manner. Through the action of the sweat glands the skin always serves as an important excretory organ and it is having additional work to do during pregnancy. In addition to the obvious perspiration the skin is also constantly excreting waste products of which we are not conscious. A woman who seems to perspire more freely during pregnancy should not be troubled by it or attempt to stop it but should try to aid the activity of the skin by drinking plenty of water, breathing deeply, exercising, and dressing warmly enough. Daily warm baths not only serve to stimulate the skin but also to remove the waste matter that has collected on it. A woman who becomes thoroughly chilled because not dressed warmly enough may seriously inhibit the action of the sweat glands, reduce the efficiency of the skin as an excretory organ, and thus throw an extra burden on the kidneys.

Plenty of fresh air which we all know is important for healthful living is another matter which should be mentioned when discussing the hygiene of pregnancy. The oxygen which a woman needs for herself and the growing fetus is taken into her lungs and the carbon dioxide which has come from the fetus and from herself is given off from her lungs. She should take particular pains to keep the rooms of her house well ventilated and to get out of doors every day in order that she may always get plenty of oxygen and not breathe air that is laden with carbon dioxide. Another reason for getting out of doors every day is for sunshine, the ultra-violet rays of which we know are a protection against the development of rickets, and also for the exercise.

Exercise.—Walking is an excellent way in which a pregnant woman may get her exercise for it makes use of and

thus strengthens the muscles which will be active in labor. Exercise to which the woman is accustomed may be taken in moderation, but the risks of bad jolts, jars or falls must be considered and exercises which incur any such danger should be avoided. Housework is also an opportunity for exercise during this period, and is an excellent way to keep the muscles in good condition, as well as to further the normal functioning of digestion and elimination.

The danger of getting overfatigued has been mentioned and one way of avoiding it is by taking plenty of rest. An extra rest each day and at least ten hours in bed each night not only is an insurance against fatigue but is also helpful in relieving pressure symptoms.

Clothing.—The clothing of a woman in pregnancy deserves consideration. The danger of tight clothing is not as great these days as it was formerly but it is well to remember that no clothing should be worn which would in any way hinder the veins of the lower extremities from functioning as they should. Round garters and tight bloomer elastic should be avoided. As the woman increases in size a properly fitting maternity corset should be worn which should support the uterus without binding and which can be adjusted to the changes in the figure. A brassiere which supports the breasts thereby giving relief from the discomfort of congestion, should be worn but it should not compress the breasts.

As the woman increases in size and changes her mode of walking to some extent, she may feel somewhat unsteady on her feet, and be conscious of the need of a firmer base on which to stand, that is, she may need to change her shoes to a larger size with lower heels. But she must be sure that her arches are well supported as her increased weight might cause a flattening of the unsupported arch. High French heels are uncomfortable, sometimes causing backache. They do not support a woman as securely as lower, broader heels, and are thereby likely to increase the danger of her turning her ankles or falling.

Care of the Teeth.—The care of the teeth is another important matter in pregnancy. Some authorities believe that

there is a tendency toward increased acidity in the stomach and the mouth during pregnancy. Acid in the mouth attacks any crack in the enamel and makes a condition which is propitious for the development of decay by the action of bacteria. Since the fetus must be supplied with calcium for skeletal development, and since the provision seems to be that the mother will supply for the fetus even to her own detriment if need be, it is generally believed that if the mother's diet is deficient in calcium the calcium needed by the fetus will be taken from the mother's bones and teeth. If the teeth suffer a loss of calcium they are more likely to decay, which probably accounts for the old saying, "for every child a tooth." There is great controversy regarding the cause of caries (decay) but clinical observation and the experience of physicians indicates that diets adequate in calcium, phosphorus and vitamins, especially vitamin D, protect the teeth against the demands being made by the fetus on the mother's daily calcium intake. Some authorities advise using a slightly alkaline mouth wash to reduce any acidity which may exist in the mouth. Dental care during this period is needed and the teeth should be examined at least twice during the period.

Care of Breasts.—During pregnancy certain changes are going on in the breasts preparatory to the nursing of the baby. The whole question of lactation and the factors affecting the secretion of milk is still a debated one, but it can probably be accepted as a safe general rule that a wholesome, healthful routine of living without undue emotional strain of one sort or another should help rather than hinder the satisfactory functioning of the breasts. In addition to this general rule, certain specific things can be done especially for the nipples which probably lessen the danger of infection from cracked nipples later on and which make nursing easier for both mother and child. If the nipples seem so flat that they will be hard to grasp, something should be done during pregnancy to prepare them for nursing. The doctor's advice should be sought in regard to this.

Other Significant Considerations.—In addition to living a satisfactory life from a physical point of view, it is most important that a woman should have a life as free from emotional strain as possible. Often circumstances which are in no way under the control of the woman precipitate her into an emotional situation which inevitably effects her. It should be borne in mind, however, that a regular physical regime which helps to keep her in good physical condition should also help her to keep her balance emotionally. The relationship is subtle between the two and each seems to react on the other but whatever can be done to maintain a serene and happy atmosphere should be done. The emotional atmosphere for the home at any period in family life should be one of happiness and self-control dominated by a note of mutual consideration for the independence and happiness of each member of the family group. During the period of pregnancy the emotional life of the home should proceed as nearly normally as possible. There is some difference of opinion as to whether pregnant and lactating women should lead absolutely placid lives or not, but the general concensus of opinion is that a normally wide range of emotional experience will harm neither mother nor child. No woman should think that because she is pregnant she should stay at home all the time. She should continue her social pleasures as well as her work so long as it does not cause undue fatigue, and she should only cut them down to the amount that will avoid fatigue rather than cutting them out entirely. A well organized plan of living with a wholesome amount of recreation planned for and not undertaken spasmodically on the spur of the moment lessens the chances of fatigue, worry and the accompanying evils of irritated temper or depression.

During pregnancy the woman has nine months in which to make her plans for the arrival of her baby and to make the readjustments in family life which may be necessary. If there are other children they must be prepared for the new baby in such a way that they will welcome him into their midst with pleasure. It is not always easy for the one who has been the youngest and has therefore had the posi-

tion of baby in the family to see his position taken by another who must for many months, at least, absorb most of the mother's time.

Often children long for a baby sister or brother and welcome the news of an expected arrival with pleasure, but care must be taken that they do not get erroneous ideas of the baby. It is important to tell them the truth about the matter and to realize that their knowledge of a baby may be so limited that they may picture the advent of some one who will immediately begin to play with them. They must know that the baby will be little and helpless, will need much of mother's care, must be treated gently, may be a brother or may be a sister. They should know the truth about reproduction in simple but correct terms. It is not well to say that the baby is growing in mother's stomach, for example, for that is not the truth. The term that some people use in the effort to tell the truth although seemingly fearful of being too accurate, "growing beneath mother's heart" has a sentimental flavor about it which young children do not need. They accept quite simply and naturally the statement that the baby is growing inside mother's body in a special place meant for a baby to grow, called the "uterus" if one wishes to give it its name. There is no reason why the statement should not be made to them and every reason why it should. They have a wholesome normal interest in the matter and they should have the truth.

Fear that children will talk makes people hesitate to answer their questions correctly and often induces them to hush the questionings as if it were not right for them to ask. But if children are going to talk it is better that they spread the truth among their friends rather than the untruths which may be given them by their parents or the unwholesome descriptions which they obtain furtively because their parents have forbidden their quite legitimate queries. The way in which parents answer their children's first question about the great and omnipresent fact of sex doubtless has much to do with the first attitude which the child will have toward sex. Those first patterns formed

will possibly effect his whole outlook on sex and all its ramifications.

The matter of answering the children's questions about birth correctly is important not only from the sex point of view but also from another aspect. The questions about the birth of a baby or of animals which are usually asked at an early age are often the first questions which parents are tempted to answer untruthfully. This is true partly because they themselves have not acquired the right attitude and so find it difficult to answer such questions simply and naturally without emotional color, and partly because they have not acquired sufficient scientific knowledge to give them the correct vocabulary or enough background to answer the questions in a simple but truthful way. To reduce scientific truths to simple terms which can be grasped by a child and which can be given in the amounts he is ready to receive presupposes a sense of assurance which comes from having a sound basis of scientific knowledge at one's command.

Whatever may be the cause for the untruths or half truths which parents so often give in answering these first questions about sex, the fact remains that this may be the first time when parents fail to be honest with their children. In this way the first lessons in untruths may come from the parents themselves who complain a few years later of their children's tendency to falsehood. Another undesirable effect following a parent's attempt to hush a child's questioning is that a child thwarted in his normal desire for information may turn to undesirable sources, and may be less likely in the future to go freely to his parents with his questioning.

To prepare the other children for the new baby by telling them the truth is therefore of prime importance. It may not be wise to do so this until the later part of pregnancy as long months of waiting will seem unduly long to a child. Then too, since there is some probability of a miscarriage unnecessary disappointment to the children may result. It is well to delay the telling until obvious preparations are being made. In these preparations the

children should have some share so that they may have toward the new baby a sense of ownership and responsibility which will do much toward warding off any feeling of resentment or jealousy because of the great amount of attention the new baby will receive. The advent of a new baby must almost inevitably mean that the other children will seem to receive less attention than usual. Unless they are prepared for this in some way they may resent it and feel unkindly toward the baby.

If there is to be some readjustment of rooms in order that the baby may have a room to himself the children can help in making the change. The new baby clothes or those that have served the other babies may be arranged in the baby's bureau drawers or basket and the children thus learn how tiny and helpless the baby will be, needing the mother's attention for a long time after he is born. The crib can be seen by the children and they may delight in helping make it up with the tiny sheets and blankets. They can, indeed, join in all the preparations for the new baby, thereby learning in a normal wholesome way something about the birth and the care of a baby.

If the children have a special desire for a brother or sister they must know that no one knows about that before the baby is born, and they must be prepared to welcome either brother or sister. It is important for parents to refrain from expressing their desires in regard to this matter too freely before the children lest the children but reflect the attitude of the parents which is so often not as fixed as it sounds to be. As a result of this children are less ready to make the adjustment to disappointment,—an adjustment which parents seem to make easily.

If the mother is to go to the hospital when the baby is born the children should know that. If the hospital is near by it is well for them to see it or some other hospital in order that they may have a feeling of familiarity toward hospitals which engenders a sense of security. They should not have the shock of wakening some morning to find that mother has disappeared in the night and gone to some strange place they know not of. It sometimes makes

a later visit to the mother while in the hospital a fearsome experience which leaves scars on the child's mind difficult to overcome.

If the baby is to come within the first year of married life it means that the woman becomes pregnant very soon after marriage. The first year of married life calls for many adjustments and if the woman becomes pregnant during that year it means that she will be having to make these adjustments at a time when she is possibly suffering from some of the physical disturbances which may be the accompaniment of pregnancy. It sometimes puts a rather heavy burden on both the man and the woman and therefore the first year of married life may be fraught with many trials which the young man and young woman were in no way prepared to expect. There is the sex adjustment to be made, the adjustment to living in close proximity with some one whose little daily habits of living are not known and which may possibly be annoying, the possible adjustment of one or the other to an entirely new circle of friends and relatives, or the adjustment of both to an entirely new place.

There may be the need on the part of the wife to adjust to household duties after having led a business or professional life as well as the need of adjusting to the fact that she is still of economic value even though she may not be an earning member of society. There may be the need of the young man to adjust to the burdens and responsibilities of a householder and the economic burden which accompanies the setting up of a household. There may be coal bills and plumbing bills and sundry other bills of which he never dreamed and which confront him for the first time in that first year of the new life.

Both have to give up a certain amount of independence and adjust to the needs and desires and tastes of another person, and unless there is a willingness to face the fact together and a readiness on the part of each to respect the rights of the other and not assert his own rights to the exclusion of another, the time of adjustment may become supremely hard and the attempt be given up as such a

failure that divorce ensues. Divorce statistics for 1924 show that 38.9 per cent were granted to persons that had been married less than five years and that 12.3 per cent of the divorces were granted to persons who had been married one year or less. Obviously the first five years of married life represent a period when people are finding out whether they can adjust satisfactorily to each other or not and an increasing number of people are acknowledging themselves as failures in adjusting to the particular situation which they have created. Added to all these adjustments which must be made there is the need of both to adjust to the fact that there is to be a new member in their family who is going to absorb a great deal of time and who is going to require an entirely different mode of living from the one they are following. In addition there may possibly be need for the husband to adjust to a sudden semi-invalid, and for the wife to adjust to the new physical sensations that she is having. All this conspires to produce a situation which is difficult and often extremely trying.

This may seem like a dark picture of the first year of married life but family histories bear out the fact that all these conditions may occur and that the test to which young people are put is often severe. A willingness to face these facts, a knowledge of how to face some of the situations by having been given previous important information and training, and an honest love for each other which has in it a spirit of cooperation and a sense of respect for the other's individuality, constitute an equipment for meeting the first year of married life with a high degree of success.

But whenever the first baby is coming whether in the first or a subsequent year, there are various changes which both husband and wife must be prepared to meet. Both must realize the importance of adequate care for the woman and the expense which it entails. There may be financial ability to secure one of the best specialists in obstetrics in their vicinity; or there may be the need to secure the best at the lowest possible cost, which may necessitate going to a special clinic for pregnant women thereby securing the services of well trained physicians at

little or no cost, and going into a hospital ward rather than to a private room when the baby is born. The important thing is for the husband and wife to choose wisely a physician whom they know is well trained especially in obstetrics if it is possible to obtain such a one.

The parents must, of course, plan for the baby in accordance with their pocketbook. In talking with their physician they must be quite frank and ascertain from him what his charges will be and if his charges are more than they can afford, to say so frankly. There should be no sense of shame in saying that one cannot afford a certain charge, and one finds that the best physicians prefer this honest acknowledgement on the part of a patient. If the charge which an older man with long years of experience makes is too high, such a physician will refer the patient to a younger man who though well trained has not had the experience which would warrant the higher fee of the older man.

It may be that the husband and wife in deciding to go to a specialist for care during pregnancy and the obstetrical period will have to withstand the prejudice of an older generation who considers such precautions and additional expense unnecessary, but they can fortify themselves with the facts and statistics which show that good prenatal and obstetrical care saves the lives of mothers and babies and that there is too a high percentage of deaths in this country because of lack of proper care.

It may be that the arrival of the new baby will necessitate a change in living because the present quarters seem too small to add a third person whose regime is to be so different from the regime of his parents. It is generally advised that a baby sleep in a room by himself if possible. In this way he can live according to his regime without interfering so much with the usual regime of the family. Their comings and goings will not break in upon his sleep, nor will the light which the parents want in their bedroom at night. He will be away from the noise which the older children will make, and he can live his peaceful life of eating, sleeping, and growing, especially during those first weeks under conditions which are conducive to such a regime. If the things

needed for caring for the baby are kept in this room and if the bathroom is near by, the many necessary things which must be done for the baby can be done with the least degree of effort, an important consideration for a woman who may have many other household duties beside the care of the baby. If moving is to be done it should be planned with the advice of the physician at a time and in such a way as to avoid over-fatigue for the wife.

It will be important for both husband and wife to realize that a baby will make a great difference in their household. They will not be free to come and go as independently as they have done. The night's sleep will probably be interrupted because the baby must be fed for a time once or twice during the night. Babies are bound to cry and it is right that they should, but it is often hard for those whose ears are unaccustomed to the cries of little babies to accept those cries with the necessary philosophy. Fearful mothers or worried fathers can find their nerves sorely tried by the perfectly healthy cry of a baby.

That there are many adjustments to be made should in no way frighten people and make them look upon this period with dread. The preparation for the first baby should be one of such intense and mutual interest as to draw those two who are going through this experience together into a closer sympathy and understanding than they have before experienced. When, however, both husband and wife have in advance some realization of the difficulties which may be experienced they are better equipped to meet them successfully.

The things needed for the baby may mount high in cost or be obtained at a minimum of expense. He needs a bed by himself, for example. It may be an expensive bassinette or a straight sided clothes basket. Either will serve the purpose. One wishes to keep the things about a baby as clean and hygienic as possible. The important point, therefore, is to select something that can be easily kept clean by being washed. If a crib is to be bought it is well to remember that the baby will grow and the economic thing is to buy a larger rather than the smallest size. There

needs to be a bureau or some drawers, at least, where the baby's things may be kept. Although the baby should be dressed as simply as possible there must be a sufficient number of each garment to allow for plenty of changes. Dr. Slemons in his book, "The Prospective Mother," says, "In preparing clothing for the newborn, several principles must be kept in mind. The first is that the garments must be warm without being unduly heavy; and another that they should be roomy, permitting perfect freedom of motion. A third no less important principle is simplicity. Adornment of the clothing gratifies the mother, but does not serve a single useful purpose."

Carolyn Van Blarcom[144] in her book, "Getting Ready to be a Mother," gives the following list of clothes as adequate for meeting the baby's needs.

"Two to four dozen diapers, about 18 inches square.

"Three flannel bands 6 inches wide and 27 inches long, unhemmed.

"Three knitted bands with shoulder straps.

"Three shirts, infants' size two, of cotton and wool, silk and wool, but not all wool.

"Four wool and cotton flannel petticoats.

"Four wool and cotton flannel nightgowns.

"Six thin white cotton slips or dresses.

"Flannel wrapper or a yard square of flannel for extra wrap in cool room.

"Cloak and cap, or other wrap for out door use in cool weather."

The unhemmed flannel bands are used for the newborn baby until the cord has come off and the umbilicus healed. Some women have more than four flannel night gowns, and for some time do not attempt to dress the baby in petticoat and dress. Since newborn babies sleep much of the time, dresses or slips are not really essential and if one garment suffices it simplifies the dressing of the baby and reduces the washing.

There should be a special drawer or box for diapers, and additional provision for the wet diapers until they are washed. A galvanized iron pail seems to be a satisfactory

way of caring for them. Soiled diapers should be freed immediately of any fecal matter by holding them in the flushing toilet in cold water. If this does not suffice to get rid of all fecal matter a short stiff brush will remove the rest. After such care they are ready to be washed with the wet diapers. The proper care of diapers is a simple matter and need not be disagreeable if properly attended to. Diapers wet with urine, no matter how small the amount, should never be dried and then used again. The regular washing in hot suds and water at a certain time each day of all the diapers makes this inevitable task a fairly simple one.

In doing the necessary things for a baby, it is usually more comfortable to sit in a low chair so that one's lap will be as flat as possible. This chair should, of course, be without arms. Many hospitals, however, today teach their nurses to do everything for the baby as it lies on a table which is high enough so that they do not have to bend to their task. Mothers often provide themselves with tables which are indeed convenient although not essential. If one's bathroom is small and one bathes the baby in the bathroom, it is not always easy to introduce this piece of furniture in which case the mother must dress the baby in her lap.

The bath-tub may be of rubber, which is more convenient because it is collapsible and light, or it may be tin or enamel. The rubber tub may be on its own stand or it may fasten to the sides of the regular family bath-tub. In either case it is about the right height for the mother to work easily without bending over, which is the point to bear in mind. A tray with the necessary toilet things all gathered together in one place, a bath apron of two thicknesses, rubber or stork sheeting covered with flannel, or some soft absorbent material such as Turkish towelling, which is kept with the tub, all help to make the matter of bathing the baby as simple and expeditious as possible. To dry a baby after the bath one must have towels of a soft absorbent material with which to pat the baby dry rather than rub him. The wash cloths should be small and soft, several thicknesses of

cheesecloth quilted together make soft wash cloths for babies.

It is most interesting and satisfactory to have scales in one's home in order to watch the baby's weight, but it is useless to buy scales unless one buys reliable ones.

The whole matter of equipment for a baby is not a definitely standardized one and from time to time different things are advocated. The various books on infant care give lists which differ in details although they are similar in general. The main thing to remember is that one must have the things necessary to provide for the baby's sleep, rest, nourishment, and elimination, and to facilitate his bath and dressing. The doctor and nurse who are to give a woman care often have things to suggest which they think are especially satisfactory, and it is well to get advice from them on the subject.

Gathering the equipment and clothing for the baby and planning the room are matters of great interest to the family. As has been said, the children may join with interest in the preparations. The father, too, may take part, particularly if he can do a bit of carpentering, for some of the equipment may easily be homemade,—cribs, and pens, and bathing table, for example.

The Advisability of Hospitalization for Delivery.—Another plan which must be made is in regard to the obstetrical period. The tendency is for doctors to recommend hospitals if available, especially if it is a first baby or if there have been any symptoms of complications. The reasons for advising the hospital are: first, the hospital has absolutely all the equipment necessary for meeting any emergency which may arise; second, the hospital has additional trained people to call upon immediately in case they are needed; third, at the hospital there is every facility for giving the baby any special care it may need; fourth, at the hospital the woman will live a perfectly regular life during the postnatal period and will escape the consequences of any emergency which may arise in the home. One must bear in mind that the birth process must be looked upon as a surgical procedure the technic of which is

similar to that practised in a surgical operation. The hospital is prepared to make an aseptic delivery and thus to minimize the danger of complications due to infection.

The stay in the hospital need not be long, not more than a week sometimes, if the woman can go home in an ambulance and stay in bed after she gets home. The hospital facilities are particularly valuable at the time of the birth of the baby and for the more or less critical first few days. The later part of convalescence can be taken care of satisfactorily at home. But hospitals, although much more accessible than formerly, are not always available, and women sometimes feel that if there are other children they cannot make satisfactory arrangements for them while away from home. Much can be done, however, in the way of winning the children's cooperation; if a reasonably satisfactory arrangement can be made for their care, it is a good time for them to begin to learn to stand on their own feet and learn to live without their mother for a while.

If hospitalization is impossible one should get from one's physician a list of supplies essential to a successful confinement at home. Such equipment should be gathered together in one place about eight weeks before the baby is expected so as to be ready in case of a premature birth.

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CHAPTER VI

GROWTH DURING INFANCY

Education Begins at Birth.—Not many years ago the word "education" was used to connote formal school training only. "Education" was supposed to begin upon entrance to school, to consist of the "three R's," and to end when the individual left school. A generation ago there was no widespread appreciation of the fact that real lessons in life and real ability to achieve success in the art of living were learned, not in the schoolroom, but in contacts with life itself. There was little understanding of the fact that desirable character and personality traits and a strong physical body could be produced by "education." Least of all was there awareness of the fact that the most extensive, the most important learnings in life, have taken place before the child enters a formal schoolroom.

In the past thirty years Educational Psychology has demonstrated that there is very little transfer from such formal subjects as Latin and Mathematics to the practical life needs of the great mass of people.[128] Other studies have demonstrated that ability to learn does not atrophy in adulthood.[140] Still others point clearly to the possibility of "educating" character and personality and of establishing sound physical habits.[52] Most important to the care and training of young children is the position taken by practically all of the outstanding contemporary writers in Psychology and Pediatrics that the years from birth to school age (five or six years) are occupied with learnings which are as important as, if not more important than, any which occur later in life.[142]

It is not difficult to see, then, that old ideas of formal training must yield to a far broader interpretation of the word education, which is now interpreted to mean that

education *is* life and growth—as broad as life, as continuous as growth.

It used to be thought that a child could be prepared for the future by theorizing and studying in the present. But we now know that study whenever it develops the mind while depriving the body of wholesome growth or while warping the character and personality of the child is indeed a false preparation for life. We now know that the only way to insure a sound physical body in adulthood is to develop sound physical habits and a strong body in childhood; that the only way to insure desirable character and personality traits in adulthood is to establish them as habits in childhood; and that, far more important to success and happiness in adulthood than the acquisition of formal academic training is the possession of a healthy body and a healthy personality. Each day the child lives he forms good habits or bad habits of living; each day these habits become more fixed, and thus each day more firmly determines the outcome of the next day.

Blanton[10] has expressed this viewpoint when he says, "The minuteness, the inevitableness and the multiplicity of causes of all behavior point at once to the earliest years as the most vital to training. It is still too often assumed that education begins at school. The emotional personality and habitual slants begin at birth; the child may be said to graduate into the schools. Parents have complained that modern life is taking their children from them. If this has been true, then the newer philosophy of child training gives them back. Children do not go untrained until school age, or until the school hour. They are being trained somehow, somewhere, every hour of their lives, sleeping or waking." And again: "Education for successful emotional and habitual living begins at birth. And since it begins with birth, it deals with such commonplace things as sleeping and eating and moving and crying. It never leaves the plane of the small and the apparently insignificant, for no matter how spectacular the result, it is composed of small acts, performed day by day and moment by moment."

Motor Development.—Motor accomplishments grow from the simplest beginnings in reflex action and in random and uncoordinated movement. The newborn infant promises little of the motor skill and bodily grace of the five-year old child. During the first three months a good deal of general bodily movement takes place with stretching and waving of arms and legs. At this time, as well as

Fig. 9.—This three months old baby is watching the movements of his own hands with absorption and is discovering that he can move them at will. He is not sitting alone but is being supported from behind.

later, freedom for such activity is essential and the clothing although designed for protection, should permit as much freedom as possible. There should be certain periods (many mothers provide these at bath time) when the infant may stretch and kick entirely free of clothing, for it is only by practice that he can achieve strength and coordination. If we watch a tiny infant we can see him experimenting with his body, gradually learning to isolate out of his random activity those movements which give him results. The hand-mouth coordination resulting in the satisfaction of

sucking on an object is a case in point. The way he learns to use his eyes is another, for with each successful muscular adjustment he obtains the reward of clear vision, and with

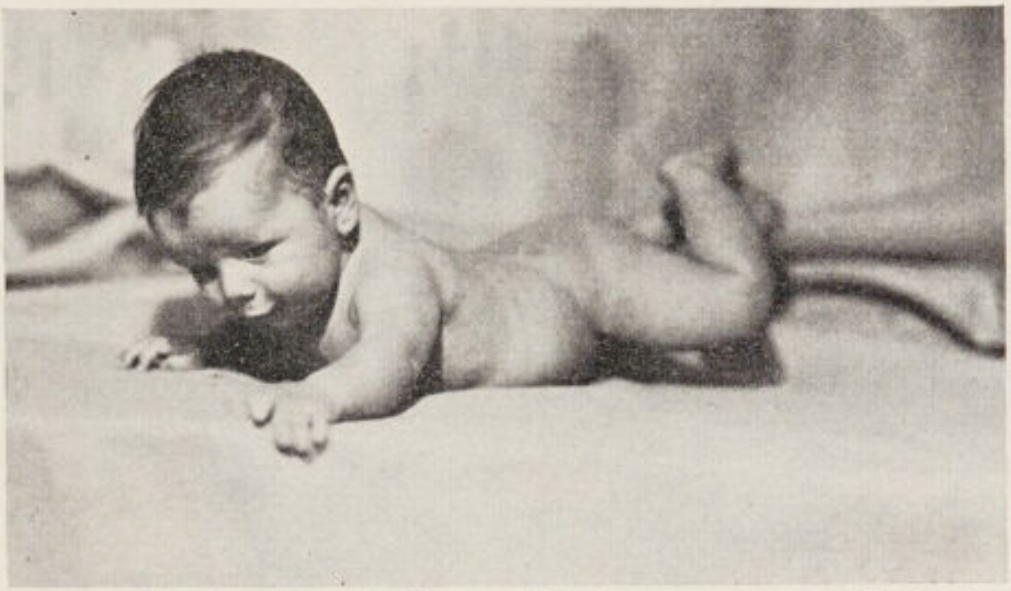


Fig. 10.—At three months he can lift the upper half of his body and, by pulling his elbows under him, can stay up for an appreciable length of time.

each success comes an increasing likelihood that the right movement will be made again, and a decreasing chance that the wrong movement will intrude itself. So by trial

Fig. 11.—At six months he can propel himself by wriggling.

and error, with the right movements accompanied by the satisfaction of success, the wrong movements resulting in failure, the child gradually learns the management of his own body.

By three months he has learned to connect his hand with his mouth, in a fair measure to focus and coordinate his

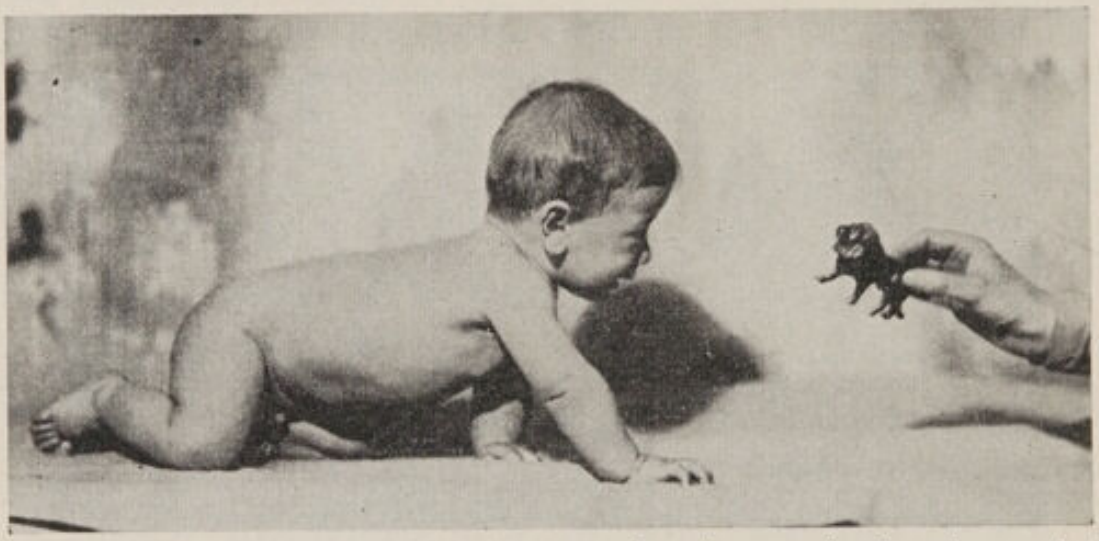


Fig. 12.—A superior child of six months of age who has learned to crawl "on all fours."

eyes, to guide his hand with some degree of sureness by his eye, to pull or push his feet and hands with good coordina-

Fig. 13.—He can sit upright at six months of age, but is "wobbly."

tion and strength; he has, in other words, learned some really voluntary control of his own body. He can hold up his own head without support by the time he is three

to four months old; if prone on his stomach he can lift the upper half of his body and, by pulling his elbows under him, can stay up for an appreciable length of time.

If he is not hampered by his clothing, he learns by the time he is six months old to turn himself over from this position, so that he becomes free to change his position in his crib if he needs to. It is sometimes from this position

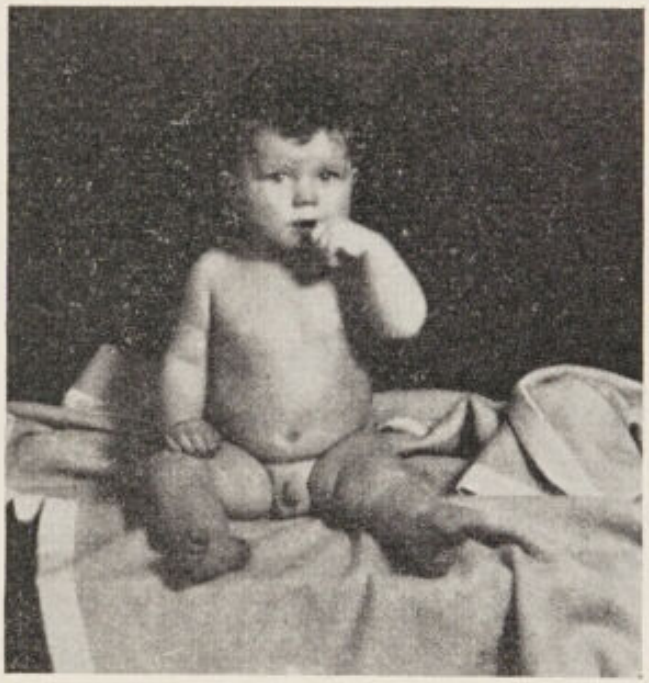


Fig. 14.—This ten months old child needs no support as he sits upright. He can maintain this position for an indefinite period.

that, in his wrigglings he discovers he can propel himself, and he may by five or six months be getting himself from one place to another by hitching himself along on his stomach.

At four or five months he can sit up for short intervals if sufficiently supported by pillows. At six or seven months he can sit with slight support, falling over only when he becomes tired or when his general wrigglings or a desire to reach something upset him. At six months he can make stepping movements if held under the arms; at eight or nine months he has usually learned some technic or other which serves to get him from one place to another with ease. Sometimes he travels on "all fours," sometimes sits and hitches himself along with his heels, sometimes scoots

along on one hip using two hands and the opposite foot for propellers. Probably the creeping method he adopts is determined by the way he first happens in his wrigglings to establish locomotion. Stern[130] and Koffka[68] agree that many children can stand alone for a few seconds without support at nine months of age.

The baby learns the muscular movements necessary to vision (accommodation and convergence) by much the same trial and error process. At two months he has learned to adjust and hold his eye muscles to see large objects.

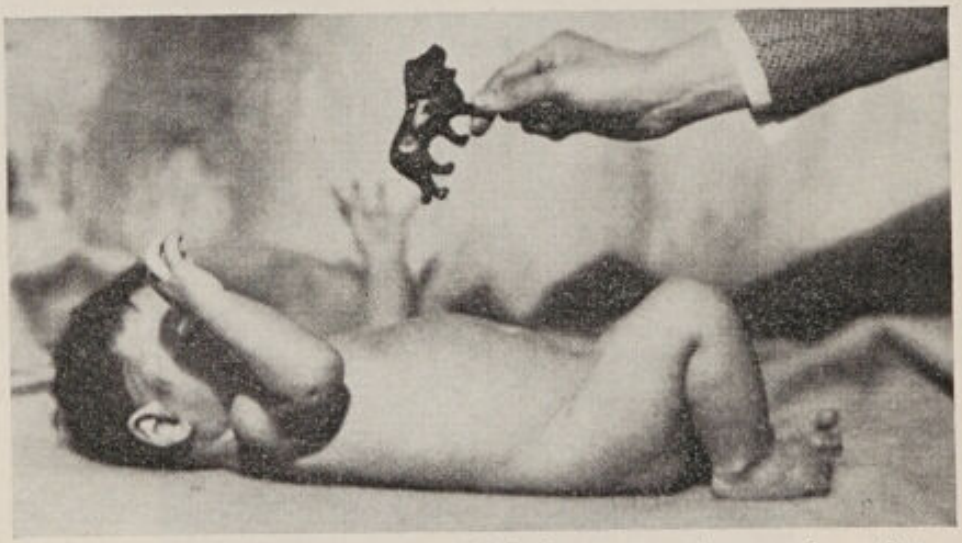


Fig. 15.—This three months old baby sees the proferred toy and is trying to get it. Note that the control over his hands is not yet established and that his first attempts to obtain the object pull his hands away from it rather than guide them to it.

He "notices" the approach of a person, a change from one room to another, and so on. At four months he sees with much clearer discrimination, but is still not likely to notice an inch cube placed before him. At six months he sees very small objects and by eight months he not only sees them, but has achieved sufficiently good eye-hand coordination to pick them up. It is at this stage that his joy in the exercise of his new accomplishment often produces a fascination for pins, and specks of dust, which distresses his mother. At this age he reaches for things not only with his hands but with his head and mouth as well, sometimes reaching for something with both hands, head, and mouth all at once.

Six months to nine months is, too, an age when the impulse to put things into the mouth is at its height; the child begins to stuff everything into his mouth indiscriminately. A kiddie koop, large enough to permit real freedom of movement but capable of restricting the territory of this young gourmand, offers the opportunity for unsupervised but safe play which is essential even at this age. There should also, of course, be times when he can travel at large and exercise his body to its full capacity.

Fig. 16.—This six months old baby has progressed in his reaching technic. He is pulling toward the object with both hands and both feet, but has already specialized to the extent that one hand is slightly in the lead. His gaze is clearly directed upon the object.

Shinn[122] says that her niece learned to inhibit the hand-mouth impulse at seven months, but that this inhibition is rare before eight months. Fenton[33] and Gesell,[42] however, place hand-mouth inhibition at a year where most writers place it.

The growth in the use of the hands is extremely significant during the baby's first months. At birth the hand, though strong enough in the reflex grip to maintain the body weight, is useless as a vehicle of the will. The thumb lies flaccid and helpless in the palm, or fans about uselessly. However, the hand, especially the fingers, soon becomes useful as an aid to producing sensations. The fingers of the two hands come together, touching, exploring each other as early as one

month after birth. Bainard found that movements of both hands in reaching and grasping are definitely coordinated by the time the child is six months old. The thumb gains strength and individuality, and functions in opposition to the fingers in grasping at from two and one-half or three months (according to Dearborn, Moore, Preyer, Fenton) to six months (according to Watson). The greatly increased efficiency of the hand as an organ for grasping when the thumb is in opposition can be seen if the reader will try closing the thumb into the palm of his hand before grasping an object, and will then release the thumb so that it can

Fig. 17.—Grasping at three months. Note the use of the thumb as the far hand clutches the block.

oppose the fingers as is normal in adult grasping or picking up of objects. The baby's hand is usually sufficiently skillful at six to eight months to pick up a common pin.

The question of preference in use of hands rises here, since a good deal of our encouragement of one hand or the other should depend upon whether or not children naturally show preference for right or left and upon whether or not a forced change is injurious. We do not as yet have enough studies to establish at what age preference if any, should appear. Watson[154] found that 96 per cent of adults are right handed, but could not conclude how much of this preference was native and how much trained. Gesell[42] found that 19 per cent of children showed preference for one hand or the

other in reaching at six months of age, 50 to 65 per cent at nine months, and 65 to 80 per cent at twelve months. Lippman[70] states that at four and one-half months children in accepting an object use either hand, one as frequently as the other. But from four and one-half months on there is a gradual increase in favor of the right hand with 72 per cent of preference for the right hand at twelve months. Jones[63] reports a wide variation in handedness in individual cases between eighteen and sixty months of age. Wellman[156] in a study of preschool children found an increasingly greater difference between the use of the two hands throughout the preschool years.

Preference for the right hand by the age of one year seems clear for most children, but whether this preference is native or trained is not clear. Much can be done to encourage the use of the right hand by giving the baby things toward his right hand, but insistence upon use of the right hand if the child seems persistently more awkward with the right and more skillful with the left hand seems unwise, especially if encouragement of the use of the right hand meets with emotional resistance from the child. Reference to the matter of handedness is made again on page 281 in connection with the development of speech.

A ball or rattle hung by a cord over the cradle will give a two to four-months-old baby much practice in reaching and grasping, in directing his hand to strike an object, and in coordinating the eye-muscles to follow a moving object. The plaything should not be left there all the time, however, especially if the child is subject to over-stimulation or over-fatigue, nor should it be left close enough to his eyes that the lessons in convergence will teach a habit of fixating at too close a range. From three to five months control of grasping and holding develops sufficiently to make a string of wooden beads or spools a desirable plaything. Inflated rubber animals (not too large ones) are light in weight, easy to hold and easy to wash. A piece of crumpled tissue paper makes an intriguing noise when pounded or squeezed, and along with a rattle to jingle when waved, adds other opportunities to teach through the ears, as well as through

the eyes, the connection between movements of the hand and results obtained. The connection between eyes and ears is being learned rapidly during the first months. Tanner states that the eye, hand, mouth coordinations are well developed from the fourth to the sixth months. If the baby drops a plaything at four months he seems scarcely to miss it; if he drops one at six months he may register his disappointment temporarily but seems to have no idea what has happened; if, however, at nine months he drops a favored toy, he not only misses it but has a pretty clear idea of what has happened to it, and he will usually look down toward the floor or the bottom of the crib to locate it. We should not return lost objects to his grasp too soon because if we do we deprive him of an excellent opportunity to learn, not only the dissatisfaction of unskillful motor movements (which produced his loss), but also a fundamental law of physical life (the law of gravity).

Sensory Development.—The sense of *touch* is used consciously to produce sensation by the time the infant is a month old. The tongue and lips seem to be used first for this purpose. Shinn[122] reports that her niece used the tongue for active touch at five weeks, putting her tongue out and drawing it back between tightly pursed lips. Before the third month fingers are used consciously to produce touch sensations. Valentine reports that on the eighty-eighth day his baby touched the fingers of one hand with the other, looking at them meanwhile. Shinn says that by the third month hands rival tongue and lips in building sense perceptions, and that during the twelfth week the "little finger fumbled and felt over our hands and dresses, learning active touch." Dearborn reports that L. at seven months rubbed her fingers over the bristle of her hair brush, shivered and withdrew her hand vigorously.

Pain at least skin pain, remains slow in development. Sensitiveness to colic pain or gas pressure is apparently acute during the first weeks of life; but Dearborn reports that on the seventy-ninth day pinching the finger to a degree which would be unpleasant to adults caused no sign of discomfort. A slight pinching on the three hundred

forty-first day (about eleven months), however, caused crying.

Smell continues to develop from early infancy and by the seventh or eighth month is controlled consciously by inhalation of breath if the child has been taught how to do this. For some months, however, the smells that are agreeable to infants do not always coincide with judgments of adults in the matter. For example, Dearborn reports that on the three hundred forty-fourth day (about eleven and one-half months) his baby showed no dislike for the bad odor of rancid fish oil belonging to some small fish vertebrae she was playing with, but smelled of them deliberately to repeat the experience. He also says that on the three hundred sixty-first day the odor of a fresh marigold was distasteful and caused her to turn her head away. As late as the seventeenth month Preyer reports his baby as unable to separate the sense of smell from that of taste, since he opened his mouth upon presentation of a fragrant flower. This mistake was not made by this baby after eighteen months of age.

The sense of *taste* seems to be fairly discriminating at the end of a few months. Preyer reports an accurate discrimination between salt and sweet, which are two taste impressions of like sort. Dearborn's child refused the sourness of a fairly sour orange on her two hundredth day. Shinn reports that taste of new foods became a source of pleasure to her niece during the first fortnight of the eighth month. Preyer reports that a new taste gave great surprise at the ninth month. The baby's judgment of pleasure in taste, like his judgment of smell, does not always correlate with adult judgment. Dearborn says that his baby seemed to enjoy a bitter taste on his two-hundred seventy-ninth day (about nine months), and did not object to castor oil until the three-hundred eighty-fifth day (about thirteen months). She showed no objection to the bitterness of nux vomica on the five hundred seventy-seventh day (about nineteen months). This is important to remember in relation to the feeding of children, since children frequently accept without objection foods which many adults consider distasteful, such as kidneys, turnip, liver, etc.

Discrimination in taste can be developed early and should be trained to include a large variety of experiences through the introduction of new foods into the diet.

Authorities differ in their reports about reactions to *sound*, both about quality of sound rousing reaction and about age at which reactions occur. Nearly every writer, however, agrees that sharp or quick sounds cause blinking, starting, and sometimes crying during the first few days of life. As we have seen, Valentine and Dearborn disagree as to whether or not sounds on the piano are heard during the first weeks of life. There is no disagreement after the second month, though, and several writers mention instances of reaction to piano, bells, the human voice between the second and fourth months. Discriminative recognition seems to be present by the second or third month if the sound heard has become familiar; for example, the step of an approaching person seems to have become associated with personal attention and is sufficient to cause the baby to stop crying. Localization of some types of sounds seems evident and fairly accurate by the third month. Simon[124] asks as a test question in regard to three-months old babies: "Does it turn its head toward a sound, dog or bell?" Preyer says hearing is acute by the fifth month, since the baby, even while taking his milk, will turn his head at rather slight noises. By the middle of the fifth month Shinn's niece seemed to notice hoarseness in her aunt's voice. Dearborn says that his baby on her one hundred sixty-first day (five and one-half months) "certainly knows her name perfectly," since when being entertained she would turn her head upon hearing it. Shinn's niece recognized her own name at the end of the sixth month, and enjoyed outdoor sounds like notes of birds or stamping of horses in the stable by the ninth month.

Clear sensations of *sight* are dependent not only upon adequate development of the nerve endings and nerve centers for vision, but also upon two sets of muscular adjustments,—one set which is necessary to turn the two eyeballs (convergence) and the other set which controls the lens within the eyeballs (accommodation). These

two sets of muscular adjustments must be learned accurately before the eyes are effective as sense organs. This has been discussed briefly in connection with motor achievements. Perceptions involving sight are dependent upon the development of skills prerequisite to accurate use of the eyes. These skills are fairly perfect at six months, and the development of sight perceptions goes forward rapidly from that time.

Much human behavior is made up of reactions toward objects in the environment, and is dependent for efficiency upon accurate judgments of the size of these objects, their shape, location with reference to the observer, their rate and direction of motion, and so on. Contrary to common belief, these judgments are not innate; they are learned in every detail as we shall see when we follow the pattern of that learning. It is these learnings, in sense perceptions and judgments, along with the achievement of control over his own body, mastery of language, expression and control of emotion, and reactions to people, which occupy the waking time of children from the time they are born. Infants are more than cunning and amusing objects; they are rapidly developing bodies, minds, and personalities, learning a quantity and quality of essential life lessons that will never be equalled at any later period in life. Once the child has learned to use his eyes, his ears, his tongue, his nose, and his fingers, he is placed in possession of the means of exploring everything that comes within his immediate environment. If we watch an infant several weeks old we shall see him occasionally stop all his other activity to listen intently for some sound that has caught his attention. At three months we see him lying in his cradle exploring the surrounding scene with his eyes, listening with absorption to chance sounds, turning his head to "see" as well as to hear the sound. At four months he is seeing many things, is listening, and is grasping and touching objects that come within reach. He looks, he touches, he listens, associating all the results of stimulation to his senses.

Shinn reports that during the second week of the fourth month her niece seemed to realize a familiar touch when she

felt her rattle, but had no idea that what she saw was the same thing she felt. During the fourth week in the fourth month, however, this same baby saw her mother's hand, kept her eyes on it until her own hand struck it, then took hold of it, thus associating visual and touch perceptions.

At six months the baby adds smell and taste to his conscious exploration, and has learned that acute touch sensations can be added to his investigations through lips and tongue. He seizes a rattle, waves it about, following it with his eyes, turning to listen; he smells it; he puts it in his mouth tasting and touching; he explores it with every sense at his command. And from this he learns about rattles; how big they are, what shape they are, how hard they are, how heavy, how near, what kind of noise they make; more than that, he is associating all of these things together, so that eventually the sound of the rattle reminds him of the proper size, shape, weight, and use of that object. "Visual, tactual, and auditory experiences are not originally interrelated in any definite and precise manner. They become related to each other in an orderly fashion only as the subject (in our case the baby)* perfects an adequate system of localizing responses for the various stimuli that affect each sense. In this way, a person learns to identify the various experiences obtained through one sense with their proper equivalents in other sense realms."[21] Each object thus acquires for the baby a variety of meanings in terms of which he learns to recognize what to expect from it and what he can do with it. Important beginnings in sense perceptions and judgments are achieved in infancy. Much that is important, however, occurs later, especially when the child has learned to creep and walk and has thus greatly extended his environment for exploration. We shall, therefore, delay the discussion of the various types of sense perceptions until those chapters which deal with the ages at which each perceptual learning seems outstanding.

The important things for us to remember here are: that the task of learning control over the sense organs is one which occupies much of the energy and attention of infants;

* Parenthesis ours.

that once these controls have become fairly efficient, energy and attention are given to using them as a means of supplying associations and meanings to the rapidly growing intelligence. We should remember, also, that these meanings are rich in proportion as the environment is rich, but that the efforts of attention and the constant building of new associations are extremely fatiguing, and therefore, that the young infant must be protected from over-stimulation and over-fatigue.

Emotional and Social Growth.—The newborn infant has no conception of himself as a person nor of other people

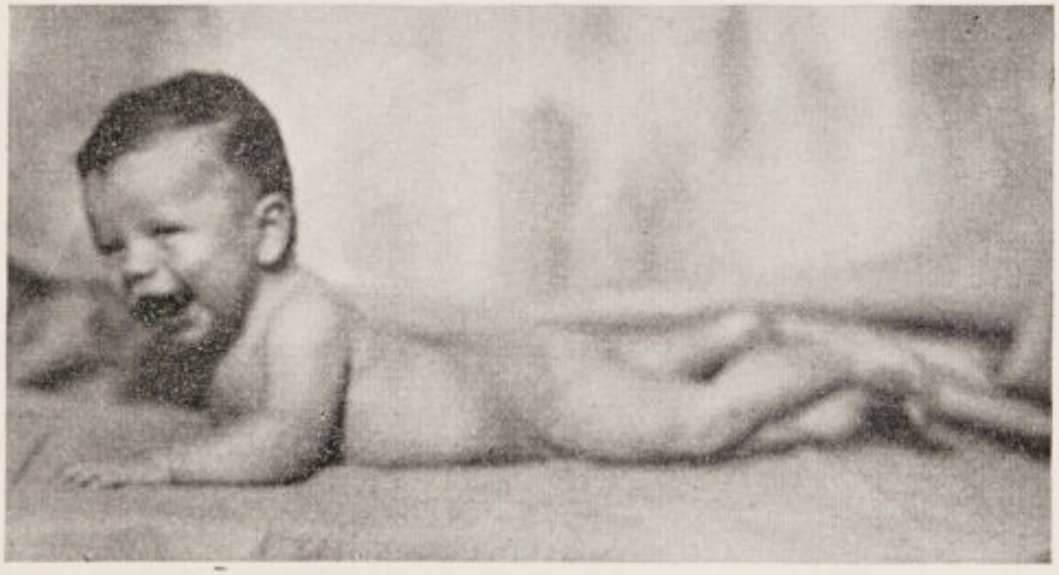


Fig. 18.—This three months old child has caught sight of his mother and expresses his pleasure in a smile. He can scarcely be said to be smiling at her.

as different from any of the sense impressions which come to him. When he is hungry or in discomfort he cries with no thought that a person or persons must come to his relief, but only that eventually he is relieved. Having no realization that he is attended by persons he has, of course, no consideration for the inconvenience he may cause them. He has only the sensations from his own body and the vague conglomerate sensations from the external world.

Strange as it is, he seems to become aware of other people sooner than he becomes aware of himself as a clearly defined entity. At just what age he gives indication of recognition

of other people is not agreed upon by writers. Kerley[66] thinks that the first recognition appears between three and six weeks. Buhler, writing from Vienna, says that the first really human response to appear in an infant is a smile which is evident at two or three months in response to a human face. At this time the infant seems to discriminate between one familiar individual and another. Buhler

Fig. 19.—This six months old child has caught sight of a stranger who was trying to amuse him while his picture was being taken. Note how much more animated and "social" this smile is than is the smile of the three months old baby.

has observed that infants respond not only to adults but to other infants as well by the third or fourth month. This response consists of smiles and sounds with imitative crying. Following this, she says, is a short period of playing together, each child occupied with his own individual interests. This is similar to the parallel play of two-year old children described later. At about the sixth or seventh month there appears an interest in the use of each other's persons as play objects. Buhler cites also

instances of offering playthings to one another and says that at eleven or twelve months this develops into cooperative play of a rudimentary sort.

Most children of six months differentiate between familiar persons and strangers. By eight or nine months they show fear of strangers if too unaccustomed to them or if there has been an unfortunate experience with them. By the time a child is a year old he usually has definite preferences and dislikes for people. He does not remember people long, however, unless he has had some unusually severe emotional experience with them, and may, according to Kerley, when twenty months of age, forget even his mother if she is away from him for a week.

Children take pleasure in laughing aloud as early as three months and some infants will crow with delight at a sudden motion, a rustling of paper, and other similar stimuli. They show embarrassment as young as six or seven months, and are definitely conscious of being laughed at before they are a year old. A child of nine months seems to know when the conversation concerns him. It is certainly unwise to discuss a child in his own presence after he is a year old.

Infants should see people other than mother or nurse often enough to prevent fear of strangers, but should be protected from persons who insist upon poking, tickling, and jogging them. It is not wise to make feeding time or bed time the time for visitors. Eating and going to sleep are serious occupations for infants; there should be no overstimulation or distractions mixed with these activities. Too many children develop the habit of playing and bidding for attention at meals when they are three months old,—a habit which causes much friction as they grow older.

Adults should not make a practice of addressing all the conversation to the child, or of letting it all center around him, whenever they are near him. If they do not avoid this very natural temptation the child may develop the false idea that all the conversation in the world must be about him, since all the conversation that he hears centers

around him. He should learn early that people talk about other things and have other interests—even when *he* happens to be awake. *Lessons which teach a proper sense of proportion about one's own importance in the world cannot be begun too early.* There is no more miserable person in the world than the child who, accustomed to feel that the world centers around him because all he has ever known of it does so center, finds himself in a larger world of which he is only part, and usually a most unimportant part at that.

A child is never too young to begin to carry his own weight in the social scheme. At a few weeks he must learn that he may not keep adults dancing attendance whenever he cries. If he is clean, fed, and comfortable he should be left alone while mother or nurse attends to other duties. At three months he should amuse himself for appreciable portions of his waking time. At eight months he can creep after his own toy when it rolls away from him. He must under no circumstances be permitted to develop into a "bossy" baby who demands constant service regardless of the inconvenience he may cause other people. Important lessons in self-control and in consideration for others should have taken place before he is a year old. This does not mean, of course, that he should have mastered his lessons at a year, for he will, unless unduly suppressed, still be needing to learn certain things about self-control and still be conquering certain aspects of selfishness when he is a full-grown adult. It does mean, however, that his lessons should have *begun*, and that in certain important ways he should be getting practice in self-control and unselfishness,—those traits of character which, though very hard to learn, are indispensable to a well rounded and healthy personality.

Beginnings of Language.—Language is generally understood to include any and all means of expressing feelings or thought,—gestures and signs as well as written or spoken words. Many writers consider that the child's language development has begun at birth when he utters the "birth cry"; Kant, the philosopher, has suggested that the child

thus expresses his "wrath at the catastrophe of birth." That the child has at birth an ego sufficiently well-formed to express anything whatever, would be a point for denial by most modern psychologists; but that the birth cry is a beginning toward the establishment of mechanical control over the vocal apparatus would doubtless be a point for agreement. From the moment of birth vocal responses are almost as constant during waking hours as the ceaseless random activity of arms and legs. In the sense that the skills of walking can be said to develop from apparently instinctive beginnings in locomotion displayed in random muscular activity, so the skills of talking can be said to develop from the apparently instinctive beginnings in vocalization displayed in such vocal sounds. At first these sounds seem largely reflex in character, varying over a range of about twelve or fourteen vowel and consonant sounds. Within the first eight months, however, the variety of these sounds has been extended so that there are included all the sounds necessary for language; English, Spanish, French, Anglo-Saxon, German, and African sounds being recognized by Mrs. Blanton[9] in her study of infants. The infant can be seen experimenting,—holding his breath, then expelling it to get first one sound, then another, cooing, crowing, blowing bubbles, and gurgling. In this way he rapidly learns how to control the flow of air over the vocal cords so that sound results. From two months of age his development of control over the whole apparatus progresses steadily. He has mastered most of the vowel as well as a few consonant sounds before he is four months old. At six months he can combine certain vowel and consonant sounds like "da," "bah," "ugh," "ma," and seems to have learned to guide his vocalizing by his ear, since he sometimes stops in his vocal play to listen and then tries to repeat the last sound he made. Often he repeats "da-da-da-da-da" or "ma-ma-ma" which may lead his parents to think that he is meaning to designate father or mother, whereas he is doubtless only exercising. This period of experimental vocalization is often referred to as the babble stage of language development.

These random babbling sounds become organized into vocal habits, according to Watson,[154] depending upon whether or not they produce results satisfying to the infant. For example, if the infant is surrounded by English speaking people those sounds which are useful to English are selected for commendation and attention and hence preserved, while those not relevant to English are ignored and thus eliminated as unproductive of results. Thus random vocalizations become vocal habits, and vocal habits in turn become language habits. Tanner and Rasmussen agree that pain, weariness, fear, anger, astonishment, joy, desire, and pride can all be expressed through sound and gesture by the time the child is six months old. A very real beginning in language has thus been made during the first half year of life.

By the age of nine months the random and meaningless character of the babblings seems to become softened into a rhythm somewhat similar to the rhythm of flowing speech, and closely resembles the rhythm of whatever speech the child hears. It is not unusual to hear a child of ten or twelve months cooing or jabbering to himself with a rhythm which sounds like a free-flowing conversation.

Most parents have an impulse to talk to their children while bathing or tending them. This, fortunately, is a parental impulse which should be obeyed, since it provides the child not only with a model for rhythm during early infancy, but with a model for vocabulary as his development progresses. Most children have developed a sufficiently discriminating reaction to language to permit recognition of their own names by the time they are six or seven months old, and by the time they are eight or nine months old to understand either the word "no" or the tone in which it is spoken when it is used to forbid action.

Increases in Height and Weight.—Table IV shows the rapid increase in height (almost 7 inches) during the first nine months of the baby's life. Table V shows the increase of weight for increase in height. During the first six months the baby usually doubles the birth weight.

TABLE IV*

HEIGHT STANDING (INCHES) BOYS AND GIRLS BIRTH TO NINE MONTHS
(Federal Children's Bureau†)

Age (months).	Height.	
	Boys.	Girls.
Under 1 month	21.125	20.875
1 month, under 2	22.500	21.875
2 month, under 3	23.625	23.125
3 month, under 4	24.500	24.000
4 month, under 5	25.375	24.875
5 month, under 6	26.125	25.500
6 month, under 7	26.750	26.125
7 month, under 8	27.250	26.750
8 month, under 9	27.750	27.250
9 month, under 10	28.250	27.625

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have been changed to decimals.

Bodily Changes.—It is not an uncommon idea among people that the child is a diminutive adult and that an increase in size constitutes the principal change that takes place in his body from birth to maturity. The child's body is, however, an organism which develops through an orderly series of changes into the mature individual. It is fundamental to recognize that there are differences, both physical and chemical, in the structure, as well as differences in function of the body of the child and of the adult. A knowledge of these differences is the basis for an understanding of the growth process and the physiologic needs of the child.

There are many ways in which the bony framework of the growing infant differs from that of the adult. Scammon[118] says that "In all, something over 800 ossification centers are formed in the human body and of these slightly more than half appear after birth . . . As the formation of new centers and the fusion of older ones proceed at unequal

TABLE V
WEIGHT (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS BIRTH TO NINE MONTHS
(Federal Children's Bureau*)

Height (inches).	Weight.	
	Boys.	Girls.
20.00	8.250	8.125
20.25	8.312	8.406
20.50	8.375	8.6875
20.75	8.417	8.969
21.00	9.500	9.250
21.25	9.750	9.562
21.50	10.000	9.875
21.75	10.250	10.187
22.00	10.500	10.500
22.25	10.875	10.844
22.50	11.250	11.1875
22.75	11.625	11.531
23.00	12.000	11.875
23.25	12.375	12.250
23.50	12.750	12.675
23.75	13.125	13.050
24.00	13.500	13.375
24.25	13.875	13.750
24.50	14.250	14.125
24.75	14.625	14.500
25.00	15.000	14.875
25.25	15.406	15.250
25.50	15.8125	15.625
25.75	16.218	16.000
26.00	16.625	16.375
26.25	16.969	16.687
26.50	17.312	17.000
26.75	17.656	17.312
27.00	18.000	17.625
27.25	18.343	17.969
27.50	18.687	18.312
27.75	19.031	18.656
28.00	19.375	19.000
28.25	19.687	19.312

* Bureau Publication No. 84, Community Child Welfare Series No. 2.

rates during the first two decades, the number of separate bone-masses in the body varies from year to year during this period . . . The number of bones in the average full-term newborn child is 270. This number is somewhat reduced in the first two or three years of life through the

fusion of primary centers which were present before birth. From this time until puberty, however, the number increases steadily through the formation of epiphyses and the ossification of the bones in the hands and feet. In the fourteenth year there are about 350 separate bony masses in the body. After puberty the number of bones is again decreased rapidly until nearly the middle of the third decade and then much more slowly. Often it is not until late middle life

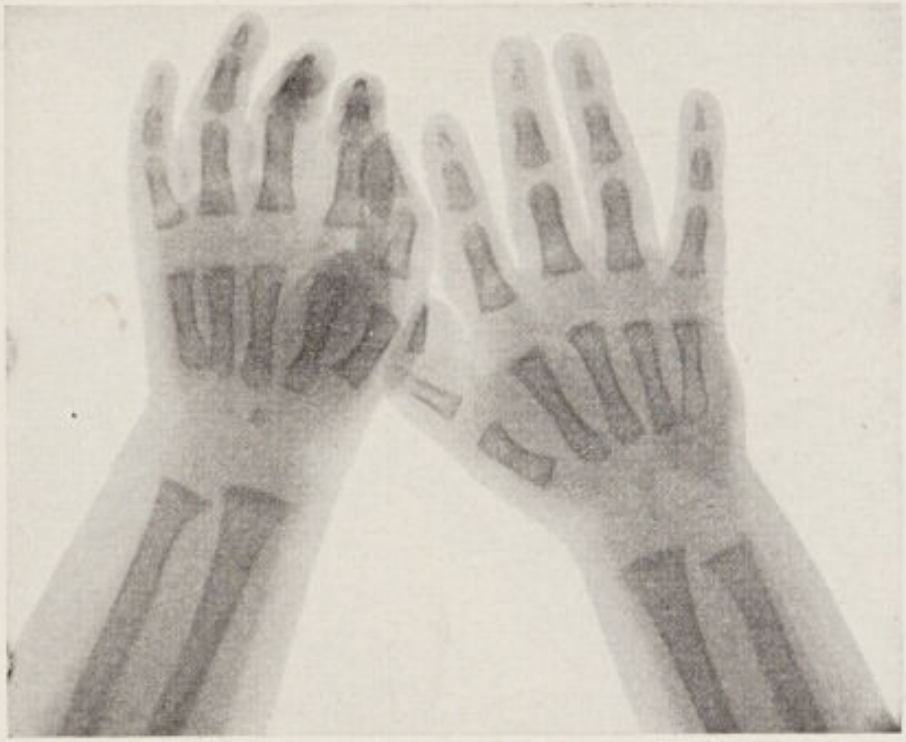


Fig. 20.—Bone age one year.

that the number of bones is reduced to the quota of 206 generally accepted as the normal number in the human body . . . "

Previous to the advent of *x*-ray our knowledge of the appearance of points of ossification and the development of the bony structures was largely dependent on the study of the dead specimens, but the use in recent years of the *x*-ray in the study of living children has recast our ideas. In post-natal life the appearance and development of the carpal bones (those in the hands) have come to be considered as among the best indices of the general development of the bony processes throughout the body. Scammon[118]

says, "The ossification of the carpus is generally entirely post-natal beginning in the early part of the first year and coming to an end shortly before puberty. Investigators differ considerably in their determination of the order and

Fig. 21.—Bone age two years.

the date of ossification of the carpal bones." There appears to be a large amount of variation in both the time and order of ossification in carpal bones even in normal children. Pryor's* results based on the study of 554 children show:

"The bones of the female ossify in advance of the male. This is measured first by days, then months, then years.

"The bones of the first child, as a rule, ossify sooner than those of subsequent children.

* Pryor, J. W., "Some Observations on the Ossification of the Bones of the Hand." Bulletin University of Kentucky, Vol. VIII, No. 11 (1916).

"Regardless of the variations (normal) the ossification is bilaterally symmetrical.
"Variation in the ossification of bones is a heritable trait."

The bony and cartilaginous skeleton forms from 15 to 20 per cent of the total body weight at birth; such statistics

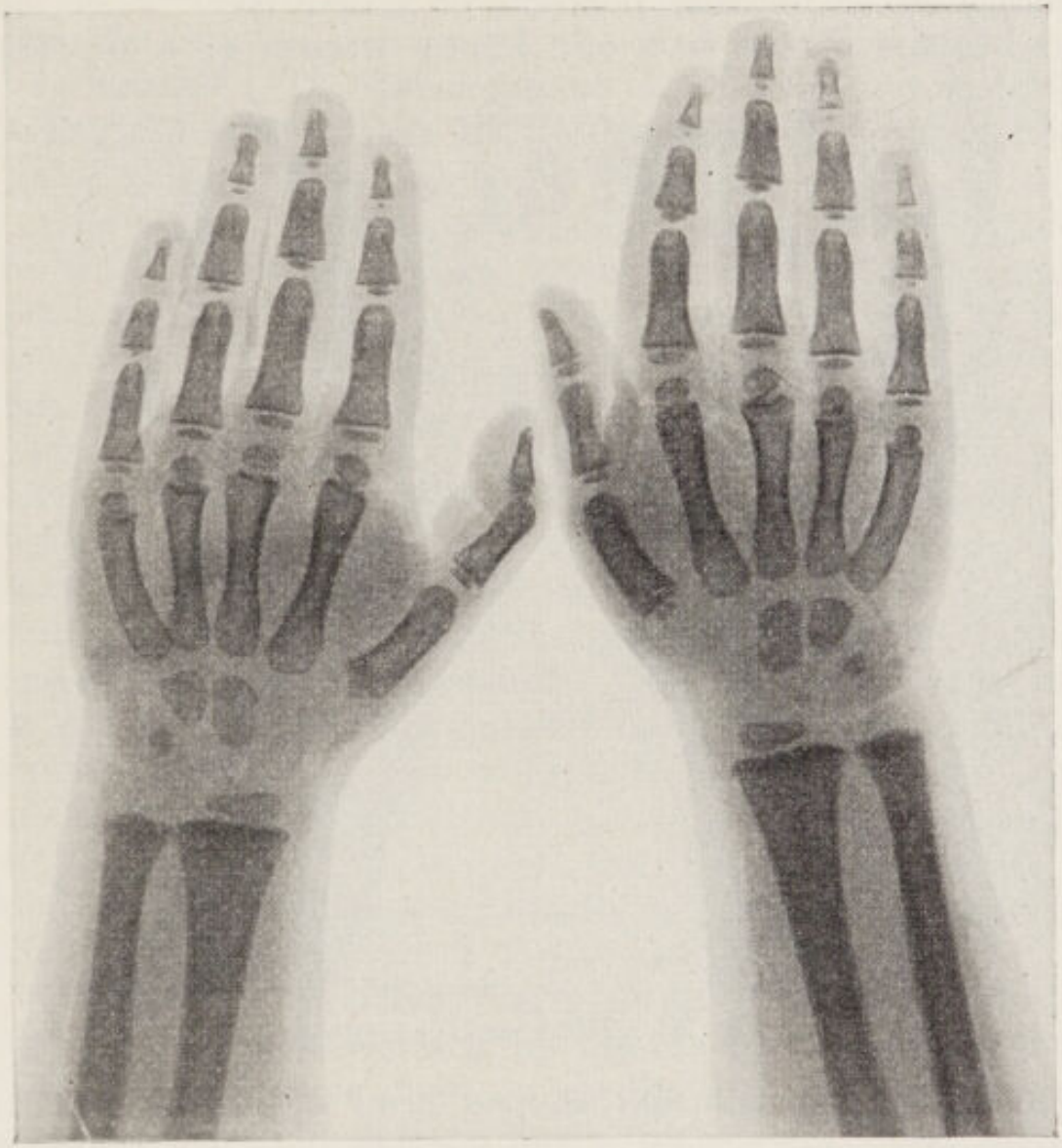


Fig. 22.—Bone age three years.

as are available show that this proportion remains unchanged during childhood and maturity. The bones of the infant are much more spongy in structure than those of the adult. Toppich found that nearly 60 per cent of the bulk of the bony skeleton of the newborn was made up of material other than bone tissue. There is a reduction of porosity in all the bones except the vertebra during childhood.

In the child's skeleton there is a large proportion of cartilage and of fibrous tissue and the younger the child, the greater the proportion. It is this large proportion of cartilage that gives the child's bones the comparative softness which renders them liable to deformity when subjected to unusual pressure or muscle pull. The size and shape of the feet of Chinese women of a previous

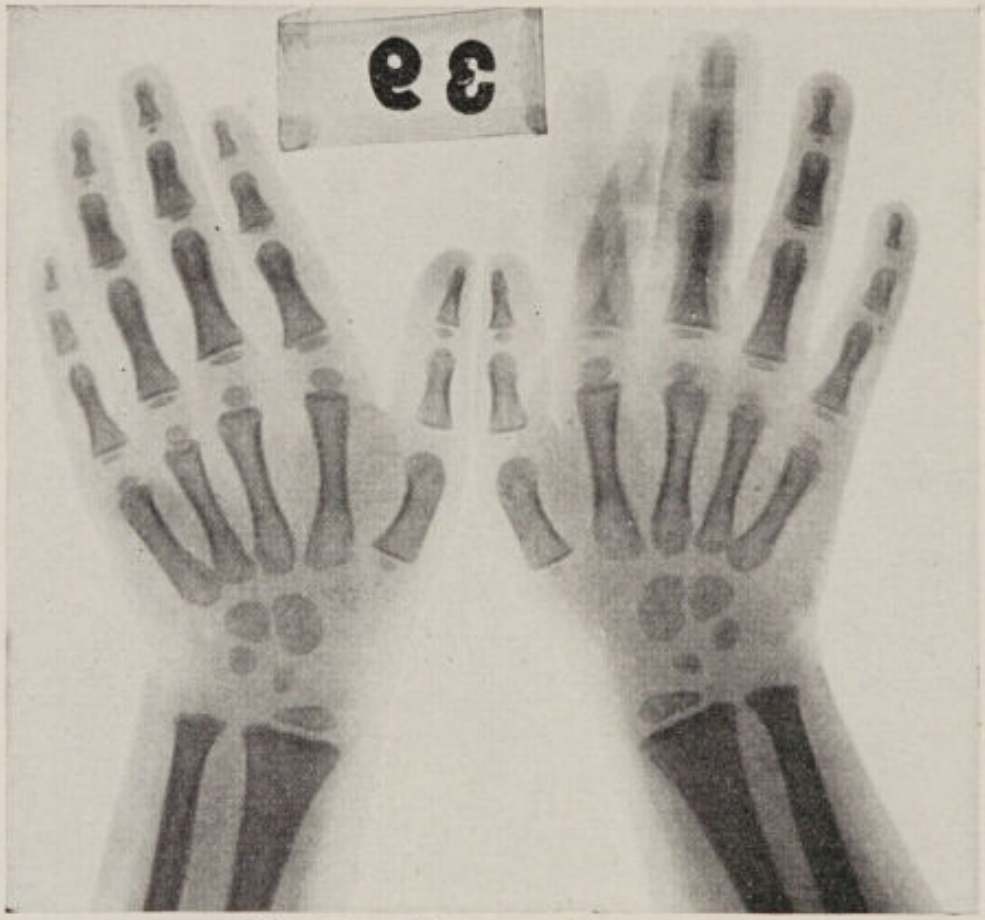


Fig. 23.—Bone age four years.

generation, the unusual shaped head of certain African tribes and the bow legs of the rachitic child, are examples of deformity due to pressure and muscle pull. The bones of the child have provision made for growth either of the bones themselves or of the organs which they enclose. Bones of the skull instead of being firmly united to one another, as they are in the adult, are loosely connected by membranes, leaving considerable space between the edges. This allows for ample space for the brain to grow and develop.

During early infancy all parts of the skull grow rapidly. The cranial capacity increases from 400 cc. in the newborn to 700 cc. at six months, 900 cc. at twelve months, 950 cc. at eighteen months. The horizontal circumference increases in the same period from about 35 centimeters at birth to 47 centimeters at eighteen months. After eighteen months although continued, the growth is less rapid and less marked. The development of the skull is intimately associated with the growth of the brain, the eyeballs, the teeth, and certain of the large muscles.

The average weight of the brain at birth is 370 Gms. in the male and 350 Gms. in the female, while the adult brain weighs from 1260 to 1400 Gms. One-third of this increase takes place in the first nine or ten months and the rest of the increase is attained by the middle of the third year. The growth of the brain is completed by the sixteenth to twentieth year. The brain of the newborn is heavy in comparison to the total weight of the body, the ratio being as 1:8 while in the adult it is as 1:40. The spinal cord at birth weighs about 3 to 3.5 Gms. being about one-eighth of that of the adult. According to Pfeister* the weight of the cord is doubled in the first five months, trebled in the first year, and quadrupled by the beginning of the third year. The length of the spinal cord is from 15 to 17 centimeters, a little more than one-third as long as in the adult. It doubles its length in the first ten years of life.

Changes in Digestive Tract.—Studies to determine the amount of saliva secreted by infants have been difficult. That the amount is slight during the first four months but increases rapidly from the fourth to the sixth month seems fairly well established. These glands increase approximately three times in weight during the first six months and five times during the first two years. The saliva of the new-born contains no digestive enzymes except ptyalin, and that in small quantities, although there is nothing in the milk for it to act upon. The saliva probably aids digestion by coagulating the milk. The reaction of the

* Quoted from Scammon(118).

salivary secretion is neutral or slightly alkaline at birth but with the ingestion of milk becomes acid.

Recent radiographic studies have modified earlier conceptions of the shape and position of an infant's stomach. Radiographs have shown that when the child is in an erect position the stomach lies transversely in the body rather than vertically as was previously thought. They have also shown that the infant's stomach has a distinct fundus (enlarged portion) whereas previously it had been described as lacking a fundus. The capacity of the stomach of the newborn is at first very small, varying in individuals and according to the diet; its average anatomic capacity is about 1 ounce (33 cc.). This is doubled in the first ten days, tripled in the first month and increased over six-fold by the end of the first six months. Scammon* says that it is "an established fact, however, that the healthy breast-fed babe occasionally takes much greater quantities of food at one time than would seem possible, according to the capacity of the stomach, and it has been shown that part of the milk passes unchanged from the stomach into the intestine while the child is nursing."

The time required for the average healthy infant's stomach to empty itself depends on the quality and quantity of the food. After an abundant feeding of breast milk, the stomach of a healthy infant is empty in two hours; if the same quantity of cow's milk is given the stomach is emptied in three hours. It is recognized that even the slightest disturbances may influence the motility of the stomach so greatly that food may remain for an hour or so longer. Therefore the child should be quiet after feeding.

Hess, DeBuys and Henriques† find the emptying time of the stomach materially influenced by the position of the child. "If the child is placed upon the right side, the stomach empties much more rapidly. The mobility is slower in the supine (flat)‡ position while it is at its optimum

* Feer, "Textbook of Pediatrics," Anatomic and Physiologic Peculiarities, Scammon, R. E., p. 9.

† Quoted from Grulee (48), p. 85.

‡ Parenthesis ours.

in the semi-erect position." Air is always taken with the food, usually only a little, frequently enough to cause air block with its consequent vomiting, gas and colic. Smith and LeWald[126] found by *x*-ray examination that in a vertical position the stomach contents gravitate to the bottom and the gas can then be expelled through the cardiac orifice of the stomach. Thus scientific findings have justified the practice of mothers of laying a colicky baby over the shoulder and patting its back. In a recumbent position the opening into the esophagus becomes blocked by the food in the stomach and the accumulation of unescaped gas gives rise to distention of the stomach and pain, as well as causing pressure on the mucous membrane and blood vessels of the stomach and in this way interfering with gastric secretion.

Carlson[20] has shown that "The empty stomach of the newborn shows periods of gastric hunger contractions before the infant has had any experience with food. The hunger periods are more frequent in the infant than in the adult; that is to say, the duration of motor quiescence of the empty stomach between the hunger periods is shorter. In the newborn and very young infant, the quiescence of the empty stomach lasts from ten to sixty minutes; in the adult usually from one to three hours.

"This greater frequency of hunger in the child is shown by the more rapid development of the hunger period after a previous meal. In an adult (after a full meal) gastric hunger contractions do not develop for from four to six hours. If the individual is lying in bed the time is even longer. In the normal breast-fed infant the average time of appearance of a hunger period after a full meal is only two and one-half hours."

Gastric juice containing its characteristic enzymes, rennin, pepsin, lipase, is present at birth although varying in amounts with different individuals. Hess has been able to collect 8 to 10 cc. of highly acid secretion before any food had been given. Carlson has demonstrated that the adult stomach produces a continuous secretion of gastric juice varying from a few cubic centimeters to 60 cc. per

hour independently of any food or psychic reaction. The secretion present at birth is doubtless of this character.

Hess has shown that free hydrochloric acid which activates pepsinogen and changes it into pepsin is present in demonstrable amounts in the stomach of the newborn. Grulee[48] expresses some doubt as to whether the hydrochloric acid in the newborn is sufficiently concentrated for the action of pepsin although it may be sufficient for that of lipase and rennin. His investigations indicate that during the first month of life the acidity of the stomach remains nearly stationary during the first hour after a meal, increasing from then on until the next feeding. If the feeding is delayed for hours, the acidity may become as high as in the adult.

Absorption of food in the stomach of the very young infant is probably slight, the major part of the absorption being thought to take place in the intestine.

Concerning the length of the intestine Scammon[118] says that at birth it is quite variable but that this variation does not seem to be intimately associated with variations of body length or weight. Pirquet[103] on the other hand holds that in the adult the average total length of the small intestine is about ten times the sitting height of the individual. Henning* found the same relation to hold good in infants.

Scammon found that the intestinal tract increases about one-third in length during the first year of life. Thereafter the growth is much slower. The most marked differences between intestine of the infant and of the adult is that in the infant the mucous membrane is more developed than in the adult and that the muscular layers are comparatively weaker. The villi in the newborn are distributed the entire length of the small intestine as in the adult.

The following table (Table VI) adapted from Scammon shows the length of large and small intestine at different ages.

Authorities generally agree that the digestive changes in the alimentary tract of the infant seem to occur in the same

* Henning, Centralbl. f.d. med. Wissensch., 1881, p. 431.

manner as in the adult. All the enzymes and glandular secretion also the hormones, prosecretin and secretin, which function in the digestive processes are present in the newborn, and for the most part, have been identified in the fetus. Recent research has proved that all the proteins are split into amino-acids and peptids before absorption, disproving the earlier theory that some proteins

TABLE VI*

LENGTH OF THE INTESTINE

(Based on Data of Brandt, Arnoljevic, Debele, Wemberg, Valtorta, Messedaglia and Vainaindio, and Scammon)

Age.	No. of cases.	Length of large intestine in centimeters.	Length of small intestine in centimeters.	Length of total intestine in centimeters.
Birth	25	66.0	338.5	402.6
1 to 3 mos	25	67.9	337.4	405.3
3 to 6 mos	15	70.7	380.9	451.6
6 to 12 mos	9	83.1	418.1	501.2
1 to 2 yrs	6	88.9	460.4	549.3
2 to 4 yrs	6	88.1	468.6	556.8
4 to 6 yrs	10	99.9	469.9	569.8
6 to 8 yrs	7	108.5	500.6	609.1
8 to 10 yrs	7	116.4	579.0	695.4
Adult	14	160.7	753.9	914.6

*Abt Pediatrics—Scammon, R. E. p. 322.

of breast milk were absorbed unchanged. Milk sugar is not absorbed as such, but when given in quantities within the limit of digestion and absorption, is changed by enzymotic action into dextrose and galactose. The products of the digested food of the infant are absorbed through the whole gastro-intestinal tract.

Before birth the kidneys function little if at all. The kidneys of the newborn weigh 25 Gms. (about 1 ounce); they double their weight in the first year and triple it by three years. Bean says that their growth parallels the periods of great physical and mental activity, and the increased alimentation of the body. The kidneys form about 0.6 per cent of body weight in the newborn as compared with 0.2 to 0.3 per cent in the adult. The bladder

is almost entirely an abdominal structure at birth and in early infancy its physiologic capacity is variously estimated from 40 to 70 cc. (about $1\frac{3}{7}$ to $2\frac{1}{2}$ ounces). There is a close relation between quantity of water taken and the quantity of urine excreted. Sixty to 70 per cent of ingested water reappears as urine.

The urine, during the first few days of life, is scanty and concentrated, tallying with the small amount of fluid taken and the large water output from the lungs. The presence of relatively large quantities of uric acid and of albumen in infant's urine during the first and second weeks of life are, as indicated by Scammon, nonphysiologic and not particularly harmful. The urine is voided, according to Scammon, about three times as frequently as food is taken, and if water be taken between meals micturition (voiding of urine) may occur twenty to twenty-five times in the twenty-four hours.

Feldman,* quoting the work of Schanjawski, gives the following number of micturitions in twenty-four hours and the quantities voided (Table VII):

TABLE VII

QUANTITY OF URINE AND NUMBER OF MICTURITIONS IN TWENTY-FOUR HOURS

Age.	Number of micturitions.	Average quantity voided each micturition.
14–30 days	13	34 cc.
1–3 months	14	31 cc.
3–6 months	20	31 cc.
6–12 months	16	44 cc.
1–2 years	12	60 cc.
2–3 years	10	88 cc.
3–4 years	9	92 cc.
4–5 years	7.5	90 cc.

As Feldman says: "The total twenty-four hour quantity of urine in an infant six months old is double that of an

*Feldman, W. M., "Antenatal and Postnatal Child Psychology," p. 508 (1920).

infant one month old. At four years old it is three times. This quantity, however, varies with a number of factors."

Breast Feeding.—Human milk is the natural food for babies. Statistics show that the infant mortality rate among breast fed babies is lower than that among artificially fed babies, due probably to the fact that breast milk contains properties which help the baby to resist disease as well as to the fact of having the right combination of food elements. One would wish, therefore, that a baby should have the opportunity of having some breast milk for at least six or eight months. The average composition of breast milk is sugar 7.5 per cent, fat 3.5 per cent, protein 1.25 per cent, mineral salts 0.25 per cent, water 87.50 per cent. But there are individual variations and some modifications may apparently be effected by changing the mother's diet and amount of exercise.

While the scientific literature is filled with data concerning the lactation of animals, especially the cow, comparatively little may be found in regard to those factors influencing lactation in women. Very little scientific knowledge on the optimum conditions for producing mother's milk has been obtained, either through metabolism experiments or by observations.

Meigs[83] has presented a very complete review of the literature which reports experiments on animals where the milk yield was studied while changes were made in the food. In the first place, changes both in the quality and quantity of protein fed have been shown to affect the total milk yield, and in some cases to slightly affect the concentration of protein. Moreover, changes in the quantity of the total ration seem to affect the total milk yield. On the other hand, carbohydrate metabolism, as indicated by the level of the blood sugar, seems to have very little to do with the secretion of milk. Fat metabolism, as well as the phosphorus content of the diet, may affect the milk fat. The milk phosphorus is not affected by the phosphorus content of the fat. Furthermore, the calcium of the blood plasma of the mother is the precursor of milk calcium, therefore, not the diet of the mother as much as the calcium stores

in her own body may be drawn upon to furnish calcium for the milk.

Various factors affect the quantity of milk secreted. Macy and Outhouse have shown that a reduction of liquid intake, failure to empty the breasts completely at given intervals, and overwork have a tendency to lower the quantity production.

Certain compounds have been reported to be galactagogues or stimulants for the production of milk during lactation. None of these substances have been definitely proved to be of positive value. One of these, malt extract, one tablespoonful of thick malt extract being taken three times a day, may be efficient because of its vitamin B content rather than any specific drug affect.

According to some "tales" tea is a galactagogue and is advised by women and taken in large quantities during lactation. Without doubt high liquid intake during this period is advisable. However, the specific stimulation action of tea has no foundation in scientific experiment. Milk, sometimes advised by women, however, is quite different from tea and similar substances in its value during lactation. Milk is valuable as a food component in the diet not only in the effect it may have upon the milk of the mother, but also in its "building power" for the maternal tissues. It is a most economical source of calcium as well as being valuable for other food components, especially protein. Hoobler[58] found that as a source of animal protein in the diet, cow's milk was best suited for the preservation of the maternal tissue and the production of milk protein. Hoobler has given the following distribution of sources of protein in the diet as desirable:

Cereal	60.5 per cent of total protein
Vegetables	14.2 per cent of total protein
Fruit	1.4 per cent of total protein
Milk	23.9 per cent of total protein

Hoobler[58] has also reported from observation of lactating women that an animal protein diet produces milk higher in calories and nitrogen and keeps the mother in positive

nitrogen balance better than a vegetable protein diet. Diet probably is the best galactagogue that is known at the present time. Regardless of numerous investigations the evidence is inadequate to indicate the value of drugs as galactagogues. Atropin or pilocarpin have an effect on the mammary secretion which is neither constant nor marked. Tissue extracts and internal secretions, such as pituitary extract and corpus luteum may result in a temporary increase in milk secretion, never lasting more than twenty-four hours, frequently lasting only ten minutes. Extracts of placenta, fetus, adrenals, thyroid, ovaries all give varying results and therefore cannot be definitely recommended as galactagogues. Therefore, until more definite data is obtained, diet and stimulation of the mammary glands must be emphasized as the best galactagogue.

Diet of Lactating Mothers.—In referring to recent research in scientific nutrition, McCollum[75] makes the following statements, "A study of the data makes it apparent how dependent the nursing mother is on the character of her diet as regards the quality of the milk which she will produce. When her diet contains proteins of high biological value, an abundance of the vitamins, inorganic elements in proper amounts and a source of energy in the form of carbohydrates and fats, she produces a milk which will induce optimum gains in the weight of her young. In just so far as her diet falls short in containing these essentials will the quality of her milk be reduced. The nursing mother cannot, except in a very limited degree, put into her milk from *her bodily reserves that which she does not receive in her food supply.* It is, therefore, of the greatest importance that the pregnant and nursing mother have a highly satisfactory diet in order that there shall be no shortage of the dietary essential in her milk supply."*

According to Wilcox[161] most types of hypo-alimentation (underfeeding) of the nursing infant relate themselves to improper management of the life and the habits of the mother. It has been estimated that for every calorie secreted as milk, another calorie must be available for the

* Italics ours.

work of secretion. Therefore, to a woman's required diet as an adult of a certain weight doing light work, there will have to be added twice the number of calories represented in her milk if she is to have a good supply of milk and maintain herself. It has been shown that although the child may be gaining, the mother may be losing and therefore, due to inadequate diet may be drawing upon her own tissues for nursing. When both mother and child are losing weight it may be that the mother's metabolism is unable to meet the extra demands of lactation.

Kennedy and Dutcher[65] says that the diet of the mother determines the amount of vitamins A and B in human milk. All available information indicates that lactation and reproduction are most successfully attained when the maternal diet is generously supplied with adequate quantities of vitamin B. Four to five times the amount of vitamin B necessary for growth is necessary for lactation. It is established experimentally that the diets of lactating mothers should contain generous supplies of other vitamins as well as of vitamin B.

In discussing the effect of underfeeding upon lactation, McCollum[75] says there are "several factors which influence the effects of underfeeding, *e. g.*, the stage of lactation, the degree of underfeeding, the character of the ration, the state of the flesh of the animal, the plane of nutrition of the animal previous to underfeeding and the length of underfeeding."

McCollum cites through personal communication the observations of Maxwell and Miles in China that osteomalacia (softening of the bones with much less than normal amount of calcium) was especially prevalent among women who have borne children. The poverty of the people results in great restriction of the diet almost exclusively to cereals with little sunlight or exercise. According to McCollum the fact that rickets frequently occurs during the nursing period emphasizes the fact that breast feeding has its limitations in safeguarding the infant's health, and that proper feeding of the mother at this time is as important as breast feeding itself.

In describing the condition of nursing female rats on low calcium diets, McCollum[75] says, "even though the animals did not present any abnormal appearance, as is frequently the case on low calcium diets, they were, nevertheless, in a state of great nutritional instability"—described as low vitality, nervous, apprehensive, unsteady, and tottering gait—furthermore, he states that "this condition did not usually appear while the females were nursing their first litters, but after the second litter had been nursed for about fifteen to sixteen days the symptoms usually appeared." The young did not develop normally on the low calcium diets even though the mother sacrificed much from her skeleton and tissues.

The ration for a lactating woman should be made optimal. The importance of adhering to such a diet may be emphasized by quoting Macy and Outhouse—"The adherence of women throughout pregnancy and lactation to dietaries rich in fruit, vegetables, dairy products, glandular tissues, and the like, together with the early presentation of vitamin carrying foods to the infant, serve as the most potent factors in the production of a nutritionally stable child."

Technic of Breast Feeding.—The care of the mother's nipples during pregnancy and after the baby is born have been described, care which is given to prepare them for nursing and to protect them against an infection which might follow a cracked or sore nipple. If a nipple does crack in spite of care it will probably be necessary to use a nipple shield. As has been said, the baby's sucking at the breast stimulates the mammary glands to action and by the third day the baby is probably getting milk from the breasts. Within two weeks the amount secreted in a day should have increased to at least a pint if the baby is to get enough and later a quart will be necessary to supply the baby's needs although much more may be secreted.

The mother lies slightly on her side to nurse the baby, the right or left according to the breast to be used and the baby lies in the curve of her arm. Usually alternate breasts are used at each feeding. The baby should get the nipple well back into the mouth, taking in not only the nipple but

the areola around the nipple if good suction is to be attained. The mother grasps the breast with the thumb and forefinger of the opposite hand and so keeps the breast from pressing against the baby's face thus obstructing his breathing. The baby should be kept from sleeping during the feeding and if this is done he probably gets all he needs in ten or fifteen minutes and from $\frac{1}{2}$ to $\frac{3}{4}$ of what he needs in the first five minutes. He should not be allowed to nurse too fast but should have the nipple removed from his mouth once or twice for a rest. He should not be kept at the breast more than twenty-five minutes. A baby who wants to stay at the breast longer than that is probably not getting enough to eat. After feeding he should be held up against the shoulder for a moment or two and his back patted so that he may expel any air he may have swallowed.

Physicians vary as to the intervals of feeding but the tendency now is to have longer intervals between feeding than formerly. The four hour interval gives longer periods of rest to the mother, the three hour interval means more frequent stimulation of the mammary glands. If the baby is on a three hour interval, there are usually 7 feedings in the twenty-four hours and if on a four hour interval, 6 feedings, as one night feeding is omitted. Within a few weeks a second night feeding may be omitted and if the baby gains well and sleeps well the late evening feeding may be omitted and the baby be allowed to sleep from six to six. The fact is that each baby must be considered individually and a schedule worked out that seems to promote the well being of the baby and the mother. In twenty-four hours the baby should take from $2\frac{1}{2}$ to 3 ounces of fluid for each pound of weight, the average baby needing about 3 ounces. The total amount needed should be distributed evenly between the number of feedings in the twenty-four hours. This, of course, can be done accurately in cases of artificial feeding. To get a fair estimate of what a breast fed baby gets at a feeding the baby may be weighed before and after feeding. A baby's stomach at birth has a capacity of about 2 ounces but as the liquid is constantly leaving the stomach and passing on into the intestines it does not mean that he can

take only 2 ounces. The amount which a baby should have at each feeding depends on several things, such as his age, his weight, the number of feedings in the twenty-four hours and his general vigor. He should have enough to make him satisfied and content after the feeding and not so much as to distend his stomach.

Adequacy of Breast Milk as a Food.—McCollum[75] has questioned the tendency to dogmatically accept human milk as the perfect food,—the tendency to take for granted that whatever milk is produced by the mammary glands is necessarily of good quality. "There can no longer remain any doubt that human milk has been over-rated with respect to its food value. Recent researches show clearly that it is not necessarily a perfect food. The quality and the quantity depend, in the human mother as in other species, in great measure on the nutritive condition of the lactating woman."

Macy and Outhouse have shown that breast milk varies greatly in quality and may fall far short of meeting the requirements of an infant. Although the infant may not die as a result of inadequacy in his mother's milk, his growth and development may fall definitely below the optimum. They have also shown that the milk from the same individual may vary considerably from time to time. Carefully controlled work on the feeding of young rats with human milk from women who were under supervision showed that human milk is not always adequate in vitamin content, due to the deficient intake in the woman's food. These same investigations showed that milk from women on the average American dietary is a relatively rich source of vitamin A, a comparatively poor source of vitamin B, and very low in its vitamin D content.

The ideal for all infant feeding is to approximate insofar as possible the optimum food for a growing infant. Sometimes a modified cow's milk formula is superior to mother's milk. A point worth considering, however, is that if even part of the time and effort which is at present devoted to the study and practice of artificial infant feeding be applied to the conduct of maternal nursing, more infants could be

nursed and nursed longer on breast milk than is now the rule.

Artificial Feeding.—In spite of every effort made by some women to produce a quantity and quality of breast milk which would be right for their babies there are a few women who seem unable to nurse their babies at all and others who can only nurse for a short time. This means that babies must be artificially fed either wholly or in part. For the encouragement of such women, it should be said that the knowledge of how to meet the nutritional needs of babies has increased to such an extent during the last twenty-five years that one need not dread bottle feeding today as one would have twenty-five or even fifteen years ago.

The technic for breast feeding is much simpler than for artificial feeding for in breast feeding the supply of milk is always fresh and sterile and the only precaution necessary is the bathing of the nipples before feeding. If a baby is to be artificially fed the purity of the food supply must be ascertained and the method of keeping it, preparing it and giving it to the baby must be such that there is the least possible opportunity of its becoming contaminated.

The usual substitute for mother's milk has been cow's milk although other animal milk is used from time to time in special cases. The composition of cow's milk differs from human milk as Table VIII on page 223 shows.

This table indicates that there are certain outstanding differences between cow's milk and breast milk, not only in the quantity but also in the quality of the chemical constituents of cow's milk and human milk. The fat of cow's milk is different in chemical composition from the fat of human milk. There is more tripalmitin and less triolein in cow's milk than human milk. The fat exists in a much coarser emulsion, is more difficult to digest and the fatty acids are more volatile and therefore more irritating to the infant's stomach in cow's milk.

The sugar of human and cow's milk is identical in chemical composition but the total amount is less in cow's milk. Therefore, after the usual dilution of cow's milk for infant

feeding some form of carbohydrate is always added to the feeding mixture.

TABLE VIII*

COMPARISON OF THE CONSTITUENTS OF COW'S MILK AND HUMAN MILK

Percentage Composition of Cow's and Human Milk

	Cow's.		Human.		Calories.	
					Cow's.	Human.
Protein	3.41	3.2	1.0	1.52	21.3	7.4
Fat	3.65	3.9	3.0	3.28	49.8	43.9
Carbohydrate	4.81	5.1	6.4	6.50	28.9	48.7
					100.0	100.0

	Fat, per cent.	Sugar, per cent.	Protein, per cent.	Salts, per cent.	Calories, per ounce.
Cow's milk	3.5–4	4.5	3.5	0.75	18–20
Human milk	3.5–4	7.5	1.25	0.25	20

* Lusk: *Science of Nutrition*, 4th Ed. p. 545.

TABLE IX†

AVERAGE COMPOSITION OF ASH IN MIDDLE MATURE PERIOD OF HUMAN LACTATION

Four to Nine Months

Total	CaO	MgO	P_2O_5	Na_2O	K_2O	Cl
0.207	0.046	0.007	0.034	0.013	0.061	0.036

† Abt Pediatrics, Vol. I, p. 616.

The total protein in cow's milk is greater than in human milk. It is therefore usual in making up a formula either to add water to cow's milk, in order to dilute the amount of protein, or to add an acid (usually lactic) to modify some of the protein. There are two types of protein in both human and cow's milk,—casein and lactalbumin. They are present in the following amounts:

	Casein, per cent.	Lactalbumin, per cent.
Cow's	84	14
Human	55	54

It has been shown that lactalbumin is superior to casein in influence upon growth. Since cow's milk contains only 14 per cent of lactalbumin, it is evident that dilution of cow's milk in making up a formula alters its food value seriously for the infant.

The minimum protein requirement for an infant is given by Bartlett[81] as 1.5 Gms. per kilo of body weight in twenty-four hours. The average breast fed baby gets 2.0 to 2.5 Gms. per kilo of body weight. For the artificially fed baby from 3 to 3.5 Gms. of cow's milk protein in twenty-four hours per kilo body weight has been found to be the average requirement for a growing infant.

Macy and Outhouse[79] found that the vitamin A content of cow's milk and human milk is comparable. However, consideration of the destruction of vitamin A in cow's milk through oxidation during the preparation of the feeding formula is a factor to be considered. Therefore, additions of foods rich in vitamin A should be made early in the diet of the artificially fed as well as the breast fed baby. As sources of vitamin B, breast milk and cow's milk are considered relatively poor, the latter being somewhat superior. Cow's milk is less satisfactory as a source of vitamin C than as a source of vitamins A and B. The amount of vitamin C in raw milk is not very great and if the milk is pasteurized it is decreased, due to oxidation. The amount present is thought to be influenced by the diet of the cow.

Vitamin D has also been investigated and found in very limited and inadequate amounts in both human and cow's milk. The antirachitic vitamin (D) is essential for the stabilization of calcium and phosphorus metabolism and for the normal deposition of these minerals in the bony framework. Both Hess and Gerstenberger have found that human milk, originally lacking in vitamin D, may become activated to cure rickets through the action of ultra-violet light, while experimental evidence indicates that the anti-

rachitic value of cow's milk can be enhanced by food but not by ultra-violet light. Sunshine and cod liver oil should be administered early as a method for supplying vitamin D to the developing infant.

A comparison of cow's milk with human milk would point to the fact that cow's milk unchanged in any way would not provide a baby with the various food elements in the proportion he needs. It becomes necessary therefore to change the composition in one way or another to meet the individual baby's needs and it is wise to do this under a doctor's direction. It is important to consider the source of supply of the milk that is to be given to a baby or in fact that is to be given to the family, especially if there are little children. Milk is a most excellent medium for bacteria, both nonpathogenic and pathogenic (disease producing). In the last twenty-five years laws have been passed in many states which have aimed to protect the public against receiving a milk supply which has a high bacterial count or which is contaminated in any way. 10,000 to 50,000 bacteria per cubic centimeter may be considered a low bacterial count. Often milk from unsupervised farms may contain more than 500,000 per cubic centimeter. Farms are inspected and certain requirements made as to the way the cattle shall be cared for and the milk handled. Many states require that the cows shall all be tested for tuberculosis, as tuberculosis of cows has been looked upon as a source from which tuberculosis has spread among people. These and other hygenic measures have aimed to produce a milk with a low bacterial count. A low bacterial count does not necessarily mean that the milk is free from pathogenic organisms however, and as these are the special danger, many people believe that the milk should be pasteurized.

The fact to be borne in mind is that the baby should receive milk free from pathogenic organisms and this means that one must assure oneself of the safety of the source of the milk, and must also give the milk the right care from the time it is received at the house until it is given to the baby in order that it may not become contaminated. If the

formula is made up at home, all the utensils necessary for its preparation as well as the bottles and nipples must be not only washed thoroughly but boiled daily. The milk should have been delivered in a bottle which has a cap completely covering the top of the bottle. If this is not so, the top of the bottle should be washed by pouring a little sterile water over it and wiping off with a bit of absorbent cotton dipped in sterile water. The formula must be mixed and measured in sterile utensils and poured into sterile bottles which should be corked with sterile stoppers, rubber or cork or pledgets of non-absorbent cotton. It is more satisfactory to pour it at once into individual feeding bottles than to keep it in bulk. It is also a wise precaution to prepare an extra bottle for each twenty-four hours in case of an accident, as to fall short of milk is more disastrous than having some milk left over. The formula is kept in an ice box, preferably a small one kept for that purpose, and the amount to be used at a feeding heated in the bottle in which it has been standing. If one has enough nipples for each feeding in the twenty-four hours they should all be washed and boiled at the time that the formula is prepared and kept in a covered dish which has also been boiled. In picking them up one should take care to touch them only on the edge and not on the part that is to go into the baby's mouth. If there are not enough nipples for this procedure the nipple should be boiled before each feeding. Bottle and nipple should be rinsed in cold water immediately after the feeding, and the bottles left filled with water. One's individual technic in regard to preparing a baby's formula and caring for it as well as the bottles and nipples, may vary as long as one keeps in mind the essential of scrupulous cleanliness in order to avoid any possibility of infection. Needless to say, the hands of anyone who is caring for a baby should be washed vigorously under running water before handling anything that has to do with his food. There are some who never use a bottle or nipple for a baby, but as sucking is the normal way for a baby to get his food and as it is possible to keep bottles and nipples absolutely clean, there seems to be no valid reason for using a spoon and cup entirely as a

substitute for the bottle if the baby is not nursed by the mother. As the baby gets older it is, of course, well to prepare him for the other ways of taking food and not allow him to continue the sucking method beyond the early infant period.

The milk should be given to a baby at 100 degrees Fahrenheit or slightly more than body temperature. It can be very simply heated by setting it into a kettle of water so that the water comes up to the top of the milk in the bottle and then heating the water. Do not put a bottle which has just come from the ice-chest into a kettle of very hot water as the bottle will probably break. An adequate way of testing the heat of the milk is to let a drop fall from the inverted bottle on the inside of the wrist when it should feel comfortably warm but not too hot. The hole in the nipple should be such that the milk will drop in fair sized drops but not pour. If the drops are tiny and slow in coming the hole is too small and the baby will have to work harder than he should to get his food. Nipples should be made of good rubber, should have no creases or ridges where the milk could collect and should be reversible so that they may be well washed. The time taken for a bottle feeding should be about the same as that taken for a breast feeding and the baby should be held over the shoulder after the feeding just as is done with a breast fed baby.

Supplementary Foods.—It is obvious from the rate at which the body of the child grows that the nutritional demands must be adequately met or retardation of the body processes must ensue. It is equally clear that the tremendous growth of brain, skeleton, muscles, and organs during the first year make demands which cannot be met for many months by the average mother's milk unsupplemented. It is necessary to add foods rich in calcium, phosphorus, iron, and vitamins, in such a form as can be utilized by the child's digestive tract, and in amounts that are suitable.

Addition of Orange Juice or Tomato Juice.—The supply of vitamin C available for the breast fed infant depends upon the amount present in the diet of the mother. Vitamin C is a necessary element in the infant's food intake to

protect him against latent scurvy, also as a precaution against more or less retarded growth and interference with normal development and calcification of the teeth. Unfortunately the average adult diet is frequently low in vitamin C and this vitamin C seems to be the one most often lacking in any milk. To insure against a possible deficiency of this necessary factor either orange juice or tomato juice should be given at an early age; both are potent sources of vitamin C and contain also considerable amounts of vitamin A and B.

The juice from canned tomatoes, sweetened with a little sugar or Karo syrup, has been used very successfully with pre school children as a source of vitamin C. The above mixture, boiled together for two minutes to blend it, compares favorably with orange juice, as the following figures show:

TABLE X

COMPARISON OF FOOD CONTENT OF ORANGE AND TOMATO JUICE

	Prepared tomato juice.*	Orange juice.
Amount	⅓ cup	⅓ cup
Protein	0.94 Gm.	0.53 Gm.
Fat	0.15 Gm.	
Carbohydrate	8.40 Gm.	8.66 Gm.
Calcium	0.005 Gm.	0.025 Gm.
Phosphorus	0.012 Gm.	0.014 Gm.
Iron	.....	0.0002 Gm.
Calories	32	37
Vitamin		
A	++	+
B	+++	++
C	+++	+++

* Calories, protein, fat and carbohydrate were figured according to Sherman's percentage for canned tomato, as he gives no figures for tomato juice. Calcium phosphorus and iron were estimated in accordance with his percentages for minerals in tomato juice.

Both orange and tomato juice are well digested by the average healthy child. Both exert a mild laxative effect when given in liberal quantities. They can be given to the

breast fed infant at the age of six or eight weeks starting with ½ a teaspoonful a day, increasing the amount until the juice of an entire orange or ¼ cup of tomato juice is taken by the time the child is weaned.

If a child has to be given a formula containing cow's milk, the milk should have been either pasteurized or boiled; in either case the vitamin C content is reduced and hence it is absolutely essential that orange or tomato juice be given to provide adequate amounts of this factor for the bottlefed child. The same principle holds true in the use of dried milk. As a child is being gradually introduced to cow's milk at least by the sixth month, it must be kept in mind that the milk has been pasteurized and it is necessary to continue the daily use of orange or tomato juice.

Cod liver oil is added as a protective food to insure an adequate supply of vitamins A and D, and for its stimulating effect upon growth and metabolism. The work of Macy shows the inadequacy of mother's milk in its supply of vitamin D, so that healthy breast fed as well as artificially fed babies need cod liver oil. It is wise to begin with a few drops daily, and to increase gradually to ½ a teaspoonful daily. In pathological conditions such as an indication of rickets, the advice of the child specialist should be sought.

Vegetables and fruits are valuable in the child's daily food intake because they supply beside carbohydrate, the minerals needed by the body for its maintenance and the building of its new tissues, and the vitamins essential to development and growth. Green vegetables are especially valuable as sources of vitamins and minerals, especially iron, and for providing favorable conditions for its absorption and use in building hemoglobin. The ash of fruits in general shows them to be valuable in maintaining the neutrality of the blood. Both vegetables and fruits are almost indispensable to the child because of their vitamin content. Thin green leaves are as a rule rich in vitamins A, B, and C. Fruit and vegetables which are eaten raw usually contain significant amounts of vitamin C. Cooking may rob the food of a large share of its vitamin and mineral content unless it is carefully done and the water in which the

food was cooked is used in the diet. For this reason it is desirable to steam such vegetables as spinach, carrots, and peas. Vitamin B is much more widely distributed than either vitamin A or C and usually will be included in adequate amounts if fruits and vegetables are used generously.

Because of their indispensable place in the diet, vegetables can safely find their way into the diet of children fairly early in the first year provided they are sieved; some pediatrists favor the third or fourth month, others defer their introduction to the sixth or seventh month. Spinach is one of the first vegetables chosen, usually because it is high in vitamins, in iron, and calcium. Young carrots, young peas, tender string beans can also be introduced early and are valuable for their mineral and vitamin content. Some physicians with a long experience in feeding children advocate a wide range of vegetables and think that the child should know the taste of at least twelve by the time he is a year old. By the end of the first year the child should be getting at least 6 or 7 tablespoons of vegetables each day.

Fruits are valuable in the child's diet not only because they are sources of vitamins and minerals but also because they contain cellulose and fruit sugars. Stewed fruits are valuable for babies in their laxative effect. The juice may first be given and later the fruit, pressed through a wire strainer. They can be introduced as early as the third or fourth month. Prunes are frequently chosen as the first to introduce because of their high iron, cellulose, vitamin, and carbohydrate content. Recent research has shown that apricots are more effective for hemoglobin building than prunes. Here as in vegetables a teaspoonful is the amount to give until the child adjusts to the new food. Raw fruits should be given with judgment since if they are given when not ripe or when not finely divided, they irritate the intestinal tract inducing disturbances which may prove very discomforting. By the end of the first year the child should be able to take daily 3 or 4 tablespoons of stewed fruit in addition to orange or tomato juice.

As the child grows and becomes more active the food value of the mother's milk, even when supplemented by

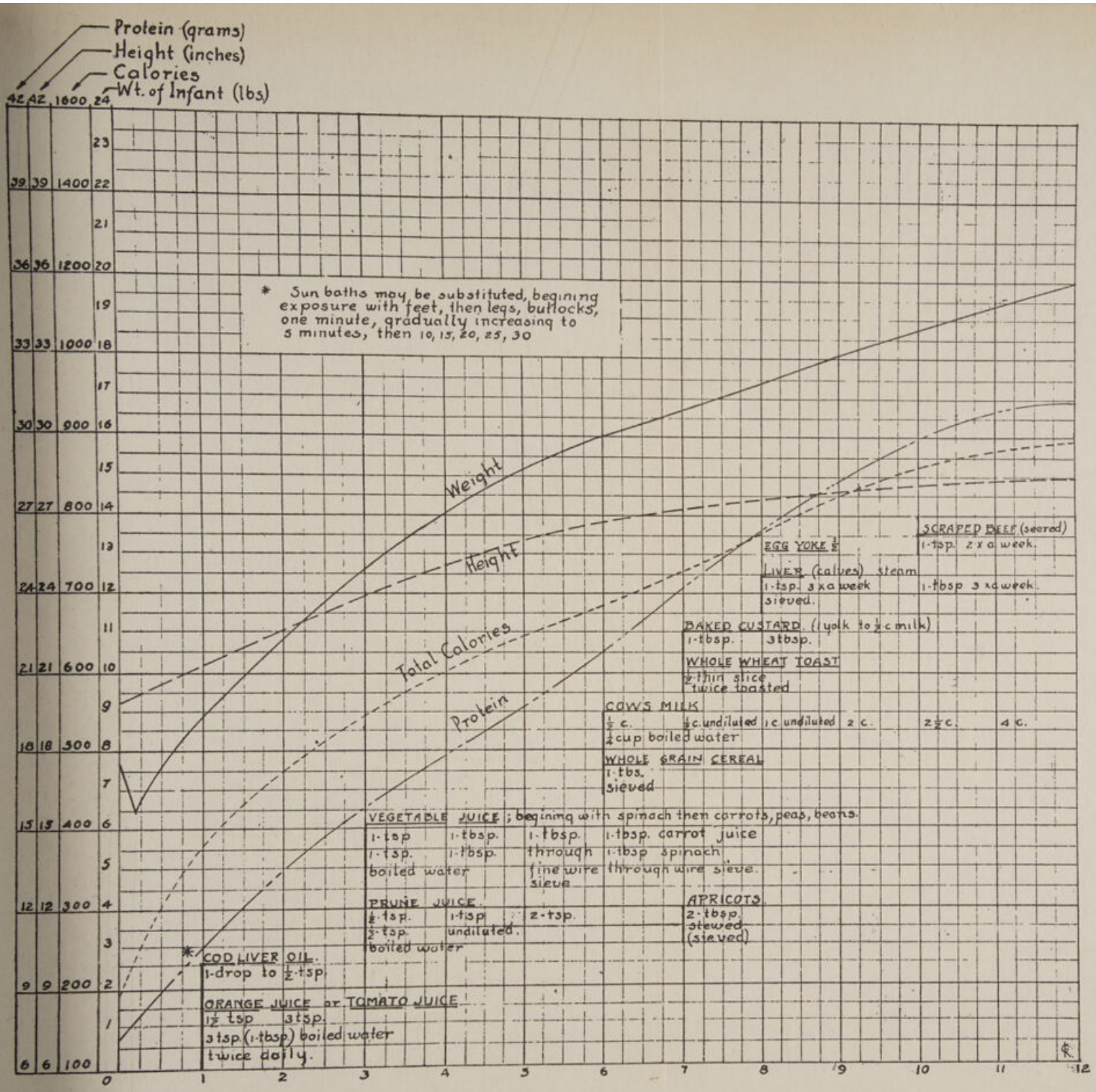
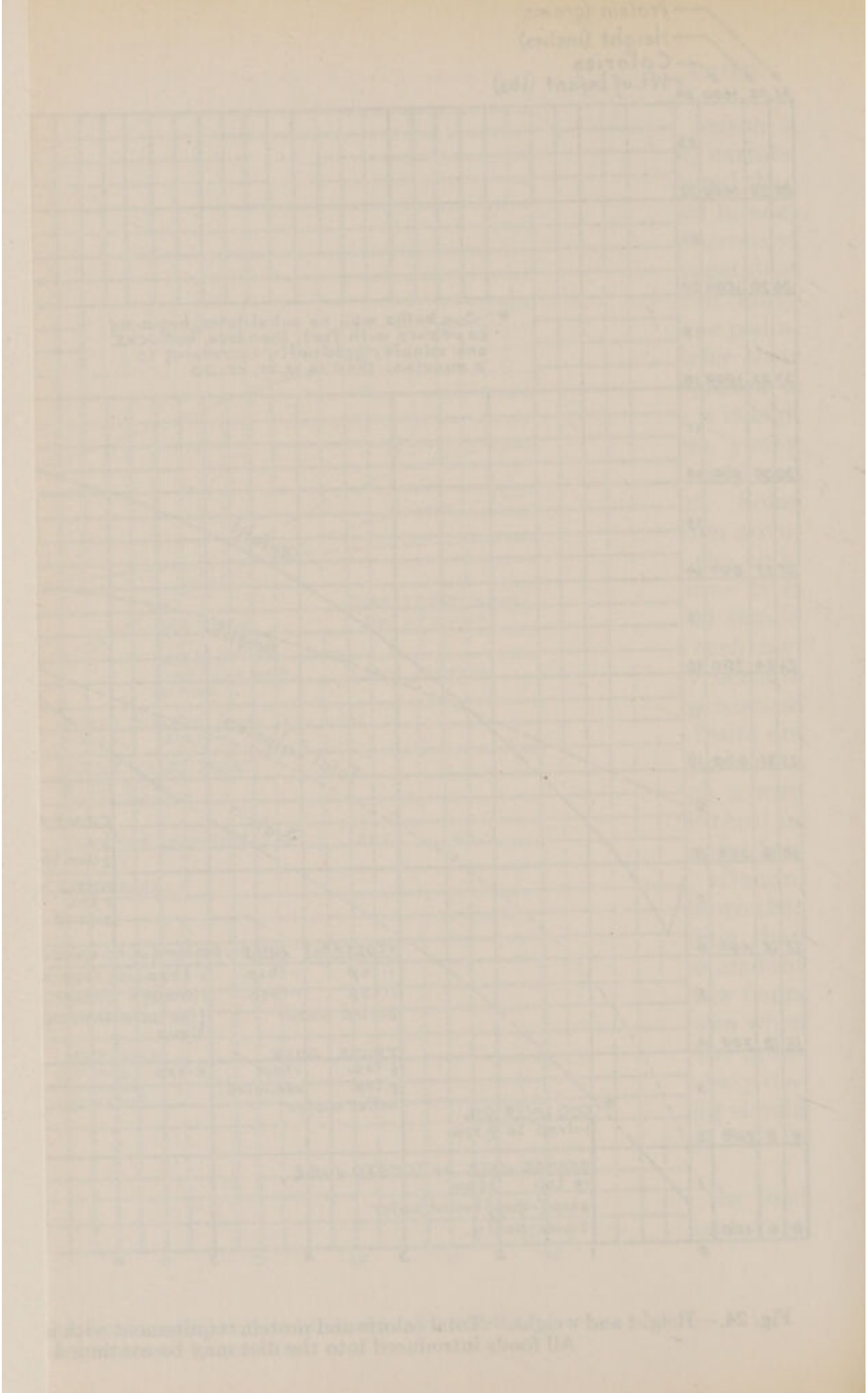


Fig. 24.—Height and weight. Total calorie and protein requirement with introduction of foods from birth to twelve months. All foods introduced into the diet may be continued and increased in quantity.



cow's milk, is not adequate to meet the increased demands for the development of his body and his energy output. It is necessary therefore to supplement both the mother's milk and cow's milk not only with vegetables and fruits, high in minerals and vitamin, but with other foods which are rich in carbohydrate, such as cereals and potato. Cereals, of the whole grain type, can be given if sufficiently cooked and if at first they are strained in order to more finely divide the coarse particles that might be a source of disturbance to the delicate mucous membrane of the child's intestines. Many children's specialists introduce cereal at the sixth month, beginning with a teaspoonful of cream of wheat, and gradually increasing it to 2 or 3 tablespoons daily. Whole grains would seem preferable on account of their mineral and vitamin content to the highly milled ones. It is not always possible in a local market to secure whole cereals, because they are not satisfactorily stored for long periods, difficult to mill, and the local demand may not be great enough to keep an adequate stock on hand. In such cases it should be remembered that the more highly refined product *can be* adequately supplemented with other *foods* and the losses in vitamins and minerals can be thus met.

It was formerly thought necessary to cook the cereals for four hours to break down the cellulose covering of the starch granules and render the starch more available for digestion. Recent investigation tends to prove that such prolonged cooking is not necessary for the digestion of cereal and that if cooked until palatable and smooth and soft it will be comfortably and easily digested.

The chart shown in Fig. 24 has been found helpful to mothers in suggesting the time when foods may be introduced and the amounts desirable.

Regime.—It is obvious that to meet a baby's needs there must be a *daily regime* which differs greatly from the regime of independent adults or even of older children. The hours of eating and sleeping are different. The complete dependence of the baby demands the service of others for what may easily seem countless things in the course of a

day, and night may even sometimes seem to be turned into day. Too easily may the youngest member of the household seem to be the small tyrant for whom everything gives way and around whom the whole family revolves and by whom the whole family schedule is disrupted. But such a state of affairs should not be allowed to exist and need not if the schedule for the baby is planned and adhered to and is made to fit into the essential family routine. A schedule strictly adhered to is of utmost importance. The animal organism seems to be built on a rhythmical pattern; the heart beats according to a certain rhythm, breathing goes on rhythmically. Human beings live rhythmically and the baby needs to begin immediately to live his life according to a certain rhythm. Not just food at certain intervals but food every day at the same time. A baby who lives according to a schedule to which he perhaps unconsciously but doubtlessly physiologically becomes accustomed does not have the sense of insecurity about his care that the baby who is daily subjected to a different scheme inevitably has.

It is essential to maintain a proper balance between *activity and rest,* between exercise and sleep. The young infant's business in life is to grow, and without sufficient rest this is impossible. The newborn sleeps the greater part of the twenty-four hours. At six months he is still sleeping from sixteen to eighteen hours. By the end of his first year he is sleeping fourteen hours. When not sleeping the infant should be in his bed free to move about, but should be picked up and handled by adults very little except when necessary for feeding, changing his clothing, or bathing him. When the child is able to sit he should be propped up against a pillow, but care must be taken to protect him against fatigue. His sleep should be uninterrupted and quiet. The windows should be opened in the room in which he is sleeping, but the wind should not blow directly upon his bed. If the temperature is in the neighborhood of zero it is desirable to limit the amount of fresh air admitted, since it is difficult to keep infants warm without using an excessive amount of bed clothes.

Physical exercise for an infant is very different in kind and degree from that for an adult. A baby lying on his back and kicking is having strenuous exercise for him, much more vigorous than horse-back riding for an adult. To sit up, to stand, to walk require for the young child a real expenditure of energy. A reasonable amount of exercise will stimulate the muscles, ligaments, and bones, but overstimulation and overexercise is to be guarded against. Exercise is conducive to a good appetite and to sound sleep. When it is carried to the point of fatigue where recuperation is difficult it may do harm to the child. This is especially true of nervous fatigue. Often parents are very proud of their child and wish to show off his accomplishments. This leads to forcing children to do things before they are ready or for too long a period of time. Often, also, the presence of an older brother or sister in the family stimulates the baby to try to do what is beyond his skill and ability. A young child is excited by many things which seem unstimulating to us, such as a large variety of toys, constant amusement, automobiling, continuous hilarity about him. This excitement, in turn, induces fatigue which may later bring about detrimental physical results.

A child should spend as much time as possible *out of doors*. The number of hours which he can spend out of doors will depend on the climate and the season of the year. If the sun shines the child should be placed in it for at least a short time each day so as to get the benefit of the ultra-violet rays. The eyes of a baby should be protected so that the sun does not shine directly into them.

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CHAPTER VII

GROWTH DURING THE PERIOD OF TRANSITION FROM INFANCY TO EARLY CHILDHOOD

Development of Motor Co-ordination.—The period from nine to eighteen months is one of rapidly increasing facility in locomotion. Forbush, Shinn, Rasmussen, Gesell, Koffka, and Stern all agree that this is a time in which the child learns to creep, to pull himself up by chairs, to climb, to walk, and to control his body as a whole. Shinn and Fenton report that the children being observed by them climbed stairs and "everything else possible" at twelve months. It is not unusual to see children of fifteen months climbing stairs with the aid of a banister, one step at a time and on all fours much as puppies do, or coming down stairs, again with the aid of a banister, by dropping to a sitting posture on each stair, wriggling to the edge, standing on the next stair below, dropping down, and so on. If given sufficient opportunity for practice on stairs that do not offer too great hazard, children of eighteen months can ascend and descend stairs in an upright position and with the aid of a banister only.

With all the experimenting in general bodily movement characteristic of this age, it is interesting to note that dropping from a standing to a sitting position takes almost as much, if not as much, learning as pulling up from a sitting to a standing position. Most children, however, have achieved both skills by the time they are a year old. The proportion of the body, the short legs and longer trunk, tend to make the movements clumsy and it requires a long period of experimenting until the child can adjust the center of gravity of his body so he can stand and move with the assurance of not falling.

Walking is the most spectacular accomplishment of this age. We give it a good deal of attention because it seems a single general developmental process which epitomizes the previous motor development. It is, in a sense, a summary of the child's preceding motor accomplishments, and has come to be so regarded by parents and nurses. Most people fail to catch the significance of failure to splash in the bath at three or four months of age, or to oppose the thumb in grasping before six months, but few people are undisturbed if their child fails to walk by the time he is eighteen months old.

We find occasional reports of children who have walked at nine months, a rare report of walking at eight, or even at seven months. A much more usual age, however, is twelve months, Gesell reporting 20 to 49 per cent of his children walking alone at this age. Variot* states that 67 per cent of children walk between the age of eleven and fourteen months. A few children, otherwise normal in development, may fail to walk before eighteen or twenty months because of physical illness, lack of practice, or other reasons.

We are inclined to think of walking as a function established and complete in a fairly brief space of time at the close of the period of infancy; we fail to realize that as a skill it begins its training in early infancy with the stretching and wrigglings which teach coordination and lend strength to all muscles of the body; nor do we as a rule understand that progress in perfection of the skill of walking extends throughout the entire period of childhood. Before the child walks he must have experienced a long prerequisite training in coordination and strengthening of the muscles which begins as early as the third or fourth month and continues well past the two year level. Baldwin and Stecher[7] studied the skill of three to five year old children on a walking board and found a progressive increase in this ability from three to five years with a maximum increase between three and four years. Gesell[42] reports continued progress in locomotion

* Variot, G., Sur les Facteurs Normanx et Morbides qui Peuvent Advancer ou Retarder le Debut de la Marche Bipede chex les Jeunes Enfants. Bull. and Mem. Soc. Med., 1927, 43, 353–361.

throughout the preschool period and cites the sequence as follows: "In four months the child holds his head erect; in nine he sits erect; in twelve he stands erect; in eighteen he walks with a skill which is distinctly human. Hopping, skipping, jumping, standing on one leg, dancing, perhaps even pirouetting may all come before school age." All these are regarded by Gesell as important aspects of the skill of locomotion.

There is a marked difference of opinion among writers as to whether locomotion and other motor accomplishments come as the result of inborn urges or as a result of habituation and training. Gesell says, "It is not implied that all these motor attainments are the outgrowth of habituation and training. Inborn propensities assert themselves at varying stages. While he is acquiring head posture he is impelled to raise his head from the pillow; while he is gaining back control he has an urge to raise his back; when this is raised he sits, he has a similar propensity to stand, and thus he both propels and is propelled along his upward course." Thus he makes clear that inborn propensity and training react upon each other,—are supplementary and reciprocal.

If we regard the degree of satisfaction accompanying an act as evidence of the innate character of that act, we can scarcely dispute the innateness of the urge toward locomotion, at least in most children. The thrill of accomplishment which accompanies each new bit of learning seems genuine as he throws back his head to crow his delight, or as he abandons himself to an orgy of practicing his new achievement. The number and severity of bumps that some children take without complaint or discouragement in the process of learning upright locomotion seems proof of intense absorption. We miss an excellent opportunity to teach physical courage if we curb his freedom or seem too concerned over his bumps during this absorbing learning period.

Anderson,* too, states the case for innate urge and influence of environment extremely well: "While it is

* Anderson, John, The Development of Motor, Linguistic, and Intellectual Skills in Young Children. Reported at the Toronto meetings of Research in Child Development, Toronto, Canada, May, 1929.

true that the level at which the individual functions with respect to any particular activity is a function, in large part, of hereditary equipment, nevertheless functioning is also the product of the number of times or specific situation in which that particular activity has been exercised. The environment furnishes the stimulation and the occasion for the development of the skill. The inherited characteristics of the individual determine, under a given amount of environmental stimulation, the level and the limit to which the skill *can be** developed; the environment determines the extent to which the skill *is** developed."

Since so much importance is attached in the minds of most parents to the achievement of walking, let us analyze *some of the reasons for delay.* From what has been said above, we can readily understand that walking is a skill, the development of which depends upon many things. Variot thinks that the most important factor in walking is age, meaning that if we were to correlate success in walking with all other factors possible we would find the highest correlation to be between success and the ages of the children studied. He also feels that the most frequent reason for disturbed or retarded walking is to be found in acquired or congenital diseases of the nervous system.

There are, however, a number of other factors which contribute materially to success or failure in walking. The child's nutritional condition and general physical health are of prime importance. If he is greatly overweight, if his muscles lack tone, or if he suffers from rickets, he cannot be expected to support himself in an upright position as soon as would a normal child. If he has been or is ill, he probably lacks the necessary muscular strength for walking, since, being a new and unaccustomed activity the demand on strength and energy is great. Illness handicaps him also because it curbs his interest in activity and thus deprives him even of the amount of practice his small physical strength might endure.

Space which is too limited, floors which are too slippery or too drafty or too dirty to permit freedom for practice,

* Italics ours.

will handicap the child. He should have the larger part of some room in the home, the floor of which is protected from drafts and if possible equipped with linoleum which can be kept clean but which is not too slippery for unskilled feet. Clothing and shoes are important, too, since the child must not be hampered by dresses which upset him when he tries to stand, nor by shoes that are too small or too soft. He should wear the minimum amount of clothing permitted by the weather,—overalls which fit closely enough to keep out of his way conserve laundry. Shoes with a firm enough sole to support his feet, as well as to keep him from wearing blisters on his feet are helpful. Corset shoes (high shoes with corset steels to support the ankles) are neither necessary nor desirable since full play of the muscles is necessary to strengthen the feet. Lace oxfords are to be preferred unless high shoes become desirable for warmth in winter or for support of an overweight child. Button shoes or slippers with button strap do not offer enough support because they cannot be adjusted daily to the child's foot and leg.

Not many years ago we thought that every child who delayed walking beyond the twentieth to twenty-fourth month would turn out to be feebleminded. The chief reason we worried about his slowness was, not that he might be physically or emotionally inadequate, but that he might be intellectually inferior. But having followed children who were late in walking we now know that they often turn out to be normal or even superior in intelligence. Aoki* found in studying 53 children of school age a correlation between age of first walking and mental test scores made at the time of the study to be only 0.19, which is not a significant correlation. He found the correlation between age of walking and scholarship in school to be 0.53, a significant but not a high correlation. On the other hand Mead,† in comparing the age of walking in feebleminded children with that in normal children found that the normal children

* Aoki, S., Significance of First Walking in Child's Development. Shinri Kenkyu (Psychological Studies), 1926, 21, No. 1.

† Mead, C. D., The Relation of General Intelligence to Certain Mental and Physical Traits. Teachers College Publications, 1916.

she studied had walked on the average at thirteen and eighty-eight hundredth months, whereas the feebleminded children studied did not achieve this skill until twenty-five and eight hundredths months on the average. It seems evident that all feebleminded children are late in walking, but the converse is not true, since all children who are late in walking are not feebleminded.

Certain emotional factors are also of importance in determining the speed with which children learn to walk. Severe accidents may produce fear and timidity. Too great anxiety on the part of adults over casual bumps may convince a timid child that he takes too great a risk in trying to walk. Too great enthusiasm over his first attempts may inhibit a self-conscious child, or too ready laughter at the "cuteness" of his gait may take on an aspect of ridicule. If the parents become over-anxious because he does not walk the feeling of anxiety soon conveys to the child attaching excessive importance to his learning and making him too afraid of failure.

Again, some children have no motive for walking or locomotion of any kind, and this may prove sufficient to delay the effort, especially if they have not discovered the thrill of movement for its own sake. It is a good idea to let the six or eight-months old baby struggle a bit when he has let his rattle drop only a few inches from him. The thrill of recovery will attach satisfaction to his efforts and encourage him to make a greater effort the next time. Give a nine to twelve-months old baby a ball to play with. The urge to pursue it will provide him with real motive for practice in locomotion. In fact, balls of varying sizes and weights provide an unexcelled type of "teaching toy" from a few months through the entire period of childhood. Some of the child's wants that can be obtained through his own locomotion should be withheld in order to provide him with natural motives for practice and with natural satisfactions as rewards for his activity. Thus, he may learn the joy in activity for its own sake which will serve him well as a habit of health in later years. Other children to play with provide natural circumstances which encourage

activity and are from an early age as important for this reason as for the reason that they give stimulus to social development.

We should remember, too, in this connection that walking, like all other motor and verbal skills, may suffer an apparent set-back because of illness or because of a diversion

Fig. 25.—This simple backyard equipment is one mother's solution of the exercise problem.

of attention to some other activity. All development is dynamic. It seldom flows smoothly and continuously. Children often seem to have learned to do something and then to forget it. This is because, although the first learning has been accomplished, attention may be turned elsewhere before the motor habits have been well set, and the child seems to forget for a time what he had learned. When attention returns, however, we find that he has not entirely forgotten, but soon "brushes up" the learning and goes on with the fixing of the skill habits.

In considering the increased activity which accompanies the growth of the infant and increasing age, it seems important to mention the value of equipment involving the use and growth of muscles as well as the place equipment may have in the sensory development of the young child. For the very young baby equipment for motor development involves objects which can be used in the immediate environment of the crib. As sensory development progresses the arms and hands are moved, waved about and the muscles of the arms and back, as well as those moving the hand come more and more into use. Substantial balls which may be "felt" and waved about are simple toys which increase and encourage the use of muscles at this early period of development. A specific time when the infant is given complete bodily freedom for kicking his legs and waving his arms should early become a part of the daily schedule. The period immediately after the morning bath is often used for such activities.

Equipment in the yard or playground for a child of nine to eighteen-months is filled with opportunities for development of motor control and motor coordination. For the finer movements, similar to those used in indoor equipment, the sand pile, with dishes, spoons, and sieves, activities of pouring sand and shoveling sand, with pails for carrying, all are a part of the equipment which aids in the development of finer motor coordination, in the use of muscles. The equipment out of doors develops in the very young child a sense of balance and surety about his own body. Climbing up and down steps and slides, climbing over packing boxes, the jungle jym or some substitute for climbing, all of which necessitate the use and development of the larger muscles of the legs, arms and back and develop a surprising agility at an early age.

The supervision of an adult on the playground should be almost entirely that of an "on-looker" who may anticipate dangerous situations, encourage and suggest, giving the child a feeling of safety and a sense of accomplishment and success rather than failure—*without interference*—allowing the child to explore at his own will, to learn about places

and things by his own experience and not through "pressure" or "bullying" from an adult. Kiddy-Kars, swings, teeter-totters gradually may become a part of the experience of a child of eighteen months.

The training in muscular coordination that comes to young children through climbing up and down steps, over large boxes, pushing loaded wagons we have no way of measuring. It is not uncommon, however, to observe in children a certain unskillfulness in handling their bodies, a certain sense of physical instability which results from not having had an opportunity to perform these movements. A case in point is that of Edward. When Edward came into the nursery school at twenty-five months of age, he had lived all his life in the second floor of a duplex apartment. There had been no yard or outdoor play space, and he had been carried up and down the steps into the apartment and when out on the street was either wheeled by his mother in his "go cart" or led by the hand for a few blocks. He had no experience in the coordination of his body in climbing a ladder, mounting the jungle jym, climbing into the crow's nest. All these movements had to be learned. It was several months before he could mount without apparent concern the small ladder by which children of his own age climbed to the measuring board in the physical growth laboratory. So far as one could judge it was not fear of falling but an inability to induce muscular coordination. That his environment was responsible for this condition was proved by his prompt response to opportunity to use play equipment and the subsequent disappearance of his awkwardness, lack of balance, and sense of physical instability.

From nine to eighteen months the *development of use of the hands* is significant. The skill with which children use their hands for exploration and manipulation largely determines the amount of stimulation available to the growing intellect; for, unless the child has gained facility in locomotion and in manipulation his intellectual environment is seriously restricted. At nine months the baby is restricted in his environment to the space he can cover by creeping; but

at sixteen and eighteen months he can walk, run, and climb, thus extending his environment for exploration to practically every part of the house and yard. He need no longer wait for things to come to him or to be taken places; he can now go to new scenes on his own volition. His delight in motor achievement occupies him tremendously at this period, yet, he seems to have also an almost insatiable appetite for sensation. In fact, his investigative trend often leads him into trouble, since he has not yet learned that ink bottles and gas jets are to be let alone. Everything seems to offer him possibilities for new sensations. Mother's dressing table, father's desk, the kitchen cabinet lure him irresistibly.

The child begins now to discover bigness and littleness, hardness and softness, roundness and squareness, heaviness and lightness, and all the other properties of objects, as yet only superficially, but nevertheless, as factors to be learned about and to be taken account of in action. Eye-ear associations, eye-hand coordinations, the relations of each sense and each bodily skill to all the others are being built up rapidly. He is, in a sense, perfecting the machinery by which he is to learn about the detail of the world around him. The learnings themselves are well begun when he is eighteen months old, but so much takes place in the next age period that we shall reserve our detailed discussion of sense perceptions until the next chapter.

At six months, we recall, the child has learned to use his thumb in opposition to his fingers in grasping, but he has not yet discovered the advantage of a "pincer technic" (Gesell's term) in picking up objects. If he wishes to secure an inch cube or other small object from his tray he uses a "palmer scoop" (also Gesell's term), descending upon the object with his whole hand and usually succeeding in picking it up only when he has pushed it against a corner or side of his tray. At nine months, however, he has learned the advantage of approaching the object with his fingers and thumb, and can usually pick up small objects between thumb and fingers or approach a small dish by

placing thumb and fingers over the edge. At twelve months he is fairly skillful in the manipulation of objects, and can place a cube in a cup, a cup on a saucer, or one small tray on top of another with comparative ease. In fact, the use of objects, one in relation to the other, as cup on saucer or spoon beside plate, is usually begun at this age.

Gesell has an interesting test to show the child's adaptation to materials which interest him. If we present a child of less than six months with a small wooden cube and then with a second, he is more than likely to drop the first in order to take the second. At four months he usually reaches incipiently with both hands, his whole body as well as both hands participating in his eagerness. Such reaching is not as a rule effective; but soon the reaching becomes more nearly narrowed to the use of the two hands and becomes more efficient. At six to nine months the greater efficacy of reaching for objects with one hand has been learned, and as is characteristic of new learnings he seems unaware for the moment of other possibilities; so he uses only one hand, dropping one prized object for another. He learns quickly, however. By nine months he uses each hand with enough independence from the other that he can retain the first cube while he reaches for the second. Three cubes, though, are too much for him; he drops one or both of the first two to gain a third. At twelve months he is equal to three, occasionally reaching for the third with his mouth, and at eighteen months he can accept a fourth or even a fifth without losing those he already possesses.

It is interesting to note in connection with use of the hands at this age that learning to let go of objects is almost as difficult as learning to take hold of them. We can see this if we watch a fifteen to eighteen months old child learning to throw a ball. At first he is almost sure to let go of it at the wrong time, dropping it behind him or flinging it straight up in the air. He usually takes several trials to learn just when to let go in order to make an effective throw.

It is interesting, too, that in spite of the fact that he has at nine months learned to inhibit one hand in reaching,

he still has at twelve to eighteen months a tendency to balance other types of movement by symmetrical movement in both halves of the body. We see him feeding with one hand and duplicating part of the movements in the other, or stirring in the sand box with one hand and making circular movements in the air with the other. These symmetrical movements must be inhibited as he grows, since he must learn to use two hands together in cooperative but not duplicated movement. Drummond[32] notes that the child Margaret used one hand to hold the waste paper basket and the other to get the paper out of it at twelve months, but succeeded in doing so only after many unsuccessful attempts to do it all with one hand.

The child should have a small corner of some room in the house for his own in which he may be surrounded by certain of his individual possessions and equipment. By eighteen months he enjoys carrying large blocks back and forth, and is developing an increasing interest in building with blocks. The finer, more carefully adjusted movements are encouraged by the use of equipment at table play—such as form boards, cylinders, peg boards, boxes with covers, etc. Everyone is acquainted with the baby who when first creeping finds his way to the kitchen cupboard where he loves to pull out the pots and pans and manipulate covers, parts of double boilers, etc.

In summary, the following are some of the motor performances that investigators have found characteristic of *twelve months* old babies. Authorities are cited wherever authorities seriously disagree.

Can open and shut lids; pull things out of boxes and sometimes put them back. Can put the cork in a bottle.

Is dainty and fairly skillful with pincer technic in handling small objects. The thumb and forefinger are specialized for use in touching and pointing.

Makes funny faces—can amuse himself thus—it is not wise for adults to be too amused at this unless they are prepared to refrain from punishing the same trick later.

Can throw a ball (according to Fenton and Lucas).

Can walk with help (Stern and Bainard).

Can lower self from standing to sitting position.
Climbs stairs using hands and knees (Shinn and Fenton).
Can hold a crayon and make strokes (Gesell).
Can hold cup to drink from (Gesell).
Is learning to inhibit hand to mouth.
Pulls off own stockings or cap; waves "Bye-bye"; plays pat-a-cake.

At *eighteen months* his motor accomplishments are in general more skillful.

He handles objects more smoothly and with greater sureness; he can not only pull things out *e. g.*, books from the bookcase, but can turn the pages deftly and can learn to put them back.

He walks alone, can even run, walk up a low inclined plank with good balance, can climb the stairs in an upright position one foot at a time with or without the banister, and can do queer jigs to music.

He can cross his feet, and can stand on one foot (Stutsman).

He can scribble with pencil or crayons, string large beads, build a straight tower of at least three blocks, fold a single crease in a paper.

He can take off his shoes and stockings; can learn to wash his own hands and face; can help set and clear his own low table; can wipe a dish or two; can learn to dust, and to wipe up spilled things, and can use his handkerchief properly.

He can eat with a spoon without much spilling; can hold his glass and drink neatly.

Before leaving this account of motor skills we must again recall that their development depends on native ability in part, but also upon opportunity. The right physical and emotional environment determines the extent to which native ability can be developed. Plenty of space, simple equipment, and freedom from over-supervision are requisite to sound motor growth.

Energy Demands.—The energy demands of the child at this period are increasing rapidly. Not only must they meet (1) the maintenance of the life processes which are more rapid than the adults, but must provide for (2) the

muscular activity, which increases rapidly and is comparatively great, and (3) allow for storage in growth. It is estimated that the child may store from $\frac{1}{4}$ to $\frac{1}{3}$ of the calories which represent his total food intake. Internal activity, of which pulse and respiration are examples, also make demands upon the energy intake. Rose[112] advises allowing 40 calories per pound of body weight for the later part of the first year.

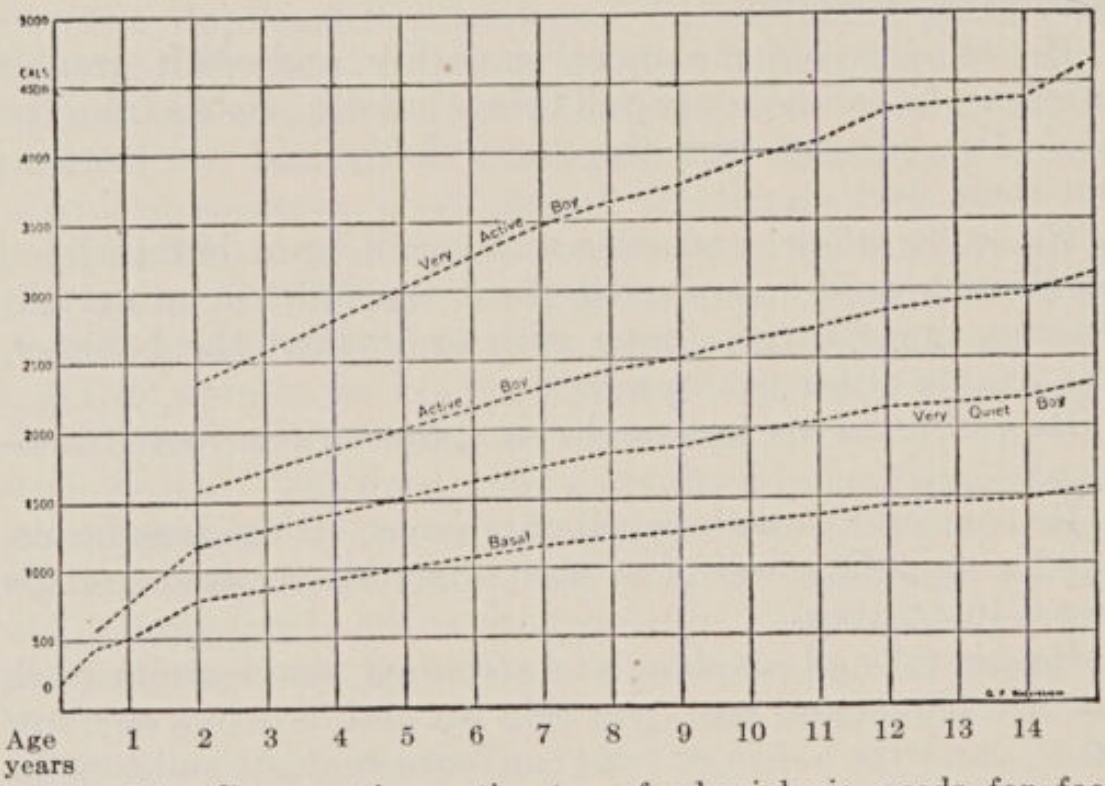

Fig. 26.—Comparative estimates of physiologic needs for food (in calories). (Lusk, Jour. of Home Econ., Baltimore, Vol. X, p. 281, 1919.)

It is to be remembered that crawling, walking, in fact all bodily movement, is accomplished with great effort at this age. This is due to the fact that the muscular coordination is not fully developed. It is true also that the body is not yet able to effectively regulate losses of its own body heat.

Murlin* believes that the influence of muscular activity becomes an increasingly important factor in the total metabolism as the child grows older. He estimates the

* Murlin, J. R., "Physiology of Metabolism in Infancy and Childhood," in Abt's *Pediatrics*, Vol. I, Ch. V. (pp. 520–847), p. 661.

basal requirement for an infant to be 60 calories per kilogram per hour. If the infant cries very much and very hard his average energy requirement may be increased 40 per cent. For the average infant, if he sleeps an average length of time the allowance for activity should not be more than 15 per cent of the total energy requirement.

The requirement for activity increases steadily as the child spends more and more time awake. The requirement for growth in relation to weight increases certainly for the first three months and possibly up to six months, after which it flattens out. As the child grows older and passes beyond the nursing age, the muscular activity becomes so great as to present peculiar problems to the investigator whether of basal metabolism, of muscular efficiency or of the total daily needs. Figure 26 shows very clearly the influence of activity upon metabolism and in turn upon the total food requirement from birth to puberty.

TABLE XI*

HEIGHT STANDING (INCHES) BOYS AND GIRLS NINE TO EIGHTEEN MONTHS

(Federal Children's Bureau†)

Age (months).	Height.	
	Boys.	Girls.
9 months, under 10	28.250	27.625
10 months, under 11	28.625	28.125
11 months, under 12	29.000	28.500
12 months, under 13	29.500	28.875
13 months, under 14	29.875	29.250
14 months, under 15	30.250	29.750
15 months, under 16	30.625	30.125
16 months, under 17	31.000	30.500
17 months, under 18	31.375	30.875
18 months, under 19	31.750	31.250

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have changed to decimals.

Increases in the height of boys and girls during this period (9 to 18 months) average $3\frac{1}{2}$ inches, which is just half of the increase during the first nine months of life. The increases in weight for these increases in height average 4.9 pounds for boys and 4.4 pounds for girls, as compared to 11 pound gain in the first nine months. Although the increases in height and weight are less in this period than in infancy they are not therefore unimportant and should be watched with the same diligence. Tables XI and XII taken from the Children's Bureau Standards shows the increases in height for each month and the accompanying increases in weight for corresponding increases in height.

TABLE XII

WEIGHT* (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS NINE TO EIGHTEEN MONTHS

(Federal Children's Bureau)

Height (inches).	Weight.	
	Boys.	Girls.
28.25	19.687	19.312
28.50	20.000	19.625
28.75	20.312	19.937
29.00	20.625	20.250
29.25	20.969	20.500
29.50	21.312	20.750
29.75	21.656	21.000
30.00	22.000	21.250
30.25	22.312	21.344
30.50	22.625	21.437
30.75	22.937	21.531
31.00	23.250	22.625
31.25	23.562	22.807
31.50	23.875	23.187
31.75	24.187	23.469
32.00	24.500	23.750

* Weight for height fraction of whole number, such as 20.25 etc. obtained by calculation.

Dentition.—Scammon[118] in discussing the chronology of the eruption of teeth says that "the eruption of both the deciduous and permanent teeth is subject to great individual

and probably some racial variation. Usually the eruption of the former begins with the lower central incisors in the early part of the second half year and ends with the second molars in the latter part of the second year. As a rule, the eruption of the deciduous teeth takes place in a series of periods of activity which are separated by periods of quiescence which grow progressively longer, but there is considerable variation in this process." Table XIII presented by Scammon gives the details of the calcification and eruption of the deciduous and permanent teeth.

Lewis and Lehman* have concluded from a study of observations at Merrill-Palmer School on 170 children, eighteen months to nine and one-half years of age, that occlusion of the deciduous series is functional in nature and in general obeys the biological law of continuous change. They have found that occlusion is affected by growth changes and by factors influencing growth.

For example, in thumb sucking cases where the habit has not been broken, the resultant malocclusion remains practically static. When the habit has been broken before the fifth year, the resultant malocclusion has a tendency to correct itself.

Moreover, Lewis and Lehman found through this study that only in a few cases was *attrition* (teeth worn down by rubbing) present and in the large majority of cases there was no appreciable amount of attrition discernible. They have noted the fact that Merrill-Palmer children have a well-balanced diet including a variety of foods requiring vigorous mastication, and if chewing wears teeth down Merrill-Palmer children should exhibit attrition. However, it seems possible that there may be a relation between high calcium and high vitamin diet resulting in well calcified teeth and the absence of attrition in the growing child. Furthermore, the early introduction of foods such as zwieback which exercise the jaws and teeth, stimulating the circulation in the gums, all points to the presence of

* Lewis, S. and Lehman, I., Observations on the Growth Changes of the Teeth and Dental Arches. *The Dental Cosmos*, Vol. LXXI, No. 5, May, 1929.

TABLE XIII*

SUMMARY OF THE DEVELOPMENT OF THE DECIDUOUS AND PERMANENT TEETH
(Based on the Observations of Broomell and Fischelis, and Rose)

Deciduous Teeth

Upper and lower teeth.	Calcification begins.	Calcification completed.	Usual time of eruption.	Decalcification begins.	Shedding begins.
Medial incisors	4th fetal mo.	16th to 18th mo.	6th to 8th mo.	4th yr.	7th year
Lateral incisors	4th fetal mo.	10th to 16th mo.	7th to 9th mo.	5th yr.	8th yr.
Canines	5th fetal mo.	2 yrs.	17th to 18th mo.	9th yr.	10th yr.
First molars	5th fetal mo.	18th to 20th mo.	14th to 15th mo.	6th to 7th yr.	10th yr.
Second molars	5th fetal mo.	20th to 22nd mo.	18th to 24th mo.	7th to 8th yr.	11th to 12th yr.

Permanent Teeth

Upper teeth.	Calcification begins.	Calcification completed.	Average time of eruption.		Usual period of eruption.
			Males.	Females.	
Medial incisors	1st yr.	10th to 11th yr.	7 yrs. 8 mos.	7 yrs. 5 mos.	7th to 8th yr.
Lateral incisors	1st yr.	10th to 11th yr.	8 yrs. 11 mos.	8 yrs. 6 mos.	7th to 8th yr.
Canines	3rd yr.	12th to 13th yr.	12 yrs. 2 mos.	11 yrs. 7 mos.	12th to 13th yr.
First premolars	4th yr.	11th to 12th yr.	10 yrs. 5 mos.	10 yrs. 1 mos.	8th to 11th yr.
Second premolars	5th yr.	11th to 12th yr.	11 yrs. 4 mos.	11 yrs. 1 mo.	11th to 12th yr.
First molars	10th fetal mo.	9th to 10th yr.	6 yrs. 7 mos.	6 yrs. 6 mos.	6th to 7th yr.
Second molars	5th yr.	16th to 18th yr.	12 yrs. 9 mos.	12 yrs. 5 mos.	12th to 14th yr.
Third molars	9th yr.	18th to 20th yr.	.....	.....	17th to 20th yr.
Lower teeth					
Medial incisors	1st yr.	10th yr.	6 yrs. 10 mos.	6 yrs. 7 mos.	7th to 8th yr.
Lateral incisors	1st yr.	10th to 11th yr.	7 yrs. 11 mos.	7 yrs. 7 mos.	8th to 9th yr.
Canines	3rd yr.	12th to 13th yr.	11 yrs. 2 mos.	10 yrs. 3 mos.	12th to 13th yr.
First premolars	4th yr.	11th to 12th yr.	11 yrs. 3 mos.	10 yrs. 8 mos.	10th to 11th yr.
Second premolars	4th to 5th yr.	11th to 12th yr.	12 yrs. 0 mos.	11 yrs. 7 mos.	11th to 12th yr.
First molars	10th fetal mo.	9th to 10th yr.	6 yrs. 5 mos.	6 yrs. 3 mos.	6th to 7th yr.
Second molars	5th year	16th to 17th yr.	12 yrs. 3 mos.	11 yrs. 9 mos.	12th to 16th yr.
Third molars	8th to 9th yr.	18th yr.	.....	.....	16th to 20th yr.

* Abt Pediatrics, Volume I, p. 302.

"healthier" teeth. It is necessary to teach the young child to chew. This should be done at an early age and it should be remembered that this is a process which is learned by the child and is not instinctive. The mistake is often made of giving sieved and mashed food for too long a period after the child's teeth have erupted when he should be taught to chew. Teaching the child to chew requires patience and close supervision on the part of the parents, since allowing food to be swallowed in large unmasticated pieces should not be permitted.

Physical Régime.—The *problem of meeting the increasing physical needs of the child* is not one that can be left to chance. The rapidly developing body, the increasing energy requirement incident to crawling, walking, learning, playing for many hours daily, all mean that the quality and the quantity of food must be chosen with these needs in mind.

In the opinion of many pediatricians the child should have been gradually introduced to cow's milk and a variety of fruits and vegetables, eggs and liver by the time he is weaned. There is reason to believe that many of the undesirable attitudes of children toward certain foods have their inducing cause in the suddenness with which children are introduced to these foods and in the amounts they are forced to consume before learning to like them. By the end of the first year the following amounts are reasonable to expect a child to eat; one quart of whole milk either to be drunk or taken combined in soup; ½ slice whole wheat bread or the same toasted; 5 tablespoons of orange or tomato juice; ½ teaspoon of cod liver oil; 3 to 5 tablespoons of cooked fruits, such as prunes and apricots; 5 tablespoons of finely minced green vegetables, such as peas, spinach, string beans, carrots; 3 to 5 tablespoons of mashed potato and 3 to 5 tablespoons of cereal, preferably whole grain cereal; half to one yolk of an egg, 1 to 3 teaspoons liver sieved, or the same amount of scraped beef. Cream soups can be used also to vary the menu.

Food, in the amount suggested above provides a diet adequate in amount and in quality for the growth at this

period. It is essential to provide everything necessary for the child to grow strong and to build the right kind of foundation for the habits of a life time. Rose[111] says, "One year of good feeding at the beginning of life is more important than ten after forty, and a baby's needs are not to be judged by an adult's inclinations. Feeding must be a matter of principle and not of impulse; the reward will be partly in the present—much more in the future."

It is to be remembered that the child is getting acquainted with his world and the taste of different kinds of foods which are wholesome for children is part of the experience on which he is to build his habits. It is time well spent to prepare the foods so that they are palatable and inviting, and to vary the diet from day to day so it gives a change in consistency and flavor.

Regular hours for eating, sleeping, sun baths, a nap in the afternoon (perhaps in both afternoon and morning until about twelve to fifteen months); regular bed hours for retiring, regularity of elimination, plenty of fresh air are essential to the development of a sturdy constitution, of a strong digestive tract able to stand the inevitable strain of adult life, and of good habits and attitudes toward living.

There is too prevalent a belief that if foods such as coffee, tea, watermelon, ice-cream, do not make a child ill when he eats them, then they are good for him. This conclusion, however, is unwarranted. The most insiduous result of the giving of such foods is the perversion of his appetite so that he does not desire the foods which are best for him.

As emphasized in the discussion of the establishment of daily habits of the infant regularity of bowel and bladder elimination is important, since at this time in the life of the child training for the toilet is begun.

Control over bladder and bowel elimination is an important aspect of motor development from twelve to eighteen months. Some children, if sufficiently regular in elimination, can be taught to control the sphincter muscles before they are a year old. The process of teaching is one of "conditioning," or accustoming, the child so that he learns to associate with the process of elimination the feeling of

the chair or chamber against his buttocks. Many mothers place the infant on chair or chamber whenever time for elimination is about due, usually immediately before or after feeding. The process is timed so that the child eliminates while on the chair and thus associates the elimination with the sitting posture and the chair. Every time he eliminates under these conditions the association is strengthened and there is less likelihood of his eliminating under any other. Eventually, if we are persistent, the habit becomes fixed.

Some parents, however, find attack upon this training problem when the child is still so young too trying for them and too wearing for the child. If the child is not stable and well, some writers advise waiting until after the first birthday to begin toilet training. Blatz and Bott[12] recommend as a normal program of training beginning bowel training at three months and bladder control at fifteen to eighteen months.*

Imitation.—There is a great deal of dispute in the field of Psychology as to whether children imitate movements that they see or sounds that they hear as the result of an instinct to do so or as the result of chance learning. Thorndike denies that there is any general tendency on the part of infants to duplicate behavior seen or sounds heard, and thus denies that there is an instinct of imitation. He thinks that children learn to do the things they see and hear done around them not as the result of an instinctive tendency to imitate but as the result of chance learnings. For example, the baby does not imitate our smile; he simply smiles because he is happy and comfortable. It just happens that he is often happy and comfortable when we are pleased with him. We smile as the result of our pleasure; he smiles spontaneously because he is happy and not because he sees us smile.

It is true too that much of the behavior of infants which originates as chance play or as spontaneous reaction to situations becomes fixed as habit because we like it, or is

* An excellent discussion of toilet training can be found in Blatz and Bott: *Parents and the Preschool Child.*

eliminated from his repertory of play tricks because we dislike it. Since we ourselves tend to do the things we like to do and to avoid doing the things we do not like to do, it becomes fairly evident that we tend to pick out for preservation from the baby's chance play the tricks we do ourselves. Thus the baby learns the same things we often do, and may appear to have spontaneously imitated our behavior when in reality he has been taught the behavior by us. There can be little doubt that much of the behavior of children is initiated as the result of instinctive play, and that whatever elements of that initiated behavior prove acceptable to the adults (and later to other children) about him receives their commendation and hence results in satisfaction to him. Doubtless, also, the elements of play which prove indifferent or distasteful to surrounding persons receive either no praise or actual condemnation and hence result in dissatisfaction. In this way acceptable behavior is preserved, and distasteful behavior eliminated. Thus it is maintained by many psychologists that the child comes to reflect the likes and dislikes, the attitudes and tastes of those about him by a process of selective learning rather than by direct imitation.

That there is a more direct reproduction of tastes and attitudes, of gestures and skills than this is the point under dispute. Most writers on child care and training, however, seem to assume that at least part of the child's tendency to duplicate the behavior and attitudes of those about him is due to a direct imitation of model. Stern and Preyer cite instances of imitation of specific sounds before their children were three months old. Fenton, Shinn, Rasmussen, Forbush, and Gesell give instances of direct imitation of movements before six months. "Bow-wow," mewing like a cat, "peek-a-boo," "pat-a-cake," imitative crushing of paper, throwing a ball, are all familiar in the behavior of nine-month-old babies. "Bye-bye," imitative combing of hair, kissing of a doll, scribbling with a pencil are common at twelve months. The two-year-old child begins to show us our own mannerisms. One little girl learned to greet everyone with the same swinging gesture and the same

strident-voiced "How's evabody?" that her father used. Many mothers learn for the first time of the querulous tone which creeps into their "discipline voices" when they hear their two-year-old child disciplining his doll in careful imitation of the adult manner.

Since imitation will not be discussed again it may be said in this connection that from two years onward we find play time much occupied with "housekeeping," "traffic cop," "hospital," "shopping tours,"—play in which the child duplicates as faithfully as he can the activities, gestures, tones, and other incidents of adult behavior which have happened to attract his fancy. He is rude with the rudeness of adults whom he admires, or courteous with the easy grace of the fine example of those whom he loves. He speaks clearly and accurately, or mumbles bad grammar and profanity; he is neat or untidy, quiet or boisterous, truthful or sly, at least in large measure according to his example. Whether he reproduces the behavior and attitudes of the people about him by instinct or by selected habit is not as important to our consideration as is the fact that he does reproduce. The best way to teach courtesy is to be courteous before the child and to him. The best way to teach good English is to speak it to children while they are in the early learning period of language development. The best way to teach good attitudes toward health, toward authority, toward truth, toward society, is to have good attitudes ourselves, since children reflect the subtleties as inevitably as they imitate our more obvious gestures and tones of voice.

The model for imitation may not, of course, always be the parent. It will, however, always be someone whom, for some reason, the child loves or admires. This will be the parent or nurse until the child begins to meet other people. As contacts widen, potential models become more numerous. The strident profanity of a truck driver in the street may appeal to the child as "grown-up" and prove an attractive model. The pranks of the neighborhood "bad boy" may receive so much attention and create so much excitement that they appeal to all the other children in the neighborhood as worth duplication.

It would be a mistake to protect the child from all undesirable models, for, unless he has some experience in the selection of standards, he can scarcely be expected to use good judgment in the matter when he no longer has his parents to think for him. He should not, however, be overwhelmed by too sudden or too constant exposure to undesirable models, but should rather have a gradual experience with them, being constantly exposed to enough attractive and desirable models, either in life or in literature, to keep the balance a favorable one. Parents, being his first and his most constant models, have a great balance of power in their favor, especially if they are skillful enough to make themselves effective in this capacity.

Language Development.—From the age of nine months at which time the child usually has a passive or "understanding" vocabulary of several words, he acquires further understanding rapidly, depending, of course, upon how much language he hears. At a year he understands simple statements if they are spoken slowly and clearly and are repeated: "Where is the baby's ball?" "Give mother the spoon." "Do you want to go bye-bye?" Most children a year old can speak three or four words, using them with correct meaning and upon the right occasions. These words are usually simple and are often repeated syllables like "ma-ma," "da-da," "bye-bye," "baby," "down," "dog."

At eighteen months the variety of words found by Gesell[42] in the active vocabulary of a large number of children was several times as great as the variety found at twelve months. From one to nineteen per cent of children of eighteen months had achieved one or two simple phrases. On the average, however, the actual increase over the twelve-month's standard in number of words spoken is small, the average number being given by Gesell for twelve months as three words and for eighteen months as five or less. It is possible that this slowness of development is due to the fact that a great deal of energy and attention are devoted to walking at this twelve to eighteen months period. Watson[154] implies this when he says that after the

child has made a few steps alone he is likely to indulge for a short time in almost incessant practice in walking. Watson does not say whether this is the result of pleasure in the new response or simply a phase of development, but that motor activity occupies much of the child's attention seems clear.

A good model for language is particularly important at this period of beginning expansion of vocabulary as well as during the later more rapid increases in understanding and use of words. The young child when learning his native tongue is faced with many of the difficulties which confront adults when learning a new and foreign language. He finds his task much easier if he hears words spoken clearly and slowly, especially if they are closely associated with the object or action they express. When dressing him we may speak of his "shoes," his "dress," his "stockings," as each is used. In feeding him we may refer to his "spoon," his "milk," his "orange-juice," thus associating the right sound with its appropriate object. If we say, "throw the ball," as he throws it, or "no" as we draw his hand away from a forbidden object, we help him to associate the right sounds with their appropriate action. Practice with "where is baby's nose," "cover up your dollie," "show mother the book," provides the child with a pleasant game—unless, of course, it is overdone—and gradually extends his understanding or passive use of words and phrases which he is soon to put into active use.

Social and Emotional Development.—From nine to eighteen months the child expands his interests rapidly. He makes continuous progress toward differentiation of himself as a personality. He is no longer confused about why his toes and fingers hurt when he bumps them or bites them. He has extended his love from his concentration upon himself and his own needs and comforts to include his mother or nurse. It is still a self love which he gives, since it goes to the person who ministers to his wants, but it is nevertheless a concentrated and loyal love. It is wise for his father to share something of the physical care of the child in order that he may share this first expansion of love.

Not only does the child's ego expand to include love for his parents or nurse, but to include a number of interests and things as well. It is interesting in this connection to recall James' discussion of the Self in his *Principles of Psychology*. He speaks of the different aspects of the self,—the material self, the social self, the spiritual self. Each of these, he says, is an outgrowth from and development of an original self which expands and grows as the individual proceeds from infancy to old age. It is the social self which grows when the child of eighteen months extends his love of persons beyond himself to include his mother, his nurse, and possibly his father. By the same process of expansion his material and spiritual self grows when he extends his scope of interests and ideas. This happens as his environment enlarges and as the skills of manipulation and investigation grow. The motor growth that occurs between nine and eighteen months rapidly increases both environment and skills, with the result that the material and spiritual selves undergo a rapid expansion. The word "mine" appears in his vocabulary, and because certain of his toys become part of himself he becomes attached to them, to a special blue blanket on his bed, to a particular spoon or plate. This affection for things seems fundamental; it is probably unwise to be arbitrary about depriving him of the specially cherished belongings.

There is some discussion as to whether children at this age of attachment to toys should be allowed to have the particular kind of dolls, or animal toys which, though amusing, are ugly in the eyes of adults. No scientific evidence seems available on this point, but general opinion agrees that aesthetic taste can be influenced even at such an early age. It is probably not desirable, then, to give him ugly toys which he may come to love because of association with them.

The child's contacts with other children should at this age be enlarged if possible. He will not yet play with them in any form of organized game, yet he will profit from contacts outside of his own immediate family circle and will find himself better prepared to make the social contacts

which are so important a part of his development after two years of age. His parents and immediate family are in any case in almost complete possession of his rather concentrated love until he is at least two years old. When we recall that he is at the peak of imitative behavior at this time, and that he imitates those persons whom he loves most, it becomes clear that parents should be especially careful to be good models at this time. They should be careful not to be too anxious over minor hurts or illnesses, since they do not wish him to become hypochondriacal in his attitude toward health. They should be consistent in discipline so that he may learn what to expect. They must speak clearly and well so that he may learn to do the same. Truth, courtesy, self-control must all be carefully practiced by parents who wish these virtues to become incorporated into the rapidly forming spiritual self of their eighteen-months old child.

By eighteen months the child should be an integral part of the family, having at least some of his meals with them, and either a room or part of a room of his own. He can perform some of the simpler processes necessary for dressing and undressing himself, if allowed to do so. He can put away his toys and keep the corner allotted for play neat and tidy. It is desirable for his own development that he be permitted to share in as many of the family cooperative undertakings as possible.

References

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CHAPTER VIII

GROWTH DURING THE FIRST PERIOD OF EARLY CHILDHOOD

Progress in Sense Perception.—During this period (approximately 18 to 36 months) the *sense of touch* is concerned with discoveries of hardness and softness, of roughness and smoothness, of warmth and cold; and with the "feel" of various textures. Children of this age are usually alert for opportunities to touch fur, a rubber rain coat, figured goods, starched cloth, silks, the woven pattern of a wicker chair,—anything which offers information about how things feel. This exploration by the touch sense is more than the mere seeking of sensations which carries the fingers of younger infants over every available surface. It is now an exploration of objects as such, an endeavor to learn just what "feel" is to be associated with what "look" and what "use." The child's reaction to printed silk or to the pattern on linoleum is an example of this. He has learned in the past to associate change of level with change of line, the edge of a box means a drop to the floor line, etc., and is now interested to discover that in some instances change of line means no change of level; so he runs his fingers over and over the pattern, and sometimes expresses his discovery when he says, "this looks rough—it's smooth—why?" We see here, too, a growth in language through which the child is achieving names for the various qualities of objects now being experienced by the senses. As we shall see later in the discussion of language growth the period from 18 to 36 months is one of rapid increase in vocabulary; this association of name with sense quality is only part of the general interest in associating the proper name with every object and experience. We must not, however, conclude that the ability to sense

the quality (hardness, roughness, heaviness, etc.) is dependent upon ability to apply the right language name. Children usually learn to detect and differentiate such qualities accurately before they can name them, and, conversely, often learn the names "big," "hard," "red," "heavy" before they can apply them accurately to the proper sense experience.

Perception of the extent and contour of his own body has occupied the child for some months before he is a year old, and seems to be fairly clear to him by the time he is three years old. He lies in his cradle when he is four or five months old, touching the fingers of one hand against those of the other, enjoying the sensation he thus gets. By seven or eight months he has learned to get his toes into his mouth, but still has to learn that when he bites those toes he gives himself a sensation because the feet belong to him. Sometimes he bites a finger or a toe, then bites a rattle, studying the difference, and learning that toes and fingers are part of himself whereas rattles are not. Before he is a year old he has begun conscious exploration of his own body, studying its extent, exploring its contour. He pats his own head, fingers his own ears, rubs his own stomach. Not infrequently he discovers that some parts of his body give one type of sensation, some parts another. He may discover at a year or at eighteen months, sometimes at two or even at three years, that patting or rubbing the genital organs produces a particularly pleasing sensation, and will return to exploration of this part of his body even more often than to his play with ears or toes. Our attitude toward this activity will determine in large measure how often he returns, and to what extent his passing interest will become fixed as a habit. If we become anxious, conveying to him that he has discovered a particularly significant type of behavior, he will reflect our own attitude of importance toward it, will return to it more often, and give it more attention than he otherwise would. If, on the other hand, we regard the behavior as part of the general exploratory behavior so characteristic of the ages from one-half year to five years, he will more than likely so regard

it, and will soon forget it as his interest shifts to the next natural activity. We may, of course, treat the behavior like any other piece of undesirable behavior, pulling at his ears too constantly, playing with the ink bottle too persistently, —we may distract his attention by giving the hands more entertaining things to do, and we may clothe him or tuck him into bed in such a way that the genital organs are not easily accessible to him. Anything we do, however, to fix his attention on the behavior or to attach vivid significance to it serves only to deepen the impression and to defeat the end we have in view, namely, to allow him to forget it and to lead his interest into more acceptable activity.

The development of *perceptions of sound* is rapid from eighteen months to three years of age. The child during this period learns to identify countless sounds that have not heretofore held meaning for him. Doubtless his growth in this respect seems more spectacular than it really is because his vocabulary increases rapidly at this time, so that he may appear to be learning for the first time meanings which he has learned before but can only now express. In any case, he seems to be acquiring understanding of the sound world about him at a spectacular rate.

Probably the most interesting expansion of his understandings in sound takes place in the field of language, where the child is acquiring a passive vocabulary (of words understood) even more rapidly than he extends the active vocabulary (of words which he can speak).

His interest in and ability with music also increases rapidly at this age. Although there are tremendous differences among individual children in capacity to enjoy and to respond to music, most children of three years have learned to recognize a few simple tunes, can beat a fairly good simple rhythm, can detect the difference between high notes and low ones, between slow and rapid rhythms, and between loud and soft intensities in music. Some children can also sing simple melodies. In this, as in all other aspects of learning, skill depends not only upon original endowment but upon opportunity to learn as well. In some homes where children hear a great deal of music,

sharing it with people who appreciate it, they learn a genuine appreciation at an early age. There is danger here, as elsewhere in learning, that an appearance of appreciation and interest may be forced because it is constantly expected. Artificiality is no more desirable here than anywhere else in character growth.

Perception of size as a skill is becoming much more accurate from eighteen months to three years of age, but is still inaccurate enough to prove difficult to the child. For children from one to five years old Madame Montessori has designed many types of equipment especially adapted to train the senses. Among them are several for training perception of size: sets of cylinders varying in diameter but not in depth, in depth but not in diameter, and one set which varies in both dimensions; a set of blocks which if arranged in graded size builds a broad stair; and another set which if piled in order of size builds a pyramid. Nests of hollow cubes varying in size so that they may be fitted inside of one another make an excellent toy for training the perception of size, and are of great interest to two-year-old children.

While riding his kiddie kar or tricycle the two-year-old child must learn to judge the width and length of his vehicle in proportion to the width of an opening through which he wishes to take it. If given sufficient practice he can before he is three years old become expert enough to avoid scratching vehicle or furniture. Since he sees himself least and has less opportunity to judge his own size in relation to other things, he can still be seen making mistakes in judgment of his own size even when he is well past his fourth birthday. At eight months one of Koffka's subjects, while waiting for his bottle was shown a doll's bottle about one-fifteenth the usual bottle size. The baby reached for it as eagerly as if it were his own bottle. The child makes few such mistakes with objects after he is three years old, yet some months after he has learned fairly accurate judgments of objects he can still be seen trying to sit on a tiny doll's chair and looking surprised when it fails to support him. One very intelligent child of five

looked surprised when he failed to step over a three-foot chicken wire fence with the same easy gesture that had carried his father over it.

Judgments of shape are progressing rapidly during the ages from two to five. An eighteen-months-old child can discriminate between pictures of familiar animals, and will say "bow-wow" when he sees the picture of a dog, or will crow upon seeing the picture of a rooster. He interests us, however, by the fact that his perception of detail is of so little importance that he recognizes these pictures as readily upside down as rightside up. The two-year-old child is just beginning to have an appreciation of the difference between a triangular, a circular, and a square block if all are about the same size. If allowed to play with the pans in the kitchen cabinet he may try to make a triangular cover fit a round pan, or a square pan fit inside a round one. He could not, by the way, have a better set of equipment for teaching size, shape, weight, and motor coordination than the pans from the kitchen cupboard. Nor could he be provided expensive toys that would teach these fundamental lessons better than the empty coffee cans, oatmeal cartons, discarded spools, and other equipment offered by even the simplest home. In this connection we must remember once more not to confuse the child's ability to name "square," "round," "oblong" with his ability to actually see and appreciate the differences in contour which these terms represent. To perceive shape is one thing; to name it quite a different thing. It is with the perceiving that we are concerned now, with providing him numerous "shape" experiences so that he may learn to recognize everyday objects by their shapes, as well as by their sizes, colors, weights, and so on.

Montessori has formal equipment to aid in teaching perceptions of shape, and much can be done in formal teaching with such equipment; but children were learning judgments of size, of shape, of weight, etc., centuries before it ever occurred to anyone to teach about them formally. The subject is discussed here (1) partly because it lends an understanding of the complexity of learnings which serve

as a ground work for later mental development; (2) partly because the very complexity of the young child's world explains much of his behavior which we have otherwise regarded as inconsequential or unexplainable; but largely (3) because a proper setting for normal growth cannot be provided unless there is some understanding of the nature of that growth.

Perception of color occupies an important place in the child's interest at this age. Dearborn reports that as early as the three hundred and forty-fourth day his child took great delight in the colors of sunset clouds. It is possible, of course, that the delight in this case was with brightness rather than with color, although Dearborn says that his child rarely confused the names of red, blue, yellow, and black at nineteen months. Most authors agree that colors as well as brightness are recognized at about thirty months of age. This does not mean that children name colors at this age without a great deal of coaching; it means, rather, that they have learned to discriminate between colors so that they can match saturated colors accurately. The primary colors can be named correctly by average children of five years.

There have been many studies of the color preferences of infants and of school-age children, the results of which agree fairly well. In general it has been found that infants prefer yellow or red, and that older children prefer blue. There has been, however, very little work done in the study of the color preferences of children of the preschool age, only one or two studies being available. Munroe[90] studied 1612 paintings obtained from 138 children ranging in age from two years to four years and eleven months. She found that the two-year-old children showed a marked preference for yellow, and that the three- and four-year-old children preferred red, the four-year-old group preferring it less markedly than the three-year-old group. These studies make it appear that infants prefer yellow, and that the preference shifts with increasing age through red to blue.

Color naming, as we have said, seems a different matter from color discrimination and color preference. Munroe

found that preschool children name blue with the highest percentage of accuracy, that red is a close second, and that naming of green and yellow follow in order. The most frequently used color name, regardless of correct application, was blue.

Accurate *perception of weight* depends upon judgment of size and knowledge of the weight of various materials, as well as upon maturity of nerve centers. Big objects ordinarily weigh more than small ones, although a large bag of feathers often weighs less than a very small bit of lead. Young children often find confusion because weight varies with the material of which the object is composed as well as with the size of the object. At Hallowe'en time one group of four-year-old children, having played for a day with a paper maché pumpkin which closely resembled a real one, were presented with a real pumpkin. One of the children reached out his hands to accept the gift, but made a muscular adjustment sufficient to hold only the paper pumpkin with which he had played the day before. This was, of course, insufficient to sustain the weight of the real pumpkin which he dropped. All of the children seemed as surprised as he when they came to lift the real pumpkin, and asked many questions about the reasons for the difference in weight between that and the one they had played with the day before. Even at four years of age they had not yet learned enough about judgment of weight to avoid such an incident.

Two-year-old children are faced many times a day with situations as puzzling as this. They reach to pick up a pail with the same free gesture they have seen an adult use, and are astonished that they cannot lift it. They learn about how much muscular pull is necessary to lift a pail of sand, and make the same sort of muscular adjustment to lift a rubber ball of the same size. It is not at all unusual to see a two-year-old child upset himself because he has prepared to lift a heavy object only to find himself lifting a light one. Often he attempts to lift things he cannot move at all. One day he seems to have discovered that big things are the heavy ones and little things are light, only

to find that some big thing upsets him because it is light, and some little thing cannot be moved, no matter how hard he tugs at it. Many times he must conclude within his own thoughts that he lives in an arbitrary world at best. A two-year-old child has a widely increased environment available to him through his newly acquired motor skills; he has an appetite for control over objects stimulated by his growing skill of control over his body and especially over his hands; yet he finds himself confronted with inability to judge sizes, shapes, weight,—an inability which often interrupts his projects, gives him many bumps, peoples the world with objects which seem to him arbitrarily bent upon teasing him. It is slight wonder that two-year-old children suffer a brief period of temper tantrums almost as surely as they become two years old.

Language Development.—From eighteen months to two years there is a remarkable increase in language power. This increase is measured by two types of studies: one type which studies increase in vocabulary, and another which studies content of speech. Gesell and Smith have given us two studies of the former type, while Piaget and McCarthy have studied content.

Gesell[42] found the average vocabulary of eighteen-months-old children to be less than five words. At two years, however, his children (50 in number) could meet rather exacting tests in language involving the use of pronouns, color names, etc. He found that 60 per cent of them could use complete sentences; 48 per cent could use the pronouns "I," "you," and "me" correctly; 42 per cent could use plural forms; and 40 per cent could use past tenses of verbs correctly. This progress in language continues steadily. From three to five years of age children are engaged in learning to use prepositions appropriately, to employ descriptive words accurately, to deal with larger units of thought, and to "bring clauses and sentences into logical relation both in imaginative and in practical narration." "Indeed," Gesell says, "before five years of age, within his limits, he becomes an entertaining raconteur, whereas four years earlier he was unable to articulate a single word."

One of the most thorough studies of vocabulary growth which has been made was done by Smith[127] at the University of Iowa. She studied the vocabularies of 273 young children and found that at one year the average vocabulary is three words, at two years the average vocabulary is 272 words, at three years the average vocabulary is 896 words, at four years the average vocabulary is 1540 words, at five years the average vocabulary is 2072 words, and at six years the average vocabulary is 2562 words. According to this study children acquire about 270 new words during the second year, most of which, if we accept Gesell's figures for the eighteen months level, are learned between eighteen and twenty-four months. This seems to set the pace for later learning, since Smith's figures show an increase of over 600 words during each of the third and fourth years, of over 500 during the fifth year, and of almost 500 during the sixth year.

Brandenburg[13] and Nice[96] have studied the total language responses of children during a single day. Brandenburg found that a three-year-old child used 11,623 words during the day, and a four-year-old child used 14,930. The three-year-old child used thirty-seven per cent of his total vocabulary in one day, and the four-year-old child twenty-three per cent. During his waking time the child was linguistically inactive only nineteen minutes, the longest single period of linguistic inactivity being four minutes. These figures give some understanding of the amount of practice devoted to language at these ages.

Anderson in the summary of language studies which he prepared for presentation at the 1929 meetings of the Child Development Group concludes that the mastery of sentence structure develops as follows: At eighteen months only simple sentences, if any, are used. At four and one-half years complex and compound sentences are used but constitute only a small portion of the child's conversation. Before six years of age a child whose language growth is normal has command of practically every form of sentence structure.

When we consider that command of such a variety of sentence forms means that the child's command of the

mechanics of language is nearly complete, we can appreciate something of the amount of language learning that has taken place during the preschool years.

The content of a child's speech is significant not only as a measure of his language growth but as a measure of character and personality growth as well. Piaget[101] studied the language of two children in Geneva and has published one of the most comprehensive analyses of language content of young children. He finds two distinct classifications of language as it functions in relation to thought, namely, ego-centric speech, and socialized speech. Ego-centric speech is speech which has no social function, such as the monologues which accompany action or which verbalize fantasies, and the soliloquies which take place either when the child is alone or when he is with others, but which are addressed to no one, and are not intended to give information or to solicit an answer. This ego-centric speech is a primitive and infantile type of language which, according to Piaget, occupies approximately 50 per cent of the total speech of young children, and still plays an important part in the speech of six-year-old children. As the child matures he gives more attention to socialized language, going first through a stage of "collective monologue" in which he talks aloud to himself before others, not talking to anyone in particular but nevertheless being conscious of the audience. The content of such speech is equivalent to the content of the pure monologue, since the child is simply thinking out his actions aloud with no desire to give anyone any particular information.

McCarthy,[74] using a classification similar to, although not identical with Piaget's, found ego-centric responses occupying only 10 per cent of the speech of children between eighteen and fifty-four months of age, with a decrease in the later years. This wide discrepancy from Piaget's figures may be due to errors of sampling, to a difference in method of collecting and analyzing data, or to a difference in the social backgrounds and discipline of European and American children.

What seems significant from these studies is that children seem to pass through definite phases of growth in language. In reading about the subject we see frequent references to a "babble stage," a period of "echolalia" (repetition of all speech heard), "ego-centric speech" or "monologue," a "naming stage," a "why, when, where, what" or "question-asking stage," etc. The babble stage was explained earlier as a period of practice with the use of the vocal apparatus. The period of "echolalia" is one in which children echo after us everything we say to them. It is an excellent device for making immediate use of a model while it is still fresh in memory, and should be regarded as such rather than as an aggravating technic by which children delay answering questions or carrying out commands. The "naming stage" is one in which the child attempts to learn the names of objects, of people, of colors, or descriptive adjectives, in fact, of everything possible. "What's your name?" "What's this called?" "What color is that?" are attempts to learn the names of things. We can help the child a great deal at this stage by giving him correct and clearly-spoken names for commonplace things. The following sample of the conversation of a two-year-old child at the dinner table shows how practice with names as well as with sentence structure is achieved. It serves also to demonstrate the tendency at this age to lapse into monologue.

Peter is given his dinner. He asks, pointing, "What's that?" The answer is, "Potatoes." Peter echoes, "Yes, tatoes." Then "What's that?" Again he echoes the answer, "Spinach." "What's that?" This time he echoes the answer and practices the others, pointing to the appropriate object in each case; "Liver, tatoes, spinach." He begins a monologue: "This is liver. This is tatoes. This is spinach." Then he adds practice with sentence structure. "Petah eat his liver. Petah eat his tatoe. Petah eat his spinach." This monologue with variations persisted throughout the meal, so that Peter practiced the words "liver," "tatoe," "spinach" well over twenty times each.

The "question-asking stage" is sometimes regarded by parents as amusing, sometimes as annoying. Occasionally it is regarded as it should be, namely, as a serious effort to extend vocabulary and to gain information. Its possible abuse by the child is discussed elsewhere. Brandenburg found that in a single day his three-year-old child asked 376 questions and that his four-year-old child asked 397. Piaget gives an extremely detailed analysis of questions asked, dividing them into "the whys of casual explanation," "the whys of motivation," "the whys of justification," "the whats," "the whens," and "the hows." Most of these questions are attempts to gain information and to clarify the hazy territory between reality and imagination, but are sometimes attempts to seek justification for an act or an idea.

Among the questions which are usual to three and four-year-old children are questions about sex, about death, and about God. "What is the difference between little boys and little girls?" "Where do babies come from?" "What does it mean to die?" "What is God like?" are almost inevitable questions during the period of widespread interest in words and in facts. The child has much difficulty with "Mr." and "Mrs.," with "Yes mam" and "Yes sir," with "him" and "her," and with "he" and "she." It is to be expected that in the course of his inquiries about everything that interests or puzzles him he will ask what essential difference divides the world so obviously; hence the question, "What is the difference between boys and girls?" Or, again, a new baby may arrive or some one may die in the child's own home or in the neighborhood. We must not regard the child as morbid, but rather as intelligent if he asks "where" or "what" in such an instance. We answer many of his other questions with "God made it," or "God takes care of that"; we must not think him irreligious if he asks "Who, or What is God?" These questions, like all his other questions, should be answered truthfully, simply, and without sentimentality or tense emotional accompaniment. Occasionally, of course, in order to answer truthfully we must answer that we do not

know, but this answer must never be allowed to substitute for information which we do have and which we should give the child in simple form as soon as he is interested enough to ask for it.

In addition to using language in order to secure information children use it almost from the beginning for the purpose of giving commands or expressing wants. "Go bye-bye," "Mine," "Bobby wants a drink," are examples of this.

Soon, however, language begins to serve the purpose of simple narration. The child tries to tell things that happened to him or that he has imagined. At first these narratives are extremely simple. One two-year-old child who had witnessed an accident in which there had been a good deal of excitement told breathlessly that "Bobby falled out of the bus," but could give no further detail when asked if Bobby was hurt, or who had come to help. His only answer to any question was reiteration of the statement, "Bobby falled out of the bus." At three years these narratives become somewhat more detailed. An occasional three-year-old child can tell a fairly well connected story: "I went to Grandmother's house. She lives on a farm. I saw pigs and chickens and a baby cow. Grandpa said it was a calf. It walked funny, like this," whereupon an apt demonstration of a wobbly calf-walk is given.

Imaginative elements often creep into these narratives: "I saw a big, black bear. It was in the yard by the lilac bush." Such statements should not be disciplined as untruths, but should be regarded as natural play of imagination and treated in the spirit of play. If direct falsehoods persist and come to be used to escape responsibility or to achieve selfish ends the situation is different. When such situations arise they should then be dealt with clearly in order to keep the child from developing a habit of falsification for selfish ends.

At four years imagination can produce a whole original story: "Once there was a great big engine, and it used to come right up to Bobby's door (the story was told by Bobby

to a nursery school group), and said, 'Puff, puff, come out, Bobby, and I'll take you to visit your grandma.' And Bobby went out and climbed in the engine and it started out. 'Puff puff' it went all the way through the woods right up to grandma's door." The story goes on to describe how Bobby visited grandmother, received cookies (a fact doubtless borrowed from reality), found the engine waiting, and returned home. This story was repeated many times with a wide variety of embellishments. Sometimes the engine not only talked but waved goodbye as well. The tendency to animate objects is characteristic of the imaginative narrations of young children.

Many children who do not use narration as an outlet for imagination, take great delight in repeating stories that have been read to them. Their memories are often capable of carrying the wording of quite long stories which they recite with an exactness that sometimes deceives us into thinking that the child is reading from the page. This delusion is augmented by the fact that children sometimes remember even the exact word at which the page should be turned. These recitals are often carried off with a surprising feeling for dramatic effect. The real test of narrative skill, however, lies not in the ability to hold the attention of adults with a story, but rather in the ability to hold the attention of other children. Adults have ability and willingness to understand, even when enunciation is indistinct, the plot sketchy or indifferently pursued. Children, on the other hand, will not listen unless enunciation is distinct, and the plot entertaining, consistent, and well developed. In many ways children furnish each other with motives for real effort in language performance which adults can never furnish. This gives another reason why young children should play at least part of the time with other children and should not be isolated entirely with adults.

During the narration period of language development children should hear a variety of good stories which can serve as models. There is a good deal of discussion in the literature of child care and training as to whether children should hear fairy stories or not. Certain children of the

unstable, introvert type may be frightened by the more blood thirsty fairy stories like Jack the Giant Killer. Other children of the same type may find in fairy stories still further material for imaginations already overstimulated. On the whole, however, children, particularly those of the stable and extrovert type, are unharmed by the traditional fairy stories, and on the contrary usually derive a great deal of joy from them. Probably no writer, however, would recommend a steady diet of fairy stories. Children are too easily and too profitably entertained by stories from everyday life to permit neglect of this rich field. Simple stories about little boys and girls who get up cheerfully in the morning, go to the bathroom and brush their teeth, drink a glass of water, take off their night dresses, and so on through the routine of the listener's day will engage the attention of nearly all children from two to four or five years of age. Much that is worth while can be injected into the story by way of an example or moral, but moralizing should never be overdone lest it lose its value.

Probably the last use that the child makes of language is expression of thought or reasoning. Part of the explanation for this is doubtless that, although children can reason enough to solve some of their own problems at an early age, they do not often give evidence of the type of abstract reasoning that needs to be expressed in language. Many people think that unless the process of reasoning is expressed in language no reasoning has taken place; but to people who know children it is often evident that reasoning has occurred when the child goes to a certain place to get things, or when he builds blocks in a certain way, or when he has in some simple piece of behavior demonstrated that he is capable of solving problems and of relating cause and effect. However, the more subtle aspects of abstract reasoning do not usually manifest themselves in gross motor behavior, but take place by way of language. Language offers great difficulty to people of any age whenever it is called upon to express the lights and shades of an individual thought process. It is not to be wondered at that children find language useful as a means of giving commands or telling

narratives earlier than they find it useful as a means of expressing reasoning.

In spite of the difficulties involved, however, three-year-old children are beginning to express in language ideas and simple reasoning. One child of three wanted to know, "Where does the milk go when I drink it?" and another said, "I can't wear holes in my stockings when I'm sitting on Daddy's shoulder." Another child of this age upon being told that God made everything and everybody said, "Then, who made God?"

At four years reasoning or thinking is expressed much more clearly. One four-year-old child stood gazing out of the window on a windy day. After a thoughtful pause he said, "Trees moving; wind blowing;—trees moving make the wind blow." This is false reasoning, but clearly expressed nevertheless. Another four-year-old child, the son of a minister, overheard several children asking to have the light turned on in a room which had become dark. He said, "God is Light; God is everywhere; we don't need the light turned on here."

Causes for Language Retardation.—There are several reasons why a child of two and one-half or of three years may have failed to make a good beginning in language development. Probably the first thing to do in seeking the cause for retardation is to examine the child's hearing. It is not always easy to be sure whether or not a child is deaf enough to prevent his hearing conversation and hence to profit from the guidance of models in his language learning. Children are extremely quick to compensate for defects of eyes or ears, and may carry serious handicaps for a number of years without the knowledge to themselves or to adults that they are different from other children. The child fails to realize his handicap because, never having seen or heard well he does not realize that he could be or should be different. The parent fails to discover the difficulty because the child, being nearsighted or deaf learns to compensate for his deficiency by extra alertness in his other senses. Even supposedly expert examiners sometimes have difficulty in diagnosing sensory defects because

special methods for examining very young children are not yet widely known. Every effort should be made, however, to determine whether or not language retardation is due to defective hearing.

Defective vocal apparatus is sometimes responsible for inability or unwillingness to attempt speech. Occasionally the trouble lies in the nerve centers which control speech. Rarely the difficulty is one known as word deafness,—a defect in which although sounds are heard, the associations necessary to lend meaning to word sounds cannot be formed.

Mental retardation is in many cases the cause of retardation in language development. Many studies of the relationship between general intelligence level and acquisition of language have been made, but the exact degree of association is difficult to state since practically all tests of general intelligence include a large percentage of verbal elements. Most of the studies made, however, show that language development correlates with general intelligence about as well as it does with chronological age, the correlation being positive and high enough to indicate a clear relationship. All studies of feeble-minded children show language retardation, while all studies of superior children show language acceleration. It is safe in this connection to assume that children who talk unusually early are probably superior mentally; that feeble-minded children are always late in talking; but it is not to be assumed that all children who are late in talking are feeble-minded.

Some children of average or even of superior mental capacity are late in talking because they do not have a model which is adequate in amount or in kind. It is a matter of common observation that children who live in institutions for dependent children during the first three years of life are slow to acquire language no matter what their intelligence may be. Woolley's[164] case-study *David* is an excellent example of this sort of handicap. David, a child of normal intelligence, at two years and ten months could speak only one phrase, "good morning," and understood little else. He had until this age been in an orphan

asylum where he received good physical care, but where no one had time or inclination to say anything more than "good morning" to the children.

On the other hand, children of superior inheritance and general intelligence are often slow to talk because they are cared for by nurses who do not appreciate the need of talking to their charges, or who, when talking, are limited in expression and often use bad grammar. The marked accents of foreign-born nurses offer another handicap. Add to this the fact that children of wealthy parents seldom have free play contact with other children, and no other explanation is needed to understand why such children are frequently slow in language development.

Occasionally the model for language is at fault because there is too much of it. Parents or nurse may speak too rapidly for the child to isolate from the general flow of conversation any specific and understandable words or phrases. Reasonable speed and clearness of enunciation are essential when addressing young children. In the anxiety to give enough model to their children parents sometimes err by talking too constantly, thus bestowing upon the child such incessant attention that he learns to expect to be the "center of attraction" at all times; or, if this is not the result, he may become overstimulated and overfatigued,—a condition which handicaps rather than facilitates any type of growth.

Occasionally children do not learn to talk because they do not need to learn. They receive such constant attention and affection that they have no occasion to earn it, and their wants are so constantly anticipated that no need to express wants verbally arises.

Some children have enough need for languages that they develop the type of language by which they express wants, but are so limited in general experience that they have nothing to express in narrative and are lacking the knowledge of perceptions and judgments which provides material for reasoning. A fairly wide general experience is necessary if the child is to have a desire to express himself and his relation to the world about him. The richness and variety

of his vocabulary, the fertility of his ideas, the accuracy of his expression all depend upon the richness and variety of his experience. A home which is rich in language model and in varieties of experience usually provides a desirable background for language growth.

Occasionally parents are over anxious for evidences of development, forcing the child beyond his ability or rejoicing too enthusiastically over his successes. If a child is urged beyond his ability, realizing that more is expected of him than he can give even though he makes his best effort, he soon becomes discouraged and may sullenly refuse to try because he would rather have it appear that he "won't" than that he "can't." Children need praise for their efforts, for if reproof and correction alone meet their attempts to speak, it is evident that they are likely to stop trying. On the other hand, if too great praise attaches to effort, if rejoicing takes the form of making the child repeat the new word or phrase over for every new-comer, he may become self-conscious or inhibited in his attempt to use the partially formed skill. Sometimes, in this situation, however, he becomes, not self-conscious, but a tyrant. If too great importance attaches to his every word he may become conscious of his power over his parents, feeling that he can control their happiness by speaking or by refusing to speak.

Laughing at the child's "cute" accent or his imperfect pronunciation is particularly dangerous since children are unable to discriminate kinds of laughter and do not always know the laughter of indulgent amusement from that of mockery. Ridicule is feared and hated by young children quite as much as by adults, and a suspicion that the laugh is at his expense may in one dramatic experience kill much of his joy in language. Self-consciousness or fear of ridicule as a rule produces one of two results: either it discourages effort and tends to produce silence, or it provides one of the commonest causes of stuttering. The motor control which regulates speech is the finest in balance of any motor control in human behavior; it is the most easily disturbed. Any tension, any shock, any self-consciousness, fear of ridicule, fear of failure, may upset this balance. Stuttering may

result from a death in the family, financial strain in the family, over-fatigue, the pain or shock of an accident to the child, fear of too severe discipline, unhappiness, emotional conflict or strain of any kind. When due to such causes it can be cured only by removal of the inciting cause. Nagging the child, or calling attention to his difficulty can only make him more self-conscious, and more tense, and can, therefore, not cure, but only aggravate the difficulty.

Severe illness, the shock of an accident, the strain of death, worry, or unhappiness anywhere in the family may not only produce stuttering but may temporarily inhibit total language progress. One child of two years, already in possession of ability to use phrases and short sentences, stopped talking for over a year when his four-year-old sister died. Whether this was due to his own grief or to a reflection of family tension could not be determined, but it is probable that had the family been able to control their anxiety over his silence it would have lasted only a few days or weeks. Their worry over his difficulty seemed to convey anxiety to him and to block his efforts to speak. Not until the whole emotional tension could be relieved did the child recover from the fear of failure which had grown out of all reasonable proportion and which completely inhibited his motor speech reaction.

Stuttering and retardation in language are sometimes attributed to attempts to change children from left-handed to right-handed motor performance. This is, however, a matter much in dispute at the present time. Neurologists are agreed that the tendency to be more skillful with one hand than with the other is not due to habit alone but to an inherent superiority or strength in one half or the other of the central nervous system. Caille[17] states the case for left-handedness when he says that it has "a structural, atavistic* basis and is not an acquired faulty habit." Writers also agree that speech is one of the few motor functions which has its motor centers concentrated and developed in one hemisphere, which is called the "domi-

* Atavistic—return to ancestral type.

nant" hemisphere. This is usually in the left one. Since the function of speech is controlled by a center in the "dominant" hemisphere, speech is likely to be disturbed when an attempt is made to shift "dominance"; the extent of disturbance in speech is correlated with the strength of the inherent dominance and also with the resistance which the child makes when change is insisted upon. Orton* states that only a small percentage of children can be trained to use either hand without nervous or emotional disturbance. All the others have a decided "cerebral dominance" which makes the use of one side or of the other so urgent that interference with the natural preference will produce nervous strain. He claims that 13 per cent of all cases of stuttering can be traced to interference with a tendency toward left-handedness or to interference with natural cerebral dominance.

This claim is not corroborated by other writers, particularly by Fletcher[34] who denies the importance of handedness as an explanation for stuttering, and by Blanton[11] who traces stuttering to emotional disturbances in every case. Most writers in child training, however, would agree that it is unwise to force the use of the right hand if the child seems persistently awkward in its use and especially if attempts to change meet with vigorous resistance.

Rate of Physical Growth.—Up to the present time the method of judging whether or not an individual child is within the range of normality in height or in weight has been to compare that child with such standards as those of the Children's Bureau. These standards have been obtained by measuring large numbers of children of all ages and computing the average height and weight for each age group. Few children of any age group, however, are of exactly the average height of that age group. They scatter about the average figure, most of them measuring within an inch or so of the average height, but a few being several inches taller or shorter than the average figure.

The usual tables of standards do not give any information about the amount of variation from the average figure in

* From a lecture given at the Merrill-Palmer School, May, 1929.

each age group which may be considered normal. A much better way of comparing a child's height with that of other children of his age is to be able to state how many children of his age exceed him and how many he exceeds. For example, two-year-old boys at the Merrill-Palmer School have been found to vary from 31.5 inches to 37.2 inches in height, the average being 34.6 inches. A two-year-old boy who measures 33.6 inches is shorter than 80 per cent of boys of his own age and taller than 20 per cent. He is said to rank at the 20 percentile of two-year-old boys in height. It is much more helpful to know that such a child is at the 20 percentile of his age group, (or that 80 per cent of the children of his own age exceed him in height), than that he is 1 inch below the average height. Such a consideration of the place of the individual child as related to other children of his age has led to the use of the percentile method of rating children at Merrill-Palmer School in both physical and mental traits.

It has been felt for some time that tables showing average height and weight standards were not by themselves satisfactory in interpreting a child's height and weight. Therefore there were developed at the Merrill-Palmer School percentile tables to report a child's percentile rank.

The percentile rank in height of a child in this case is his position in a group of 100 Merrill-Palmer children of the same age and sex; *i. e.*, a percentile rank of 88 in height indicates that the child exceeds 88 per cent of all the children of that age and sex who have ever attended the Merrill-Palmer Nursery School and that 12 per cent were taller than he. The percentile rank in weight of a child is his position in a group of 100 Merrill-Palmer children of the same height and sex; *i. e.*, a percentile rank of 20 in weight for height indicates that the child exceeds 20 per cent of all the children of that sex and height, and 80 per cent exceed him in weight.

A percentile value from 25 to 75 inclusive is considered average; a rank from 1 to 24, below average; and a rank from 76 to 99 above the average of the group. Therefore, the boy with a percentile of 88 in height and of 20 in weight

is taller than the average boy of his age and is lighter in weight than the average boy of his height.

In general, a child should fall between the 25th and 75th percentile in height and weight. The 50th percentile is the Standard.

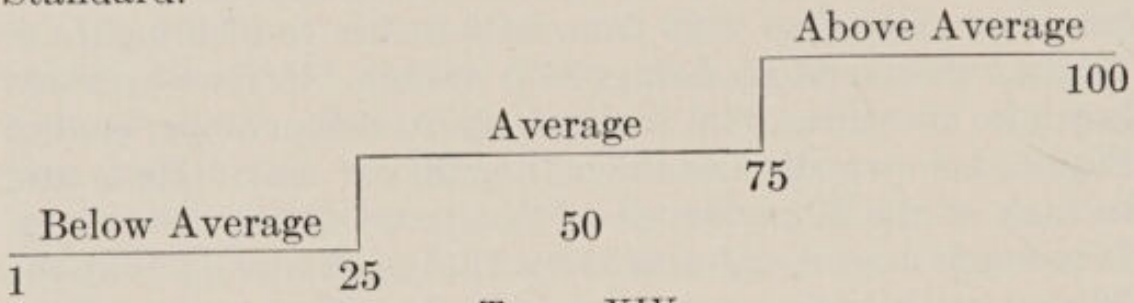

TABLE XIV

PERCENTILE TABLE ILLUSTRATING RANGE OF GROWTH
Standing Height in Inches of Boys at Merrill-Palmer School
Percentile Rank

Age in months.	1	10	20	30	40	50 (median).	60	70	80	90	99
24	31.5	33.0	33.6	34.2	34.4	34.6	34.9	35.1	35.4	35.9	37.2
30	33.5	34.6	35.2	35.6	35.9	36.2	36.5	36.8	37.2	37.8	39.2
36	35.0	36.1	36.6	37.0	37.3	37.6	38.0	38.3	38.6	39.0	40.4
42	36.3	37.5	38.0	38.3	38.6	38.9	39.3	39.6	40.0	40.4	41.7
48	37.7	38.9	39.4	39.7	40.0	40.4	40.7	41.1	41.5	42.0	43.8
54	39.2	40.1	40.6	41.1	41.4	41.8	42.1	42.4	42.8	43.4	44.9
60	40.7	41.6	42.0	42.3	42.6	42.9	43.2	43.5	43.8	44.3	45.5

TABLE XV

PERCENTILE TABLE ILLUSTRATING RANGE OF GROWTH
Standing Height in Inches of Girls at Merrill-Palmer School
Percentile Rank

Age in months.	1	10	20	30	40	50 (median).	60	70	80	90	99
24	31.3	32.3	33.1	33.6	33.9	34.2	34.4	34.7	35.1	35.7	36.8
30	32.9	34.1	35.0	35.1	35.4	35.7	35.9	36.2	36.6	37.1	38.3
36	33.8	35.3	36.0	36.4	36.8	37.1	37.4	37.7	38.1	38.8	40.3
42	34.8	36.5	37.4	38.0	38.4	38.8	39.1	39.5	39.9	40.5	42.2
48	35.8	37.7	38.7	39.3	39.8	40.2	40.6	41.0	41.5	42.1	43.6
54	37.2	39.0	39.9	40.5	41.0	41.4	41.8	42.3	42.8	43.4	44.7
60	39.0	40.4	41.2	41.8	42.1	42.5	42.9	43.3	43.8	44.5	45.7

TABLE XVI

PERCENTILE TABLE ILLUSTRATING RANGE IN WEIGHT (IN POUNDS) FOR HEIGHT (IN INCHES) OF BOYS AT MERRILL-PALMER SCHOOL

Height in inches.	Percentile Rank										
	1	10	20	30	40	50	60	70	80	90	99
34	23.0	25.4	26.5	27.0	27.5	28.0	28.5	29.2	30.1	31.1	33.0
35	25.0	27.0	27.9	28.5	29.0	29.5	30.0	30.7	31.6	32.7	34.9
36	26.0	28.0	28.9	29.5	30.1	30.7	31.3	32.0	32.8	34.0	36.2
37	26.9	29.0	29.9	30.6	31.2	31.9	32.6	33.3	34.1	35.3	37.5
38	28 0	30.5	31.4	32.1	32.8	33.4	34.0	34.6	35.4	36.5	39.0
39	29.1	32.0	33.0	33.7	34.4	35.0	35.5	36.0	36.6	37.7	40.6
40	30.6	33.3	34.4	35.1	35.8	36.3	36.9	37.4	38.0	39.0	41.9
41	32.1	34.6	35.8	36.5	37.1	37.7	38.3	38.9	39.4	40.4	43.3
42	33.2	35.9	37.1	37.8	38.4	39.1	39.7	40.3	41.0	42.2	45.4
43	34.3	37.1	38.4	39.2	39.8	40.4	41.1	41.8	42.6	44.0	47.6
44	36.6	38.9	39.9	40.8	41.5	42.2	43.0	43.9	45.0	46.5	50.0

TABLE XVII

PERCENTILE TABLE ILLUSTRATING RANGE IN WEIGHT (IN POUNDS) FOR HEIGHT (IN INCHES) FOR GIRLS AT MERRILL-PALMER SCHOOL

Height in inches.	Percentile Rank										
	1	10	20	30	40	50	60	70	80	90	99
34	22.0	25.1	26.2	26.8	27.2	27.6	28.1	28.6	29.1	30.0	31.6
35	23.3	26.0	27.1	27.8	28.5	29.0	29.5	30.0	30.7	31.7	33.8
36	24.4	27.1	28.2	28.8	29.4	29.9	30.4	31.0	31.8	32.9	35.3
37	25.4	28.2	29.2	29.8	30.3	30.8	31.3	32.0	32.9	34.1	36.8
38	27.0	29.6	30.8	31.4	32.0	32.5	33.0	33.8	34.7	36.1	38.6
39	28.6	31.1	32.3	33.1	33.6	34.2	34.8	35.5	36.5	38.1	40.5
40	29.9	32.4	33.6	34.5	35.1	35.7	36.3	37.0	38.0	39.6	42.1
41	31.2	33.8	35.0	35.9	36.6	37.2	37.8	38.6	39.6	41.1	43.7
42	33.1	35.5	36.6	37.5	38.2	38.8	39.5	40.2	41.2	42.6	45.1
43	34.9	37.2	38.3	39.1	39.8	40.4	41.2	41.8	42.8	44.2	46.6
44	37.0	39.2	40.4	41.2	42.0	42.7	43.4	44.2	45.1	46.2	48.5

The compilation of weight or height standards which can serve as bases for comparing the measurements of an individual child to those of other children in the same age group, involves certain comparable standards of technic,

both in the laboratory method and in the compilation of data.

In the laboratory the following are a few of the conditions which must always be kept constant if the measurements are to be consistent and comparable:

1. Hour of day.
2. Relationship to meals, bowel evacuation, urination, exercise.
3. Removal of clothing.
4. Time of weighing and measuring as related to birthday date of child.
5. Standard instruments—scales and measuring boards.
6. Trained technicians.

Because of shrinkage upon standing the method of taking standing height measurements is of especial importance. It has been found desirable to lift the child from the recumbent board where he has been measured, to the standing height board. The measurement is then taken immediately and read simultaneously by two technicians, while the child is standing—feet about 3 inches apart—arms at side—eyes gazing in an horizontal position.*

At Merrill-Palmer School the children, all of whom are normal or superior both mentally and physically, are measured monthly on or within two days of their birthday dates during the school year from September to June. Insofar as is possible the conditions of weighing and measuring are kept absolutely constant.

It is no doubt of greater value to compare children in a certain group with standards obtained from the same or a similar group of children rather than to compare individual children to such a widely unselected group as that of the Children's Bureau whose standards represent all types of children. It seems more reasonable to compare normal and superior children with standards obtained from similar groups which include no defective or pathologic cases than to compare them with standards based on unselected groups. It must be remembered in using Merrill-Palmer standards that they are intended for use

* For absolute accuracy it is desirable to have two technicians check each other's measurements on the same child. Should the difference between the results of measurements be greater than $\frac{3}{16}$ of an inch the measurements should be rechecked.

with healthy children and represent an optimum rather than an average of the total population. For use with underprivileged children tables based on unselected groups would be more satisfactory.

Table XVIII shows the average height for age of Merrill-Palmer Nursery School children, both boys and girls, age twenty-four to thirty-six months.* Table XIX shows the average weight for height of the same group of children. For purposes of comparison the standards of the Federal Children's Bureau, Tables XX and XXI, from eighteen to thirty-six months have been included. Merrill-Palmer boys and girls average about an inch taller in height than the Children's Bureau averages for children of the same age. A difference of 1 pound is found in the weight of Merrill-Palmer and Children's Bureau children who are the same height. Such a finding gives very clear evidence that when we consider the "median child" of both groups Merrill-Palmer children are heavier and taller.

TABLE XVIII

HEIGHT STANDING (INCHES) FOR MERRILL-PALMER NURSERY SCHOOL BOYS AND GIRLS TWENTY-FOUR TO THIRTY-SIX MONTHS

Age in months.	No. of cases.	Average (50 percentile) height, boys.	No. of cases.	Average (50 percentile) height, girls.
†24	29	34.6	27	34.2
25	..	34.9	..	34.4
26	..	35.2	..	34.7
27	..	35.4	..	34.9
28	..	35.7	..	35.2
29	..	35.9	..	35.4
†30	48	36.2	44	35.7
31	...	36.4	..	35.9
†32	56	36.7	49	36.1
33	..	36.9	..	36.3
34	..	37.2	..	36.6
35	..	37.4	..	36.8
36	..	37.6	..	37.1

† The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 24, 30, and 32 were the mid-points; the values at the remaining month levels were interpolated between these values.

* There are no Merrill-Palmer Standards below twenty-four months.

TABLE XIX

WEIGHT (POUNDS) FOR HEIGHT (INCHES) OF MERRILL-PALMER NURSERY SCHOOL BOYS AND GIRLS FROM 34 TO 38 INCHES

Height (inches).	No. of cases.	Weight, boys.	No. of cases.	Weight, girls.
*34	28	28.0	30	27.6
34.25	..	28.4	..	28.0
34.50	..	28.7	..	28.3
34.75	..	29.1	..	28.6
*35	35	29.5	46	29.0
35.25	..	29.8	..	29.2
35.50	..	30.1	..	29.4
35.75	..	30.4	..	29.7
36	..	30.7	..	29.9
36.25	..	31.0	..	30.1
36.50	..	31.3	..	30.3
36.75	..	31.6	..	30.5
*37	63	31.9	61	30.8
37.25	..	32.2	..	31.2
37.50	..	32.6	..	31.6
37.75	..	33.0	..	32.0
38	..	33.4	..	32.5

*The number of cases is reported only at these height levels because the standards were calculated for weight in which 34, 35, and 37 inches were the mid-points; the values at the remaining height levels were interpolated between these values.

The rate of growth in height,—that is, the monthly increases for a child from twenty-four to thirty-six months of age according to Merrill-Palmer standards averages .25 of an inch every month. In comparing the rate of growth of a single individual child with the Merrill-Palmer standards, however, we find that the increases are not as regular as the average rate would indicate.

While the average gains of Merrill-Palmer Nursery School children are $\frac{1}{4}$ inch monthly during the period of twenty-four to thirty-six months, the gains of E. M. (Table XXII) during the period of twenty-five to thirty-six months averaged $5\frac{5}{6}$ inch—twice as much as the expected gain. From December to January E. M. seemingly did not gain in height, which period was followed by a gain of $\frac{13}{16}$ inch from January to February. The weight of this child as

compared to other girls of her height indicates that she is from one to two pounds heavier than other girls of her height. Moreover, the weight gains fluctuated from a loss of $1\frac{4}{16}$ pounds in December and again in February to a gain of two pounds in January. Since the average gain of this child in height was twice as much as that of other girls of her age, it is not surprising that her gain in weight is greater than that of girls of her height.

TABLE XX*

HEIGHT STANDING (INCHES) BOYS AND GIRLS EIGHTEEN TO THIRTY-SIX MONTHS

(Federal Children's Bureau†)

Age (months).	Height.‡	
	Boys.	Girls.
18 months, under 19	31.750	31.250
19 months, under 20	32.125	31.625
20 months, under 21	32.500	31.875
21 months, under 22	32.75	32.250
22 months, under 23	33.00	32.500
23 months, under 24	33.375	32.750
24 months, under 25	33.625	33.125
25 months, under 26	33.875	33.375
26 months, under 27	34.125	33.625
27 months, under 28	34.375	34.000
28 months, under 29	34.750	34.250
29 months, under 30	35.000	34.500
30 months, under 31	35.250	34.875
31 months, under 32	35.500	35.125
32 months, under 33	35.750	35.375
33 months, under 34	36.000	35.625
34 months, under 35	36.250	35.750
35 months, under 36	36.500	36.000
36 months, under 37	36.625	36.250

*Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

†Bureau Publication No. 84, Community Child Welfare Series No. 2.

‡Fractions have been converted into decimals for purposes of comparison.

TABLE XXI

WEIGHT (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS EIGHTEEN TO THIRTY-SIX MONTHS

(Federal Children's Bureau)

Height (inches).	Weight.*	
	Boys.	Girls.
31.75	24.187	23.468
32.00	24.500	23.750
32.25	24.562	24.062
32.50	24.625	24.375
32.75	24.687	24.687
33.00	25.750	25.000
33.25	26.093	25.344
33.50	26.437	25.687
33.75	26.781	26.031
34.00	27.125	26.375
34.25	27.437	26.719
34.50	27.750	27.062
34.75	28.062	27.406
35.00	28.375	27.750
35.25	28.719	28.094
35.50	29.062	28.437
35.75	29.406	28.781
36.00	29.750	29.125
36.25	30.094	29.437
36.50	30.437	29.750
36.75	30.786	30.062
37.00	31.125	30.375
37.25	31.469	30.720
37.50	31.912	31.062
37.75	32.156	31.406
38.00	32.500	31.750

* Weight for heights fraction of whole number, such as 34.25 etc., obtained by calculation.

Such an analysis of the growth of an individual child clearly points out the fallacy of considering small gains or losses over as brief a period of time as one month. Morgan's† work at Merrill-Palmer School on a small group of seven children indicates that the period of greatest growth

† Unpublished study of Morgan, H., "Growth of Seven Nursery School Children over a Period of 16 Months." Merrill-Palmer School (1929).

is from mid December to mid April. Variations in the technic, as well as in the physical and mental condition of the child have already been mentioned as possible causes of the fluctuations in weight and height. Since often the cause of such fluctuations are unexplainable it has seemed of greater value to consider changes in weight and height over a longer period of time than one month, for example, three or four months. In some cases it has been of interest to compare the absolute growth of the children over the total period during school from September to June. It should be made clear that absolute gains over a long period of time as well as the rate of gain during such a period are both factors of importance in considering the growth of the child.

TABLE XXII

GAINS IN HEIGHT AND WEIGHT OF E. M. FROM 25 TO 36 MONTHS

Date.	Age.	Height (inches).	Gains.	Weight (pounds).	Gains.
1926					
April 21	25	$32\frac{9}{16}$	.....	27	
May 10	26	$33\frac{1}{16}$	$\frac{8}{16}$	$27\frac{12}{16}$	$\frac{12}{16}$
June 10	27	$33\frac{4}{16}$	$\frac{3}{16}$	$28\frac{6}{16}$	$\frac{10}{16}$
Sept. 13	30	$34\frac{4}{16}$	1	29	$\frac{10}{16}$
Oct. 8	31	$34\frac{12}{16}$	$\frac{8}{16}$	31	2
Nov. 12	32	35	$\frac{4}{16}$	$30\frac{14}{16}$	$-2\frac{2}{16}$
Dec. 10	33	$35\frac{5}{16}$	$\frac{5}{16}$	$31\frac{6}{16}$	$\frac{8}{16}$
1927					
Jan. 10	34	$35\frac{5}{16}$	0	$30\frac{2}{16}$	$-1\frac{4}{16}$
Feb. 11	35	$36\frac{2}{16}$	$\frac{13}{16}$	$32\frac{2}{16}$	2
Mar. 11	36	$36\frac{6}{16}$	$\frac{4}{16}$	$30\frac{14}{16}$	$-1\frac{4}{16}$

The work of Porter[104] and others has shown that there may be a *seasonal* variation in the rate of growth. The observation has been made frequently that individual children may make "spurts" in their rate of growth and may pass through periods in which they show no record of growing in height. It is true that other factors than season may enter into the explanation of such variations—such as the physical condition, relaxation or tenseness of the child at the time of

measuring as well as the variability in the technic of the measures, a variation which cannot be avoided regardless of the experience and training of the technicians.

Robertson[109] has indicated that there are large oscillations or waves of growth in children which he has termed "growth cycles." In man there are three such cycles, each cycle beginning with a period of relatively slow growth followed by a period of very rapid growth and terminating in another period of slackening. The first cycle is the infantile growth cycle, the second the juvenile growth cycle, and the third the adolescent growth cycle.

According to Robertson alteration of bodily proportion which normally accompanies development, is dependent upon the actual occurrence of growth and not upon the age of the animals. If alterations are produced in the proportional growth of tissues which accompany development during the infantile period this may lead to manifest changes in external bodily proportions. These changes are evidenced by a notable decrease in the relative magnitude of the head in proportion to the trunk and a relative lengthening of the extremities, particularly of the legs. Robertson refers with interest to the question of whether or not there is a similar period of relative instability of the growth-process at the juncture of the juvenile and adolescent cycles, and also whether specific infections, abnormalities of development, etc. exhibit preference for the one or the other period of instability. Dr. Lydia Roberts* has made the statement that "Disease of the endocrine glands may affect the length of the legs, making them longer or shorter than normal, depending on the particular gland concerned; the bow-legs of rickets markedly shortens the height of the child, and less specific nutritional disturbances may perhaps alter appreciably the length of the child's legs and thereby his height." In a study of the stem recumbant ratio at Merrill-Palmer School, it was found that the stockiest children showed a slightly higher degree of rickets than the children who were of the long lean type. However,

* Roberts, Lydia, "Nutrition Work with Children," p. 43. University of Chicago Press (1927).

the slight difference between the two groups may not be significant.

A discussion of the early use of the Stem-Stature Index has been given by Gray.[44] In 1922 he writes that "As a gage of build, the hither-to honored standard of stature (standing height, H) is equalled or excelled by the 'essential stature' (the body trunk, measured by different observers from slightly different landmarks, *e. g.*, sitting height, Si, or stem length λ)." For some time before the work of Gray it had been shown that physical measurements may be examined in two ways: actual values and proportional values, in this case the proportional values being ratios (indices) of sitting-height to stature (Si:H) and stem length to stature (λ/H). The ratio of sitting height to standing height (Si:H) of adults usually slightly exceeds 50 per cent, oscillating between 53 and 54; yet it may fall to 47 or even lower, or it may rise above 56. Gray[44] recognizes three types of stature, one in which the trunk is preponderant; a second or opposite type with long legs, and a third or intermediate type.

West and Hrdlicka were no doubt the first to use the sitting height index as an index of body build among growing children. The following statement made by Hrdlicka and quoted by Gray (p. 415) seems to be of especial significance, "When I compare my sitting-height indexes with similar indexes obtained by Dr. West, it appears that the indexes of Dr. West's children were at all ages somewhat smaller or that the lower extremities in these children were at all ages somewhat longer than they are in our chidren in the asylum . . . These figures make me think that it is possible that it is in the lower extremities where lies the principal defect in the growth of the badly nourished children; but I can say nothing positive on this point!" Gray found that the private school boys whom he studied surpassed public school children, and still more asylum children of the same age, not only in standing height and in sitting height, but also in relative length of leg; that is they had longer legs for their height than less fortunate children.

Table XXIII shows the average stem-length recumbent length ratio of preschool children at Merrill-Palmer School from the ages of twenty-four to thirty-six months. The range in each month age level is also given. From a study of this data at Merrill-Palmer School it was found important to stress the variation within each age group as well as the central trend. It is apparent that the ratio of the stem to the total height progressively diminishes with increasing age. It can be seen from the table, for example, that the range of variability for boys at the twenty-four month age level is from 63.5 to 58.6, or 4.9 points, but that the range of 50 percentiles from twenty-four to thirty-six months is only 61.2 to 59.3 or 1.9 points. This shows that there may be within an age group a greater difference in ratio than the average difference between two age groups.

TABLE XXIII

STEM LENGTH-RECUMBENT LENGTH RATIO OF MERRILL-PALMER BOYS AND GIRLS

Age (months).	No. of cases.	Average ratio boys.	Range of ratio.	No. of cases.	Average ratio girls.	Range of ratio.
*24	27	61.2	63.5–58.6	..	...	.....
25	..	61.0	63.3–58.5			
*26	35	60.8	63.1–58.4	29	60.8	63.0–58.3
27	..	60.7	63.0–58.3	..	60.6	62.7–58.0
28	..	60.5	62.9–58.2	..	60.4	62.4–57.8
29	..	60.4	62.8–58.1	..	60.3	62.2–57.6
30	..	60.2	62.7–58.0	..	60.1	61.9–57.4
31	..	60.1	62.6–57.9	..	60.0	61.7–57.2
*32	52	60.0	62.5–57.9	46	59.8	61.4–57.0
33	..	59.8	62.2–57.8	..	59.6	61.3–56.9
34	..	59.6	62.0–57.6	..	59.5	61.1–56.8
35	..	59.5	61.8–57.5	..	59.3	60.0–56.6
36	..	59.3	61.6–57.3	..	59.2	60.8–56.5

*The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 24, 26, and 32 were the mid-points; the values at the remaining month levels were interpolated between these values.

It seems fair to conclude that it is possible to use this ratio as early as the preschool age as an index of body type

since it is evident from the table that the short, stocky type of preschool child (child with high ratio) differs conspicuously from the long, lanky type (child with low ratio). A study of 50 preschool children over a period of years indicates that the body type does not change during the preschool years.

Dentition.—Good teeth, says McCollum[75] are determined in great measure, before the child is born. It is true, also, that serious damage may and often does occur to the teeth in postnatal life. As is indicated by the table No. XIII, page 252, calcification of the permanent medial incisors and lateral incisors begins during the first year. Calcification of the canines begins during the third year, of the first premolars during the fourth year, of the second premolars and second molars during the fifth year. Therefore, it is important that the child should receive a diet rich in calcium salts and vitamins during the period when the teeth are becoming calcified. Thoma[138] states that "nature, ever economical, utilizes the mineral salts of the roots of the first teeth, which become absorbed as the permanent ones get ready to take their places." Although the first permanent molar begins to calcify before birth, the most important time for the formation of the enamel of the permanent set of teeth as a whole, according to Thoma, is between the ages of two and ten. It is important, therefore, that the preschool child should receive during this period of tooth formation a large amount of the foods necessary for the formation of sound tooth tissues, food rich in mineral salts and vitamins. Moreover, children from the age of nine months on should be gradually given harder foods which have a beneficial effect upon the growth of the jaws and the nourishment of the teeth due to chewing.

It is a well known fact that infectious diseases of childhood such as measles, scarlet fever, etc. may temporarily interrupt the development of the teeth and when development is resumed a fault may be visible in the enamel to mark the event.

That decay may appear at an early age in the deciduous teeth is evident from the survey of Rypins (quoted by

McCollum[75]), "Rypins examined 1197 preschool children of Kansas City, Missouri, between the ages of three and six years. Rypins found that 27.2 per cent had dental caries, which averaged over one decayed tooth for each mouth examined, and almost four decayed teeth for each of the carious mouths. Of the teeth erupted 6.3 per cent were carious." It is the general conception that dental caries is caused by the action of bacteria or germs which normally inhabit the mouth, these bacteria, acting in the presence of food debris and certain elements in the saliva, result in the formation of an acid which attacks the enamel covering the exposed parts of the tooth, after which underlying softer parts become rapidly destroyed. McCollum thinks there are many other factors which may be actual and potential causes of dental decay and its progress, such as (1) low resistance of the teeth to decay because of developmental defect (antenatal and postnatal); (2) faulty diet (both of the mother during pregnancy and of the child); (3) neglect of dental attention through ignorance of the parents; (4) the cost of dental attention, a serious consideration with families of low economic status; (5) failure of the child to call attention to the condition of the teeth, either because it is too young or because of fear; (6) lack of dental facilities, so common in rural sections.

Howe[59] in experimental work on guinea pigs has been unable to produce dental caries by fermentation and the presence of micro organisms isolated from caries. However, he was able to obtain serious teeth disturbances on diets deficient in vitamins. Although he feels experiments on the teeth of guinea pigs cannot be conclusive regarding human teeth, he recommends a diet including whole milk, fresh vegetables, particularly of the green and leafy varieties, fresh fruits and whole grains.

Touverud[141] concluded from his work on the teeth of rats fed on faulty diets that the resistance of the teeth against decay must lie in their structure and chemical composition. Changes in these two factors may be the first step in the process of decay, rendering the tooth susceptible to a third factor which may be a local one, usually bacteria. Howe

is inclined to attribute dental disorders primarily to irregular mineral metabolism.

Mellanby[84] found when a diet that was deficient for tooth development in dogs had vitamin D added to it in sufficient quantities smooth white regularly arranged teeth were formed.

According to McCollum "diseased teeth appear to result from the eating of foods which do not demand chewing and consequent exercise for the teeth; adherence of pasty foods to the surface of the tooth, with resulting fermentative decomposition with acid formation which etches the enamel; unhygienic condition of the mouth; probably also abnormal composition of the saliva which should protect the teeth, but under certain conditions may fail to do so.

"The development of sound teeth, capable of resisting the destructive agencies mentioned, is essentially a dietary problem. The small jaws and crowding of the teeth so frequently seen in children of today is almost certainly the result of faulty skeletal development, and will be influenced by the dietary errors which favor the development of rickets. Malposition favors food packs and the maintenance of foci of fermentation between the teeth. The evidence presented strongly indicates that failure of normal tooth formation—by which we mean the proper spacing of sound teeth—during the developmental period, is the basic cause of a series of events which terminates in dental decay."

Such conclusions all have a very direct and definite bearing upon the development of optimum teeth in the preschool child. Not only proper growth but proper dentition all point to encouraging the preschool child to become familiar with and eat foods which in the light of experimental evidence today favor the development of perfect teeth.

Motor Coordination.—From eighteen months on the general bodily activity is greatly increased. Walking has usually become more or less automatic, although it retains something of a "toddle" until the child is nearly three years old. Other skills develop rapidly now; he runs,

climbs stairs, boxes, trees; he swings; he jumps up and down, often climbing up and jumping down from boxes or stairs, or simply jumping up and down in one spot for minutes on end. He does not often fall now, although his venturesomeness may occasionally take him into places from which he cannot get down. He digs, fills pails, and carts sand in a wagon. He rides his kiddie car, his scooter, his tricycle for fairly long periods without stopping.

Fig. 27.—This two year old child is duplicating the movement of her right hand with her left hand. This bilateral type of activity is very characteristic of the first half of the third year. Note also her squatting position. This too is characteristic.

Children differ, however, in their activity. Sholly[134] found in her study of the activity of preschool children that the differences to be observed in children's activity are great—both in the choice of activity and in the amount of energy expended on it. Some children will spend most of their time on construction activities, others practically none. Some will use the vehicular toys most of the time, others are inclined to the imaginative types of play. Some children will never be found using the jungle gym and similar

pieces of apparatus. Some children apparently will be quiet and comparatively inactive while others seem to be very active during comparatively longer periods of time. However, close observation with an Activity Rating Scale over a stretch of time clearly revealed the fact that the inactive child has occasional spurts of energetic activity and that the active child is extremely energetic only in spurts and also has long spells of quiet playing or working.

This can be seen if we read a report on E. M., who was found to be one of the most active children observed. On one occasion, E. M., two years, eight months of age ran up an inclined plank, jumped into the sand pile on reaching the end, turned a somersault, got up, and started again, repeating the activity for five minutes. This was the longest period of strenuous activity observed in the ninety-six hours of observation on this child. The children as a group spent unbroken periods of from five to fifteen minutes with inactive occupations. Children of this age spend more time in activities which represent lower levels of activity than in activities which represent the higher levels of energy expenditure. There is, however, frequent shifting in intensity of activity.

Skill with the hands develops rapidly from eighteen months to three years of age. At two years the child can scribble, cut gashes in paper with a scissors, can string fairly small beads with a needle and thread; and can pile four or five blocks into a tower. At three years he can copy a circle with a pencil; can close his fist and wiggle his thumb (so great has his control of the thumb become); can build a high tower with his blocks; can build simple block houses; can set a low table neatly, if told what to put on it; can carry a tray containing a plate or bowl, feed himself neatly with a fork; can wipe up spilled things without aid, dust, help care for a pet animal, wipe a number of dishes; can wash himself efficiently, turning the water into the bowl, soaping backs and fronts of his hands, using a wash cloth for his face, wring it out and hang it up on his own hook. He can manage the front buttons of his clothing at the toilet and can undress himself with the exception of

difficult buttons and fastenings, hanging up his clothing neatly and placing his shoes under his bed or in the closet.

These skills by which he cares for himself depend, of course, on the character of his clothing, the nature of the house in which he lives, and the attitude of surrounding adults as well as upon his intelligence and his general physical development. He cannot unbutton tiny buttons

Fig. 28.—This four year old boy has built his own garage and is resting while he surveys his project. One can imagine the amount of physical energy he must have used and can guess what his appetite for luncheon will be.

with small or concealed buttonholes. He cannot hang up his own coat or suit unless there are proper loop tapes by which to hang them, and hooks in the closet low enough for him to reach. He cannot care for himself in the bathroom unless he has a box light enough for him to move about, steady enough so that he will not tip over when he stands on it, and high enough so that he can reach the toilet or the fawcets of the basin. He will not learn respect for other people's towels and wash cloths until he has his own and a place within reach to hang them. It is true, too, that

independence and the skills necessary to it are learned only gradually, and that they are only begun at the age of three. If adequate practice is allowed, these skills are usually fairly well developed at five years, the age at which children can be almost entirely independent of adults in matters of personal hygiene excepting for supervision. Independence can be learned, however, only when the adults who care for the child are willing to relinquish their position of

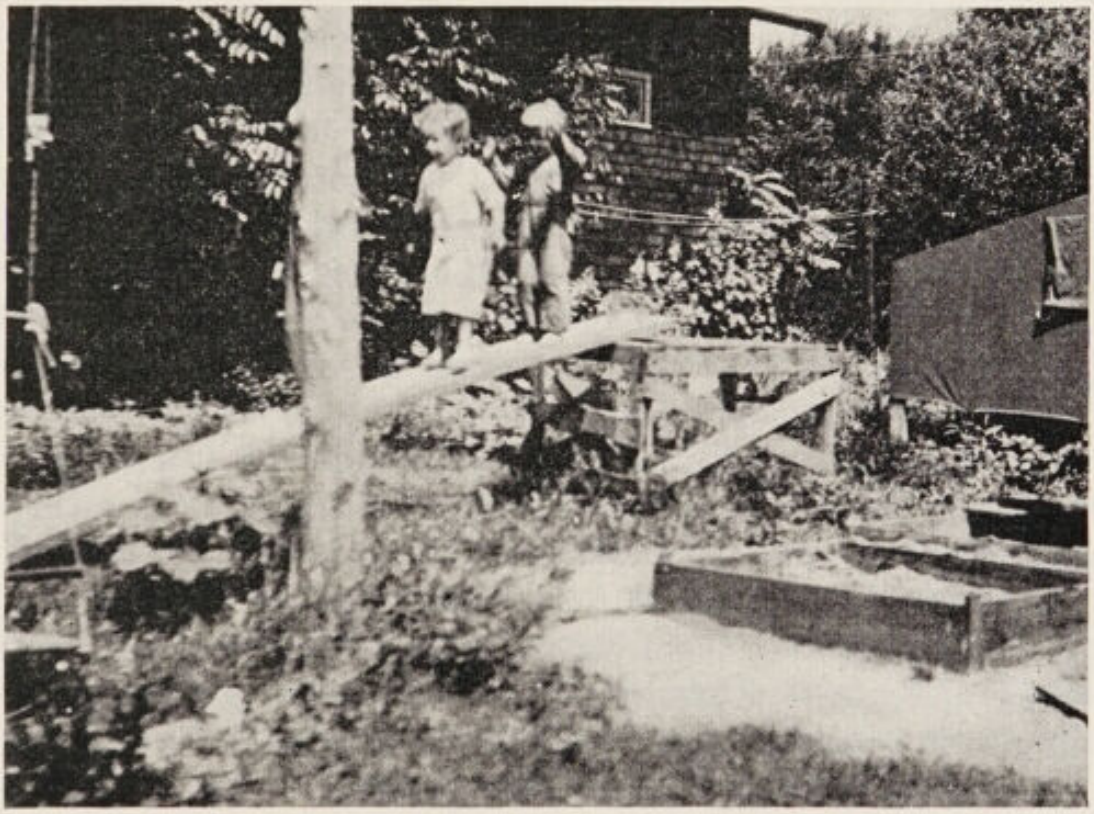

Fig. 29.—Lessons in balance. These two year old children have no fear and have learned their courage on this simple backyard equipment.

complete control over him. There is a great temptation to do everything for him in order to keep him entirely dependent on us as adults and consequently helpless without us. It is a subtle way of fastening him to us. Few parents would do this, even for the emotional gratification it affords them, if they realize how seriously they handicap the motor, mental, and emotional growth of the child by refusing him his independence as he is capable of assuming it step by step.

Equipment for children from eighteen months to three years of age should be simple: plenty of space, particularly

out-of-door space, with a place to run, to climb, to dig; a shovel and pail, or an old pan and spoon from the kitchen; a sand pile or an open patch of dirt, a kiddie kar or an old broom handle to ride; some simple and durable blocks, (fairly large ones at this age), or odd bits of board, empty spools, empty oatmeal cartons, etc.; a doll (a corn stalk dressed up will do), and a carriage (a box on wheels can substitute for this), a few bits of cloth for covers; clay or a bit of mother's dough from the baking; paper and pencil (wrapping paper serves); the list could be extended indefinitely. The main principle to be followed is that the materials should not be useless, mechanical toys, but *materials* which challenge him to resourceful activity, which encourage either general bodily activity, or skill with the hands; should provide for development of perceptions and judgments; should teach technics for expressing oneself. Opportunity to care for one's own physical needs, the privilege of helping about the house or the yard, and other children to play with, plus simple "do-with" equipment should provide even from the age of eighteen months a sound background for physical, mental, and social growth.

Clothing.—Clothing at this age as at every other age should be chosen to meet the activity and educational needs of the child as well as to protect him with garments that are attractive and serviceable. It should be chosen to suit the temperature and weather.

Too warm clothing may increase the child's susceptibility to colds. The child too thinly clad is likely to become inactive. The decision in regard to the suitable amount of clothing must be made on the basis of the child's reaction rather than the adult's feeling. Soft, lightweight garments of a spongy wool material are warmest, but sweaters should be covered with the right sort of outdoor garments to keep them dry in wet and snowy weather, since there should always be a period of outdoor play, except in very stormy weather. Rubbers should be worn when the ground is wet.

Clothing should also be chosen of adequate size. All clothing should be large enough to be easily put on and

should not bind the child in any way, but it should not be so large as to be cumbersome and so hamper his activity. Shoes, stockings, bedroom slippers, rubbers, and overshoes should all be long enough. If too short they may affect the shape of the foot and the way the child walks, and so cause troubles of various sorts. Drawers and trousers should be long enough in the seat not to bind in any way, lest they cause an irritation which might enourage undesirable habits. Garters, if round, which are preferable in general, must be loose enough not to make a mark on the leg, although tight enough to hold stockings up. If long garters are used, they should be made of elastic that has plenty of "give" to it. They must not be tight and must be fastened to waists that are so made that they will bring the pull well up on the neck, and not on the tips of the shoulders, which pulls the shoulders forward or down and so has a bad effect on the posture.

Clothing should be chosen to give the child freedom in play. They should be simply but attractively made, and should be of durable material which can be easily cleaned or washed. Elaborate clothes about which the child has been cautioned and of which he is supremely conscious may prevent the free expression of his desire and need for activity. Unattractive clothes, or any clothing that makes a child conspicuous, may also have an undesirable effect. Short coats and sweaters, light in weight, with leggings or bloomers, give the child freedom for play as well as covering him adequately. Bulky garments, heavy in weight, such as heavy overcoats, hamper a child's activity; they are often of greater weight than a child should be expected to carry. "All wool" garments are light in weight as well as warm.

Clothing should be chosen to allow for learning. The child's clothes should be so made that he can learn at an early age to wait on himself. A child likes to learn, and he can begin to learn at an early age. Large buttons and buttonholes, few in number and easy to reach, facilitate the learning process. Many and small buttons and blind buttons and blind buttonholes hinder it. Dresses, blouses, and waists should button in front, so that the child may

learn to button and unbutton them. Plackets in drawers and trousers should be long enough to allow the seat to drop completely, so that the child may easily seat himself on the toilet without help. Cuffs on sleeves should be large enough so that the sleeves may be easily rolled up when hands are to be washed. It is often difficult to find in manufactured clothing garments that are planned to accomplish the above purposes.

According to Griffith[45] the clothing of a one year old child averages in weight $1\frac{3}{4}$ pounds; from one to four years, 2 pounds; and from four to six years, about $2\frac{1}{2}$ pounds. The ratio of the weight of the clothing to weight of the child is six per cent from two years to five or six years.

The results of a study made by Schmidt-Monard in Germany on the weights of children's clothing are quoted by Griffith. Schmidt-Monard found that children's clothes from three to six years average seven per cent of the total weight for boys, and six per cent for girls.

A study of the clothing of 50 nursery school children made by one of the students at Merrill-Palmer School (Campbell) has shown that the ratio of the weight of clothing to body weight was for boys indoor clothing 4.47 per cent, and outdoor clothing 11.87 per cent of body weight. For girls the indoor clothing weighed 3.91 per cent of the body weight, and the outdoor clothing 9.75 per cent.

Campbell found also the range of indoor clothing weights to be 15 ounces to 2 pounds and 12 ounces, and the range of outdoor clothing weights to be 1 pound and 12 ounces to 6 pounds during November, December, and January. This investigation involved a study of relationship between weight of clothing and activity. No correlations were found to exist between the weights of clothing worn by children and their activities which fact does not substantiate the popular belief that heavy garments worn by children do restrict their activity. The average number of pieces of clothing worn indoors by both boys and girls was six, and outdoors by both boys and girls was ten.

In considering fabrics, it was found that the majority of the girls wore all cotton garments indoors, while the boys

wore a greater variety of fabrics. The average weight of the clothing worn outdoors by boys is very slightly heavier than that worn by girls, while the weight of the boys indoor clothing was 27 per cent heavier.

Campbell has made some interesting observations from the study of individual cases. R. S., a boy, had the highest activity score for the total group. He had next to the lowest physical rating of all of the children studied. However, the ratio of his outdoor clothing to his body weight was 17.62 per cent, or next to the highest ratio obtained. He was a nervous, tense child which fact tended to make him seem hyperactive in comparison with the group. Although this is only one example, it does show how many factors aside from clothing enter in to influence the type of activity of a child.

Food.—Lusk[72] in 1918 set up standards for the food requirements of boys of various ages based upon accurate basal metabolism studies plus somewhat arbitrary allowances for energy according to the activity of the child. Unfortunately for the present purpose, his figures for children between the ages of two and five years are largely hypothetical, for they are apparently based on a single basal metabolism of a boy two and one-half years old.

The work of Holt and Fales[57] is the first extensive study of the food requirements of children who were found to be normal by medical examination. After studying the work of previous investigators, they formulated a schedule of food allowances for children from one to eighteen years of age, based on basal metabolism plus allowances for growth, activity, and excreta. They checked the validity of these allowances by observations of the actual food intake of 106 healthy children ranging from one to eighteen years of age, over a four-day period, and found that the data concerning the actual food intake agreed closely with their estimates.

A study simliar to that of Holt and Fales was made in 1924 by Goodhue,* who confined her observations to preschool

*Goodhue, A. L.: "A Study of the Diets of Healthy Children from Two to Six Years, by the Individual Method." Unpublished thesis, University of Chicago, Chicago, Ill., 1924.

children, all of whom were in good health and of average or better than average development, as determined by medical examination. Goodhue weighed the actual food intake of each child over a twenty-four hour period, checking this with a detailed report of the food intake measured by the mother for the following seven days, to be sure that it represented the diet. She determined the calcium, phosphorus, and iron as well as the calorie, protein, fat, and carbohydrate intake.

A third study of this nature was made in 1926 by McKay,[78] who obtained the actual weighed food intake of 55 children between two and six years of age over a four-day period. Twenty-five of the children were in private homes and 30 in an orphanage. All were examined by a pediatrician and pronounced normal physically. The average intake of the children in private homes was found to be higher in calories, protein, calcium, phosphorus, and iron than that of the orphanage children in corresponding age groups.

An unpublished study of the food intake of 124 children at the Merrill-Palmer School in Detroit gives further data on food standards. These children were from private homes representing a wide range of economic status. The school program includes the cooperation of the parents in submitting, at least three times a year, a report of the amounts of food, by measure, eaten by their children over a period of seven consecutive days. From several hundred such reports 124 were selected as being accurate, complete, and representative of the diets of normal, healthy children as determined by physical examination and the growth records kept by the school. The food intakes were calculated from these reports and the school records, and the average intake for each of the different age groups was determined.

These studies of normal children made by the individual method probably give the best conception of the food requirements of the preschool child. The actual number of children studied by this method is still relatively small and it is possible that with further studies the standards thus obtained will have to be modified. The general agreement in the standards determined by these methods, however,

seems remarkable, when the number of persons making the investigations, the variations in the technic followed, and the unavoidable errors occasioned by the varying content of the same prepared dish, are considered.

Less work has been done on the mineral needs of young children. Both McKay and Goodhue determined the amount of calcium, phosphorus, and iron in the diets of the children they studied. Sherman's[120] work indicates that a moderately active man weighing 70 kilograms should have 0.68 Gm. of calcium, 1.32 Gms. of phosphorus, and 0.015 Gm. of iron to meet his minimum requirements, with a 50 per cent allowance as a margin for safety. He believes, however, that owing to the demands of growth the mineral requirements of the child are greater in proportion to his energy needs than those of the adult. These exceptional needs during the growing period, according to Sherman, probably call for at least 1 Gm. of calcium and 1 Gm. of phosphorus per day. These figures have been used widely as a standard in planning dietaries for young children. Recently (1928) Hawley at the Bureau of Home Economics devised a double scale for calculating the energy, protein, and mineral needs at various ages, in percentages of the requirements of a moderately active man as determined by Sherman. The mineral need of a three-year-old child calculated in this way is 0.54 Gm. of calcium, 1.04 Gms. of phosphorus, and 0.012 Gm. of iron. Thus, two types of standards for mineral needs are available, one based on studies of the actual intake of normal children and the other upon the requirements of an adult.

Sherman and Hawley agree that the optimum standard for calcium and phosphorus is the amount of each contained in one quart of milk plus what is provided by the rest of an adequate diet. As Sherman makes no statement concerning the amount of iron needed by the growing child compared to that needed by a man, it has been inferred that he recommends the same amount for all ages, that is, 15 milligrams per day.

The data secured from the study of 124 children attending the Merrill-Palmer School showed the average weight for the

three-year-old child in this study to be 31.8 pounds, and the energy value of his food to be 1432 calories, that he averaged 50.5 Gms. of protein per day, 55.6 Gms. of fat per day, 171.4 Gms. of carbohydrate per day. Accepting the Hawley and Sherman Standards for minerals it is desirable to include in his daily food intake one gram each of calcium and phosphorus and 0.012 Gm. of iron. Such figures as these can at best only be approximate, however, they can serve as a valuable guide and can be followed with safety when feeding a child of three years.

The source of the food which supplies this requirement may be most economically chosen from foods as listed in the following table.

TABLE XXIV

Protein.	Fat.	Carbo-hydrate.	Calcium.	Phosphorus.
eggs milk meat fish cheese	butter codliver oil animal oils eggs cream	bread cornstarch rice tapioca potatoes & other vegetables cake cookies	milk fruit vegetables	milk egg yolk meat

Iron.	Vitamin A.	Vitamin B.	Vitamin C.
green vegetables especially spinach egg yolk meat especially liver dried fruits	milk butter cod liver oil egg yolk green vegetables	whole wheat bread whole cereals vegetables fruits eggs milk	tomato juice orange juice raw vegetables fruits

A study of 250 home reports made by parents of children attending the Merrill-Palmer Nursery School showed that their home meals frequently did not contain enough fresh fruits, and cooked and uncooked green leafy vegetables to meet the needs of the growing child. Analyses of the

home dietaries also proved them, as a rule, low in calcium, iron, and the vitamins, if current standards are accepted.

The following menus for three days are suggestive of the variety of food which can be introduced into the diet of a child of three years and supply an adequate, balanced ration.

Breakfast.	Breakfast.	Breakfast.
1 orange	⅓ cup apple sauce	¼ cup stewed apricots
¼ cup rolled oats	6 tablespoons wheatena	¼ cup Pettijohns
4 tablespoons whole milk	1 cup milk	1 cup milk
1 slice toast*	1 slice toast	1 slice toast
¼ teaspoon butter	¼ teaspoon butter	¼ teaspoon butter
1 cup milk	1 tablespoon honey	
Dinner.	**Dinner.**	**Dinner.**
1 meat ball	⅓ cup salmon loaf	½ cup cream tomato soup
⅓ cup creamed cabbage	1 tablespoon cream sauce	⅓ cup green beans
⅓ cup stewed tomatoes with croutons	⅓ cup spinach	1 carrot sandwich
1 celery sandwich	⅔ cup milk	⅔ cup milk
⅔ cup milk	1 medium celery stalk	⅓ cup cream tapioca with crushed pineapple
⅓ cup stewed prunes	1 cabbage sandwich	
	⅓ cup stewed plums	
	1 oatmeal cookie	
Supper.	**Supper.**	**Supper.**
½ cup cream vegetable soup	⅓ cup scalloped potatoes	⅓ cup scrambled eggs
1 lettuce leaf	⅓ cup buttered carrots	1 small baked potato
1 bread and butter sandwich	2 leaves lettuce	¼ cup buttered cabbage
	1 cup milk	1 medium stalk celery
1 cup chocolate blanc mange	1 cottage cheese sandwich	⅔ cup milk
⅔ cup milk	½ cup baked custard	⅓ cup grapes (seedless)
Midmorning lunch.		**Midafternoon lunch.**
⅓ cup tomato juice		⅔ cup milk
½ teaspoon cod liver oil		

In providing the main meal (dinner) for the child the following guide has proved helpful:

*Always use whole wheat bread or toast.

A main dish, usually protein
A cooked vegetable
An uncooked green leafy vegetable
(may be used in sandwich)
Milk to drink and used in cooking
Whole wheat bread
(in a sandwich)
An additional source of carbohydrate
An egg
(included in the main dish, sandwich or dessert)
Fruit or other dessert, usually fruit flavored

There are a number of factors to be considered in establishing the right attitude of a child toward his food. The esthetic appeal of the food itself has a marked effect upon appetite. Most persons realize that the sight, taste and smell of the food served makes a direct appeal to the senses. Meals planned to offer some contrast of color, flavor, and texture probably attract children as they do adults. Careful preparation and attractive service are highly desirable. One serving of food that is burned or uncooked or too hot gives an unpleasant sensation that, if repeated, may give rise to a food prejudice which will take months of reëducation to overcome.

Experience indicates that small portions, with an opportunity for second servings, inspire a much greater desire for food than large portions, and have the further advantage of helping the child to form the habit of finishing what is placed on his plate, since they can usually be eaten without undue effort.

Irregular meals and eating between meals, which result in a constant, even though small, supply of food in the stomach, prevent the contractions of the stomach which normally give rise to the feeling of hunger.

From the beginning of the child's life, the kind of food he eats influences his appetite. A diet containing the right proportions of the different food elements results in a general body vigor which in itself promotes a good appetite. It is recognized that vitamin B has a favorable effect upon appetite. Experiments upon animals have shown that diets lacking it, though otherwise apparently adequate, produce fitful appetites in a very short time. This relation of vita-

min B and appetite is one of the reasons for the emphasis placed upon whole wheat, including the germ, whole grain cereals, cabbage, spinach, and tomatoes, all valuable sources of vitamin B, in the diet of the young child.

The physical condition of the child plays an important rôle. The healthy, active child usually has a noticeable eagerness for food at mealtime, often absent in the child who is physically below par. In a healthy child a sudden lack of appetite may be a sign of an approaching illness. Frequent colds, ear troubles, and other infections all seem to effect the appetite.

The child who is fatigued from overstrenuous play, excitement, or lack of sleep is likely to show a distaste for food. Urging him to eat under these conditions is not advisable. Rest and possibly a small amount of food, such as a glass of milk, are best at such a time, even if it is the child's regular mealtime.

This discussion is based solely upon the child with no known food idiosyncrasies. It is recognized, however, that some few children have food sensitizations which even when very slight seem to inhibit the desire for food.

Food Habits.—The child whose mealtimes have always been treated in a matter-of-fact way is not likely to develop faulty food habits. Wholesome food, properly prepared, and given to the child without special comment but with the attitude that of course he will eat it, usually produces the desired results. If the food is not eaten after a reasonable interval, it is probably best to remove it. If the child is still hungry he usually learns by experience and eats without delay at succeeding meals. Such a procedure, carried out calmly, will do much to prevent feeding difficulties. The child who finds that, by refusing his food, he can create an exciting emotional situation centering about himself tends to repeat this behavior until every mealtime becomes the occasion for a scene of coaxing, tears, threats, or anger, upsetting to both the child and adult. Missing a meal or two is far less likely to harm a child than are emotional scenes often repeated.

Food prejudices may arise from any of a number of causes. As noted before, burned or otherwise unpalatable food served once may prejudice the child against that food when it is served again. An emotional upset at a meal may be the reason for subsequent refusals of dishes which were served at that meal. It is unwise to discuss food dislikes in the child's presence. Children are quick to imitate their elders, especially those of whom they are particularly fond, and a chance remark that "Mother can't drink milk," "Father simply won't eat spinach," or "Aunt May never does take cereals for breakfast," may be the unwitting cause of the child's refusal of a food.

New and unfamiliar foods are best presented to the child with foods he is known to like, until he becomes used to them. Teaching the child to maintain an interested and tolerant attitude toward unfamiliar foods, and preparing him in advance when new foods are to be served, are advisable. The new food should of course be served in an appetizing way, so that the child can be told truthfully to "eat it, it is good."

When children have developed capricious appetites or prejudices toward certain foods they will employ many ingenious devices to avoid or delay eating their food. Very slow eating, chewing but not swallowing, leaving the table to go to the toilet, playing with the food, and excessive conversation are often definitely schemed by the child so that he may not be required to eat. Denying the child his dessert until the main course is finished, or removing all the food and refusing more until the next regular meal if the delay is extended, have been found usually to be successful procedures in situations of this kind.

It sometimes happens that children who are finicky eaters at home eat without question whatever is set before them in the nursery school. The influence of other children is undoubtedly an important factor here, for most children are quick to conform to the behavior of the group. Absence of special adult attention is another factor, for the child in the school soon realizes that no one is there to supervise every mouthful and it is to his own interest to eat without waiting to be coaxed.

The ease of handling food may influence the amount the child eats. Eating utensils should be suited to the small hands and mouths of the children. Children's knives, forks, and spoons, made like the regulation eating utensils but smaller in size, may now be obtained in many designs. The use of these from the first eliminates the need for learning to use two kinds of eating utensils, as is necessary when the child begins feeding himself with curved handled "baby spoons" and "pushers." The food itself should be easy to manipulate. When for example lettuce is served shredded the children find the long strips hard to eat with a fork. A lettuce leaf which can be picked up in the fingers proves much more satisfactory. Diced beets are also difficult for the children to eat, either with fork or spoon, but sliced beets, which can be speared with the fork, are easily dealt with. Peas offer a similar problem, which can be solved by serving them in a nest of mashed potatoes or as a puree.

It is essential that the child be accustomed to different types of food so that he can learn to chew properly and can exercise his teeth and gums. Tough foods are not advisable, but vegetables, certain raw fruits, bread crusts, toast, and other foods which offer some resistance to the teeth, are useful aids in teaching mastication, for mastication must be learned.

While it is not necessary consciously to consider all these points at every meal, it is well to have them in mind so that feeding difficulties may be avoided or, at least, their causes understood in time to make the proper adjustments before habits are established.

References

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CHAPTER IX

GROWTH DURING THE LATER PERIOD OF EARLY CHILDHOOD

Rate of Physical Growth.—Table XXV shows the increases in standing height for boys and girls from three to five years of age to be 5.3 inches for the boys and 5.4 inches for the girls. The rate of increase per year for both sexes has decreased as compared with the rate shown in infancy and the period of early childhood. This decrease in rate is characteristic of the growth of children, in general, as has been shown by investigators in the field of child development.*

The range of height from 1 to 99 percentile for boys of these ages is wide. At three years (thirty-six months) the range is from 35.0 to 40.4 inches. At four years (forty-eight months) it is from 37.7 to 43.8 inches. At five years (sixty months) it is from 40.7 to 45.5 inches. The range of height from 1 to 99 percentile for (above average) girls of these ages is just as great. At three years the range is from 33.8 to 40.3 inches. At four years it is from 35.8 to 43.6 inches and at five years it is from 39.0 to 45.7 inches.

Table XXVI shows the Children's Bureau standards of standing height for boys and girls from three to five years, and represents a larger and more unselected sample of the general population. It will be seen that the Merrill-Palmer boys and girls are about one inch taller at three years and 1.3 inches taller at five years than the Children's Bureau standards.

While making this increase in height from 37.6 to 42.9 the Merrill-Palmer boys gained in weight as shown in Table

*The greater number of studies of weight and height have been made among school children and adolescents. However Baldwin and Wood, Woodbury, Faber and the Children's Bureau have made notable contributions to the preschool field.

TABLE XXV

HEIGHT STANDING (INCHES) FOR MERRILL-PALMER NURSERY SCHOOL BOYS AND GIRLS THIRTY-SIX TO SIXTY MONTHS

Age in months.	No. of cases.	Average 50 percentile height boys.	No. of cases.	Average 50 percentile height girls.
36	..	37.6	..	37.1
37	..	37.9	..	37.4
*38	65	38.1	58	37.6
39	..	38.3	..	37.9
40	..	38.5	..	38.2
41	..	38.7	..	38.5
42	..	38.9	..	38.8
43	..	39.1	..	39.1
*44	74	39.3	74	39.4
45	..	39.6	..	39.6
46	..	39.9	..	39.8
47	..	40.1	..	40.0
48	..	40.4	..	40.2
49	..	40.6	..	40.4
*50	70	40.9	73	40.6
51	..	41.1	..	40.8
52	..	41.3	..	41.0
53	..	41.6	..	41.2
54	..	41.8	..	41.4
55	..	42.0	..	41.6
*56	59	42.2	56	41.8
57	..	42.4	..	42.0
58	..	42.6	..	42.2
59	..	42.7	..	42.3
*60	41	42.9	36	42.5

*The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 38, 44, 50, 56 and 60 were the mid-points; the values at the remaining month levels were interpolated between these values.

XXVII 7.8 pounds and Merrill-Palmer girls while increasing in height from 37.1 to 42.5 inches made a gain in weight of 8.8 pounds. During the same chronological period the Children's Bureau standard show that boys increase in standing height from 36.6 to 41.6 inches and girls increase 36.2 to 41.3 inches. The gains corresponding to these increases in height are shown in Table XXVIII and for boys are 7.0 pounds and for girls 6.9 pounds.

During this period there is a marked change in the proportion of body measurement, the increase in total length being largely in the legs. This is evident in the ratio of stem length to recumbent length, or the stem-stature index,

TABLE XXVI*

HEIGHT STANDING (INCHES) BOYS AND GIRLS THIRTY-SIX TO SIXTY MONTHS

(Federal Children's Bureau)†

Age (months).	Height.	
	Boys.	Girls.
36 months, under 37	36.625	36.250
37 months, under 38	36.875	36.500
38 months, under 39	37.125	36.750
39 months, under 40	37.375	37.000
40 months, under 41	37.625	37.250
41 months, under 42	37.875	37.500
42 months, under 43	38.125	37.750
43 months, under 44	38.250	38.000
44 months, under 45	38.500	38.125
45 months, under 46	38.750	38.375
46 months, under 47	39.000	38.500
47 months, under 48	39.125	38.750
48 months, under 49	39.250	38.875
49 months, under 50	39.500	39.125
50 months, under 51	39.625	39.250
51 months, under 52	39.875	39.500
52 months, under 53	40.000	39.750
53 months, under 54	40.250	40.000
54 months, under 55	40.500	40.250
55 months, under 56	40.625	40.375
56 months, under 57	40.875	40.625
57 months, under 58	41.125	40.875
58 months, under 59	41.250	41.000
59 months, under 60	41.500	41.250
60 months, under 61	41.625	41.375

*Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

†Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have been converted into decimals.

which is 59.3 (50 percentile) for boys and 59.2 (50 percentile) for girls at three years and 56.8 (50 percentile) for boys and 56.7 (50 percentile) for girls at five years as shown in Table XXIX. The child now shows much better muscular coordination, handles his body with ease and grace. His activity has increased greatly and the energy demands become heightened. A study of food intake covering seven con-

TABLE XXVII

WEIGHT (POUNDS) FOR HEIGHT (INCHES) OF MERRILL-PALMER NURSERY SCHOOL BOYS AND GIRLS

Height (inches).	No. of cases.	Average weight boys.	No. of cases.	Average weight girls.
*37.00	63	31.9	61	30.8
37.25	..	32.2	..	31.2
37.50	..	32.6	..	31.6
37.75	..	33.0	..	32.0
38.00	..	33.4	..	32.5
38.25	..	33.8	..	32.9
38.50	..	34.2	..	33.3
38.75	..	34.6	..	33.8
*39.00	75	35.0	64	34.2
39.25	..	35.3	..	34.6
39.50	..	35.6	..	35.0
39.75	..	36.0	..	35.3
40.00	..	36.3	..	35.7
40.25	..	36.7	..	36.1
40.50	..	37.0	..	36.5
40.75	..	37.4	..	36.8
*41.00	69	37.7	68	37.2
41.25	..	38.1	..	37.6
41.50	..	38.4	..	38.0
41.75	..	38.7	..	38.4
42.00	..	39.1	..	38.8
42.25	..	39.4	..	39.2
42.50	..	39.7	..	39.6
42.75	..	40.1	..	40.0
*43.00	53	40.4	44	40.4
43.25	..	40.8	..	41.0
43.50	..	41.3	..	41.6
43.75	..	41.8	..	42.2
*44.00	29	42.2	25	42.7

*The number of cases is reported only at these height levels because the standards were calculated for two-inch height groups in which 37, 39, 41, 43 and 44 were the mid-points; the values at the remaining month levels were interpolated between these values.

secutive days for 57 boys and girls between three and four years showed the average for the group to be 1509 calories or 45 calories per pound of body weight. A study of the food intake for the same number of days for 44 boys and girls between four and five years gave an average of 1585 or 41 calories per pound of body weight. These averages are slightly higher than some of the standards in use. Records of the gains in height and weight of these children over a twelve month period showed that the average increase in height and weight for the group equaled or exceeded the average increase in height and weight for the Merrill-

TABLE XXVIII

WEIGHT* (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS THIRTY-SIX TO SIXTY MONTHS

(Federal Children's Bureau)

Height (inches).	Weight.	
	Boys.	Girls.
36.	29.75	29.125
36.25	30.281	29.437
36.50	30.812	29.750
36.75	30.969	30.062
37.	31.125	30.375
37.25	31.469	30.719
37.50	31.812	31.062
37.75	32.156	31.416
38.	32.500	31.750
38.25	32.744	32.062
38.50	33.187	32.375
38.75	33.531	32.687
39.	33.875	33.000
39.25	34.219	33.375
39.50	34.562	33.750
39.75	34.916	34.125
40.	35.250	34.500
40.25	35.656	34.875
40.50	36.062	35.250
40.75	36.469	35.625
41.	36.875	36.000
41.25	37.250	36.375
41.50	37.625	36.750
41.75	38.000	37.125
42.	38.375	37.500

*Weight for heights fraction of whole number, such as 36.25 etc. obtained by calculation.

Palmer School, indicating that the energy value of the food intake had been adequate for the energy requirement of the children of these ages.

Meeting the Food Requirements.—By the time the child has reached this period he should have all temporary teeth and the habit of mastication should be well established. The food served can be less finely divided and the variety increased to include almost all the vegetables eaten by the other members of the family. The child can now take his meals with the family and should be permitted to do so. It is desirable to give him his sugar in fresh and dried fruits which not only afford the simple sugars suitable for him to have, but also the minerals and vitamins as well as cellulose which adds bulk to the diet.

The amount of carbohydrate in the food intake of 124 children as revealed by a study was shown to be 5.50 Gms. per pound of body weight at three years and 5.08 Gms. per pound of body weight at four years. A detailed study of the item in the diet revealed that the carbohydrate had been taken in the form of cereals, vegetable starches, whole wheat bread and fruit sugars. Very little cane sugar had been used and not an unusual amount of white bread. These are desirable forms in which to secure carbohydrate since they combine starch or sugar with minerals, vitamins and cellulose. It is well to plan to include a raw and a cooked green vegetable in both the midday and the evening meal, since it is possible to insure the day's carbohydrate requirement and not secure at the same time as large a supply of minerals and vitamins as the child needs.

There is every reason to believe that the mineral and vitamin demands of the body are just as insistent at this time as in any of the other periods mentioned. All available information indicates that it is wise to give only moderate amounts of fats, probably not over 1.5 Gms. per pound of body weight. This is best offered in the fats which contain satisfactory quantities of vitamin A. If a child receives a quart of milk a day, a small amount (1 ounce) of butter, one egg, and the fat which is found in his other foods he will receive very close to his daily fat requirement.

TABLE XXIX

STEM LENGTH-RECUMBENT LENGTH RATIO OF MERRILL-PALMER BOYS AND GIRLS

Age (months).	No. of cases.	Average ratio boys.	Range of ratio.	No. of cases.	Average ratio girls.	Range of ratio.
36	..	59.3	61.6–57.3	..	59.2	60.8–56.5
37	..	59.2	61.4–57.2	..	59.0	60.7–56.4
*38	58	59.0	61.2–57.1	54	58.9	60.6–56.3
39	..	58.8	61.1–56.9	..	58.8	60.5–56.2
40	..	58.7	60.9–56.8	..	58.7	60.4–56.2
41	..	58.5	60.8–56.6	..	58.6	60.2–56.1
42	..	58.4	60.6–56.5	..	58.5	60.1–56.1
43	..	58.2	60.5–56.3	..	58.4	60.0–56.0
*44	64	58.1	60.4–56.2	67	58.3	59.9–56.0
45	..	58.0	60.3–56.0	..	58.2	59.8–55.9
46	..	57.9	60.2–55.9	..	58.1	59.7–55.8
47	..	57.8	60.1–55.7	..	58.0	59.6–55.8
48	..	57.7	60.0–55.6	..	57.9	59.5–55.7
49	..	57.6	59.9–55.4	..	57.8	59.4–55.6
*50	58	57.5	59.9–55.3	62	57.7	59.3–55.6
51	..	57.4	59.8–55.2	..	57.5	59.2–55.4
52	..	57.4	59.7–55.2	..	57.4	59.1–55.3
53	..	57.3	59.6–55.1	..	57.3	59.0–55.2
54	..	57.3	59.5–55.1	..	57.2	58.9–55.1
55	..	57.2	59.4–55.0	..	57.1	58.8–55.0
*56	52	57.2	59.4–55.0	51	57.0	58.7–54.9
57	..	57.1	59.2–54.9	..	56.9	58.4–54.7
58	..	57.0	59.1–54.9	..	56.8	58.3–54.5
59	..	56.9	58.9–54.8	..	56.7	58.2–54.3
*60	37	56.8	58.8–54.8	36	56.7	58.3–54.2

*The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 38, 44, 50 and 56 were the mid-points; the values at the remaining month levels were interpolated between these values.

Values read from percentile curves for six month age groups.

The total amount of protein eaten by children of these ages, as shown by the study of 124 children, is greater but, the amount per pound of body weight is about the same as the younger group consumed, namely 1.58 Gms. per pound. The range of protein in the diet of children of these ages is from 0.89 to 2.46 Gms. per pound of body weight in the three year old group and from 0.71 Gms. to 2.12 Gms. per pound of body weight in the four year group. The protein of the child can be met by taking a quart of milk, a whole

egg and the protein in other foods. There seems no sufficiently justified reason for withholding small amounts of meat from the diet and it is desirable to substitute meat and fish occasionally for eggs.

The average child of these ages can take from $\frac{1}{3}$ to $\frac{1}{2}$ of a cup of green vegetables, of soups, of custards, of desserts, a whole orange or apple, a poached egg or $\frac{1}{3}$ to $\frac{1}{2}$ of a cup of creamed egg. The quantity of food which the child will take whether $\frac{1}{3}$ or $\frac{1}{2}$ of a cup will depend somewhat upon his appetite, his general physical status and his attitude toward food. It is undoubtedly a better procedure to offer a smaller quantity of food and have it eaten willingly than to insist on a larger amount of food that may be more than the child at that particular time can be expected to eat. The children tend to eat the foods they are accustomed to and to refuse the foods to which they are unaccustomed.

It is not unusual for the child when he is first permitted to join the family for meals to indulge in a type of behavior which may be very trying to the other members of the family. For many months because of his very physical dependence he has had to be fed and waited upon; when he comes to participate in the family meals he still desires to be the center of attention. If he finds himself ignored he will resort to almost any device to secure adult consideration. Refusal to eat, temper tantrum, dawdling, bargaining about his food, "he will eat carrots if he can have ice cream," are some of the kinds of behavior one is likely to encounter in the child at this period. Many children dominate their parents and the rest of the family in an unbelievable manner through their refusal to eat. A matter-of-fact, firm manner will do much to bring to the child a realization that there are some things in life which must be done and eating is one of them.

Too little research study has been made in *the posture of children* between the ages of two and five years to formulate any satisfactory conclusion. When a child has had bow legs or marked knock knees the aid of an orthopedic surgeon has been sought but little attention has been given to the body posture of the average child.

The common idea has been that postural defects such as pronation, flat foot, prominent scapulae, were outgrown and were temporary aspects of development. It is true that certain postural conditions may accompany development, but it does not argue that all such conditions are necessarily aspects of development.

A study of the postural defects noted in 350 examinations of normal children made by the same physician showed the following results.

TABLE XXX

UNPUBLISHED STUDY "INCIDENCE OF POSTURAL DEFECTS IN PRESCHOOL CHILDREN AT MERRILL-PALMER SCHOOL"

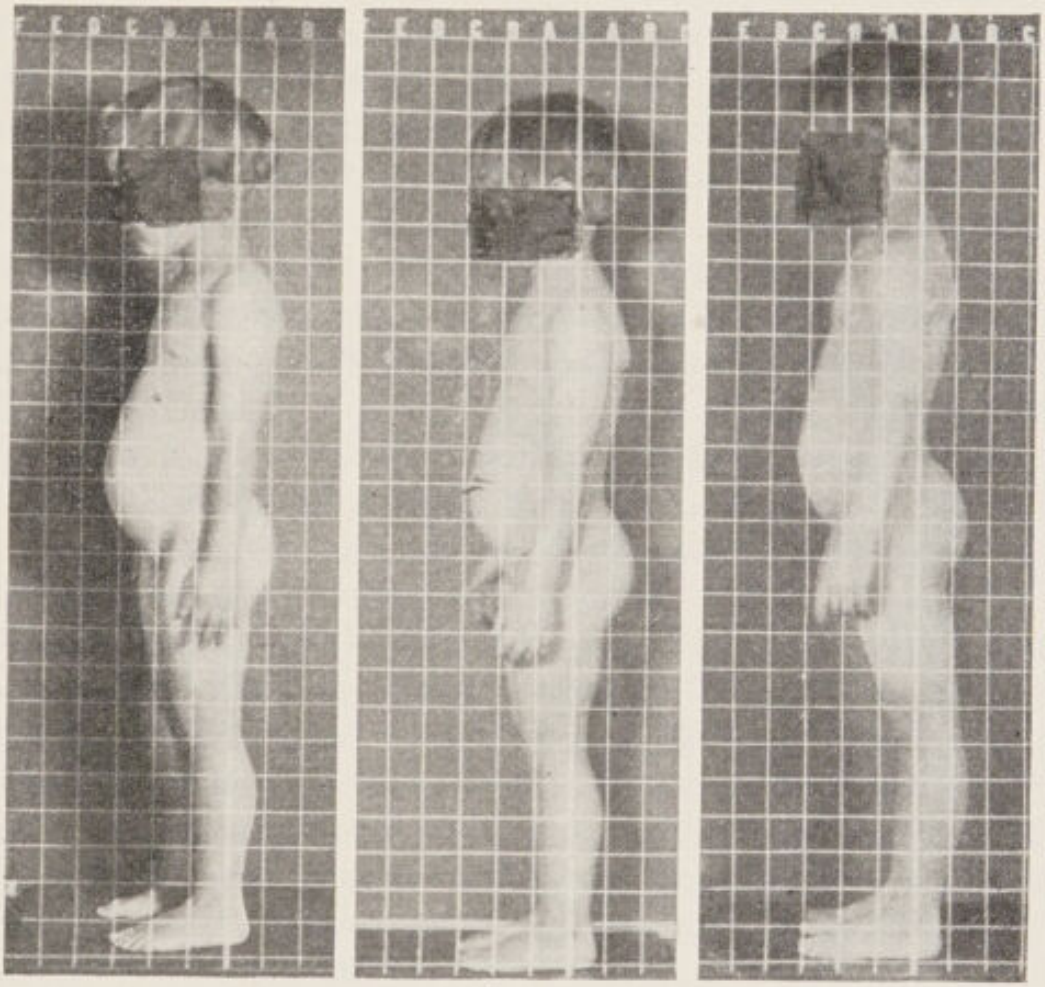
Age.	N	Kyphosis, per cent.	Prominent scapulae, per cent.	Forward head, per cent.	Forward shoulders, per cent.	Lordosis, per cent.	Scoliosis, per cent.	Knock knees, per cent.	Bowlegs, per cent.	Flat feet, per cent.	Pronation, per cent.
24–29	24	8.3	0.0	8.3	16.6	8.3	0.0	62.0	45.0	12.4	83.0
30–35	44	11.3	4.6	9.0	22.3	6.8	0.0	74.0	27.6	11.3	72.0
36–41	46	17.0	15.0	0.0	15.0	17.0	0.0	82.0	34.0	3.3	82.0
42–47	64	12.0	14.0	7.8	29.0	17.0	0.0	71.0	22.0	6.0	54.0
48–53	62	27.0	38.0	4.8	54.0	22.0	4.8	51.0	24.0	4.8	69.0
54–59	48	34.0	48.0	22.0	48.0	25.0	10.4	54.0	13.0	2.0	54.0

It is evident that kyphosis (round back), prominent scapulae (shoulder blades), forward shoulders, lordosis (hollow back) and forward head appear to a more marked extent in the four to five year old group than in any preceding age groups. Bow-legs decrease markedly from 45.0 per cent in the two year old children to 13 per cent in five year olds, while knock knees decline from 62 per cent in the two year old children to 54 in the five year old and pronation from 83 per cent in the two year old to 54 per cent in the five year old.

In twenty cases who were examined by the same physician and were seen from two years of age to five years of age by him the percentage of cases showing prominent scapulae, forward head, forward shoulders, lordosis, trebled and the percentage of kyphosis increased six times. The percentage of knock knees declined from 70 per cent in the second year

to 38 per cent in the fifth year, bow-legs from 25 to 15, and pronation from 75 to 61.

It would seem that, whether viewed from the larger number of cases or from the small number of cases followed



a b c

Fig. 30.—Showing postural defects in the same child at three different age levels. a. Three years seven months, note prominence of abdomen, foreward head. b. Four years ten months, note prominent scapulae. Slight lordosis. c. Four years eleven months, note foreward head and shoulders, marked lordosis.

through a period of years, pronation, kyphosis, prominent scapulae, foreward head, lordosis tend to appear and increase as the child grows older.

Sleep.—Although the factor of sleep may seem to be one that tends to regulate itself automatically, experience shows that parents ask many questions about it. Characteristic of these questions are: "How long should a child

of two to three years sleep?" "As a child grows older should he sleep fewer hours?" "At what age should a child take the responsibility for going to the toilet during the night?" "How many times during the night should a child be taken up to prevent the wetting of the bed?"

These questions are not to be answered by consulting a single authority on the subject since authorities differ conspicuously. For example, some authorities recommend as little as eight hours of sleep for a young child; others recommend fourteen.

In recent years studies made by research groups have shown uniformity in their results and the standards quoted from the literature are either too few hours or more than children really sleep.

Interesting data was furnished on the hours of sleep by Gardner's[38] analysis of home reports made by Merrill-Palmer parents. Some three thousand records of normal children were studied, the reports giving the number of hours of sleep, kind of sleep, whether the child had to be taken up to urinate. These records covered the period from October 11, 1926, to February 1st, 1927, a period which included many variations of weather, marked changes in humidity and temperature, and opportunity for long play periods out of doors as well as for only very short ones. The records came from two nursery schools, one of which had children varying in age from twenty months to three and one-half years, the other having children of three and four years of age. The summary of the records studied showed that the children of the younger group average eleven and sixty-one hundredths hours of sleep, and the children of the older group eleven and fifty-three hundredths hours. Although the general impression is that the younger children sleep a larger number of hours the actual averages of the two groups showed very little difference. These figures were within a few minutes of the amount found by Blatz and Bott[12] and in the "Minnesota Study."* Since

*Foster, J. C., Goodenough, F. L., Anderson, J. E.: "The Sleep of Young Children." Journal of Genetic Psych., vol. 35, No. 2, Jan., 1928. pp. 201–216.

Gardner's conclusions are made from three thousand records from homes with which the school was in daily contact and the trustworthiness of similar records had been known it would seem reasonable to base advice to parents concerning the number of hours of sleep on these findings. The results are more significant because the children in these schools are known by medical examination, laboratory tests and daily observation to be in a state of health.

One of the interesting facts revealed by this study was that there were three and one-fourth times as many nights of restless sleep recorded among the younger children as among the older ones. Among the older group the records of only thirteen children showed restless sleep: six of the thirteen children accounted for 76 per cent of the restless sleep. Five of the six were very active, strenuous boys, who frequently found it difficult to sleep during the school nap period. Among the younger children twice as many children showed records of restless sleep as among the older ones. Records of one-third of the group showed 53 per cent of the total restless sleep. Of this one-third more than half were boys, not of the vigorous active type as in the older group, but boys who had had some disturbance such as tonsillitis or abscessed ears. Among the young children 52 per cent were take up from the bed and taken to the toilet during the night. Among the older ones 40 per cent were taken up.

Gardner draws the conclusion that "There is no evidence that the child of five needs less number of total hours of sleep than the child of two. It may be more convenient from the family's point of view for this sleep to be taken at night although for the welfare of the child it would seem desirable that the night sleep of eleven and one-half hours be supplemented by rest of at least one hour during the day."

Blatz and Bott found that the average length of nap decreased from one and three-fourth hours at one year to no nap at five, and the "Minnesota Study" showed that the nap varied from one hour and fifty-nine minutes at one year to thirteen and one-half minutes at five years.

Elimination.—Probably more difficult than any other phase of education with parents about the physical health of their children is the phase that concerns elimination, particularly the phase which concerns fecal elimination.

The problem of getting parents to patiently establish a daily rhythm of the bowels, to realize that it is as natural and as necessary as the sleep rhythm or the hunger rhythm, is an educational task demanding tact and faith. Much of the education has had to be by means of personal interview and has had to be repeated many times before home procedures have been changed. A very definite hindrance to the acceptance of the education has been the wide spread approval and use with children of laxatives or cathartics. Some children are regularly given a cathartic every night and have been receiving one since babyhood, the parents apparently not realizing that the cathartic habit is being formed by the child and the serious physical disadvantages of peristalsis induced by drugs. Several factors seem to have played a part in the development of constipation, one is the failure to form the habit of systematically drinking water during the day. Some days many of the children will drink adequately, other days scarcely a half pint will be consumed. The two reasons most often given by the parents are that the children do not like to drink water and that to drink water makes them wet the bed at night. Another factor causing difficulties in elimination is that the great majority of family dietaries are lacking in bulk as well as in vitamin and mineral content.

There is a good deal of confusion about the number of bowel movements to be expected and the hour desirable for the establishment of the rhythm. Many individual physicians advocate widely different practices. Some insist that two or more movements daily are essential for health, others that a movement every two days is satisfactory. Some insist on morning rhythms, others on evening rhythms.

To secure some satisfactory foundation based on observation of Merrill-Palmer children a study[38] was made of 1973 records submitted by the parents of children in two nursery

schools from October eleventh 1926 to January thirty first 1927. The children studied here were the same children as were studied for sleep habits.

It was found that in the older group 75.76 per cent averaged one bowel elimination daily and that 24.26 per cent averaged more than one daily, although only a very small per cent had two daily movements regularly. Among the younger children 31.18 per cent had two movements daily. Among the older children 42 per cent had a bowel movement in the morning and 58 per cent in the afternoon or evening. In the younger group the percentages for time of day were the same. From this Gardner concluded that one movement a day was satisfactory for the health of the children and that the hour at which the movement occurred varied depending on the hour at which the rhythm had been established.

Motor Coordination.—In studying the motor skills of children from three to five years of age we notice practically all of the abilities discussed in the last chapter still in the process of development, but definitely advanced toward perfection. Children from three to five years of age have smoother movement and better general coordination; they are lighter and more graceful, more rhythmic in movement. They can skip, balance, walk on a straight line, run on tiptoe quietly, ascend and descend stairs with alternating feet and without holding the banister. They can operate an "exerciser" or a toy airplane which require several types of movements at once, advancing, turning, backing with skill. They can climb ladders, "skin the cat" on a turning pole, swing standing up; can rake leaves, and "straighten up" a yard or a room efficiently.

Four year old children can care for themselves at the table excepting for spreading bread and cutting things with a knife; they can care for themselves at the toilet if their clothing is reasonably simple; can not only undress themselves completely but can dress themselves if helped with long underwear under stockings and similar difficulties. There are practically no published studies to show just what speed and skill should be expected from children in dressing,

washing and other self-care activities, although several such studies are now being made. Wagoner and Armstrong[150] studied the buttoning process with children from two to five years of age, and found a relatively high correlation (about 0.60) between skill at buttoning and unbuttoning and intelligence as measured by the Merrill-Palmer tests and the Goodenough drawing test. They also found a decrease in time of buttoning and unbuttoning with increase of age.

Stutsman[132] uses buttoning buttons as one test of intelligence, and finds that children of thirty-three months can button two buttons in one hundred seventy seconds; of forty-two months can do two buttons in thirty-four seconds and four buttons in seventy-six seconds.

Skill with the hands and ability to express creative ideas increases rapidly during this three to five-year period. The child can now build complicated structures with his blocks; can cut, paste, and draw so that he produces interesting beginnings in art work; he can model simple objects in clay or wet sand. It is interesting to see a two-year old child playing with brush or pencil, scribbling over a page, delighted with the simple situation of moving his arm and leaving a visible trail behind it. Soon, however, he begins to differentiate stroke from scribble, and becomes interested in the total product before him. He masses his colors or his scribbles and strokes, sometimes covering a whole drawing page, sometimes announcing himself "all done" when only a small part of the page is finished. He seems, even before he is three years old, to have a feeling for the unity of his product. At three it sometimes occurs to him to name what he has produced; and at four he sometimes announces what he is going to draw or paint before he begins to work, and occasionally produces a recognizable resemblance to the object he has set out to reproduce.

Marked individual differences are evident at all ages and in all forms of motor skill, particularly the creative skills mentioned above. Some children can mark a clear rhythm (can initiate it—most children can imitate if given a copy) at three years; an appreciable percentage of children can do it at five; most children have achieved this ability at six or

seven; but a few never learn it. Gesell gives samples of four-year-old drawings of a man. They vary from a scribble or an imperfect straight stroke to drawings that are clearly recognizable, one having the type of detail and accuracy not often achieved before eight or nine years of age. Some children of seven or eight years cannot manage scissors well enough to cut along a straight line; yet many four-year-olds can cut accurately along the outline of a figure if the turns are not too fine and the grooves too deep; an occasional three-year-old can cut patterns. Some nine-year-old children are still unable to bathe or dress themselves; most five-year-olds can do it; an occasional three-year-old is thus accomplished. Although such differences in motor skill are often to be attributed to individual differences in innate physical or mental capacity, they are also evident among children who are mentally and physically average in capability, and are, in such cases, to be attributed to differences in interest and in opportunity for practice. One of the duties of parenthood is to see that children have freedom and opportunity for exercise and for the development of motor skills which will make them able to care for themselves efficiently, to accomplish work successfully, and to express themselves adequately. The basis of physical health which is laid in early childhood, the habits and skills of physical hygiene may determine his physical, and so in a real measure his mental and social efficiency in adulthood. The joy in physical movement, as well as the fixing of early skills contributes to the joy and skill in the sports and play of later childhood, and may make the difference in adulthood between the person who takes adequate physical exercise with enjoyment and the person who takes none.

Progress of Sense Perceptions.—Some of the more complex perceptions are being built during the three to five year period. The *perception of distance* particularly is developing at this time. Like all perceptions, it is built through experience, and accuracy of judgment grows as other habits grow. An object is judged to be near or far depending upon:

1. The apparent size: large if near; small if far away. This can often be judged by comparison with known familiar objects like trees, houses, etc.
2. The clearness of outline: clear if near; hazy if far away.
3. The amount of detail visible: detail can be seen if near; cannot be seen if far away.
4. Vividness of color: colors appear saturated if near; more neutral if far away.
5. Number of intervening objects: few if the object being judged is near; many if it is far away.
6. The accommodatory and convergent strains on the eyes as they adjust to nearness or farness.

There are other criteria by which objects are judged to be near or far, but these are sufficient to give us some appreciation of the complexity of the perceptions by which distance is judged. Unless we stop to analyze such a judgment process we are likely to think that it is the function of an inborn capacity. Yet, we must realize that it is a learned function, and that skill with it is achieved only through experience and practice.

We can see how much judgment of distance is a learned function dependent upon habit if we change from a low, moist climate where density of atmosphere tends to obliterate line and color, to a high, dry climate where clearness of atmosphere permits line and color to be seen over great distances. Distances are grossly underestimated in the clearer atmosphere. From such misjudgments come the many stories of eastern tourists who visit Colorado and start to walk "to Pike's Peak before breakfast" only to find themselves walking hours later but still miles from Pike's Peak. Accustomed to judging as only a few city blocks in distance the clearness of outline and vividness of coloring and detail that they see in the mountain peak, they find it hard to realize that under different atmospheric conditions their judgment can be in error by twenty or thirty miles.

Judgments of distance probably show more clearly than any other type of judgment how much adult behavior which we take for granted as automatic or perhaps as innate is in reality the product of painstaking learning in early childhood.* . A six-months-old baby reaches for a proffered

*For an illustration of misjudgment of distance at three months see Fig. 31.

toy, but neither his muscular adjustment nor his judgment of distance is good, so he may reach several inches beyond the toy, and may have to make several attempts before his hand closes over the coveted object. He soon learns judgment of shorter distances, but at a year he reaches eagerly for the moon, and seems unable to understand why it cannot be obtained. At three years his judgment of distance is still inaccurate enough to cause him to make many mistakes. He sometimes forgets that distance diminishes apparent size so that he comments on "the

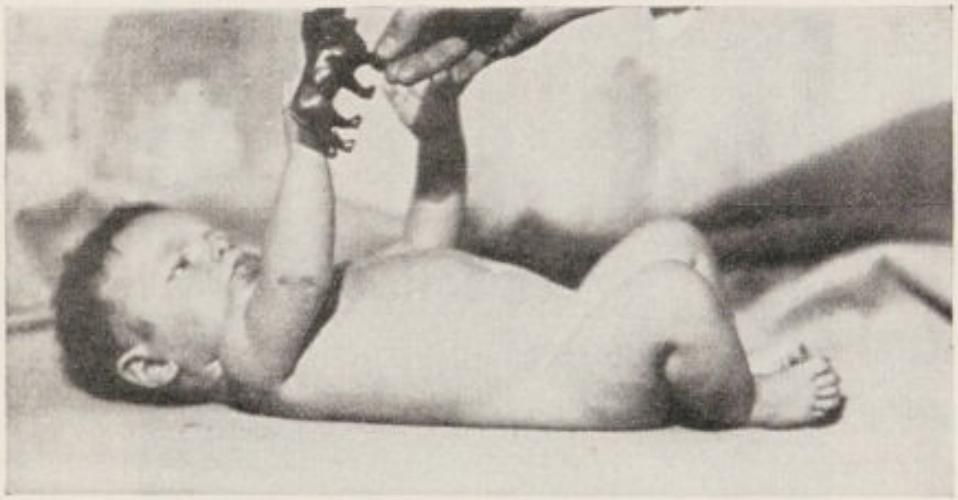


Fig. 31.—This three months old baby has finally directed his hands toward the object but has misjudged his distance and has therefore failed to obtain the object. Note the studied expression on his face as he concentrates at his task.

baby automobile," which he sees at some distance. But from three to five years he makes such mistakes less and less frequently as he builds his understanding of the principles involved. The speed with which he progresses depends, of course, upon his native intelligence and upon his opportunity to learn.

Interest in number, although evident before three years of age does not occupy the time and attention that it does after three. Some children display this interest sooner than others, although it would be difficult to determine without a carefully checked study how much of such an interest when it does appear is spontaneous and how much is reflection of adult interest in calling the child's attention to the con-

cept of number. Children of eighteen months will often lay blocks or beads out in rows of two or of three. We cannot be sure whether this ability is appreciation of similarity of size and shape of groups of two or three units to other like groups, or whether it is ability to appreciate that each group is made up of one and one or of one and one and one. Children of two can often be heard counting "one, and another," or "one, and one," or, sometimes "one, two."

Fig. 32.—This four year old child has failed to realize that her own structure is less safe than the climb up to the top of the slide which she is endeavoring to avoid. She has also misjudged the distance from the block to the slide and is having difficulty to bridge the distance.

After two years interest in language is at a peak so that one can readily teach a two-year-old child to recite the cardinal numbers up to eight or ten, or, with sufficient coaching, up to nineteen or twenty. This sort of recitation, however, belongs to the condemned catagory of "parlor tricks" since children of two or even of three years have no understanding of the meaning of number beyond "one," "two," possibly "three," and "lots." Although they can be taught to recite numbers "parrot fashion" they cannot without excessive coaching actually count a series of more

than four objects until they are nearly four years old mentally, or of thirteen objects until they are nearly six mentally.

Perception of time develops very slowly and is expressed almost invariably through language so that its actual progress is difficult to measure. Judgment of time is probably the least accurate of all adult judgments although most adults fail to realize this fact. When we are busy and interested time seems to pass rapidly; when we are idle and bored time seems to drag. Failing to realize this adults are often unfair to children who not only find the same thing true, but who have had much less experience with time than older people have had. A mother takes her child to call upon one of her friends, telling him to sit quietly while she visits. She is interested and time flies; he is bored and time drags. Half an hour seems only a few minutes to her, but hours to him, so that when he becomes restless or resorts to some means of entertaining himself she becomes impatient at his seeming unreasonableness. Again, she sits reading an interesting article, when he asks if she will help him reach something he needs in his play. She answers, "Just a minute, dear," but continues to read. Several minutes later, after an interval that seems less than a minute to her but an endless time to him, she attends to his need. He gets very little help in judging "minutes" from such an experience.

Again, for example, the child is allowed to go out to play for "half an hour," and called to come in after what seems almost no time at all. Or he is told to sit quietly for "half an hour," and released only after what seems to him almost forever. "Half an hour" is indeed a variable quantity to a young child who has not yet learned to judge it with the objective aid of a clock. By the time he is four, however, he has learned that "a few minutes" means less than "an hour" or "several hours," although he still seems unreasonable when he is told that "we won't be going to town for a long time—not for several hours," but returns every half hour or so to ask, "Isn't it time to go yet?" When he is two there seems no other way of explaining

"when Daddy will be home" than to tell him that it will be "after you've had your lunch, and have had your nap, and have played a long time;" but at four years "afternoon" means after lunch, and "late this afternoon" means a long time after lunch, in fact, just before supper. At four he will understand when we tell him that "Daddy will be home late this afternoon." Questions like "When is noon?", "How long is half an hour?", "When is tomorrow?" are familiar on the lips of four-year-old children. "Yesterday," "tomorrow," "next week" still puzzle the four-year-old. Norsworthy and Whitley[97] say that such complex time concepts as "last spring," "day before yesterday," "a month ago" are quite unintelligible even to six-year-old children.

Inability to appreciate time units produces a characteristic problem at four and five years, namely, the problem of dallying. Sitting indefinitely before distasteful foods, occupying endless periods of time at dressing, or at picking up toys, is a trait that causes a great deal of annoyance. After the newness of feeding himself, or of dressing himself has worn off, the task loses the interest it once had and time drags. Add to this the clumsiness of fingers, comparatively skillful, yet in reality slow in dealing with exacting tasks, along with the inexperience which has not yet learned that uninteresting duties do not last forever, and the result is procrastination and dallying. Anything that revives interest in the task to be done will help; but the particular need of the dallying child is an appreciation that time passes, that the longer he spends in the performance of routine duties the less time he has for play. An hour glass with the sand constantly dripping, or a clock with hands that relentlessly tell the passage of time often help with this problem. A race with the sand or with the hands of the clock usually provides interest, and will surely make clear the fact that dallying only lengthens the time spent on routine and thus automatically shortens the time for uninterrupted play.

Advance in the *appreciation of music and rhythm* is rapid from three to five years of age. Ability to discrimi-

nate pitch, timber, intensity, and interval, as well as skill in pitching the voice all grow quickly if the child has any special ability in this direction and if practice is given. Some children of three or four years have a response to rhythm which enables them to stamp, march, skip, or sway in perfect time to simple music. A few can beat drums, clap cymbals, or shake a tambourine accurately enough to accompany music. Occasional children have achieved control of the muscles which produce sound and have a sufficiently good sense of pitch to enable them to sing simple melodies at three, more complex ones at four. There is danger here, however, in the temptation to teach children "parlor tricks" in music. Many four-year-old children, having only a slight gift in music, can be taught to sing dozens of nursery rhymes, or to dance an entertaining variety of jigs to music. Average or slightly superior children can, if sufficiently coached, be taught to recognize scores of victrola or piano selections, reciting even long French or Italian names glibly before they are four years old. This sort of thing gives the impression of great precocity; it sometimes even deludes us into expecting brilliant musical futures from such children.

The Surette School of Music at Concord, Massachusetts, made an admirable contribution to the teaching of music for young children when it took a stand against such artificial performances as those cited above. Mr. Surette believes that a feeling for music is more important than the mechanics of performance. Too great an emphasis upon academic memory tricks or upon mechanical reaction to music, he thinks, often interferes with true appreciation of music. Children must "experience" music with their minds, their bodies, and their emotions. He advises letting children hear good music, sometimes listening quietly, sometimes expressing themselves in bodily movement; but "coaching" should be avoided until the foundation in appreciation has been laid.

Development of Reasoning.—There is a good deal of dispute about whether or not young children reason. Some writers say that reasoning is a complex mental

process impossible for young children; others say that it is a mental process which grades in complexity from the simple trial and error problem solving of animals through the intricate associations involved in the solution of subtle mathematical and philosophical problems. One writer Pierce[102] in child psychology says that children do not reason before they are seven years old, and that it is, therefore, impossible to discipline them by any method involving reasoning before that time. Thorndike* says that very young children "not only possess the requisite elementary processes involved in reasoning, but also the interest in reasoning, but we nip it in the bud by neglecting their questions, making them accept mere words as explanations, by feeding to them the dry bones of mathematics and grammar, by teaching them to accept everything upon authority. It is not the case that interest in reasoning comes late in youth; it comes early, but we restrain and dwarf it."

It is evident that reasoning of a rudimentary sort is within the ability of fairly young infants if we consider the following example from Gesell.[42] Although not using the term reasoning, Gesell describes under "adaptive behavior" how nine to twelve-months-old babies recover a cube which has been covered over by an enamel cup. The test is described as follows: "The examiner takes one of the small red cubes and casts it upon the table to entice the child's attention. He may even allow the child to handle the cube for a moment. While the attention of the child is directed to the cube, the examiner swiftly covers it with an inverted enamel cup and placing the handle to the child's right, he notes the first reaction of the child to the cup." Gesell's comment on this test is enlightening: "This is undoubtedly a valuable performance test. Complicating and distorting factors are relatively few. The test is placed near the beginning at each of the schedules when nearly every child is much interested in the red cube. The mental processes required for the solution of this situation follow closely the paradigm of Binet's definition of intelligence, and it was most astonishing to find one six-months-old child who

*Thorndike, E. L.: *Notes on Child Study*, p. 101.

solved the situation, not only once but six times in immediate succession, exhibiting great zeal and concentration."

Instances of such "solutions of situations" can be cited endlessly from random samples of observations of the behavior of children from a few months of age through childhood. Whether or not young children reason is then, not an argument of fact but a dispute over definition. It is somewhat important that we clarify this point, since no matter what fine lines of argument separate writers in the dispute, the general reading public understands pretty well what is meant by reasoning. If, to them, a child reasons, then he may be disciplined and directed by "reason"; if he does not reason, then the only method of guidance or discipline open is one of arbitrary commands and force.

One mother discussed the use of reasoning in discipline as follows: "Four-year-old Tom came into the house the other day with muddy boots and marked up the entire kitchen, turned about and remarked it, seeming to enjoy the procedure immensely. I do not spank for such offenses, but insist that the damage be repaired. Tom knew this; so when he had finished his parade he immediately found cloths and set about cleaning up. He had not, however, realized that the joy of a few moments would exact in payment the whole of his play period. When he had finished his work he gave evidence that he had put cause and effect together as he announced, 'I guess I won't go out in the mud again.' Going in the mud gives Tom great joy; I am sure that if physical pain, *e. g.*, a spanking, had been the only result of his escapade he would have found the fun of the mud even stronger than the fear of pain, and would have continued to play in the mud. If physical pain is the only consequence of undesirable behavior children soon become callous to it, but the logical consequence of an act means constantly fresh experience,—it commands attention, it exercises reason, it lengthens memory. Moreover, logical consequence is better than spanking, because life does not spank, but rather, exacts logical payment for error. Tom is not too young to learn this."*

* Mrs. Arthur Colten. Taken from an unpublished statement.

The practical difference in methods of handling children which results from our attitude toward their capacity to reason is a most important one. We shall, therefore, in our discussion of reasoning accept the more common understanding of the term, and shall consider the following four aspects:

1. Relation between cause and effect.
2. Generalization from many instances.
3. Application of a principle to specific instances.
4. Solution of a problem, or successful coping with a new situation.

Most children of twelve or fourteen months have discovered that they can bring a dish on the table nearer by pulling the whole table cloth toward them; they have discovered the relation between tilting the bottle and getting more milk; they have made the association between having a hat on and going out of doors. Long before twelve months they have discovered the relation between arm movements and the noise produced by a rattle, between releasing their hold of a ball and its falling on the floor. These are all examples of an understanding of cause and effect.

Generalization and application come somewhat later; and it is possible that the slow development of these capacities has led some writers to conclude that all reasoning capacity is late. One need only to watch young children casually to conclude that their ability to generalize is not well developed. They must meet many specific situations, must be told about numerous specific instances before they are able to draw conclusions from them. The story of Skeezix and Pal, his dog, in the comic strips illustrates this. Skeezix was discovered using his toothbrush to scrub Pal's teeth. Uncle Walt tried to impress Skeezix with the seriousness of his offense and concluded, "Skeezix, you must never use your toothbrush on Pal." A few minutes later Skeezix was found scrubbing Pal's teeth as before, and upon being reprimanded said, "But, Uncle Walt, this is your toothbrush." Uncle Walt should have generalized for Skeezix, pointing out that no toothbrush should be used for anything but to brush the teeth of the person to whom

it belongs; and should have explained as much of the reason why this is so as Skeezix could understand.

Only by giving children information in numerous specific situations, by teaching them the reasons for behavior in many specific instances, and many times drawing conclusions in such a way that they can understand the process, can we help them to the technic of generalization. The young child has not met situations in sufficient number to permit a cognizance of the similarities and differences by which general classifications are made. He does not realize for example that combs, toothbrushes, and wash cloths belong to the general class of "personal belongings," are things that each individual uses for himself alone; whereas most chairs, books and other household furnishings belong to the general class of "family belongings" and are things which can be used by the family at large. Personal belongings are alike in the fact that they are used in the care of the person, and are different from family belongings as a class.

As the child gains experience with a wide variety of situations he becomes familiar with the elements of each, and gradually comes to discover how nearly similar or how widely different the elements in several given situations must be to permit classification or generalization. We can help him in this by extending his general experience, and by pointing out to him the essential similarities and differences upon which classifications are built. This must be done gradually, however, since young children are usually more confused than aided by detailed explanations and complex patterns of thought, and can reach only the simplest and most obvious conclusions. It is important to realize in this connection that many of the experiences and conclusions familiar and obvious to adults are new and strange to young children; the very strangeness of details often requires the child's entire attention at times when we expect his attention to be occupied with conclusions.

The child suffers a similar handicap in his attempts to apply general principles to specific situations. He lacks experience, and hence often cannot decide whether or not a given situation comes under a general ruling, or, still more

often, does not even try to decide since the association between situation and principle never occurs to him. We explain to a three-year-old that he must remove his galoshes before entering the house because they track mud over the floors. He seems to understand and abides by the request for several weeks. When the weather becomes less severe, however, and galoshes are replaced by rubbers we are surprised one day when, apparently forgetting our request and his own good habit, he appears in the house wearing his rubbers and leaving muddy tracks behind him. He is puzzled when we ask if he has forgotten that muddy overshoes are not to be worn into the house, and replies, "But, mother, I thought you said galoshes. You didn't say anything about rubbers."

The child's inability to generalize and to apply principles is also due to a habit of mind which leads him to think what he wishes to think rather than what the situation demands. Wishful thinking, as this is called, is a characteristic of immaturity, and is found not only among children but among adults who, although often brilliant in mental accomplishment, may be immature in personality. The child, wearing his rubbers into the house because he has misunderstood the generalization involved, may have thought that rubbers were not included in the rule partly because he wished to think it. Four-year-old Betsy illustrated this type of wishful reasoning when, during a game of papa and mama, the papa wanted a gun which she had found. She carried her point by saying, "No, you can't have it because I'm the mama and mamas carry the guns." In such an instance the child is not to be condemned for compromising with truth, nor even for a refusal to face facts, but should, rather, be led to see her error and aided to clearer thinking in the matter. If personality and mental growth are progressing on a basis of increasing independence and experience the child will eventually outgrow the part of his wishful thinking which leads him to errors of judgment.

Probably the aspect of reasoning most universally agreed upon among writers as real reasoning is that of *problem*

solving. Whenever a new situation for which the individual has no habitual reaction presents itself, the individual is said to be faced with a problem. As long as life flows along familiar channels where no new or unaccustomed action is demanded, habit serves all needs. But whenever a strange situation arises habit is powerless and a new solution or a new pattern of action is needed, and reasoning becomes necessary. The steps in such problem solving are usually listed as follows:

1. Location of the problem and determination of its nature.
2. Survey of possible solutions.
3. Selection of the most promising solution.
4. Trial of chosen solution.

First, the problem must be felt or realized. This seems obvious, yet, people sometimes find that smooth activity is interrupted, and habitual reactions are no longer adequate, but cannot discover just why they cannot go on or just where the difficulty lies. The nature of the problem must be known before a solution can be undertaken.

Second, various possibilities must be surveyed. It becomes evident here that the richness and variety of possibilities depends upon breadth of experience, since the wider the past experience of the individual with similar problems, the more varied will be the possible solutions which suggest themselves. Children suffer a handicap at this point in problem solving in proportion to the narrowness of their experience, a limitation which is felt not only because of lack of available relevant facts but because of inexperience with the technic of assembling facts and of choosing which ones are relevant. It is important, then, to see that children have not only a fairly wide general experience but also a wide experience with the specialized technic of problem solving.

Third, the selection of the most promising solution, depends upon an amount and kind of experience which aids in judging the relevance and importance of various elements. Sound judgment at this point of problem solving again depends upon general experience and upon specific problem

solving experience; but it also depends upon accurate perceptions of qualities of objects and upon accurate judgments of space, time, people, situations, etc. The child needs patience to assemble all of the most important relevant possibilities in step two, but he needs judgment to make a sound selection in step three. All the skill and courage requisite to judicious decision-making are required here.

Fourth, the trial of the chosen solution, leads either to a continuation of the activity which was interrupted when the original problem arose, or to a return to step three. If the chosen solution proves inadequate the problem remains unsolved and activity continues to be suspended. In the latter case a return is made to step two for a further survey of possibilities, and another selection is made at step three. If this selection proves upon trial an adequate solution the problem is, of course, solved; if not, return to step two and repetition of steps three and four continues until the problem is either solved or abandoned.

These steps of reasoning are illustrated in an incident which occurred in a nursery school where each morning the children have tomato juice served in small dessert glasses. The glasses were being served from a low serving table to children seated in groups of four at individual tables. One child from each table was serving his table. Jimmie, aged three years, having been chosen to serve, carried glasses from the serving table to his individual table until everyone in his group had been served. But he did not count correctly and appeared at his table carrying a fifth glass which he discovered was not needed and had to be returned to the serving table. Meanwhile the children at all the other tables had been served, had drunk their tomato juice, and had returned their empty glasses to a serving tray. Upon reaching the serving table Jimmie was faced with a problem: he must return his extra glass of juice to the serving tray, but the tray was full of empty glasses. He achieved step one in reasoning immediately: he realized where his problem lay, and could see exactly what the nature of his problem was.

He surveyed the situation (step two) as he stood holding the glass of juice and trying to figure out what he could do about it. An idea which promised to work occurred to him (step three); and he took the glass by its handle and tried to use it as a pusher (step four), pushing the other glasses about in an attempt to crowd them a little closer and thus to make room for his glass. This solution failed. He returned to step two, considering other possible solutions as he stood thoughtfully holding his glass. Once more an idea occurred to him (step three), and he tried (step four again) to pile his glass on top of one of the empty glasses on the tray. But the handle on the side of his glass caused it to tilt, and threatened to spill the juice. At this point experience with similar situations led him to realize that this solution was a failure because although putting his glass of juice on top of another glass would get his glass on the tray (one aspect of his goal) it would spill the juice and thus defeat another important aspect of his goal.

Once more he stood holding his glass as he surveyed other possible solutions (another return to step two). Suddenly his face beamed. Apparently he had discovered another possibility (step three). He reached out and poured his juice into one of the empty glasses thus "saving it," and triumphantly set his now empty glass upon another thus getting it upon the tray. It could tilt now with no loss of juice. In his own mind he had achieved success in his problem.

His inexperience had, however, caused him to lose sight of one important factor in his problem. He did not realize that tomato juice poured into a used glass was not in reality saved, but must be thrown away. It is interesting to note, too, that this complex piece of reasoning, illustrating clearly every step of problem solving had taken place without a single word of language. It is clear that the ability to perform these steps of reasoning depends upon a general experience which places the individual in possession of a variety of facts, and which permits an accurate interpretation of facts in terms of their proportionate importance. Necessary, also, is experience in the special technic of

reasoning, viz., in the technic of analysis and synthesis of facts. An important contribution to the child's mental growth can be made if we permit freedom for wide experience with things, with people, and with situations. We must give him opportunity to solve his own problems, to do his own thinking whenever the situation involved is simple enough to permit a reasonably sound solution from the background of his limited experience, or whenever the risk of a wrong solution is not too great.

If, for example, the eight-months-old baby drops his rattle, he is faced with the problem of recovering it. Unaided, he will make a variety of attempts to reach it, and will learn valuable lessons in the art of trial and error, and of finally selecting a good solution (steps two, three, and four of problem solving). Moreover, if he succeeds as a result of his own effort he has the satisfaction of finding his own solution and this will make him more eager to attempt solution of the next problem that confronts him. If we rush to him when he drops his rattle, however, restoring it to his grasp before he has had an opportunity to sense his problem, we rob him of an excellent chance to learn a valuable lesson.

If when he is eighteen months old, we permit him to handle his own spoon or cup, he will soon select from all the possible ways of holding them, the one or two ways which solve the problem of giving him food or drink successfully. If at three years he is permitted to cope with the problem of getting his blocks into a box he will soon learn the best way to fit them together. Consider the problem of an eighteen-months-old child who has been playing horse, and who has been running about dangling the reins behind him. He gives his imagination free play until the reins catch over a stake in the ground thus impeding his progress. He is now faced with a problem. At first he is likely to behave much as an animal would under the same circumstances; he tugs and jerks at random, trying to pull himself free. If he has not the habit of attacking his own problems he will probably set up a lusty cry when he fails thus to free himself, expecting some adult to solve the situation for him.

If, on the other hand, he has become accustomed to facing his own difficulties, he will probably pause in his struggles, examine the situation, discover that he must back up in order to release the reins, do so, and thus extricate himself.

We see a two-year-old riding his tricycle, going joyously forward until a wheel slips into a crack in the sidewalk and brings him to a stop. Again, he will behave according to his habit. If he has already the habit of dependence, of expecting someone else to do his thinking and solve his problems for him he will probably begin to cry in distress. If, however, he has retained his self-independence he will probably descend from the seat, examine the problem, and decide to do the necessary backing or lifting, thus solving his own problem capably, and then resume his interrupted activity.

At three years he begins to express his reasoning in language, and at four he gives many examples of verbal reasoning which, unless we realize how usual this is at four years, may lead us to consider him unusually precocious for his years. It is not at all unusual to hear children of three years reason as did Barbara whose playmate, Blanche, looked out of the window at heavily falling snow and said, "Oh, see the feathers." Barbara said, "They're not feathers, are they?" and received from an adult the answer, "No, Blanche is using her imagination." Barbara was apparently much impressed with the word "imagination," and went about repeating it over and over. Later in the day she said, "If Blanche had said, 'That is snow,' would that have been imagination?"

Decision making is an essential part of step three in problem solving, and like all other aspects of reasoning, depends for its development upon practice and success. Adults who have never learned to make decisions find themselves serioulsy handicapped because of the trait of indecisiveness. The technic is fairly simple:

1. When, for example, a decision is pending between situations A, B, and C, it is necessary to examine all the advantages of A, of B, and of C, and also to take account of all the disadvantages of each.

2. The advantages inherent in situation A must be weighed not only for number but for importance against the advantages inherent in situations B and C, and also against the disadvantages in situation A; the same must be done for B and C.

3. The individual making the decision must choose, knowing that by virtue of his choice he is giving up the advantages of the situations he decides against, accepting the disadvantages of the situation that he decides for along with its advantages.

4. The individual must believe in his decision sufficiently to act upon it.

Indecision may be due to failure in any of these steps. In step one the individual may not know enough about the facts which are relevant to his decision to enable him to lay them out for examination. Or, he may not realize when he has gathered enough relevant facts to warrant a decision; or he may use as a way of delaying the effort of final decision the excuse that he has not yet enough facts. In step two failure may result because of insufficient general knowledge upon which to base a judgment as to the importance of the various advantages or disadvantages involved. The individual may, in other words, lack the items of experience necessary to an evaluation of the advantages and disadvantages inherent in his present situation. The most frequent failure in decision-making, however, lies in step three. Too few people have the strength of will to face the necessity of giving up advantages and of accepting disadvantages once a decision is made. They refuse to accept the fact that any decision necessitates the sacrifice of certain advantages in favor of others, and the acceptance of certain disadvantages. Indecisive people are often indecisive because they lack courage,—courage to give up one set of advantages in order to gain another, courage to accept disadvantages which inevitably accompany advantages. Courage of this sort should be learned early, and is probably the chief reason that children should have experience in decision-making while they are still young.

The strong belief in a decision which is spoken of in step four of decision making and which is necessary before that decision can be acted upon, offers the final pitfall for the indecisive person. Many people can go through the pretense of decision-making as far as step four, can delude themselves and the world into thinking that a decision has been made, yet can procrastinate until the test of action never comes; and so, by this procrastination they can indefinitely postpone the actuality of decision-making. No decision is really made until it is acted upon, nor can any person who fails to act because he continues to wonder whether or not he has made the right decision be said to have made a decision at all.

Children need practice if they are to learn decisiveness. They need to make the many little decisions apparently trivial to adults, but important to them. "What shall I play now?" "How can I make this tower of blocks stand straight?" "Where shall I keep my dollie?" Such decisions should not be made by adults but should be made by the child himself. He should have hours every day when the decisions of play, of simple routine living are entirely his responsibility. Every decision for which he has sufficient experience and judgment should be left for him to make.

He should not, however, be permitted to make decisions in cases where he lacks such experience, or where the consequences of a wrong decision would be too serious. Nor should he be permitted to think that he is making decisions when in reality he is not; when, for example, we lend so great a weight from our own opinion that he is unduly swayed toward a decision which is not really his own but which he considers his own because he has phrased the final statement regarding it. Neither should he be permitted to make decisions which he promptly retracts without appreciating that he has failed to act upon them. One mother, thinking she was training her two-year-old son in decision-making, approached him each morning and said, "Son, will you climb out of bed yourself this morning or shall mother lift you out?" The boy would answer, "You

lift me out;" but as she approached to do so he would say, "No, I'll get out"; as she retreated, "No, you lift me"; and the process continued often as long as fifteen minutes. This child obviously was not learning decisiveness, but rather indecisiveness and an unwarranted sense of power over his mother. If she wished to train him to make decisions she should have acted upon his first request promptly and in spite of any desire on his part to change his mind.

In this connection it should be remembered, however, that when training a child to make decisions we must guard against letting him acquire the habit of making snap decisions under the delusion that he must decide all things quickly. Sometimes, led into error by America's slogan of efficiency, we force decisions, either in cases where sufficient facts are not available, or in such haste that whatever facts are available cannot be adequately considered. Many people consider themselves decisive when as a matter of fact they are only artists at snap judgments. It is probably better to be indecisive and to know it, than to consider oneself decisive and forceful when one is really only reflecting the opinions about one or is jumping to ill founded conclusions.

Children are likely to make certain characteristic errors in reasoning because: (1) they lack experience, or because (2) their attention is too unstable to permit concentrated thinking.

In case the errors are due to lack of experience, it is usually because the child fails to account for certain facts, or because he gives undue prominence to some of his facts. A fourteen-months-old child whose parents had been accustomed to amusing him by letting him stand on one end of an apple box so that he could see out of the window, became agile enough to dance up and down while thus occupied. One day he knocked the box out from under himself and sustained rather a bad bump. His interest in seeing out of the window was so great, however, that he did not cry, but promptly took measures to correct his difficulty. He wriggled himself along on the floor until his feet came in

contact with the accustomed end of the over-turned box, evidently expecting merely by placing his feet in contact with the accustomed spot on the box to be able to see out once more. His disappointment caused him to cry even though the bump had failed to do so. His error in reasoning was due to the fact that he failed to appreciate the necessity of being raised through space before he could see out of the window, and that he had attached undue importance to placing his feet in the right position on the box.

Three and four-year-old children often make similar mistakes. The following conversation illustrates this: Ralph, three years old, said to Eddie, four years old, "When I'm five, I'll be older than you." But Eddie answered, "No. Next Christmas, you'll be four, and next Christmas I'll be five, and then I'll be a big boy." Ralph having failed to take account of all the relevant facts, neglected a most important one, namely, that Eddie would be ageing as rapidly as he himself would be. Eddie, however, remembered this, and hence won the argument rightfully on the basis of superior thinking.

The character of children's attention makes accurate thinking difficult. In spite of the fact that young children often give sustained attention to concrete materials for long periods of time, they seem on the whole incapable of entertaining abstract ideas in any appreciable sequence or for any long period of time. They may have all the necessary facts for solution of a problem, but unless some progress toward solution becomes evident fairly soon they are likely to lose sight of the goal, or are likely to become distracted by some trivial aspect of the problem. It is a fairly good rule to let children work on problems unaided if there is some appreciable chance that success will come with reasonable effort, but to give aid rather than to allow failure to occur too often. Failure means dissatisfaction and an increasing unwillingness to attempt solution of problems, whereas success, especially success which comes as a reward for ones own effort, is a keen stimulant to further attempts. Aid should be given, too, whenever it becomes apparent that lack of motor ability or lack of ideas

is about to produce discouragement leading to abandonment of the attempt, or irritation resulting in an explosion of temper. The child should not learn the habit of failure because he is too often faced with problems too difficult for his ability; nor should he give up problems before reaching solutions because solutions are too long delayed. He should not develop a habit of explosion in temper because the drive for success outruns his motor ability. He should learn none of these things from his experience with problem solving; but he should, rather, because he has ample experience with problems within the scope of his ability, develop habits of success, of persistence, of versatility in thought, and, most important, the habit of attacking his own problems willingly.

Social and Emotional Development.—From eighteen months to three years, but particularly from three to five years, the expansion of the material, social, and spiritual selves continues rapidly. At this time the child begins a *social and emotional weaning* which is equally as important as the physical weaning which preceded it. The process of weaning from parents and home should come about gradually, beginning when the child makes his first venture into the world of playmates at eighteen months or two years of age, continuing through all the experiences of the "gang age," and reaching completion with adolescence, at which time the individual should be capable of independent judgment in almost every life situation.*

Every normal child must, if society is to live and progress, be regarded as a potential contributor to society's progress. No group of people can maintain itself and advance in development if it carries an excessive number of non-productive individuals. Modern society, organized on Christian principles, carries many individuals who are dependent upon it because they are physically or mentally incapable of maintaining themselves. So heavy is this burden of defec-

* This does not mean, of course, that the adolescent should presume to exclude from his judgment the wisdom and counsel of persons whose experience is superior to his own. No person is ever too old to profit from experience which is more extensive or more expert than his own.

tives that no appreciable weight can be added to it without threatening the general health of society. Every normal individual, then, must be taught to carry at least his own share if economic and social balance is to be maintained; and it seems reasonable to suppose that in order to compensate for the drain of the defectives, persons of superior physical and mental endowment must carry a good deal more than their own share. Certainly society cannot long suffer its individual members to evade the responsibility of self-maintenance nor can it progress if its superior members fail to contribute more than they take from general welfare.

Parents must think of their children as eventually becoming independent and contributing members of a social group. White in his Mental Hygiene of Childhood states this point clearly: "The whole process of the child's development has as its goal its emancipation from the parents, so that its own life may be free to develop to the fullest without the hindrances that are inevitable if there continues an attachment to the home that is in the nature of dependence upon it. A full, free development of the personality is only possible if it is free from crippling dependence of any sort. From this it follows that the problem of the parents in guiding that development can best be met only in the full consciousness of the object to be attained and the possession of enough love on their part to work unconditionally to that end."

This does not mean that in achieving growth of independence the child is to be weaned away from love of parents and home. Quite the contrary, for the child who can become gradually an independent personality within his home seldom feels anything but devotion and loyalty for parents who understand him so well and who prepare him for life so wisely. On the other hand if the child in his attempts to achieve independent development and social responsibility is met only with accusations of "disloyalty to his parents," and with repressive discipline which mistrusts his growing judgment and insults his growing maturity, he can do nothing but chafe against the restraint and break away at

the first possible opportunity. Parents who are wise will grant freedom gradually and increasingly, and will welcome rather than resent signs of a desire for independence on the child's part. It is a natural temptation for parents to rejoice when children remain content to stay at home, to limit their social and spiritual contacts to the family. They are likely to speak with pride of the child who is devoted to his family, saying, "He's simply miserable when he's away from mother and me," or of the boy who "never has fallen in love with any girl,—he's devoted to his mother." "He never plays with other children long; he'd much rather stay at home with me," affords the child's mother tremendous satisfaction; but it is an immediate danger signal to the psychologist whose profession makes him alert to signs of difficulty in mental or personality growth.

One mother who kept her robust five-year-old boy in long curls and Lord Fauntleroy suits betrayed herself in words as well as in deed one day when she brought him to school. He struggled until he released his hand from hers and, running joyously down the hall burst into the school room where, quite obviously absorbed in his plans for the day, he set to work immediately. The mother whose lip was trembling because he had forgotten "to say goodbye" stood in the doorway where she attracted the attention of the teacher. "He seems very happy here, doesn't he?" was the teacher's attempt to make her feel better. "Yes, I'm afraid so"; and the mother lost control as tears welled up in her eyes. She had brought herself to enter him in school because of the pressure from her husband, her friends, and her own conscious mind, but unconsciously she wished him to be unhappy and incapable of interest when he was away from her.

The mother or father who brings a child to the nursery school, then stands bidding him intensely affectionate goodbyes until the child is worked into a frenzy of weeping over the tragedy of separation, is in reality gratifying his own unconscious wish that the child should be thus miserable at parting. The parent who meets the traditional

demand that children be associated with other children yet who by criticizing each playmate subtly destroys whatever affection the child may develop toward anyone outside the family is using an insidious weapon. Such parents may even appease their conscience by "inviting little friends" to their homes, or by insisting that their children accept invitations to visit elsewhere. Yet they succeed effectively in dwarfing each interest which would provide expansion of the social self beyond the home, each idea which would stimulate independent growth of the spiritual self.

It is interesting that some parents can stunt the growth of their children, can inflict or wish to inflict unhappiness. It is notable too that the very parents who talk most about devotion to their children and to "family life" are often the ones most prone to inflict such pain upon their loved ones. This can happen because emotions frequently blind intellect. No clear-thinking parent would consciously place insurmountable stumbling blocks in his child's path to progress. Yet, the wish to control all the life of a beloved person, the emotional jealousy of interests and persons who command a share of the loved one's attention are often more powerful than the intellectual desire to free that personality for growth.

The first contacts outside of the home, even those made when the child is only two or three years old, almost inevitably mean exposure to behavior and to ideas that differ from the ones taught at home. The child learns new games, new words, new mannerisms. In most neighborhoods the new learnings will fit the ethical code of most of the parents who compose that neighborhood, so that the major part of what the child learns outside the home, though different, will be acceptable. Some of the learnings will be different enough, however, to meet with disapproval. It is when this happens that the temptation to forbid extra-familial contacts becomes most severe. It is well to remember in this connection that not all standards which differ from our own are wrong, and also that even though a given child may have one or two undesirable traits much

good can be found in all children. To forbid contacts may be to forbid valuable opportunities to learn these two facts about life.

As the self of the child develops he expands his interest, first beyond himself to the persons who minister to his physical needs, then to other members of his family or to a few people who come into the family circle frequently. Usually he includes in his expanding love a few of his special possessions. Before he is three years old he has, if his contacts have been sufficiently varied, begun to direct part of his affection toward other children. At five years his contacts with other children begin to assume the appearance of "gang interest." At eight or ten, if his growth is normal, he is well established as a "gang" or "clique" member. Sheldon* in studying the social life of pre-adolescent children found 934 different societies or clubs among 1139 boys, and 911 societies among the 1145 girls studied. Puffer† found among the thirteen-year-old boys he interrogated only 21 per cent who had never belonged to a gang. Norsworthy and Whitley[97] think that "gang" activity is bound up with desire for physical activity, the love of adventure, and the interest in getting results which count, as well as with fundamental impulses to socialization. Anything in the nature of a pass-word, or of a "club-house," anything, in fact, which represents organization and secrecy is welcomed as an inherent part of the "gang" activities. Although the child's impulse to lay stress on secrecy often tempts parents to suspect unwholesomeness, most of the secrets and activities of this age are thoroughly wholesome. Unless there is some especially pernicious influence at work in the "gang" parents will be wise to respect this phase of development of the individual personality, being ready of course to listen and to share, but never to intrude. Hollingworth[54] refers to this age as the "Big Injun" age. Few connotations could better describe the general nature of activities common at this period.

* Sheldon: *Amer. Jour. Psych.*, vol. 9, p. 249.
† Puffer: *Ped. Sem.* vol., 12, p. 176.

At twelve to fourteen years of age the child enters the early adolescent period of social development. During the "gang" period loyalties to the gang and to certain ideals of courage and good faith have been intense but fairly impersonal and almost entirely sexless. With the advent of adolescence there is a renewal of intensity in personal relationships with the result that intimate and devoted friendships become the rule. The whole emotional life of adolescence is deepened and broadened, so that personal relationships are usually more ardent. At first the child devotes himself to members of his own sex, sometimes passing quickly from one intense friendship to another, or sometimes retaining a single friend for months. Hero worship is a usual accompaniment of the emotional friendships of early adolescence, the hero or heroes being chosen from among the child's teachers or older friends or from literature and history. Some children remain in the early adolescent period for several years; others pass quickly into the later adolescent period of social development, a period in which loves and loyalties are still intense, but now devoted to members of the opposite sex rather than to members of the same sex. This period serves to acquaint the child with potential mates and should, if well managed, give him sufficient experience with members of the opposite sex to insure a wise choice.

Blatz and Bott in their book Parents and the Preschool Child say that "every child is born potentially to be the founder of a new family." It has been said above that each individual in society must maintain himself economically and must contribute to general social welfare according to his ability and strength. If we accept these two goals of development,—viz., the founding of a family (the biological goal), and contributing materially and socially to society's progress (the social goal), we can appreciate the main threads which should dominate the child's social growth. He must learn to make an adequate adjustment to mating, and he must prepare himself for vocational or professional independence from his parents. In other

words he must become emotionally and intellectually weaned away from his home.

As has been said, this weaning begins, or should begin, at twelve to eighteen months of age in the first acquaintances with people outside the home and in the first habits of self-maintenance like feeding himself, caring for his own toys, and so on. It should continue through the expansion of the social self in love of playmates, the loyalties to the gang, the friendship and hero-worshiping of early adolescence, and the devotions of later adolescence. The weaning should also progress in expansions of the spiritual self, and will do so as independence, self-control, and tolerance are learned through contacts with ideas and interests outside of the home as well as in the home. The child must grow from infancy to maturity; from infantile selfishness to mature altruism and tolerance; from naive, explosive and direct expression of emotions to mature control and socialized expression; from complete dependence to independence and responsibility.

This progress from infantile behavior to maturity should occur in every phase of social and emotional life. Physical growth brings about conspicuous changes which can be detected by everyone. Physical growth as a phenomenon of human life is, therefore, recognized and accepted by everyone. Mental growth, somewhat less conspicuous in its manifestations, is still, nevertheless, fairly evident. Most people recognize that children grow in intelligence, viz., learn more facts and become more skillful in meeting situations as they grow older. The fact of mental growth although less obvious and less generally recognized than the fact of physical growth is nevertheless fairly generally recognized. That personality grows as well is a fact not known to many people. The general belief of the public at large is that personality is just something that descends upon us and about which we can do nothing. Psychologists and educators have only fairly recently discovered not only that social and emotional growth are possible, but also that they follow certain clearly defined patterns of growth. They have found, for instance, that this

growth can be, and for the best personality development should be, steady, well-rounded and constant.

The manner in which emotions can and should grow is inte esting. *Growth toward maturity in emotional life* may take place in two ways: (1) in a change in type of stimulus which excites any specific emotion; and (2) in an altered manner of expressing the emotion. Consider, for example, the emotion of love. In the newborn infant the love emotion is roused by physical caress, a stroking of the skin or patting of certain specific areas. Between a year and eighteen months it is roused by ministration to the physical needs of the child. Expression of love at this level usually consists of return caresses, of cajoling smiles, and of demands for attention. Sometimes an individual never grows beyond this stage, but always remains in the state of love infantilism in which he devotes his entire love energy to physical caress and his entire love loyalty to the person or persons who wait on him, give him his own way, and protect him from all unpleasantness. Such individuals occasionally find mates who will meet them on the parent or nurse basis, but even so marriage is seldom successful for them, since expression of love on this level is too demanding and too selfish to permit happiness.

As the individual develops in love he should learn to be stimulated by ideas and interests as well as by caresses, and by the spirit and personality of another person as well as by his physical attractiveness. He begins to learn something of this if he is given an opportunity to know his parents in the role of persons as well as of "doting" caretakers, if he can meet and learn to love other children even though they, like himself, have selfish interests and refuse to sacrifice themselves to his whims. Love in the gang is often roused by a situation which permits the child to "show-off" before an audience, or which permits him because of the "gang" or of the cooperation of particular members within the gang to achieve his own desires. Often he learns to use individuals or groups as a background for his own activities and as a means for accomplishing his own selfish purposes. He is likely to yield his own desires

only as far as is necessary to win and keep his place in the group. His expression of love at this age is usually a blustering defense of his "gang," or an occasional self-conscious attempt to serve one of its members. In the "gang" he receives a fairly severe discipline in expression of the love emotion since he soon finds that physical caresses given to a "pal" or to members of his family in the presence of the "gang" meet with scorn. He must grow beyond the baby timidity which tempts him to cling to his mother's skirt, or to cry when he is bewildered or displeased, if he is to be acceptable to his contemporaries. Fortunately, his urge to meet the demands of his group is usually strong enough to motivate the necessary self-control.

There are some people who never grow in love beyond the confines of their own families. When this occurs the social and emotional weaning has been incomplete. Such persons can never learn to love anyone who indulges them or "understands" them less completely than their families do. Nor can they conquer the tendency to run back to the protective atmosphere where childish weeping and infantile clinging dependence are tolerated. Some individuals pass beyond the family boundary into the gang stage, but never go beyond that. This again is a stage of incomplete social and emotional maturity. If so, they continue to demand the applause of a specific group, to depend for stimulation and motivation upon the "exclusive feeling" of secret societies or club life. They are ever ready to furnish ideas but seldom willing to make a real sacrifice to carry them out. The patient and continued love and understanding of individuals without which close friendship is impossible is beyond them. One hears these persons referred to as "the life of the party," yet usually finds them miserable and without resource when alone or when dependent upon one or two people.

Early adolescent friendships teach that kindness and service are the *sine qua non* of mature love, since in maturity one loves most the person to whom one willingly gives most. Adolescent friendships are often founded on the basis of admiration for accomplishment, for brilliance or richness

of ideas, for soundness and beauty of personality. They should teach the individual to love mind and soul as well as body, to rejoice in the sharing of interests and ideas as well as of physical caresses. They should serve to stimulate expression of love in improved accomplishment, broader service, and richer development of the personality. They can, in fact, be considered sound and wholesome in proportion as they expand interests and enrich personality, and may be condemned as unwholesome in proportion as they limit interests and dwarf personality growth.

Many persons grow this far in love, developing a mature reaction to spiritual and social stimuli, accomplishing an almost completely socialized expression of love in service to society, but cannot bring themselves to the final achievement of the biological goal of social growth as expressed in the choosing of a mate and the establishing of a new family.

We have seen that the love emotion evidences growth which progresses in an orderly fashion toward ultimate maturity. The emotion of fear should grow, too, as the child becomes older. At first the infant fears only loud, sharp noises and removal of support and perhaps one or two other such simple things. He expresses his fear by clutching and screaming. Throughout infancy he remains afraid of things which threaten his physical body, and continues to express his fear in primitive fashion. As he grows he soon learns to fear failure also, and thus becomes afraid of experiences which threaten his ego as well as those which threaten his body. His reaction when he encounters failure at eighteen months or two years of age is usually to cry or to give up his attempt and to seek the aid of the first available adult. Some people never develop physical courage; others never grow beyond that fear of appearing in an unfavorable light which drives them to cringe or weep at the first hint of difficulty and to turn for help to the first available source. Such people hate responsibility because they fear it, and are continually shifting to other people whatever responsibility comes to them, thus showing their immaturity.

As the child grows older, however, he should learn physical and moral courage, fearing only laziness, selfishness, intolerance, and other behavior which threatens his mental and social well-being. He should learn to control his desire to scream or weep, and should develop the fortitude necessary to face situations demanding physical or moral courage.

Anger, like love and fear, should grow. The newborn infant screams, and strikes out with his arms and legs when his random movements are inhibited. For several months anything which inhibits him bodily is likely to solicit screaming and bodily resistance. As his ego develops he becomes roused to anger by anything which thwarts or inhibits his activity in any way. If the stimulus is severe he reacts in a thoroughly primitive manner, screaming, kicking, throwing things. We recall that at two years of age the child is thwarted in many ways. Able to run about he is tempted to investigate everything within reach, and often begins an interesting inspection of some forbidden object which he must yield before he is satisfied. His misjudgments of size, shape, distance, weight, etc., often inflict pain or disappointment upon him. He encounters a multitude of occasions which thwart his activity and prevent him from carrying out his desires. Being only two years old he reacts directly and primitively.

Some people never grow beyond two-year-old behavior in anger. They become furious whenever thwarted in any way, are unable to tolerate resistance to any whim which possesses them. They express their anger in the two-year-old manner, viz., they have temper tantrums. Sometimes these are unmistakable two-year-old tantrums in which the individual screams or cries, kicks doors, throws anything within reach, or directly attacks the person of the one who roused anger. Frequently the tantrums are slightly disguised,—the individual sulks, assumes a "hurt" manner, has a "heart attack," faints, complains of pain, thus endeavoring to make the offender sorry and inflict mental rather than physical hurt upon the person who roused resentment. One tyrannical and thoroughly spoiled

woman of sixty ruled her son whenever he displeased her by throwing herself on her knees and praying God to forgive such a thoughtless, selfish boy. Another parent, a father, ruled his family by fainting fits which came on whenever any member of the family dared to resist him in any way. In both of these instances prayers and fainting attacks deserve no other name than temper tantrums. The individuals who resorted to them were using the technic of the two-year-old child who is roused to anger whenever "things don't go to suit him" and who expresses his anger in an explosive temper tantrum.

People who have grown to maturity in anger become angry only when they suffer injustice or when they sense that injustice and tyranny are being inflicted upon others. They should express anger in fighting for a cause, in "cooperative pugnacity," as Norsworthy and Whitley call it, and in fighting through work for something which seems worth while. The fighting impulse should not be killed, since we do not wish an individual to be too long suffering, but it should be guided from the physical to the spiritual level, and should come to serve as motivation for worthwhile accomplishment.

Parents should appreciate the need of growth in the emotional life of their children, and should understand the stages through which that growth progresses. Otherwise they may fail to permit development or to provide a setting for it because, although they see the need of physical weaning, they cannot bring themselves to wean children emotionally.

Growth toward maturity in social life takes place also in an interesting way. Children from a few months of age enjoy playing with or near other children. They recognize or "notice" each other, occasionally playing with each other in the sense of touching or caressing, or of offering a rattle one to another. But after the first novelty of another child wears off the play becomes highly individualistic, each child occupying himself with his own activities in almost complete disregard of the other. From eighteen months to two years the child continues to be absorbed

in individual play but is more influenced by the presence of another child. Characteristic play of this age is sometimes referred to as *parallel play*, for each child, although apparently playing quite by himself usually plays at the same type of game which occupies the other children of the group. Not only does he play the same game, but he plays at it longer and has more resourceful ideas than he would if playing alone. A favorite game at two years is digging in sand or dirt. One child fills his pail, carries it a short distance and empties it. Another child, who has

Fig. 33.—These three year old children are playing alone and yet together. Each is working on her own project in the sand yet each occasionally exchanges a spoonful of sand with the other. It is at this point that parallel play merges into group play.

been digging only, adopts the idea of filling a pail, fills his pail, carries and empties it. There has been no exchange of words, but simply an exchange of ideas. The next step to greater socialization may come when the second child conceives the idea of emptying the pail on the same pile of sand with the first child, thus changing the activity from a purely individualistic emptying of pails into a cooperative building of a mound of sand. This change may take place in silence or may occur after an exchange of words, and may last for several minutes or may relapse into individual activity almost immediately. Sometimes a brief socialization is evident when one child says, "Let's play in the sand," but dissolves when the idea is carried out since each child occupies himself in almost complete disregard of the others.

A few months later at about three years of age these children exchange ideas more frequently and more obviously. "Let's play blocks. I'll build a garage." Another child answers, "All right. I'll build mine over here." Again separate projects will be undertaken, but now there is an almost constant recognition of the presence each of the other, and a flow of conversation. "See, mine's big." "O look, I made a roof." Perhaps there will be a temporary merging of projects. "Look out, my car's going to visit your garage."

At three to four years the *shifting group* is conspicuous. Under this arrangement a fairly loosely organized game may grow up, lasting throughout a whole morning or even for several days, entertaining the activity of a number of children, but depending upon the presence of no particular child. For example, child A may say, "Let's play store." Child B and child C like the idea and join with A to build walls and counters with the blocks. D may appear, watch for a moment, and having learned what is happening, begin to carry blocks. The project is so loosely organized that his appearance causes no confusion, nor is the absence of B felt when he drops away to play for a time with his kiddie kar. Child E may join the game, and A and C may go off on some individual project, leaving the store game intact with D and E but with none of the original children. Later B may return. The game goes on with one child or with several, each individual coming or going at will. This type of game is typical when children are getting their first practice at socialized play yet still feel the charm of solitary play in which they can execute their own ideas in their own way.

As the organization of *group play* becomes more fixed certain characteristic relationships appear. The children who play together frequently soon fall into fairly definite positions within the group. Buhler* refers to these relationships as those of leader, of cooperating companion, tolerated companion, or rejected companion. The leader is the child who furnishes most of the accepted ideas and

* Buhler, Charlotte, from a lecture given at Merrill-Palmer School.

whose wish dominates the play. He proves acceptable to the other children who are willing to follow his lead and who generally rather uncritically admire him. The child who dominates a group through bullying, and hence who rules by fear, cannot be called a leader in any constructive sense.

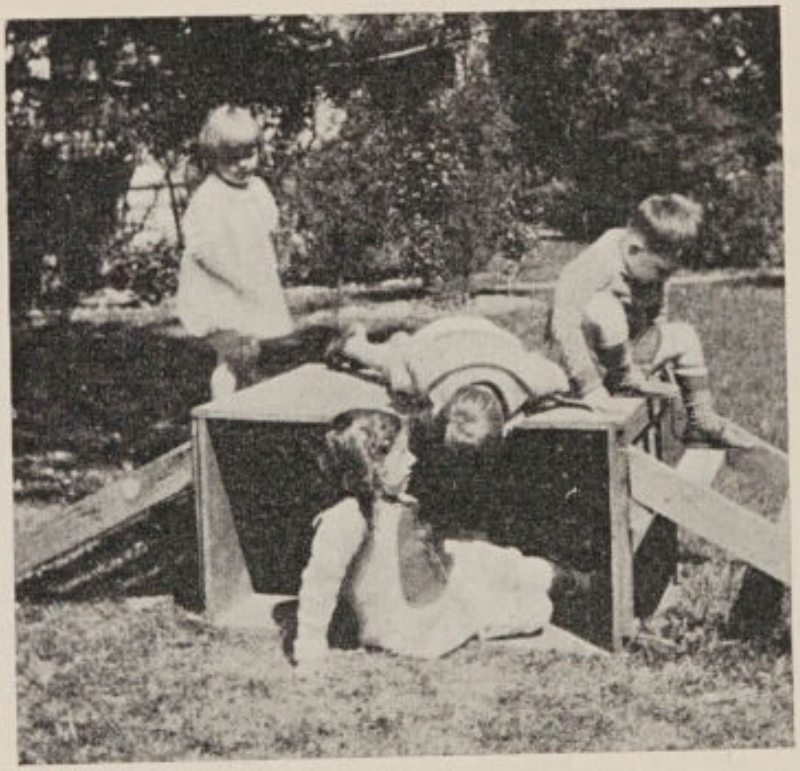


Fig. 34.—This group of three and four year old children are dramatizing the "Troll that goes over the bridge." They are cooperating in the process and illustrate the fact that group play often occurs among young children.

The cooperating companions are those who are always sought by other children, and who stand in a position of cooperation with the leader, often offering him acceptable ideas, and sometimes as the game changes or a special type of leadership is required stepping temporarily into a position of leadership. These children are usually thoroughly resourceful, and are not afraid to criticize or even to ostracize the leader when occasion arises.

The tolerated companions, though seldom sought by the group unless they are needed to "fill in," are often permitted to play even when their services are not par-

ticularly needed. They are not usually resourceful, and seldom have acceptable ideas to offer. As a rule they are so pleased at being allowed to play that they are willing to play at any post or in any capacity assigned to them by leaders or cooperating companions. When the group or the game changes they sometimes graduate into the positions of cooperating companions but seldom into a position of leadership.

The rejected companions are what their name signifies, —rejected by the group. Sometimes they really wish to play but have had too little experience to know how. If this is the case they usually soon learn and may become cooperating companions or even leaders in time. However, they are rejected sometimes because they are entirely lacking in the skills and ideas, sometimes because they have been so over-protected or over-indulged at home that they cannot mould themselves into an acceptable social pattern. Occasionally such children have a strong enough gregarious impulse to make them conquer even bad home training and to face the discipline necessary for successful social contact. They usually suffer intensely in the process of remoulding their habits, but sometimes succeed remarkably well. A child who is strong enough to bring about such success usually has the qualities which equip him for leadership, and may progress rapidly to that position in the group which once rejected him. A rejected companion whose parents fail to help him realize and conquer the reasons for his rejection is indeed in a sorry position since he will either continue to crave companionship he does not know how to win, or will retreat to the consolation of family protection to spend the rest of his childhood trying to fool himself into believing that he never cared to play. The degree to which he succeeds in fooling himself in this respect often determines the degree to which he is neurotic in later years.

The child who has succeeded in adjusting to his peers has taken an important step in growth. As he meets his contemporaries on an acceptable level he progresses in the emotional weaning from his family, and builds exten-

sions of his spiritual and social selves. The period from three to five years of age is ordinarily one of rapid development in this respect. It should be a time when he asserts himself as an individual with at least some degree of success. He should not, of course, become "bossy" and "intolerable" since such traits can only inhibit his growth toward successful social individuality, but he should meet occasional success in his independent strivings if he is to continue in the development of his independent personality. It is fairly usual for these independent strivings to take the form of boisterousness, of "showing off," and of fighting. Most fathers appreciate the ultimate value of such behavior in their sons and wish to encourage a certain amount of it. But most mothers grieve when it appears, fearing that their sons will never grow up to be "gentlemenly." Both mothers and fathers tend to discourage such behavior as "unladylike" in girls. Parents should not, of course, encourage or even tolerate crudeness, or rudeness to adults or to children, nor should they permit fundamental disrespect toward adults in any instance. Most mental hygienists, however, consider a certain amount of competition and striving among contemporaries a thoroughly wholesome preparation for desirably aggressive forms of behavior necessary for success and poise in adulthood.

By three years of age conscience or self judgment has become clearly evident. Young children have no other judgment for what is right or wrong than a reflection of the beliefs of persons about them. At three, however, they have already abstracted from general experiences a certain sense of what behavior will be acceptable and is therefore "right," and of what behavior will be disapproved and is therefore "wrong." By four and five years the child has a fairly clearly defined sense of "right" and "wrong" as thus determined. If discipline has been consistent they will have some idea of the magnitude of various offenses, and this will be defined in their minds in terms of the severity of punishment which follow each infringement. Parents should lend all possible aid to the child's attempt to form judgments of right and wrong by giving him con-

sistent disapproval for undesirable behavior, and consistent approval for desirable behavior. To laugh at him one day and scold him the next for the same bit of behavior can give him no sense of the desirability or undesirability of the behavior itself but only a skill in judging adult moods.

Again, parents should help him to a sense of proportion as to degrees of rightness and degrees of wrongness by approving or disapproving in proportion to the magnitude of the behavior. To punish him as severely for making finger marks on the window pane as for beating another child when he is in a temper can only give him the idea that the two offenses are equally serious. Young children are ordinarily extremely conventional; they have a strong desire to do the "right" thing. Children who persist in undesirable behavior do so for some definite reason, and not because such behavior is natural to them. It should be borne in mind, however, that young children lack experience, and cannot therefore be expected to behave in a manner acceptable to adults under all circumstances.

A thorough and consistently dependable judgment about what is "right" or what is "wrong" depends upon training and experience, but it cannot in any case be expected before the child reaches adolescence. To expect to try to force perfect behavior and perfect judgments of right and wrong from a very young child is to court trouble. Sometimes the child becomes discouraged with his inevitable failures to meet such rigid standards of right and wrong and gives up trying, perhaps even resorting to actively "bad" behavior to convince himself that at least in this he can succeed; sometimes he becomes morbidly conscientious. One parent became over anxious to fix all the right judgments early so that no undesirable ideas would have an opportunity to find root. She never read her child a story that she did not analyze the "rightness" or "wrongness" of the behavior of the various characters. The child never reported an instance from his play or from his thoughts that she did not question, "Was that right?", "Did the little boy do the right thing?" At six years of age her child had become so reticent, so timid, so thoughtful

that he was not sleeping, was having haunting dreams, could not digest his food, was, in fact, quite ill physically and mentally. Investigation by the clinic to which he was brought revealed that the child had gotten into a morbid state of self analysis and was terrified lest he think or do something "wrong," was dreaming that he was a "wicked" boy, and so on. It took two years to convince this child that many things he did or thought were just day to day living and did not deserve analysis, and that even if he did make some mistakes he could hope to learn from them but need not feel irrevocably lost because of them. This child must pass through the emotional changes of adolescence before the clinic can be sure that the damage done so early in life by an over-conscientious mother will not be permanent.

A child of five should have had sufficient experience with other people so that he can project himself into their thoughts and feelings with approximate accuracy. At three one child may bite another, being entertained by the resulting scream, but having no idea whatever that the other child has been hurt and is in pain. At five he should understand clearly that other people think and feel much as he does, that other people have rights and desires as important as his own. Sympathy, based on such understanding and upon the joy of helping other people to happiness, should be part of his behavior. This is an age when it is fairly easy to teach joy rather than envy and hatred for other people's happiness and success. Sometimes in trying to do this, however, we praise other people too much and the child under consideration too little, thus rousing resentment. Sometimes we hold other children before him as models until he learns to hate both the model and the behavior represented, and to sullenly envy the person who is thus constantly praised. He will soon learn to repeat praise of success, however, if he hears his parents praising their competitors. He will learn it, too, if whenever he is happy over the success of someone he loves, his happiness is accepted as desirable, thus encouraging him to share in celebrations of success. Too often good marks

on sister's report card are an automatic signal for a scolding about the poor ones on brother's, rather than an occasion for rejoicing over sister's success and the hope that brother's own card will soon warrant a similar celebration.

Meaning of Health.—A discussion of growth and development should not close without some understanding of the ultimate goal of that growth and development. This goal is the attainment of health, and involves not only a knowledge of the principles of health but also an application of these principles in daily living. It includes health of mind and personality as well as of body, and should be understood not only as the health of each of these considered separately, but also as a balance between them and an integration of all of them. It means, too, much more than the mere avoidance of illness, physical or mental, since the goal toward which we wish growth and development to proceed is abundant, vital health.

The healthy person has plenty of vitality with which to meet the daily demands made upon him, so that he can do a good day's work and meet the strains of a strenuous day of contacts without undue fatigue or boredom or irritation. More than that, a person who has achieved positive health is not only capable of meeting daily demands but has a reserve which helps him to meet physical, mental, or emotional crises without disaster to body, mind, or personality. Physical health must mean that the individual can work each day without greater fatigue than can be overcome between the end of one day and the beginning of the next. It must mean, in addition, a physical reserve of vitality which will carry the individual through a physical crisis like a severe illness or an unusual demand in work.

Likewise, in mental health the individual must have enough mental balance and strength of personality to meet the demands of daily living without boredom, irritability, decreased efficiency, or other symptoms of mental or emotional overfatigue. He should be able to meet each day's living with interest, poise, and efficiency. In addition to this, however, as in physical health, the men-

tally healthy person should have enough reserve to permit him to live through mental and emotional crises without disaster to his mind and personality; he should be able to meet crises of disappointment, grief, strain, and unusual responsibility without mental or nervous breakdown. Such health is the product of continuous growth, and should be inherent in an understanding of growth and development. Soundness of body, mind, and personality comes, as growth proceeds, to be more and more an expression of healthy living, and should be so regarded.

To achieve optimal physical, mental, and personality health the individual should be endowed with a sound constitution and a sound nervous system, which presupposes a sound heredity and good prenatal care. He should have an environment which affords adequate nourishment and adequate (although not excessive) stimulation, with opportunity for constructive play, for a reasonable amount of freedom, and for contacts with his peers. There should be not only opportunity to learn but also situations which afford satisfaction in learning. Sufficient physical, mental, and emotional rest with enough solitude to challenge self resourcefulness are essential, as are opportunities for independence, for responsibility, for adjustments to various personalities, and for practice and development of pride in self control. The growing person should have in addition to all these an abundance of good example set for him by the adults and by older children in his environment.

Parents and educators may be assisted greatly in the guidance of health by periodic health examinations. These examinations should cover mental and social as well as physical aspects of growth, and should serve.

1. To detect defects (physical, mental, and emotional).
2. To protect against disease or disorder (physical, mental, emotional).
3. To secure through a comparison with standards and a consideration of individual children's needs a basis for determining present and future growth needs.
4. To secure a basis for judgment of what may be expected of the child at present and in the future.

5. To furnish a basis for decision in regard to the child's daily routine.

But more important even than the achievement of physical, mental, or personality health is the achievement of a sense of balance between these aspects of growth and health. Optimal health of body, mind, or personality is closely related to optimal health in all three and to a fine balance in the interrelation of all three. This does not mean that the child should learn to live a stereotyped routine which balances physical, mental, and emotional growth needs by hours or by effort expended. It does mean, however, that because parent or educator has a keen sense of proportion, the child learns to evaluate and to adjust the various demands that are made upon his body, his mind, and his emotions, and that he learns to keep a proportionate evaluation between these demands. This sense of proportion does not come easily, but should develop gradually as any other growth process develops. Through it the child should gain a constantly accumulating and expanding power to live healthfully. This probably comes to the child best as a sense of participation in life, a feeling for right living which is the result of living the physical, mental, and emotional experiences in balanced proportion until such living becomes an integrated part of his being.

The ultimate product of such integration should be a person in sound physical health who is capable of:

Self expression guided by self control and consideration for others.

Development of initiative with wise choice of energy expenditure.

Independence modified by intelligent recognition of authority.

Good mental and social habits with power of adjustability.

Adaptability to routine without slavish compliance.

A pragmatic attitude without loss of vision, spontaneity, and ability to create.

Family loyalty with appreciation of wider social needs.

Tolerance without sacrifice of standards.
Facing of himself without morbid introspection.
Social adaptability without complete social dependence.
Satisfaction from, and joy in simple activities.
Unselfishness and a sense of social responsibility.
The achievement of durable satisfaction in living.

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INDEX