# INFANT FEEDING.

Lecture delivered in the Fourth Special Course of the Chicago Policlinic,

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What I propose to give you to-day will be probably more in the nature of suggestion than instruction. I may possibly be rather more iconoclastic than constructive, but I wish to take into consideration certain of the principles which underlie the subject of infant feeding, rather than all the details which go to make up successful work in that direction.

We find it stated that human milk is the best food for the infant; we find it further stated, and generally accepted, that in the absence of human milk that food which most closely resembles mother's milk in its chemical and physical properties is the best for the infant. Now I wish to deny this latter statement, and it is rather difficult to show cause for the denial, for a lie that is partly true is the hardest of all to down. It is unquestionably true that mother's milk is by all odds the best food for the *healthy* infant. Let us get that word healthy well fixed in our minds. That it should be made the guide in the formation of any artificial food for the healthy infant is likewise true, but that it should be followed absolutely, that we should bow down to it exactly and never vary from it even in the slightest particular, is not true. It is not true, for instance, that we must have a milk which shall coagulate exactly as mother's milk does in order to be successful as food for a baby; it is not true we must have exactly the same proportion of the several ingredients which enter into mother's milk imitated in our artificial food. In consequence of the general conception we find that the efforts of chemists and of physicians have been directed towards imitating mother's milk as closely as possible. We are told to take the milk of goats because it resembles mother's milk more closely than does cow's milk. But it is not practical. We cannot obtain goat's milk in sufficient quantity, but we must look to cow's milk for artificial food for the child. Furthermore, goat's milk contains widely different substances from anything found in mother's milk or cow's milk, certain organic substances the nature of which we do not understand. But the presence of these is ignored completely when the quantities of proteid and sugar and fat are tolerably near those in mother's milk. Meigs has done considerable work in this direction. He prepares a food by taking certain proportions of cream, milk, water, and sugar of milk, the latter in large quantity, and makes what is known as Meigs' cream mixture, or artificial food for babies. Meigs analyzes milk in a peculiar way, differing materially from some of the best chemists in the world, and his artificial food is based on his analysis. The mixture has not proven satisfactory in my hands. And I may say here that with cream mixtures as a rule, more or less trouble will be experienced. I have had my attention called quite recently to a number of children who have been raised upon a mixture of cream and oatmeal alone, and it is strange to see what peculiarly healthy children can be produced by this mixture. That is to say, apparently healthy, for as we shall see later, they are certainly not completely nourished children.

We must throw aside then the idea that we are to imitate mother's milk.

The first rule for any food is that it must comply with the conditions met with in the intestinal canal of the particular infant in question; the food to be successful food for a baby must be suitable to the conditions found in the intestinal canal of that baby. Let us see what we mean by this. In the majority of instances when we are called upon to direct the feeding of a child artificially, that child has already had its alimentary canal disordered, it has already been tampered with and it is comparatively rare that we have an opportunity to take a new-born baby and from the start direct its feeding as we wish; it is nearly always in an abnormal condition when we take charge of it. How? There are conditions which we may call dyspepsia, if you please, diarrhœa, or what not, but in nearly every instance the child has some abnormal condition of the alimentary canal. Let us suppose that when the baby is brought to us it is having putrid stools, shall we put it at once upon a certain kind of food because it is considered the best for a baby; shall we put that baby to the breast or on food which so resembles mother's milk that it might, *a priori*, be considered the best? By no means. We must first put that alimentary canal in the best condition, and the food we adopt for the time should be the one we would prescribe for the diseased condition there present, at any other time. This is an important thing in artificial feeding, but frequently overlooked. So often the child is brought to us with the statement, "Doctor, we want you to direct the feeding of this baby; we have tried this and that food but none of them have agreed with the baby." We can't tell what food agrees with that baby, but what they have proved is that this or that food does not agree with the conditions present in the intestinal canal. Let us remember that the first condition of infant feeding is to put that child's bowels in a normal condition, and right here come in the principles I have explained in my preceding lectures, because the conditions I have there described underlie the great majority of disorders of artificially fed babies as we find them. The first thing we must do is to purify the intestinal canal of the infant, put it in a normal condition, and then we will be in a position to feed it properly. I am thoroughly convinced that the great difficulties so commonly met in finding a suitable food for a baby, result principally from overlooking this factor.

Then another thing—when we have gotten the intestinal canal of this child in a normal condition, one which is aseptic so far as the food we wish to give it is concerned, that is to say, which contains no germs which can make poisons out of the food we intend to give it, then we must consider the food to be given to that child; it must be something adapted to the physiological conditions that are present. First our selection of a food is to be guided by the pathological conditions present, next, it must be within the scope of the physiological possibilities of the healthy child. What are they? A healthy infant is not capable of digesting coarse vegetables such as cabbage; it may take them into the intestinal canal, but they are apt to produce harm; it is not capable of digesting many fruits, particularly those that have a considerable bulk to them. Of the simpler foods, meat in particular is one which it is very rarely within the power of the healthy infant to handle. Very frequently when we give beef scraped, beef tea, cooked beef, or pressed beef juice, or any other form of beef to a baby we

find that the child develops more or less diarrhœa. There is no form of food which we give to children which produces the intense putridity of stools as that which we notice following the use of meat or meat preparations. So I say, that almost absolutely meat is a food which is physiologically improper for a young child. We hesitate to give meat to a young puppy or kitten because we say it will give them fits. I don't know whether any such objection lies with regard to the use of meat with young babies, but this I do know, that in many instances it is the cause of disarrangement of the bowels of a child, and we must consider that, physiologically, it is not a suitable food. The foods which the infant can digest are principally cow's milk, eggs, sugar and starch. Under the head of starch we must put cracker, bread, rice, arrow-root, baked potato and oatmeal. Now, with these foods at our disposal, for the proteids and carbo-hydrates and with cream, bacon, and cod-liver oil for the fats, we have a complete list of what we can give an infant for food. The most easily digested fat is, apparently, cod-liver oil, next is cream, next butter, and next fried bacon. We all know how readily young children will digest fried bacon. It is a means of feeding which has grown up with the people; it is in quite common use. Beyond this list we would say that other foods, more complex, are unphysiological.

To summarize: The food must first be adapted to the conditions of the intestinal canal; it must not contravene the physiological possibilities of the child. Having first by a proper dietary removed the pathological conditions, we are then to limit our food selection to the substances named, and which are within the physiological possibilities of the child.

The next condition which is relatively essential, is that the food given shall be sterile, which means that it shall be pure. Let me say pure instead of sterile because a great deal of the food given is pure enough but not sterile. All milk is contaminated with microorganisms in the act of milking and they are not taken out unless the milk is subjected to the actual process of sterilization, and as that is practically carried on, they are not taken out even then. But milk, even under such conditions, furnishes a most excellent food and does a healthy child no harm; a healthy child, understand. But it is not sterile, although it contains no germs ordinarily, which can make poisons out of the milk; it contains no germs which are pathogenetic, or which in themselves are detrimental to the child, therefore for the purpose of feeding it is pure. Let us say the second requirement is that the food shall be pure. This brings us to the subject of sterilization. Sterilized milk is valuable simply because of its purity. The principal utility of sterilized milk lies in the fact that it does not introduce poisons into the intestinal canal of the child. When the child's bowels are once in a normal state, by sterilizing the milk we maintain them in normal condition, simply by a negative process.

Sterilization as applied to the preparation of infant food, consists in subjecting the milk to a temperature approaching that of boiling water, over a period of from thirty to sixty minutes, and after having subjected it to the temperature in preventing further contamination by keeping the air from it. This is the ordinary process involved in sterilizing milk, and it has been shown conclusively that this process does not destroy all life in the milk; it probably destroys all adult microörganisms, but the spores are not killed, and to actually sterilize milk in this manner, it would be necessary to repeat the process twice at intervals of twenty-four hours. But the milk which we feed to children and call sterilized milk, is not sterilized, it is only grossly purified. We must not delude ourselves with the idea that it is actually sterile. Furthermore it is highly improbable that such a thing is desirable. We know that the healthy intestines swarm with microorganisms and if the milk is sterile when it enters, it is but a moment until it is far from sterile, but the organisms which grow in it under such conditions so far as known are of a harmless type, and it is quite immaterial how many microörganisms are growing in the intestine at the time of its lodgment there.

We find not infrequently that children who have been fed upon foods most closely resembling human milk will not thrive, but when put upon sterilized milk they do thrive. Yet the latter may be very gross imitation of human milk and very far from maintaining the exact proportions of human milk, while the other is prepared carefully to have just so much casein, so much fat, so much carbo-hydrate and so much water, and perhaps has been partially peptonized, so that when the casein coagulates it coagulates in flakes and even looks like mother's milk in color. Upon the one food the baby thrives, upon the other it dies, and the difference in results lies solely in the fact that sterilized milk is free from poison. But if we put sterilized milk into a poison-producing bowel, we might as well put in the poison itself, for sterilized milk can then be of no use.

The third condition which a food should meet is that it shall contain the necessary ingredients for complete nutrition. Now here is a most important problem to me; it is the prettiest point in the whole subject of infant feeding. What are the ingredients necessary to complete nutrition? Let us take for our guidance mother's milk. We know that healthy babies are raised upon mother's milk and we have every reason to believe that it is the best food which can be given to the child, because in the majority of instances children raised exclusively at the breast are the strongest and healthiest. Other things being equal, mother's milk is the type of food so far as this one feature of the problem is concerned.

What are the essential ingredients of a complete food for the child? We ought to be able to find our answer in an examination of mother's milk, and yet the method of examination applied has been found to be decidedly incomplete, and we have found that the chemical examination of mother's milk has not always told us what we are to look for. The analysis of mother's milk shows us that this substance is made up of fat, carbohydrates in the shape of milk sugar, proteids in the shape of casein and coagulable albumin, and water. These several substances exist in quite constant proportions, and it is perfectly justifiable to assume that these proportions are the best for the nourishment of the child. Comparing the analysis of milk with the dietary of the adult, it is shown that the infant requires these several classes of food in very different proportion from that found necessary for the adult. For instance, a baby does not require anything like as great a percentage of carbo-hydrates as the adult does; it requires about the same percentage of proteids, and a very much higher proportion of fat. A

child a year and a half old requires about three-fourths as much fat in twenty-four hours as a full grown adult, to meet the requirements of its nutrition. This is a point we want to keep before us constantly. Growing bone needs fat to make its nutrition complete, and that is one reason why the baby requires so much actual fat to make up this condition. Now we not only require that these substances shall be present but that they shall be present in the proper proportions, and these are the proportions found in mother's milk. But chemical analysis has not yet yielded us all the secrets of mother's milk for there is at least one other element present, which we do not know chemically, and this is a substance which the English have called the anti-scorbutic element. What is it? In the days when sailors went on long sailing voyages and could not take with them animals to kill, or fresh fruit and vegetables, and consequently were deprived of these fresh substances for long periods, they developed the peculiar condition known as scurvy or scorbutus. If, however, they were given in time fresh meat or vegetables or were given fresh milk they soon got over the scurvy. This as yet chemically unknown substance, the absence of which permits scurvy to develop, is found in fresh milk. The anti-scorbutic element therefore, is to be regarded as one of the important elements of an infant food, but not, as I shall show you later, one which is always essential. One of the most interesting cases of scurvy I ever saw was in Chicago, in a child whose food made it almost necessary that it should have scurvy. It was firmly held that everything that child should receive must be sterile, its milk was sterilized, the Imperial Granum mixed with water with which it was fed was sterilized, everything indeed that the child fed upon was sterilized, and in the process of sterilization this wonderful antiscorbutic element was killed. The child was given plenty of food in every way except this antiscorbutic element, and it developed an attack of scurvy and almost lost its life in consequence.

Remember that the mere chemical constituents of any food are but grossly the index to its food value. We cannot reach the full requirements of food stuff by any chemical examination, nor by any means except actual trial tell whether or not a given food is sufficient for a given organism.

If the mother has scurvy, her offspring will have scurvy; if she is cured, her child nursing at the breast is also cured. A female, then, who contains the antiscorbutic element, can transmit this to her milk, and this is done by the healthy human being and by the healthy cow, so a healthy milk will contain the antiscorbutic element, and furthermore, raw milk contains it, while it is destroyed in the process of sterilization, in the process of condensing, in the process of drying, so that every food we have which contains sterilized milk, or condensed milk or dried milk, is necessarily deficient in the antiscorbutic element.

A great many of the so-called infant foods in the market are deficient in one or another ingredient, and I should hesitate to say that any of the foods containing the dried milk solids are sufficiently rich in proteid material. You can give any quantity of proteids in the way of dried milk and some babies will digest them, while they will pass through others. The dried milk solids fail to answer that physiological necessity which I made the second requirement of an infant food; they cannot be assimilated by the individual in question, although you may be giving plenty of proteid, chemically speaking. The great majority of prepared foods are deficient in fats. What is the result? A food deficient in fat produces rickets, a food deficient in proteids produces rickets, and any food that is rich in carbohydrates, simply because it is therefore relatively deficient in fats and proteids, produces rickets. If we use wheat so as to make it the basis of food we are giving more carbohydrates than mother's milk can possibly contain; if we make oatmeal the basis of food—and I have seen babies raised on simply oatmeal mush and cream, not another article of food given them—we are giving the child a deficiency, I won't say of fat, because the cream will in all probability make up for the fat, but a deficiency of proteids; there is not enough material to make tissue, and what is made is necessarily a degenerate, unphysiological tissue. They used to tell us that a person who drank beer was pussy and bloated and did not have good fat, but it always appeared to me that fat was fat, and whether the individual got his fat from drinking beer or eating sugar, it was all the same. But this assumption is certainly incorrect. An individual who gets his fat in one way is different from one who gets it in another way; there is a healthy fat and an unhealthy fat. You take a fat baby, and that baby may be thoroughly rachitic, it may be suffering from fat starvation. The negroes in the South on the sugar plantations ate largely of sugar, sucked the sugar cane and became decidedly roly poly; they abounded in fat, fat formed in every part of their anatomy where it could form, and yet they were thoroughly rachitic. We can give a baby a prepared carbohydrate food, or we can give it an excess of arrowroot, an excess of oatmeal, an excess of bread or crackers or starch of any kind, and that baby will get fat, because we know it is a rule that carbohydrates, sugar and starch, if they be in excess, are transformed into fat, and furthermore we know that if an excess of proteid material be given to an individual, it is transformed into fat. This is true of children and adults as well. But fat so made is not valuable for the nutrition of the growing child; I cannot explain to you why, but it is unquestionably true. That child, then, needs fat as such; it must receive the fat in the shape of fat, or it is of no use to it. The fat which forms on its body cannot be utilized by it in the same way as fat received by it in the shape of cream or butter, or cod-liver oil; that is the reason we take a fat baby with rickets and give it cod-liver oil, cream, or any other fat the peculiar circumstances shall dictate to us. The fat laid up on the baby is not fat which that baby can use for the purpose of making bone tissue, but the fat which it takes, in the shape of cod-liver oil, the food which is fat at the time it is taken, it can use in the manufacture of bone tissue, it can use in the development of that nutrition which is necessary to prevent rickets. What is rickets? Rickets is a disease of innutrition, therefore it is properly considered by us when speaking of infant feeding. It is the result of a vicious process of feeding, a process which does not supply a complete nutrition; it follows the use of foods which do not contain all of the ingredients in their proper proportion that we have mentioned to you. Rickets may be defined as a form of innutrition characterized by certain neuroses, viz.: sweating, particularly about the head, restlessness at night, and convulsive

manifestations, particularly laryngismus stridulus, and general convulsions; by delayed dentition, and finally by the occurrence of certain bony deformities.

The bone changes are late, and we don't want to wait to make a diagnosis of rickets until after the bone changes have come on; we don't want to make a diagnosis of a cyclone after the houses are all torn down. And so it is with rickets; anybody can make a diagnosis of rickets after it has swept over the baby and left him with bandy legs and big head, but we want to make the diagnosis of rickets before the bone changes are apparent. Rickets is a disease not so much of malnutrition as of innutrition, it is a disease which arises because the complete nutrition which the child needs has not been given to it; usually it is a case of fat starvation, but it may be a case of proteid starvation. Rickets, then, is a starvation disease, and the rational treatment of rickets is to supply the proteid, to supply the fat which has been lacking in a given case. Scurvy is likewise a disease of innutrition, but for it to be produced there must specially be withheld from the child that single mysterious, unknown antiscorbutic element which is present in fresh meat, which is present in fresh milk and fresh vegetables. We don't know what it is, but it exists, and we know how to keep it away and how to supply it. If we keep this element away we are liable to get scurvy, and scurvy in its early stage is indistinguishable from rickets. The babies sweat, they have pain in the limbs resembling rheumatism; in some instances an area of hyperæsthesia which is said to be characteristic of rickets, but which I believe is never characteristic of rickets, but always of scurvy. The acute rickets of the Germans is probably the scurvy of the English. I remember a case which was called rheumatism, in a baby about eight months of age, and as I look back on that case now I am satisfied that it was scurvy. I believe that scurvy is classed not infrequently as cerebro-spinal meningitis because of the hyperæsthesia present. If we make a diagnosis of cerebro-spinal meningitis simply because hyperæsthesia is present we are careless. Let us go back and see what the nutrition has been, and whether it has been such as might possibly lead to scorbutic disease. We are rather comprehensive when we say that the lack of fat or proteid will produce rickets. I would like to prophecy that the disease which we now call rickets, we shall be able hereafter to classify into several diseases of innutrition. Besides those forms of innutrition that are so positively distinct that we are able to make a definite diagnosis of rickets or scurvy, we have various peculiar manifestations evidently due to incomplete nutrition, but not to be classified with certainty with either rickets or scurvy.

We have a great number of starvation neuroses; they may present themselves as incontinence of urine, or in the shape of epilepsy or hysteria; they may come in the shape of any of the vast class of neuroses, and yet be starvation neuroses; in fact, I am inclined to believe that the majority of neuroses, as we see them in infants, are starvation manifestations rather than so-called functional diseases.

A child's nutrition may fail because of failure at one or more of several points. In the first place, the food may be deficient in quality or quantity; in the next place, we may find the actual digestion incomplete, so that the child will not thoroughly digest the food, and, of course, it cannot be absorbed; or the failure may come from diminished absorptive power. Again, we may find the bulk of the food which goes through the portal vein and liver may fail to find in the elaborative organs the necessary change which it should find there to fit it for assimilation by the cells; or, having gotten the food into the circulation and ready for absorption, individual cells may not be able to take it up. The starving cell, when the food is right along side of it, may not be able to utilize it; and why? Because, with continuous starvation, its chemical constitution has been so modified that it is no longer able to directly unite with the food brought to it. This is possible — no doubt, is common — in certain cases of disease, for instance, in influenza, in which it seems to play a great rôle. Another factor is deficient cell power because of heredity. The individual inherits an abnormal cell which is incapable of maintaining its own nutrition, even in the presence of abundant food supply. That sort of heredity is common to the syphilitic baby, the tubercular baby, and possibly to the rheumatic child, or the child whose parents have Bright's disease; but certainly it is true of the syphilitic and tubercular child, that the tissues themselves are unable to assimilate the food which has been brought to them in a proper condition. Fortunately, in the case of the syphilitic child, we can so modify the structure of the cells by means of mercury that they can again assimilate. This explains why a syphilitic baby, in a state of marasmus more or less marked, does not get well upon mercury alone. It may improve for a while, but presently it stops improving; but when you add to that mercury a proper dietary, it picks up immediately. In the first place, the mercury will put the individual cells in such a condition that they can use the food brought to them; but if the food is not brought to them, all the mercury in the world can't cure the child. Furthermore, if we simply try to relieve the baby by giving the proper food while the cells are unable to assimilate the food brought to them, no matter how carefully prepared it may be or how thoroughly well it may be absorbed and elaborated, if that cell is still syphilitic, it cannot properly assimilate it, and the child goes on to a peculiar form of starvation. Now, when we put our mercury in, we modify that cell, assimilation goes on, and the child improves; so two factors become necessary in the syphilitic baby. In the case of the tubercular baby we have no such means at our disposal for cell improvement; we have no specific which will compel the cells to take up the nutrition brought to them, and it is only by indirect ways that we are able to improve the nutrition of the tubercular individual.

I have shown you the necessity of a complete food containing a large quantity of fat and of proteid material, and the necessity for purity. Now with these general principles, let us consider how we would feed a new-born baby that we had to feed artificially. If we know from the start that the child will not have the benefit of mother's milk, what shall we do? Shall we proceed without delay to feed that child? I am satisfied that during the first three days, during which the mother's milk is not secreted, and during which we normally allow the child to go unfed, a certain lack of strength ensues to that baby, and while I am perforce compelled to withhold food from the baby that is to be fed at its mother's breast until the mother's milk comes, so that we may not contami-

nate the intestinal canal of the child with improper germs, if I know I must feed that baby with artificial food, I proceed at once to do it. How? Always at first with sterilized milk. I should take cow's milk, and, because it is not so dilute as mother's milk, I would add to it a considerable quantity of water; I should add an equal bulk of water, thus supplying the child not only with milk and food, but with drink. The very important element of water is not to be overlooked; water is not only a food, but it is likewise an eliminant generally, and you will find that if you deprive a new-born baby of water, it will cry. I have found this cry to be not always one of thirst, but sometimes of pain. I have, in several instances, taken care to keep everything, even water, from a new-born baby. It would, after some hours, begin to cry, and on giving it water, in an hour or two the crying would cease, and shortly after it would pass urine, and I have found in these cases uric acid crystals on the diaper of the child. In all probability, these babies had uric acid infarction of the kidneys, and because they could not get water, had no means of flushing out the tubules of the kidneys, and the passage of these uric acid crystals through the kidney was what caused the pain. Two hours after drinking water they would stop crying, and we would find these crystals. Now then I would take about half water and half milk, not because mother's milk shows there shall be so much water, but to be sure that the baby shall get enough water; then I should add a small quantity of cane sugar to it, and put into each bottle one ounce of such a mixture, and I would feed that baby every two hours. It is my custom to feed them at six o'clock in the morning, at eight, at ten, at twelve, and every two hours up to ten o'clock at night, and then I stop feeding the baby, letting it cry if it wants to, all night until six o'clock the next morning, and then go on feeding it every two hours until ten o'clock at night, when I stop feeding it. When the time for feeding that baby comes around I have it awakened if it is asleep. At six o'clock I would deliberately waken that child and put it to the breast or the bottle, and try my best to make it take food. We know that the food which the child will get in this way is quite sufficient for its strength. A new-born baby may have a tendency to sleep during the day and be awake at night, but inasmuch as a baby is absolutely without habit when born, and may be made to assume any habit you choose to impose upon it, you should be careful to train it to good habits only, particularly impressing the habit of sleeping at night and being awake in the daytime. It is a little hard to get mothers to follow such directions, but it can be done nine times out of ten, and the tenth time it fails. Of course, babies are not machines, and that ten per cent. serves to separate humanity from pure mechanism. In a few days a baby will acquire the habit of waking every two hours, and it will know when ten o'clock at night comes, and will sleep all night. It is exceedingly common for mothers to break the rule and feed their babies once or twice during the night, but where I have intelligent people to deal with, I find that they can make the baby sleep all night, and it will be perfectly healthy. The great danger of too frequent feeding is prevented by this plan, and the child's stomach has the rest which it actually requires; this is true both of babies artificially fed, and of babies fed at the breast. It is a very nice thing for a mother to know that she can leave her baby at eight o'clock in the morning, go down town and get back at ten o'clock, and know that during that time the child will not need her. If she happens to stay too long, her breasts will fill up; they act with regularity just as the child does. I feel that I ought to speak very strongly upon this point, because you can carry it out if you will take the trouble.

Much has been written upon the manner of gauging the quantity of food which a baby should receive. Two general systems are in vogue, one in which the quantity is regulated by the age of the child, and the other, more rational, in which the quantity is determined by the weight of the child. Personally I take a different ground, and think that I meet the requirements very well. I am in the habit of allowing a baby who has been properly trained to be its own judge of what it shall receive. I cannot let a baby who has been improperly trained be the judge of what it shall receive, but when I have gotten a baby into proper habits of feeding the best I can do is to be guided by its own demands. For instance, I have had a baby under my care for about five months, a typical artificially fed baby. It was fed upon what was called sterilized milk before it came into my hands, and the milk was so sterilized that it is no wonder it was subject to considerable diarrhœa. After curing the diarrhœa and getting the bowels into normal condition, it was put upon sterilized milk every two hours. It is now receiving its milk every three hours and as regularly as the clock strikes the baby gets its bottle. Up to three or four weeks ago the quantity was forty ounces of milk and twenty ounces of water put into eight bottles, that is seven and a half ounces to each bottle. For a period of two months it received that quantity, and at the end of that time it began to cry after each bottle. My direction is if the child cries after it is fed a bottle of milk, pay no attention to it, it may be something accidental, but if it cries after every bottle it gets for two or three days, the stools being normal, and the cry not one of pain but dissatisfaction, watch the child until you are satisfied it is the cry of hunger and not of pain or anger, and a properly fed baby does not get out of temper, it will not cry like a baby fed hit or miss, but you can depend upon its statement that it is hungry. I am far enough from taking the statement of the mother that every time the child cries it is hungry, because that is the sole interpretation of the mother. But having found a baby that is properly fed, and which cries frequently and steadily for several days after each bottle, I don't care whether the child has been receiving the exact quantity for that age, as laid down in the books, or a greater quantity, it is not the proper quantity for that particular child. Now what do I do? This having occurred in the case under discussion, I increased the quantity of milk and decreased the quantity of water. Perhaps I was not wise in that particular instance—time will show—but I made up for the decrease in water by directing that the child should be given water between meals. The quantity of water that child was getting represented a much more diluted mixture than mother's milk. We cannot measure the water exactly that we give a child, but if we give the relative proportion of solids and plenty of water, whether the water is given with the food or not, we have done our part. I

told the mother, in this case, to increase the milk from forty to forty-five ounces, and to decrease the water from twenty to fifteen ounces, and give the same quantity; instead of two-thirds milk and one-third water, it would be three-fourths milk and one-fourth water. A child, even on so small a quantity as five extra ounces of milk a day, will be satisfied, and so long as it is satisfied, be sure you let well enough alone. I feed this baby on sterilized milk, and nothing else. It is the food upon which I put all healthy babies at first. I told you sterilized milk was deficient in the anti-scorbutic element, so that it looks as if I were a trifle careless; but that is not so. I would be careless if I ignored that fact; I would be wrong if I did not know that fact; but when I know that the milk is deficient in the anti-scorbutic element, when I know that it does not form a complete nutrient for the child and I watch the result carefully and change with the first signs of trouble, then I am doing my full duty.

Certain observations made by Davis of Philadelphia, go to show that sterilized milk is always an incomplete nutrient for children; that children fed upon sterilized milk invariably present certain symptoms of innutrition. I don't think this is invariably true, but I am willing to admit that every baby fed exclusively upon sterilized milk is liable to show some form of innutrition, either as a distinct form of scorbutus or one or the others of the starvation neuroses. But many children do not. The majority of children, in my experience, do well on sterilized milk and the danger from its use is certainly not as great, as Davis asserts. So that it seems that many children may do well, for a long time, without the anti-scorbutic element. Now if this child goes along nicely, does not sweat about the head, is not restless at night, does not develop scurvy, does not develop painful muscles and joints, gets its teeth in regular order, has the fontanelles of the head close up at the eighteenth or nineteenth month of life, is not pallid but has a nice rosy color of the skin, and in general shows that its nutrition is perfect, I shall let the sterilized milk go on. But if the mother should come to me and say that the child's color is not just what she wants, and that for the last four or five days she has noticed that the child is not so active as formerly, doesn't seem to feel so well, doesn't take his food with a relish, then I should investigate and try to find out to what these symptoms were due. A mother will often notice a slight change which you could not possibly see. If she should call my attention to these things, I should watch and endeavor to find out whether the change was due to some pathological process, some infective disease coming on, or to innutrition, and when I satisfy myself that it was due to innutrition I would stop sterilizing the milk and give the child raw milk. In other words, I should take away the safe guard that I have in sterilization, as to bowel disorders, for the sake of preventing the child's nutrition positively failing. I want to say here that we can tell within two weeks when a child begins to fail on sterilized milk, and in two weeks more, by simply putting it on raw milk we can bring it back to a normal condition. I have done this. If we keep our eyes open, while we tread on dangerous ground in using sterilized milk, we are perfectly safe. When we put the child on raw milk we run the risk of setting up disease of the intestinal tract, but we certainly avoid a positive danger in avoiding certain forms of innutrition.

In conclusion permit me to summarize:

1. In instituting artificial feeding, the alimentary canal of the infant should first be put into normal condition, and during this period the food should be such as is adapted to the conditions in the alimentary canal, irrespective of its properties or value as a complete nutrient.

2. The alimentary canal being in normal condition, the food used should be within the physiological capabilities of the baby.

3. The food adopted should be pure, and if the conditions will permit, it should be sterilized.

4. The food intended for the complete nourishment of the infant, should contain the necessary proportions of proteids, carbo-hydrates, fats, and salts, and the composition of human milk should be used as the guide in determining these proportions.

6. The anti-scorbutic element should usually be present. In its absence the child should be carefully watched, and this element supplied when found necessary.

6. Sterilized milk, and foods made up of dried milk solids are deficient in the anti-scorbutic element.

7. Water is an essential ingredient of the food supply of the infant, and should be administered freely.

8. Foods which are deficient in one or more of the necessary ingredients, lead to the development of various forms of innutrition, particularly rickets and scurvy.

9. The infant should be fed at regular intervals, and not overfed.

10. The best artificial food for a healthy infant, is pure milk, from healthy cows, properly diluted, and sweetened, and sterilized if the conditions of nutrition permit.

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# SOCIETY PROCEEDINGS.

## Georgia State Medical Association.

*Forty-third Annual Meeting, held at Columbus, April 20, 21 and 22, 1892.*

*(Concluded from page 420.)*

SECOND DAY—AFTERNOON SESSION.

Dr. A. W. Calhoun, of Atlanta, read a paper entitled

SOME OBSERVATIONS UPON CATARACT OPERATIONS AND AFTER TREATMENT.

He reported 904 operations for cataract. The records of his first 47 cases had been lost, so that the report simply embraced the records of 857 cases. Of this number 203 were cases of soft cataract in children, and 654 cases of hard senile cataract in adults. The ages of the children ranged from three months to twenty-five years; the ages of the adults ranged as follows: 138 from 25 to 40; 82 from 40 to 50 years of age; 98 from 50 to 60 years of age; 157 from 60 to 70; 104 from 70 to 80 years of age; 28 from 80 to 90 years of age; 11 from 90 to 90 to 94 years of age, making 654 of hard cataracts, which, including 203 soft cataracts, makes 904. In the beginning of his cataract operations, Dr. Calhoun said if he got 95 per cent. of successes he thought he was doing well; but since the injection of cocaine and the advent of antiseptic surgery, a hundred per cent. of successes has been the result in his cases.

Dr. A. A. Smith, of Hawkinsville, read a paper entitled