that I am sorry most of the gentlemen seem to have missed one of the main points in my paper. They have been discussing general laryngeal edema and secondary epiglottitis, which is often merely part of a general inflammation of the fauces. These are not identical conditions with the one I have attempted to describe. The point I intended to bring out in my paper was that the cases I have reported were those of acute primary epiglottitis or angina epiglottidea anterior, with no involvement of the pharynx; that in secondary epiglottitis there is, as a rule, a general acute angina. Dr. Mackenzie said in his discussion that the "condition had been known almost for all time." This may be true to a certain extent, although, of course, an absolutely accurate diagnosis could not be made in these cases before the discovery of the laryngoscope. I did not make any particular claim for its rarity, although I will say again that primary epiglottitis is rare. A good many of the cases reported by the earlier French, German and English writers were probably cases of secondary epiglottitis, or of edematous laryngitis. Dr. Mackenzie also spoke of Washington's case. I did not mention it because it does not strictly belong in a paper with this title, and then, too, it has been a disputed point what Washington died of. At the time of his death the cause was given as quinsy, and this is mentioned by Henry Cabot Lodge in "American Statesmen." The consensus of opinion seems to be that his death was due to acute edematous laryngitis. This is mentioned by Marsh in his article, and also by Lodge.

ATHREPSIA INFANTUM—MARASMUS, OR WASTING DISEASE—ATROPHY—MAL- ASSIMILATION OF FOOD.

ITS CAUSE AND TREATMENT—PROPER INFANT-FEEDING.*

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If infants, when a few months old, suffer with vomiting or diarrhea, and this condition is allowed to become chronic, then colic and flatulence associated with constipation supervene, and result in a gastrointestinal catarrh. Neglect of this condition means the development of the condition known as athrepsia. The infant does not thrive, commences to waste, and unless we realize the condition and give the baby proper treatment, such a child will die of exhaustion from inanition. When these cases linger for months they develop rhachitis. Recovery without treatment is impossible. Parrott was the first to define this disease, and classified it into three stages:

1. The infant suffers from a simple diarrhea or looseness of the bowels. The stools, instead of being bright yellow and homogeneous, are liquid, curdy, often of a green color, and contain an excessive quantity of mucus. The abdomen is distended with gas and remains constantly in this condition; the tongue is coated and the patches of a stomatitis appear in the mouth. The infant is restless, constantly whining, and will not sleep at night. The milk being retained, curdles; the tissues become flabby, and wasting commences.

2. The symptoms are intensified and the characteristic wasting becomes manifest. The stools for the most part are loose and frequent, and consist of undigested food; they are often pale and putty-like, with a peculiar odor. At other times they are of a dark brown, from the presence of altered bile. The infant is most voracious, liquid food does not seem to satisfy it, and by the mistaken kindness of its friends it is fed with some thick food, like soft bread, a diet which has the

great advantage in their eyes of keeping it quiet for a longer time than liquid food or diluted milk. At times it can hardly be made to sleep, or only dozes for a short time, unless under the influence of a soothing syrup applied by its nurse. The mouth becomes the seat of a parasitic stomatitis; the skin is harsh and dry; small boils or a lichenous rash makes its appearance. The buttocks and genitals are raw and excoriated. Its temperature is below normal; the feet and hands are congested, the face has a pallid, earthy tint, and a sickly lactic-acid smell is given out from the body, especially the abdomen. The wasting is extreme, the face being shriveled, the skin wrinkled and hanging in folds about the thighs and arms.

3. The third stage brings the child into a moribund state. It is too feeble to cry, becomes heavy and drowsy, taking little notice of anything. Death then ensues, probably preceded by a muscular twitching, strabismus or general

Henoch does not like the term "athrepsia," introduced by Parrott, but prefers "atrophy." The first symptom that this author noticed is that the child's weight does not increase, and hence he emphasizes the importance of frequently weighing children. He regards the weight taken once a week as sufficient, so that it can be a determining factor as to the progress made by an infant. Henoch says that at the end of the first month the weight is increased one-third, at the end of the fifth month it is double, and at the end of the twelfth month it should be three times the weight at birth. Weaning, dentition and all other pathological conditions interfere with a proper increase in weight.

By far the greatest number of cases of athrepsia are found in bottle-fed children. There are, however, a great many cases to be seen among breast-fed children. We can then be positive that the breast milk is lacking in some of its chemical constituents, and frequently we find that it is the proteids that are deficient in quantity. If, therefore, we meet with a case of athrepsia in a breast-fed child the thing to do is to have a chemical examination made of the breast milk. If the latter is found deficient in quality, then we must withdraw it.

A great many children will be found to thrive at once after having been removed from the breasts and changed to some artificial mode of feeding, whereas the reverse is also true. If, therefore, we wish to do away with its own mother's milk, for some positive reason, it is advisable to secure a wet nurse having a child as near the age of the one she is to suckle as possible. The hereditary history of a nurse is of great importance, as is also the quantity and quality of her milk, which should be thoroughly examined before she is given this foster child.

The treatment of this disease is one which resolves itself into removing the cause, and if bad hygienic surroundings, as impure air, crowded apartments and improper diet are the cause, then these must be remedied at once. Medication amounts to nothing in the treatment of this disease.

With hand-fed or bottle-fed children we can easily regulate the condition of their bowels and also easily regulate the quality and quantity of the food given them. The blandest and least irritating food must be selected, while frequent weighing of the infants should be resorted to in order to ascertain the progress that is being made.

Where there is much diarrhea, milk must be used sparingly or altogether omitted for a while, as the hard

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curds formed in the stomach are beyond the weak digestive powers of the weakened stomach and intestines. Small quantities of whey and barley-water, white of egg and barley-water, or the juice of a rare chop or steak may be given at short intervals during the day and night.

As soon as the child improves in respect to the diarrhea, milk in some form may be allowed. Peptonized milk is often of much value in these diseases when made by mixing three ounces of cold milk, adding two teaspoonfuls of cream, with one-half of a peptonizing powder to sweeten it, and giving it to the infant after it has stood for fifteen minutes.

The cream mixtures are often of much service, such as one ounce of cream, three ounces barley-water, one teaspoonful of sugar. Every care must be taken that the feeding-bottle is clean, and the food prepared with the most scrupulous neatness.

The great difference between cow's milk and human milk is the fact that human milk is persistently alkaline, whereas cow's milk is usually acid; that there is more nitrogenous material in cow's milk; that there is a much smaller percentage of milk-sugar in cow's milk, and finally, that the nitrogenous constituents of the milk of the cow are affected by rennet in a manner different from those of mother's milk.

In order, therefore, to feed cow's milk to infants, these differences must be corrected, and the correction of them causes further differences, which have in turn also to be corrected; the process, therefore, is a complicated one.

Before considering the means adopted to alter the chemical composition of cow's milk, it would be proper to state that there is a common but false belief that milk from one cow is the best for infants' use. The principle that underlies this belief is perfectly right. It is, that it is desirable to obtain milk of uniform composition, but it has been found experimentally that milk of the same cow varies in its composition during twenty-four hours, and that it is in reality more likely that a mixture of the milk from several cows will show a more constant analytic result than that from one single animal. Jacobi and others have stated that the chances of infection from tuberculosis through the medium of milk can only be lessened by feeding from a large number of cows.

In order to render the character of cows' milk similar to that of human milk, it is necessary to reduce the amount of casein in cows' milk. This is usually done by treating the milk with water, thus diluting it; but sometimes lime-water is used, for the reason to be stated immediately.

Second, the proportion of fat in cows' milk is less than in human milk, and it has been still further reduced by dilution. Therefore, it is necessary to add to it fat in some form or other, and this is commonly done by adding cream.

Thirdly, sugar must be added to cows' milk in order to bring the lactose up to the proper level. It has been held by some that it is necessary to use milk-sugar for this purpose, but there seems to be little doubt that cane-sugar will serve the purpose quite well, or even better.

In the fourth place, according to Jacobi, it is necessary to prevent as far as possible the great coagulating effect that the ferment of the infants' gastric juice has on the casein of cows' milk, and this is satisfactorily accomplished by adding an alkali, such as lime-water, or some mucilaginous material, such as barley water.

In this way the casein curd is rendered loose and flocculent and more like that of human milk.

Dr. Meigs, of Philadelphia, advises the preparation of the following mixture: Cream, 2 oz.; milk, 1 oz.; lime-water, 2 oz.; sugar-water, 3 oz.; the latter is made by dissolving about $2\frac{1}{4}$ oz. of milk-sugar in a pint of water.

Condensed cows' milk is simply cows' milk that has been evaporated to one-fourth of its volume and sterilized, nothing at all being added to it. Then again, there is a form in which the milk is not only condensed, but has also the addition made to it of about 50 per cent. of cane-sugar. When it is also borne in mind that the composition of condensed milk varies with the season of the year, great fluctuations must occur in its chemical constitution.

Condensed milk must also be diluted with water before it is fit for use, and this dilution may entirely disarrange the proportion of the component parts of the fluid. For this reason it is found that even where infants appear to thrive on condensed milk, their apparent good health is due to an excessive deposit of fat, and not to a sufficient supply of albuminoids; and they are in the long run more prone to disease than babies fed on the breast, or on cows' milk properly prepared.

The above remarks apply with less force to that variety of condensed milk which is made from sterilized fluid and then sweetened, but even this preparation requires for digestibility to be diluted some ten times, and this reduces its nutritive value to a dangerous degree.

At times we must resort to various methods of feeding, until we find the proper method upon which a baby will thrive, and so it is that we have: 1, humanized milk; 2, sterilized milk; 3, pasteurized milk; 4, peptonized milk.

1. Humanized milk is simply cows' milk diluted with a certain amount of whey and with some cream. It is prepared in the following way: A pint of milk is set aside in a cool place until the cream rises to the surface. This is skimmed off and kept, and to the milk remaining is added enough rennet to curdle it thoroughly. The whey is strained off from the curd and added with the cream, previously separated, to a pint of fresh cows' milk, and the mixture is known as humanized milk. It is distinctly more digestible than ordinary diluted milk, and often agrees well with young infants, being given without any further dilution, in quantities suitable to the age of the infant. It may be employed exclusively during the first three months of the infant's life, and after that age may be used in combination with some farinaceous food.

2. Sterilized milk is that in which all germs tending to decompose it have been destroyed by exposure to a boiling heat at a temperature of 212 F. for a short period of time, from 15 to 45 minutes. Fresh cows' milk always contains impurities received from the cow or the atmosphere or from the vessels in which it is contained, though much care may have been taken to maintain absolute cleanliness. The milk is usually exposed to the action of steam or in a boiling heat from 5 to 45 minutes, and will keep about 24 hours. A fresh bottle must always be opened for each meal; if anything is left in the bottle after the baby has finished, it must be thrown out.

3. Pasteurized milk is simply steamed at a temperature of 167 to 170, for about 30 minutes, in other words, it is really sterilized milk at a lower temperature.

4. Peptonized milk, the fourth substitute for ordin-

ary diluted milk, is as simple a preparation as sterilized milk. It consists of milk which has previously been partially digested by the addition of some preparation of a digestive ferment, among the best known of which are Benger's liquor pancreaticus, Fairchild's peptonizing powders, etc. The milk should be diluted to some extent before being peptonized; but it is not necessary to dilute to such an extent as has been recommended for ordinary cows' milk. Generally, even for an infant two or three days old, the addition of an even quantity of barley water will be sufficient, and when a baby is two or three months old, a dilution of two parts of milk, with one part of water, will be digested with comfort.

In France there is a law forbidding any one to give solid food of any kind to infants under a year without the written authority of a qualified medical man.

Jacobi says, whatever I have here brought forward, is certainly not to disparage the boiling of the milk; it is to prove the danger of relying on a single preventive when the causes of intestinal disorders are so many. It is true, however, that the large majority of the latter depends on causes which may be met by sterilization; but not by sterilization only; also by pasteurization, that is, heating the milk to 70 C., or 165 F., and keeping it at that uniform temperature for 30 minutes, a procedure which destroys the same germs that are killed by a more elevated temperature, without much change in flavor and taste.

One of the questions connected with the employment of sterilized or pasteurized milk is this, whether the milk to be used for a child ought to be prepared at home, or whether the supply may be procured from an establishment where large quantities of milk believed to become immutable by sterilization for an indefinite period, are kept for sale. In regard to this problem Flugge plainly expresses his regrets that "we have allowed ourselves to be guided by people who are neither hygienists nor physicians, but chemists, farmers or apothecaries, and whose actions have been based on three false beliefs. Of these the first is that boiling for three-quarters of an hour destroys germs; the second that whatever bacteria remain undestroyed are innocuous, and the third, that proliferating bacteria can always be recognized by symptoms of decomposition." Nothing is more erroneous. Soxhlet himself, the German originator of sterilization, knew at an early time, that the fermenting process is now and then but partially interrupted by boiling, that butyric acid may be found in place of lactic acid, that a strong evolution of gas may be caused after such boiling, and that such milk may give rise to flatulency. Aye, milk which happens to contain the resistant spores of bacteria becomes a better breeding-ground for them by the very elimination of lactic acid, and the longer such sterilized milk is preserved and offered for sale, the worse is its condition. It may be true that these conditions are not met with very frequently, but an occasional single death in a family caused by poisonous milk will be more than enough. Therefore, the daily home sterilization is by far preferable to the risky purchase from wholesale manufacturers who can not guarantee, because in the nature of things they can not know the condition of their wares.

Another alteration of a less dangerous character, but far from being desirable, is the separation of cream from sterilized milk which is preserved for sale. Renk¹ found it to take place to a slight extent during the very first weeks, but later to such a degree that 43.5 per cent.

of all the cream contained in the milk was eliminated.

Sterilization has been claimed to be no unmixed boon, because of its changing the chemical constitution of milk. Still, the opinions on that subject vary to a great extent, the occurrence of changes being both asserted and denied by apparently competent judges. But what I have said a hundred times is still true and borne out by facts, viz., that no matter how beneficial boiling, or sterilization, or pasteurization may be, they can not transform cow's milk into woman's milk, and that it is a mistake to believe that the former, by mere sterilization, is a full substitute for the latter. It is true, that when we can not have woman's milk we can not do without cow's milk. There is no alleged substitute that can be had with equal facility or in sufficient quantity. But after all it is not woman's milk. Babies may not succumb from using it, and may seldom appear to suffer from it; indeed, they will mostly appear to thrive on it, but it is a makeshift after all, and requires modifications. Hammarsten was the first to prove the chemical difference between the casein of cow's and woman's milk. Whatever was known on that subject at that time I collated in Gerhard's "Handb. d. Kind," vol. i, 1875, (2 ed. 1882). But lately Wroblewski demonstrated the difference in solubility of the two milks. Woman's casein retains, during pepsin digestion, its nuclein—proteid rich in phosphorus—in solution, it is fully digested; in cow's casein the nuclein is not fully digested, a "paranuclein" is deposited undissolved and undigested.

Henry A. Bunker, in an article on the modification of cows' milk, says that the difficulty of the digestion of the casein of cows' milk in some children has seemed to be the resistance to the infant's digestive powers, even after the partial hydration supposed to be brought about by hydrochloric acid and heat. In all such cases the fecal evacuations were white, hard and dry, such as so often occur on a plain sterilized milk diet. In many of these cases, these dry, scybalous masses would frequently set up mucous diarrhea giving rise to severe colicky pains.

The only evidence of partial hydration by the acid and heat would seem to be the fact of increased nutrition in spite of these difficulties. Professor Chittenden² maintains and proves, by a beautiful laboratory experiment, that the products of gastric digestion have the power of combining with more hydrochloric acid than the original proteid, for as soon as proteolysis commences, the products so formed begin to show their greater affinity for acid by withdrawing acid from its combination with the native proteid, a supposition which is necessary to account for even the starting of the proteolytic process. Further, it is evident that proteoses and peptones combine with a far larger equivalent of acid than the native proteid-albumin, in the experiment, is capable of. This, doubtless, depends upon the cleavage of the large proteid molecule into a number of smaller or simpler molecules, each of the latter, perhaps, combining with a like number of hydrochloric-acid molecules. However this may be, it is evident that the products of pepsin-proteolysis combine with a larger amount of hydrochloric acid than the mother proteid, and that the transformation of the latter, at least under the conditions of the experiment, is a slow and gradual process.

It will be remembered that the original method proposed the hydration of the milk-proteids by hydrochloric acid and a rather prolonged boiling. Twenty drops of a 10 per cent. hydrochloric-acid solution were

1. Arch. f. Hyg., xvii.

2. Cartwright Lectures on Digestive Proteolysis, 1894.

added to one pint of water and one quart of milk, and this mixture was to be kept at boiling temperature for about twenty minutes. The addition of a larger amount of the acid, unless the milk was quite fresh, was found to result quite frequently in curdling the milk. It was also found that the acid so added, up to the point of saturation or breaking, exists as combined acid, as was evident from the failure of reagents to show free hydrochloric acid in the completed mixture.

The indications that the hydration secured by this method is not always sufficient to meet the requirements of certain infantile stomachs and the fact that usually in such cases the nutrition is increased in spite of incomplete and painful digestion, seemed so strongly confirmatory of the results of Prof. Chittenden's researches, that I determined to copy, in part, his experiments on HCl saturation, as applied to the proteids of milk.

To this end, milk was prepared in the original way, except that the twenty drops of dilute hydrochloric acid were added in a one-half, instead of one, pint, watery solution, and slowly but intimately mixed with one quart of milk. This mixture was brought as rapidly as possible to the boiling temperature and then set aside until another half pint of water was prepared with twenty drops more of the acid. This was added to the previously boiled milk and acid, stirred thoroughly and again brought to the boiling-point. The result thus obtained was a thoroughly palatable milk, with no taste of having been boiled, and gave no indication of free hydrochloric acid with Gunzberg's reagent. Rudisch's plan is similar to the latter.

Proteids in excess are indicated by the presence of curds in the stools. This is the most frequent cause of colic in infants. Sometimes there is diarrhea, more often constipation when the proteids are in excess. The excess of proteids frequently causes vomiting and so does an excess of both fat or sugar. If, therefore, after reducing the percentage of proteids, fat or sugar, vomiting still persists, then we must feed the baby with smaller quantities. Thus, we may have to give a four-ounce bottle where a six-ounce or a five-ounce feeding causes vomiting. Certain rules can be laid down; if an infant does not thrive, that is, does not gain in weight without showing any signs of indigestion, then the proportions, i. e., percentages of all ingredients, should be gradually increased, chiefly the proteids, however, for the latter is the most important element in an infant's food. An infant soon after birth was put on modified milk, containing:

Fat	2.00
Milk-Sugar	5.00
Albuminoids	0.75
Lime-water	1/16

I ordered eight feedings, two ounces in each. As the child was constipated, soon after we increased the formula to the following percentages:

Fat	2.50
Milk-sugar	6.00
Albuminoids	1.00
Lime-water	1/16

As the stools did not change, the fat was increased to 3 per cent., other ingredients the same. The child gained but three ounces in weight in five weeks, had greenish, curdled stools, and had distinct evidence of intestinal indigestion. It also vomited curds. The general condition of the child was one of extreme irritability, with very little sleep. Hand-feeding was stopped. The child's alimentary tract was thoroughly

cleaned, and a wet-nurse secured. This was when the baby was six weeks old; the child nursed well, gained six ounces the first week, eight ounces the second, and weighed fourteen pounds when it was four and a half months old. The child improved until it was seven months old, when suddenly the weight remained stationary. A specimen of breast milk was sent to John S. Adriance, the chemist of the Nursery and Child's Hospital, who found the following percentages:

Fat	2.0
Sugar	7.431
Proteids	.882
Ash	.162
Specific gravity 1031; reaction, alkaline.	

It is very evident that the deficiency in albuminoids or proteids is accountable for the stationary weight. The child did not gain an ounce in one month. We discharged the wet-nurse, and resorted to hand-feeding, when the child's general condition changed, and she is bright and well to-day.

In another instance, a child had been nursed by its own mother for three months, and had gained in weight regularly at the rate of six and seven ounces per week: the stools were normal in quantity and quality, when suddenly the child appeared to be colicky, was restless at night, had green stools, and did not appear to thrive. For two consecutive weeks the child did not gain in weight, and a specimen of breast milk was sent to the Pediatrics Laboratory. Mr. R. W. Bailey, the chemist, examined the specimen with the following result.

Fat	2.43
Proteids	1.25
Sugar	6.51
Ash	.20
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Total solids	10.39
Specific gravity, 1027. reaction, slightly alkaline	

The percentage of fat and proteids is so low, that it was very plain to me why this child did not increase in weight. On putting the child on an oatmeal and top-milk mixture, the digestion improved, the child's sleep was better, and the weight increased.

Another case was that of a nursing, brought to me with a history of excessive crying, greenish stools, cheesy curd in the stools, vomiting, restlessness, and a general condition of malassimilation; I asked for a specimen of breast milk, which Mr. Bailey kindly examined, with the following result:

Fat	4.32
Sugar	6.22
Proteids	1.80
Ash	.19
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Total solids	12.53
Reaction, neutral.	

The general history of the case showed that the child was fed every time it cried, and thus it was evident that overfeeding was the real cause of the trouble in this case, for I learned that the child frequently nursed for hours at the breast, and was also allowed to go to sleep with the nipple in its mouth. Whenever the child cried it was fed, frequently as often as every half hour, so that in this case, whilst the quality of the breast milk was absolutely normal, as demonstrated by the chemical examination, it required only the judicious interval for feeding to give the child's stomach proper time for the assimilation of its food.

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