

equipped chemical laboratory in the Association's headquarters, with practical chemists in charge, have been made possible because the Association has the means to support these enterprises.

Another important factor is THE JOURNAL of the American Medical Association, which, with its immense circulation, makes it possible to carry the propaganda for better things to over 50,000 of the representative physicians of the United States every week.

WHAT THE ASSOCIATION STANDS FOR.

Finally, to answer the question, What does the American Medical Association stand for? I reply:

It stands to-day, as it has stood for sixty years, but now in an entirely practical way, for a higher standard of medical education, for a gradual elevation of this standard until the physicians of the United States shall equal in scientific attainment, as they equal in intellect, the physicians of any other nation on earth.

It stands for uniform legislation in all the states; for a law based on principles adopted after careful scientific study of the problems involved, that shall be equitable and just and that shall make possible rational reciprocity among the states.

It stands for, and in the future will insist on, honesty and business integrity and against fraud and deception on the part of those who supply physicians with medicinal agents.

It stands for the development of a national, state and local sanitary system that shall be based on scientific knowledge; for the protection of public health; for enlightening and directing public opinion in regard to the problems of personal hygiene, and for securing the cooperation of an enlightened people in suppressing quack medicines and quackery.

In a word, without a selfish motive, the American Medical Association stands for honesty and fairness and unalterably and eternally against fraud and deception in all that relates to the health and to the physical welfare of the people. And especially it stands for the individual doctor, whether he lives in the greatest of our metropolitan cities or in the remotest mountain hamlet. It stands to help him, not only to become a better physician, but to protect and promote his every interest—scientific, social, moral and material—so that he may give better service to those who depend on him in their time of affliction, and also that he may stand in his community as a beacon light, a great scientific and moral leader of his people. These are the principles for which the American Medical Association stands, and it is only a question of time when it will receive the cordial support and earnest cooperation of every intelligent, right-thinking member of our profession in carrying out these principles.

Criminal Carelessness in Spreading Whooping Cough Infection.—Akerblom relates some instances of which he has personal knowledge where a physician ordered change of air for some children with whooping cough, the result being the infection of all the children in the village to which they were taken. In one village, 10 of the children died from bronchopneumonia consecutive to the whooping cough, and others from phthisis. He entitles his article in the *Therapeutische Monatshefte*, for September, "A Question of Conscience for the Physician," and urges physicians to think twice before sending a child with whooping cough to scatter infection. He remarks that the whooping cough was not aborted by the change of air in any instance, but ran its usual course unmodified.

THE FERMENTS OF MILK AND THEIR RELATION TO PASTEURIZATION.*

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The prevailing idea concerning the treatment to which cow's milk should be subjected before feeding it to an infant has changed rapidly during the last twenty years just in proportion as our knowledge of milk and its constituents has been obtained. Twenty years ago many infants were fed on raw milk and, as the laity often remarks to us, many of these infants survived. But, as we well know, a very large proportion died; in New York at that time about one-third of all infants born died within the first year.

At that time the science of bacteriology was being developed and the bacteriologic examination of milk demonstrated a shocking contamination of this fluid with bacteria.

The great infant mortality is largely due to the summer diarrheas of infancy, and it was naturally assumed that this was probably due to the contamination of milk by bacteria and that the feeding of sterilized food might diminish materially this mortality. Heating to a boiling point the milk used for infant feeding then became customary to the general practitioner, while in some cases such heat on two successive days, in order not only to kill the bacteria but the spores also, was adopted. While this practice reduced very materially the infant death rate (in New York it was reduced from 33 per cent. to 16 per cent. in ten years), there developed about 1890 a feeling in the profession that these children fed on cooked milk did not really thrive as well as those fed on raw milk, although they did ordinarily escape the summer diarrheas.

In 1892 it became evident that a temperature of 176 degrees F. for twenty minutes was sufficient to kill the bulk of the bacteria in milk as well as those pathogenic bacteria which we feared in milk, the most resistant of which is the tubercle bacillus, so that in that year the adoption of such pasteurization began, with many practitioners, to take the place of the previous sterilization at boiling point.

It was, however, known that certain chemical changes took place in milk subjected to this temperature. Some sugar was converted into caramel, some of the proteids were thought to be rendered less digestible, while a change in the taste indicated a real chemical alteration.

Further experiments to test the thermal death point of the tubercle bacillus made it evident in 1896 that a temperature of 155 F. continued for thirty minutes was sufficient to destroy this organism, while at the same time it destroyed the bulk of the bacteria present, so that at this time this lower temperature continued for a longer time was generally adopted for pasteurization.

Many of the physicians practicing pediatrics in this country had come firmly to the conclusion, however, that clean, raw milk was altogether the best food, and the development of the "certified milk" movement having secured such milk for many of our large communities, such raw milk came into fairly general use. Pasteurized milk, however, was almost universally used in summer. At the same time the recognition of scurvy as a not uncommon disease of infancy, usually associated with defective feeding and rarely accompanying the feeding of

* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

undiluted raw milk, gave a still greater impulse to the use of raw milk in infant feeding.

Other means of securing sterile milk without the subjection to heat have since been advocated. The filtration of milk, the addition of formaldehyd or peroxid of hydrogen, the use of the electric current, or the ultra-violet rays, have all been advocated but have been fairly uniformly discarded because of inefficiency, expense and the objection to the introduction of some foreign substance into milk, or on account of the modified character of the milk as a food.

Recent study of milk has developed many facts which alter our ideas. The chemical changes which were said to take place in milk at 176 degrees F. have since been said, by some observers, to occur at lower temperatures; thus Sebelien notes changes at 161-176 F. (72-80 C.), while Schlossmann states that at 156 F. (69 C.) a diminution of the solubility of albumins takes place. Solomin says that fifteen minutes at 140 F. (60 C.) causes the coagulation of albumin to begin. We have, moreover, learned that milk is not an inert liquid and simply a food, but that it has real biologic qualities. We know that it may contain the toxins and antitoxins of

Spolverini of Rome, stimulated by this statement of Escherich, has undertaken extensive investigations to determine the ferments present in milk and to answer certain interrogations by Marfan, who stated that after it had been proved that milk contains soluble ferments, it remained to prove whether these soluble ferments were specific and exclusive for each species of animals. Second, he asked: If they are specific, is this the reason for the superiority of breast milk? Third: If they are not specific, would it be possible to produce the same ferments in different species of milk? Fourth: If they were made spontaneously or artificially, would not these ferments be destroyed by heat? These important questions have been partly answered by the test work of Spolverini and partly by certain work of Hippus, which I shall quote later.

Bechamp first demonstrated the presence of diastatic ferment in mother's milk. This observation was confirmed by Bouchut and Moro, and this ferment was not found in cow's milk. Marfan and Gillet later found a saponifying ferment in woman's milk which was also present but less active in cow's milk. Nobécourt and Merklen found a salol-splitting ferment in woman's milk. This was also found in the milk of the dog and ass, but not in that of the cow or goat. Luzzatti and Biolchini found in woman's milk an amylolytic ferment which was very active; this was not present in the milk of the cow or goat. They also found a fat-splitting ferment, more active in woman's milk, less active in that of cows and goats. Spolverini found both trypsin and pepsin ferments, but this observation has been denied by Benoit, who repeated his experiments.

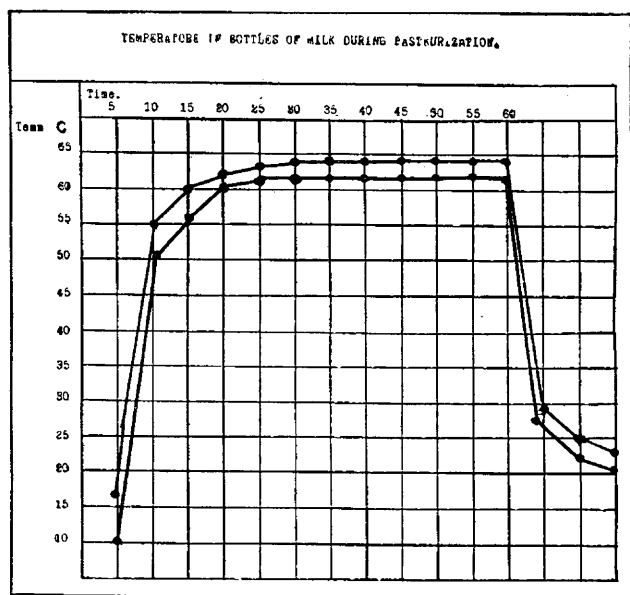
In summarizing the work presented by Spolverini we find that all the ferments which have so far been found are present in the milk of women and dogs, that is, in milk of omnivorous animals. The milk of the cow and the goat, which are herbivorous, contain all these ferments except the amylolytic and salol-splitting. To ascertain whether these ferments are specific and exclusive for each species Spolverini fed dogs, in which, as I have said, all these ferments are present, on a strict vegetable diet for twenty-two days. During this time the amylolytic ferment became much less active while the salol-splitting ferment showed no special depreciation. On the other hand, a goat whose milk showed no amylolytic or salol-splitting ferment, after being fed for sixty-five days on a mixed diet, secreted milk in which both salol-splitting and amylolytic ferments were present.

Spolverini tried to answer Marfan's third question as to the possibility of obtaining milk from cows or goats which contains the same ferments as woman's milk, and fed both a goat and a cow on germinating barley, after which he found not only starch-digesting ferment in the milk but also salol-splitting.

Marfan's fourth question concerning the effect of heat on these ferments has been carefully worked out by Hippus. The salol-splitting ferment found only in mother's milk was weakened by a temperature of 131 F. (55 C.) and destroyed by 149 F. (65 C.), while the amylolytic ferment found only in mother's milk was weakened by a temperature of 158 F. (70 C.) and destroyed by 167 F. (75 C.).

The fat-splitting ferment present in mother's milk and less active in cow's milk was weakened by a temperature of 145 F. (63 C.) and destroyed by 147 F. (64 C.)

The oxidizing ferment is destroyed by one minute at 169 F. (76 C.), while the proteolytic ferment is destroyed only by boiling.



tetanus and typhoid, the toxins and agglutinins of typhoid fever and toxins of tuberculosis. It is also believed to have bactericidal action.

At the International Medical Congress at Paris in 1900 Escherich called attention to this phase of the problem. He was not satisfied that the more ready digestibility of the proteid of mother's milk as compared with cow's milk accounts for the great superiority of mother's milk as a food. Moreover, infants fed on cow's milk, if given a very little breast milk in addition, digest the cow's milk perfectly when without the breast milk they can not digest it. He, therefore, argued that the breast milk must contain substances that aid such digestion, that is, ferments. Moreover, the babies in whom the digestive ferments of the intestinal canal are deficient, the marasmic and premature babies, may often be successfully fed on breast milk after failure with other foods. This absence of digestive fluid in cases of marasmus has lately been demonstrated by Edsall of Philadelphia.

The ferments of breast milk have since been studied by many observers, as have other reactions of milk.

Two other biologic characteristics of milk were also tested for the effect of heat by Hippus; the bactericidal, including, according to von Behring, the alexins, was found to be weakened by one-half hour at 149 F. (65 C.) or two minutes at 185 F. (85 C.), and destroyed by boiling, while lactoscrum was uninjured by 248 F. (120 C.) for one hour.

THE EFFECT OF HEAT ON CERTAIN BIOLOGIC CHARACTERISTICS OF MILK AS DETERMINED BY HIPPIUS.

1. Present in Woman's Milk and not present in Cow's Milk.

	Unchanged by	Weakened by	Destroyed by
Salol-splitting ferment.	1 hr. at 140 F.	131 F.	149 F.
Amylolytic ferment.	1/2 hr. at 149 F.	158 F. short time.	167 F.

2. Present in Woman's Milk and present but less active in Cow's Milk.

	Unchanged by	Weakened by	Destroyed by
Fat-splitting ferment.	143 F.	145 F.	147 F.

3. Active in both Woman's and Cow's Milk.

	Unchanged by	Weakened by	Destroyed by
Proteolytic ferment.	1 hr. at 140 F.	149 F.	Boiling.
Oxidizing ferment.	1/2 hr. at 149 F.	1 hr. 140-149 F.	1 min. at 169 F.
Bactericidal action.	1 hr. 140-149 F.	1/2 hr. at 149 F.	Boiling.
Alexins according to Von Behring.	1 hr. 140-149 F.	2 min. at 185 F.	Boiling.
Lactoscrum.	1 hr. at 149 F.	2 min. at 185 F.	1/2 hr. at 248 F.

After a study of the most recent observations of the result of heat on the chemical composition of milk and on ferments and other biologic properties, it seems evident that, if sufficient for the purpose of destroying bacteria in milk, a temperature of not much more than 140 F. (60 C.) should be used. Such a temperature will scarcely alter the chemical composition; it will not injure the ferments existing in cow's milk, and it only remains to discover its efficiency to destroy the bacteria we fear in milk.

The most recent observations made on the thermal death point of the tubercle bacillus, the most resistant species that we fear in milk, indicates that a temperature of 140 F. (60 C.) for twenty or thirty minutes is sufficient to destroy tubercle bacilli occurring in milk, unless they are enveloped in thick mucopurulent material, such as sputum, or are protected by a film formed on the surface of the milk. Such conditions are not likely to occur in sealed bottles of properly handled milk from healthy cows. It has, therefore, seemed to me advisable and safe to advocate the pasteurization of milk at not less than 140 F. (60 C.) for forty minutes. Such milk is unaltered in taste and retains the ferments and biologic characteristics of the milk unimpaired. It is not subjected to chemical change and is certainly much safer than any raw milk at the present stage of the development of dairy hygiene in this country or abroad.

The apparatus for the pasteurization of milk which I devised some years ago I have so modified as to pasteurize milk at a temperature just above 140 F. for forty minutes.

CONCLUSIONS.

1. Milk for infant feeding should be pasteurized so as not to interfere with its biologic properties or chemical composition, but at a sufficient temperature to destroy the bulk of the bacteria present, including the tubercle bacilli.

2. A temperature of 140 F. (60 C.) continued for forty minutes would seem to fulfill this condition.

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POTENTIAL AND ACQUIRED STATIC FLAT FOOT.

ITS ETIOLOGY, SYMPTOMATOLOGY AND NON-OPERATIVE TREATMENT.

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The impression that flat foot is a very rare condition is almost universal, even among medical men. This, however, is erroneous; on the contrary, it is a very common affection, just how common it is impossible to tell, because the patients in only a relatively small proportion of all cases ever come to the physician for treatment, and of this small number probably only a small percentage are correctly diagnosed.

Absolutely conclusive statistics on this point either do not exist, or I have been unable to find them. In Munson's¹ work we find the statement that of 9,901 members of the Illinois National Guard who offered themselves for the United States service in 1898, 33, or 3.3 per thousand, were rejected because of excessive or painful flat foot. All of these had previously passed the physical examination required to enter the State Militia. How many were rejected during this first examination is not stated, nor is there any record of how many of the remaining 9,868 suffered to a minor degree from this affection.

From the Surgeon General's office I was able to obtain the following statistics: During the years 1903, 1904 and 1905, 132,145 men were examined for the United States Army. Of this number 457, or 3.4 per thousand, were rejected because of excessive flat foot. These figures include all men who were examined for re-enlistment and do not take account of those suffering from flat foot who were rejected for some major trouble. For instance, an applicant suffering from hernia and flat foot is, of course, rejected, but the cause of his rejection is given as hernia. In addition, only reasonably able-bodied men apply for examination, as a rule, and, although our statistics tell us that of every 10,000 adult males 34 suffer with painful or excessive flat foot, I believe that, in view of the above defects in the statistics, we are justified in concluding that a very much larger proportion of our population is suffering from this condition. Of the 17,619 surgical cases of the Munich Surgical Polyclinic,² 338 of the patients, or 1.9 per cent., suffered from flat foot. It is, next to scoliosis, the most common deformity coming under the care of the orthopedic surgeon.

ETIOLOGY.

Though never fatal, it causes much discomfort, considerable pain and not a little incapacity, varying in degree from slight temporary functional impairment to complete, more or less permanent disability. The development of flat foot is the consequence of a disproportion existing between the strength of the foot and the strain to which it is exposed. Anything which weakens the foot or which exposes the foot to excessive strain predisposes to flat foot, and if either or both of these features persist long enough or are sufficiently severe they will ultimately result in the production of this condition.

Among the more common factors which cause a weakening of the foot may be mentioned trauma, such as

1. Munson: Military Hygiene, page 32.

2. Hoffa Albert: Lehrbuch der Orthopädischen Chirurgie, p. 789.